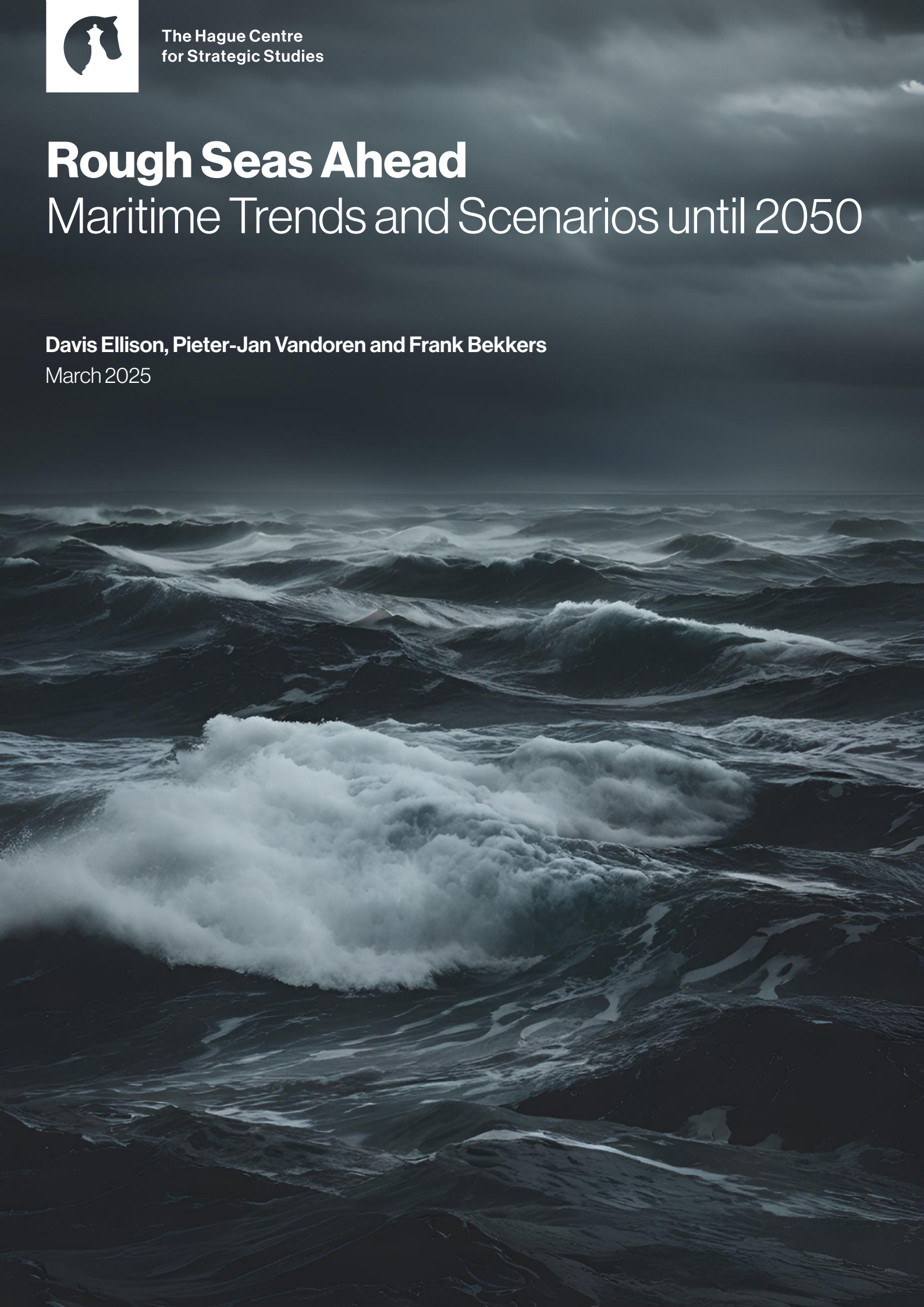
The Hague Centre
for Strategic Studies

Rough Seas Ahead

Maritime Trends and Scenarios until 2050

Davis Ellison, Pieter-Jan Vandoren and Frank Bekkers

March 2025



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Maritime Trends and Scenarios until 2050

Authors:
Davis Ellison, Pieter-Jan Vandoren and Frank Bekkers

Contributors:
Bryan Smeets and Tom Connolly

March 2025

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1. Introduction

What could be the demands on the Dutch Navy by the 2040-50 period? What is the scope for action that it and its European partners may have – or must create - to anticipate and cover any projected changes? This study builds on a previous HCSS study, *Maritime Security in a Time of Renewed Interstate Competition,*[1] but casts a wider net into the future. Rather than looking at coming challenges as an extension of present challenges, we now contemplate how the very geographic, economic and geopolitical parameters within which the Navy operates, can change.

Rather than looking at coming challenges as an extension of present challenges, we now contemplate how the very geographic, economic and geopolitical parameters within which the Navy operates, can change.

In its first part, the study looks at key trends that may change maritime security, namely long-term structural changes in global trade and shipping patterns (chapter 2) and climate change (chapter 3). In the second part, four scenarios are elaborated: competition over the extraction of deep sea resources (chapter 4); instability in Egypt, the Suez Canal and the Red Sea (chapter 5); conflict with Russia over the Northern Sea Route (chapter 6); and great power war between the United States and China (chapter 7). Extrapolating from these trends, we point out the risks of over-specialising in one area as the wide range of contingencies demands flexibility across forces (chapter 8).

Some of the major trends extended to 2040-50 feature here. Climate change, explored in chapter 3, is by far the most consequential. Sea-level rise and associated coastal flooding in Europe, along with severe heat waves and the related increased frequency of droughts and wildfires is and will increasingly pose a direct threat to life for Europeans across the continent. States that are heavily dependent on coastal infrastructure, such as Bangladesh and the Philippines, the Netherlands and Belgium, will be at particularly high risk from water stress by 2050, with a possible existential risk by the end of the century. The deaths, injuries and evacuations seen during severe floods in July 2021 across northwestern Europe and in 2024 in Spain could become a far more frequent phenomenon. Given that Dutch responsibilities extend to both Europe and the Caribbean, itself a volatile area of climate risk, nearly guarantees a strain on resources by the middle of the century.

Separately, shifts in the global system will lead to a reorganisation of trade power along the world's sea lanes. The continued abstention of the United States from global trade arrangements, especially in the Asia-Pacific, along with the leading position of China in the global economy and its growing navy, will certainly lead to a more 'globalised' naval presence along major trade routes. China's economic relations in forums such as BRICS[2], which is itself set to expand, will only solidify the shift of the global trade and economic balance away from the Atlantic area and into the Pacific. When coupled with climate change, which is set to open the North Sea Route (NSR) as a viable year-round trade route, the long-standing 'policing' role of the US Navy and its allies will be diminished. Economic competition is set to accelerate over resources as well, as the essay in this report on seabed resource extraction shows.

1 Paul van Hooft, Davis Ellison, and Frederik Mertens, 'Maritime Security in a Time of Renewed Interstate Competition' (The Hague, Netherlands: The Hague Centre for Strategic Studies, 25 January 2024), https://hcss.nl/report/maritime-security-in-time-of-renewed-interstate-competition/.

2 As of writing, this includes Brazil, Russia, India, China, South Africa, Iran, Egypt, Ethiopia and the United Arab Emirates. Dozens of other states across Africa, Latin America and Asia are set to join in the future.

Crises will continue to emerge. Economic precarity, weak or corrupt governance, military competition and a worsening climate will collude to spark and exacerbate conflicts by 2040-50 just as they do now. Vulnerable populations across North Africa and the Middle East will continue to face risks from disasters, economic inequality and civil conflict. The present proliferation of civil conflicts in the Sahel, Sudan and Libya could reverse its trend towards increased stability, though it is doubtful such a stability would be in connection to increased stability or rights for those who live in those states. Conversely, as seen in the case of the Tigray conflict in Ethiopia, recent protests against the government in Kenya and the civil war in Sudan, conflict could just as well remain the norm. The challenge is to remain responsive to what such conflicts may bring and the resultant international action through either the United Nations or EU could mandate.

Economic precarity, weak or corrupt governance, military competition and a worsening climate will collude to spark and exacerbate conflicts by 2040-50 just as they do now.

This study is informed by the technological trends explored in the previous HCSS study cited above. For the 2040-2050 period, unmanned systems and the increased capabilities of data systems will be particularly relevant. Seen throughout the four scenarios in chapters 4 through 7 is an increased reliance on unmanned undersea, surface, and aerial vehicles, and many of these are likely to be organic to future naval vessels, for example frigates. The 'transparency of the oceans' trend will continue as sensors are fused together, though as in the previous study we warn against hyperbole. Anti-submarine warfare and underwater critical infrastructure protection will remain labour intensive into the coming decades. The prime technological challenge here is leveraging advances in civilian industry computing power at pace with adversary states. This has been an area of research and development for the Chinese Navy, with breakthroughs in dual-use civilian oceanographic work.[3]

This study does not predict the future. It extrapolates current trends and ties to current policy debates that seek to address (or dismiss) them. The conclusion of the report will provide generalisable findings with relevance for public policy, followed by more specific implications for European navies. The role of navies and coast guards are specifically highlighted given the expectations the scenarios explored here would have on the high seas and coastal areas. The first chapters begin with structural trends and are followed by four scenarios of change by the middle of the century.

3 'China's Undersea Warfare' (Washington, D.C.: U.S. Congress, 13 April 2023), 2, https://www.uscc.gov/sites/default/files/2023-04/Sarah_Kirchberger_Testimony.pdf.

2. **A new global trade order at sea?** International competition and shifting maritime trade patterns

Trade patterns *themselves*, however, are largely resistant to geopolitical changes for one primary reason: geography.

How may trade patterns change with geopolitical and geo-economic developments? It seems logical to hold that invigorated political competition between large states will alter the volume and courses of maritime shipping as the rivalry intensifies. This is naturally extended to the rivalry between the US and China in contemporary times.

Trade patterns *themselves*, however, are largely resistant to geopolitical changes for one primary reason: geography. Shipping routes between the continents have been unchanged for centuries and are dependent on major chokepoints that are unchanging (e.g. the Straits of Hormuz, Malacca and the South China Sea). The digging of the Suez and then Panama canals caused the largest shifts in global trade patterns in recent centuries by physically reshaping the earth itself. A major change will likely come with the opening up of the Northern Sea Route (NSR) over Russia due to climate change, reducing the reliance of Russia and China on a global trade system that remains generally reliant on a few key physical pathways, nodes and chokepoints controlled by the United States and its allies.

While geography is fixed, the geopolitical conditions that existed during the era of globalisation and allowed for hyper-specialisation into complementary markets are deteriorating; not only the supply chain disruptions during COVID, but especially the Sino-American competition is pushing states to “reshore”, “friend-shore”, or “ally-shore” production to friendlier states closer to, or at, home. Today, globalised trade patterns underpinned by global US naval dominance is shifting towards a more regionalised structure with a less willing (and able) US military focus on preserving trade routes around the world. New trade blocs are likely to form out of self-preservation and pressure to decouple from major partners while control of key materials and high-technology sectors may become firewalled from one another leading to the growth of alternative production and shipping pathways. Regardless of its final form, the current picture of global trade will change, albeit along familiar geographic lines.

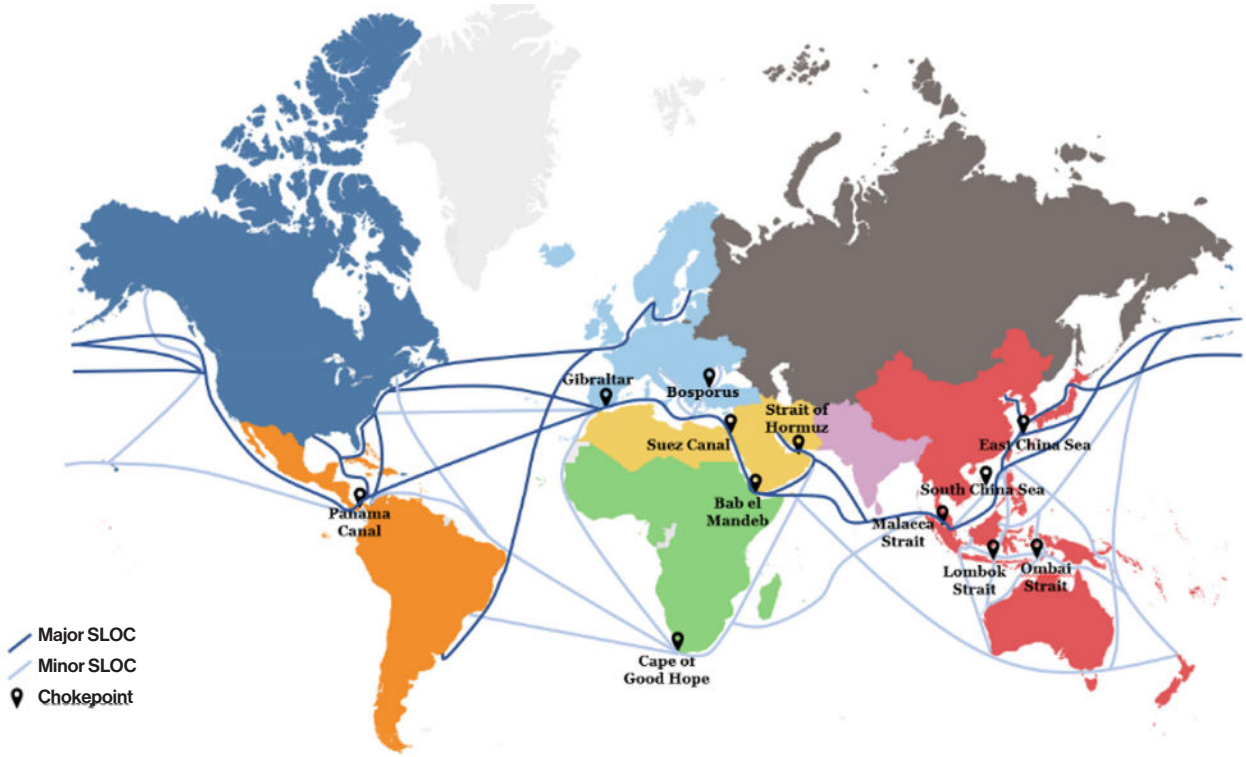
2.1. Global maritime trade patterns today

There are three major points to stress that shape the global maritime trade structure: (1) the defence of the global commons by a security provider (or providers); (2) the maintenance of regional trade blocs; and (3) the trend of re-shoring/decoupling in major powers' trade strategies.

2.1.1. The US remains the guardian of the commons (for now)

Shipping routes pass through a handful of key chokepoints, namely the Suez Canal, Strait of Hormuz, Bab el Mandeb Strait, Strait of Malacca, Lombok Strait, Ombai Strait, South China Sea and East China Sea. These narrow waterways represent major vulnerabilities in maritime transport routes, as they are easily subject to security and geopolitical risks. Great power and littoral rivalries, maritime disputes, internal instability, piracy and armed robbery against ships, terrorist attacks and climate hazards all undermine the stability of shipping processes between regions. This makes the less-than-certain nature of US maritime presence in these chokepoints a vital consideration for states with continued trade interest in these areas.[4]

Figure 1: Maritime trade routes and chokepoints



[4] Benedetta Girardi, Paul van Hooft and Giovanni Cisco, 'What the Indo-Pacific Means to Europe: Trade Value, Chokepoints and Security Risks' (The Hague, Netherlands: The Hague Centre for Strategic Studies), accessed 11 January 2024, https://hcss.nl/report/what-indo-pacific-means-to-europe-trade-value-chokepoints-security-risks/.

As this brief is being written, the continual importance of security provision in these areas is being made clear in the Bab-el-Mandeb strait near Yemen. As part of an attempt to pressure Israel over the Gaza war, the Houthi rebels in Yemen have been firing anti-ship ballistic missiles at international ships and even conducting helicopter-borne boarding manoeuvres to take crews hostage.[5] In response to this, the four largest shipping firms, Maersk, CMA CGM, Hapag-Lloyd and MSC have either paused or suspended their operations in the Red Sea. BP oil suspended shipments through the Red Sea shortly after.[6] This has a second-order effect on the Suez Canal as well, as shipping through the area has declined due to the Red Sea reroute and increased risk near the combat area in Gaza/Southern Israel. Ships have already been sent to go around the Cape of Good Hope, a significantly longer pathway to ports in Europe.[7] In response to this, the US Navy has been heavily involved in intercepting anti-ship missiles, in disrupting attempted boardings and more generally trying to deter any escalation of current tensions. French and British ships have also intercepted both drones and missiles in the area.[8] This presence is being upgraded into a larger operation, named *Prosperity Guardian*, which will include more ships as well as presence from Arab states. There has even been mention of possible Chinese involvement in the operation, though this remains unlikely. This builds on the already robust, 39-nation Combined Task Force 153 commanded by the US Fifth Fleet in Bahrain.[9] Given the durability of many US-led security missions, it is quite likely that *Prosperity Guardian* will become a fixture in the region for years to come.

2.1.2. Trade blocs in the free trade regime

As mentioned earlier and described in detail elsewhere, global maritime trade patterns remain tied to major trade routes that have existed for centuries.[10] At the ends of these trade routes lie a series of major trade blocs, the largest including the EU, USMCA (US-Mexico-Canada), Mercosur in South America and ASEAN and the Regional Comprehensive Economic Partnership (RCEP) in Asia. Membership in these forums is not mutually exclusive (many EU member states participate in RCEP, for example) and several have inter-bloc agreements on trade (e.g. the EU-Mercosur agreement in principle for free trade association). However, trade tensions have also become common, particularly when states are more aligned with either China or the US. This tension has led the US to remove itself from most major global trade structures.[11]

5 'A New Suez Crisis Threatens the World Economy', The Economist, 16 December 2023, https://www.economist.com/international/2023/12/16/a-new-suez-crisis-threatens-the-world-economy.

6 Lora Jones, 'BP Pauses All Red Sea Shipments after Rebel Attacks', *BBC News*, 18 December 2023, sec. Business, https://www.bbc.com/news/business-67748605.

7 'Top Container Lines Reroute from Red Sea to Avoid Attacks', Seatrade Maritime, 18 December 2023, https://www.seatrade-maritime.com/containers/top-container-lines-reroute-red-sea-avoid-attacks.

8 Patrick Wintour, 'US to Announce Expanded Protection Force for Red Sea Shipping', The Guardian, 17 December 2023, https://www.theguardian.com/world/2023/dec/17/us-to-announce-expanded-protection-force-for-red-sea-shipping.

9 Andrew Mills, 'US Seeks "broadest Possible" Red Sea Maritime Coalition against Houthi Attacks', Reuters, 14 December 2023, https://www.reuters.com/world/middle-east/us-seeks-broadest-possible-red-sea-maritime-coalition-against-houthi-attacks-2023-12-14/.

10 Girardi, van Hooft, and Cisco, 'What the Indo-Pacific Means to Europe'.

11 Mireya Solis and Mike Green, 'Trading Places: America, Japan and Regional Trade on the Chessboard', Center for International and Strategic Studies, 5 March 2021, https://www.csis.org/analysis/trading-places-america-japan-and-regional-trade-chessboard.

A particular feature of this maritime trade structure is that its underpinning security provider, the United States, has been reticent to fully participate in the structure it protects.[12] There is no free trade agreement between the US and the EU nor does the US participate in *any* of the major economic or trade agreements and institutions in the Indo-Pacific, despite both of these regions being top priorities for US security. Indeed, Congress frequently expresses bipartisan opposition to the involvement of the US in regional trade agreements.[13] Global maritime trade is protected then by a power that relies less upon it (with the major exception of critical raw materials, more on this below).

2.1.3. **Friendshoring and securitised global competition**

The final major feature of contemporary trade is a growing trend towards re-shoring (or 'friendshoring') and economic decoupling driven by the Sino-American rivalry and further fuelled by the Russo-Ukrainian war.

The final major feature of contemporary trade is a growing trend towards re-shoring (or 'friendshoring') and economic decoupling driven by the Sino-American rivalry and further fuelled by the Russo-Ukrainian war. The supply-chain insecurities exposed by the COVID-19 pandemic has also contributed to the push to reduce reliance on international supplies of critical goods and materials. In this, the US and China respectively put pressure on their respective trade partners to limit their interactions with their rival.[14] Felt strongly in the European semiconductor industry, particularly in the Dutch case, this has extended to most regions in the world. In policy terms, it takes the form of subsidising 're-shoring' certain high-value industries (especially in technology) and basing operations at home or a more 'friendly' country, usually a country with a mutual defence treaty.[15] In practice, this has been almost exclusively pursued by the US.

This trade strategy led by the US has concerned its allies and partners that suspect (rightly) that there is an unspoken economic security motive to benefit the US economy under the overarching logic of Sino-American competition. Domestic political considerations have historically been major drivers of US trade policy, rather than national security policy preferences; today appears to hold to that trend.[16] Nevertheless, US partners have joined in this effort, seen particularly in the case of the establishment of the EU-US Trade and Technology Council, where discussions frequently reference the term 'convergence' when it comes to EU-US relations and their joint approach to China.[17]

12 Van Jackson, *Pacific Power Paradox* (New Haven: Yale University Press, 2023).

13 Ana Swanson, 'Biden's Pacific Trade Pact Suffers Setback After Criticism From Congress', *The New York Times*, 13 November 2023, sec. Business, https://www.nytimes.com/2023/11/13/business/economy/indo-pacific-trade-delay.html.

14 Emily Benson and Ethan B. Kapstein, 'The Limits of "Friend-Shoring"', 2 January 2023, https://www.csis.org/analysis/limits-friend-shoring.

15 Niels Graham and Mondrita Rashid, 'Is "Friendshoring" Really Working?', *Atlantic Council* (blog), 25 July 2023, https://www.atlanticcouncil.org/blogs/new-atlanticist/is-friendshoring-really-working/.

16 Jeffrey S. Peake, *Dysfunctional Diplomacy: The Politics of International Agreements in an Era of Partisan Polarization* (New York: Routledge, 2022), https://doi.org/10.4324/9781003347422.

17 'Secretary Antony J. Blinken and US-EU Trade and Technology Council Ministerial Co-Chairs at a Joint Press Availability', *United States Department of State* (blog), 31 May 2023, https://www.state.gov/secretary-antony-j-blinken-and-u-s-eu-trade-and-technology-council-ministerial-co-chairs-at-a-joint-press-availability/.

2.2. Global maritime trade patterns towards 2040-50 and beyond

Along the three major areas identified in the previous section, there are three corresponding trends that are likely to emerge in the coming quarter of a century and could extend beyond this timeframe, as discussed in the next subsections.

2.2.1. The changing role of the US as a security provider

The first trend that will impact maritime shipping by 2050 and beyond is the declining role of the US Navy in providing secure global sea lines of communication (SLOCs) simultaneously around the entire world.

The first trend that will impact maritime shipping by 2050 and beyond is the declining role of the US Navy in providing secure global sea lines of communication (SLOCs) simultaneously around the entire world. Though the current effort to reinforce the Red Sea is led by strong US military and diplomatic effort, there is little to suggest that such robustness will (or can) continue into the coming decades. Domestic political currents continue to favour a strong retrenchment in Washington's global responsibilities, as the withdrawal from Afghanistan and arguments against further aide provision to Ukraine have shown.[18] A second Trump administration is likely to cement this tendency in U.S. policy circles, possibly for decades.

This then opens questions of security provision for the global commons.[19] Should the US try to shift the burden of this effort to other states or groups of states, which ones will it be and are they up to the task? In the examples of the Red Sea and Persian Gulf, both Europe and China have clear interests in ensuring both shipping and energy continues to flow outward from the region. It is quite possible that China will seek a stronger security role in maritime commons, due in large part to a lack of trust in American security provisions in a time of intensified competition.[20] This increased role is only logical as part of the maritime aspects of Belt and Road Initiative, which includes large investments in port infrastructure and is heavily reliant on maritime trade.[21] By 2050, an increased Chinese naval presence in chokepoints and along major shipping routes should be expected.

2.2.2. The emergence of new formal blocs

The emergence, or rather cementing, of new blocs is quite likely in the coming decades. The combination of the Sino-American rivalry, the fallout from the Russo-Ukrainian war and the continued development of states in South America and Africa will contribute to this trend. Given that many of the major maritime shipping pathways and chokepoints pass in or near major states in the Middle East, Southeast Asia and Africa, new groupings of these states will be of vital importance for engagement.

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18 Andy Cerda, 'About Half of Republicans Now Say the US Is Providing Too Much Aid to Ukraine', *Pew Research Center* (blog), 8 December 2023, https://www.pewresearch.org/short-reads/2023/12/08/about-half-of-republicans-now-say-the-us-is-providing-too-much-aid-to-ukraine/.

19 Paul van Hooft, Benedetta Girardi and Tim Sweijs, 'Guarding the Maritime Commons: What Role for Europe in the Indo Pacific', Guarding the Commons (The Hague: The Hague Centre for Strategic Studies, February 2022), https://hcss.nl/wp-content/uploads/2022/02/Guarding-the-Maritime-Commons-HCSS-2022.pdf; Barry R. Posen, 'Command of the Commons: The Military Foundation of US Hegemony', *International Security* 28, no. 1 (2003): 5–46.

20 van Hooft, Girardi and Sweijs, 'Guarding the Maritime Commons: What Role for Europe in the Indo Pacific'.

21 James McBride, Noah Berman and Andrew Chatzky, 'China's Massive Belt and Road Initiative', Council on Foreign Relations, 2 February 2023, https://www.cfr.org/backgrounder/chinas-massive-belt-and-road-initiative.

A more formally institutionalised Sino-Russian relationship is possible into the future, particularly in the economic sphere. Deepened military cooperation is less likely due to fears of entrapment and possible abandonment in a crisis by both sides.[22] Most contemporary commentary envisages Russia as the 'vassal' or 'rentier' state in such an economic relationship. Such an actual reduction in influence is over-inflated, yet there is no doubt that Beijing would be the greater power in nearly all facets of the relationship. From a maritime trade perspective, such a bloc would not have serious impacts, due in no small part that most of their trade is done over their long-shared land border. Should this bloc emerge simultaneously with the opening of the Northern Sea Route, however, this could have an impact in that the NSR would effectively be a trade route almost exclusively controlled by this one bloc.[23]

Outside of this relationship, other formats such as BRICS (Brazil-Russia-India-China-South Africa)[24] or the Economic Community of West African States (ECOWAS) will continue to retain importance and if further formalised would have material impact on global trade.[25] These states rely heavily on the maintenance of maritime trade between one another and such ties will have to be robustly promoted and supported in order to achieve the ambitions its respective leaders have laid out over the years. Furthermore, its members India, China and its newer members Egypt, Iran, Saudi Arabia and the UAE sit alongside some of the most heavily trafficked maritime routes in the world. Increased trade volumes within this grouping, coupled with an increased Chinese naval capability, could mean a real change in the character of trade flows in contents, import/export balances and in protection.

The trends of re-shoring and friendshoring between and within respective economic blocs could reduce the volume of high value-added goods across certain maritime trade routes.

2.2.3. **The regionalisation of value-added goods.**

Related to this bloc formation is the next trend: the regionalisation of goods. The trends of re-shoring and friendshoring between and within respective economic blocs could reduce the volume of high value-added goods across certain maritime trade routes. Should the EU-US convergence on high technology transfer restrictions to China and Russia extend over the longer-term, this will in effect regionalise those affected industries and their products into specific blocs. In effect, this has already occurred in the semiconductor industry, as states seek to reduce reliance on Taiwan given the possibility of a Chinese attack. This regionalisation would be particularly impactful for those states that have sought a much more deliberately non-aligned, or rather de-centred, foreign and economic policy such as Brazil, Indonesia, or South Africa.[26] Indonesia is a particularly interesting case, in that it either directly controls or contributes to the governance of some of the most vital shipping chokepoints in the world (Malacca, Lombok and Sunda), through which a significant amount of the world's medium- and low-value added goods pass. Should Sino-American competition escalate seriously, this would leave Jakarta between a rock and a hard place wherein it can either align with either party and antagonise the other or stay more non-aligned and antagonise both simultaneously.[27]

22 Alexander Lanoszka, *Military Alliances in the Twenty-First Century* (Cambridge, UK: Polity Press, 2022), 50–106.

23 Text Malte Humpert, 'China Pushes Northern Sea Route Transit Cargo to New Record', High North News, 18 December 2023, https://www.highnorthnews.com/en/china-pushes-northern-sea-route-transit-cargo-new-record.

24 Now expanded to include Egypt, Ethiopia, Iran, Saudi Arabia and the United Arab Emirates

25 Maria Kienzle, 'The BRICS Expansion: Perspectives for the EU', *European Institute for Asian Studies* (blog), 12 September 2023, https://eias.org/publications/the-brics-expansion-perspectives-for-the-eu/.

26 Madiha Afzal, Bruce Riedel and Natan Sachs, 'The United States, China and the "New Non-Aligned" Countries', Global China (Washington, D.C.: The Brookings Institution, February 2023), https://www.brookings.edu/articles/the-united-states-china-and-the-new-non-aligned-countries/.

27 Huong Le Thu, 'How to Survive a Great-Power Competition: Southeast Asia's Precarious Balancing Act', *Foreign Affairs* 102, no. 3 (June 2023): 30–36.

Regionalisation may offer a way out such conundrums, however. In the case above, Indonesia would not face such pressure alone. It's membership in ASEAN is a powerful signal to any economic coercer that it would face wider regional implications from any attempted pressure. The contributions of regional economic institutionalisation to regional peace maintenance in the Pacific is robust.[28]

2.3. **Conclusions**

Global trade patterns will look different by 2050 and there will be a need for naval forces to consider their strategies accordingly. Priority areas for military deployments could shift as US security provision gives way to increased Chinese presence in key areas, particularly in the Western Pacific and the Middle East. Shifts in trade blocs could impact alliance and coalition dynamics as states seek to hedge against great-power competition. Regionalised, high value-added goods areas may increase the diplomatic heft and regional military importance of small and middle power states that are seeking to remain unaligned. What has not and will not, change is the continued reliance of Europe on trade flowing through the maritime chokepoints of Asia and the Middle East and greater responsibility for these will have to be taken.

Concretely for the Dutch and other European navies, these shifts in trade dynamics will mean an increased strain on existing and future responsibilities. A reduced US military presence in key areas would pressure European states to maintain a more persistent presence in these areas without the backing of US supporting capabilities. Importantly, regional states may not actually be looking for a European presence instead of an American one and may seek their own regional solutions to security provision. The emergence of new trade blocs could shape the future of maritime coalitions with which European states would have to either contend or cooperate with. A more robust worldwide naval presence by BRICS states, for example, would not be something European maritime forces are likely to match.

What has not and will not, change is the continued reliance of Europe on trade flowing through the maritime chokepoints of Asia and the Middle East and greater responsibility for these will have to be taken.

[28] Jackson, *Pacific Power Paradox*.

3. **Rising seas:** Climate change and the maritime environment

Sea-level rise will put pressure on major coastal cities and directly impact the military infrastructure upon which navies rely.

How will climate change impact the future maritime environment in which navies will be expected to operate? Rising sea levels, increasing global temperatures and a proliferation of high-intensity natural disasters will continue to tax the resources of maritime forces around the world. Three challenges here are highlighted that will have an impact on planning priorities out to 2040-50 and beyond: (1) an increase in major natural disasters in heavily populated coastal areas; (2) the impact of sea-level rise around the world; and (3) the opening of the Northern Sea Route.

By 2040-50 and certainly in the decades beyond, the physical landscape of the maritime environment will have changed significantly. Some coastal communities and major infrastructure will become uninhabitable without massive investments in mitigation measures and emergency contingencies will lead political leaders to draw upon military resources to respond. Sea-level rise will put pressure on major coastal cities and directly impact the military infrastructure upon which navies rely. Should Arctic sea-ice melting continue at pace, the opening of the Northern Sea Route will simultaneously reduce the need of shipping through highly contested chokepoints and increase the global profile of a possible Sino-Russian trade bloc.

3.1. **The impacts of climate change today**

Currently, the impacts of climate change in the maritime environment are most strongly felt in the increased frequency and strength of natural disasters, exacerbated by a trend of sea-level rise. The most dramatic impacts have yet to be felt, however. The UN's Intergovernmental Panel on Climate Change (IPCC) uses 2040-50 as one of the primary targets to assess the impacts of climate change around the world.[29]

The frequency with which tropical cyclones/hurricanes and major flooding has impacted coastal areas has noticeably increased. The UN's Food and Agriculture Organisation (FAO) reported in 2021 that the occurrence of tropical cyclones had quadrupled between the 1970s and 2010s (from 40 to 150 per year) while a similar increase in flood occurrence was seen

[29] 'IPCC Sixth Assessment Report', Assessment Report (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2023), https://www.ipcc.ch/report/sixth-assessment-report-cycle/.

in the same period.[30] What has exacerbated the impacts of this is the increased urbanisation and population increases in major coastal cities.[31] This greatly increases the number of people exposed to extreme weather events in areas where emergency response is more difficult to execute.

Beyond the need for disaster response, this increase in the vulnerability of coastal areas impacts military considerations. David Kilcullen in his work *Out of the Mountains* predicts an increase in conflict in areas that are characterised as 'crowded, complex and coastal,' in that urban coastal areas will be areas of intense contestation, particularly in civil conflicts and insurgencies.[32] Interestingly, natural disasters can have unexpected effects on conflict dynamics. In some cases, a major cyclone or flooding can exacerbate conflict by adversely affecting only one party to a conflict, thereby emboldening the other. This was seen in the cases of separatist violence by both the United Liberation Front of Assam (ULFA) and the Naxalite insurgents in the 1990s, when the Indian state had to face both the insurgencies and answer the needs of the disaster. Conversely, if a disaster negatively impacts the parties to a conflict equally, it can facilitate the termination of a conflict. The best example of this is the impact of the 2004 Indian Ocean tsunami on the Aceh insurgency in Indonesia. With massive loss of life and damage, both the Indonesian state and the Aceh rebels were reeling from the disaster. A combination of public pressure decreased military capability and a demand for international aide facilitated a ceasefire in 2005.[33] The impact of climate change on crowded, complex and coastal areas should be a serious focus of study for naval strategists who could expect to employ amphibious forces in such areas.

In some cases, a major cyclone or flooding can exacerbate conflict by adversely affecting only one party to a conflict, thereby emboldening the other.

As of this writing, sea-level rise and the opening of Arctic transit routes have yet to have their most serious impacts. The gradual erosion of coastlines and the impact of major coastal infrastructure has led states to invest more heavily into mitigation measures. The building of hard defences (e.g. dykes), relocation of vulnerable populations and the reinforcement of natural shoreline protection (e.g. dunes, mangrove forests, etc.) have already begun in many states.[34] Relatedly, some states have made big bets on being able to exploit the effects of climate change. Russia has announced major investments into Arctic infrastructure in the expectation of the Northern Sea Route (NSR) becoming a viable economic corridor for global shipping, fossil fuel exports and military use. In June 2023, the Russian government reviewed its NSR development plan, a two-trillion rouble (approximately €20 billion) investment into icebreakers, ports and terminals, rescue centres and a bespoke satellite system to support Arctic operations.[35]

30 FAO, *The Impact of Disasters and Crises on Agriculture and Food Security: 2021* (Rome, Italy: FAO, 2021), 35, https://doi.org/10.4060/cb3673en.

31 Barbara Neumann et al., 'Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment', *PLoS ONE* 10, no. 3 (11 March 2015): e0118571, https://doi.org/10.1371/journal.pone.0118571.

32 David Kilcullen, *Out of the Mountains: The Coming Age of the Urban Guerilla* (Oxford: Oxford University Press, 2015), 232–62.

33 Tobias Ide, *Catastrophes, Confrontations and Constraints: How Disasters Shape the Dynamics of Armed Conflicts* (Boston, MA: MIT Press, 2023), https://mitpress.mit.edu/9780262545556/catastrophes-confrontations-and-constraints/.

34 OECD, 'Responding to Rising Seas: OECD Country Approaches to Tackling Coastal Risks', Policy Highlights (Paris: Organisation for Economic Cooperation and Development, March 2019), https://www.oecd.org/environment/cc/policy-highlights-responding-to-rising-seas.pdf.

35 Mikhail Mishustin, 'Strategic Session on the Development of the Northern Sea Route', The Russian Government, 16 December 2023, http://government.ru/en/news/48669/.

3.2. Climate change and the maritime environment towards 2050 and beyond

Along the three areas identified above, the impact of natural disasters, sea-level rise and the possible viability of the Northern Sea Route, there will have been real changes by 2050 that could accelerate into the second half of the century. Assessing futures in these three areas depends on which scenario plays out in the coming decades. Should global temperatures rise by 1.5C or more, there will be greater impacts. The data used below includes the range of scenarios, though it should be noted that even the most optimistic scenarios are not without significant impact.

Beginning with the intensity and frequency of tropical cyclones, the UN's IPCC has projected that it is likely that the *frequency* of storms is likely to decrease by 2050, but their intensity will be much greater. More storms will be seen in the Category 4-5 range, risking much more extensive damage to coastal areas, while fewer smaller storms may be seen. Some areas will also be more exposed to these changes than others, with the Caribbean and northeast Asia being particularly exposed to more intense, longer-duration storms. Meanwhile parts of southeast Asia will see fewer and less intense storms, a minor respite for an area that sees frequent cyclones.[36]

Flooding will also become increasingly frequent and intense, due to a combination of factors attributable to climate change including sea-level rise, heavier rainfall and stronger spring ice melts in northern areas. The IPCC has projected that more land will be impacted by flooding into the coming decades, with particular risk seen in South America and southeast and north-east Asia.[37] This is already following recent increased risks in the North America and western Europe, as seen in the cases of severe flooding in New York City in September 2023 and the July 2021 floods in western Europe.[38]

As for sea-level rise, assessments very much depend on the IPCC scenario that comes to pass. These scenarios, called Shared Socioeconomic Pathways (SSPs) are used by the IPCC in its most recent report. The SSPs integrate different sets of population, economic growth, education, urbanisation, the rate of technological development and other socioeconomic assumptions into future emissions scenarios. There are five primary scenarios that range from lower to higher emissions. The data showed below includes each of these scenarios.

One example to draw upon is the impact of sea-level rise in North African states, namely Egypt and Libya, each of which have large, coastal and vulnerable populations. Both are also of major security interest to European states. For Alexandria, Egypt's second largest city with a population of approximately 5 million, the projected sea-level rise scenarios can be seen in Figure 2 below.

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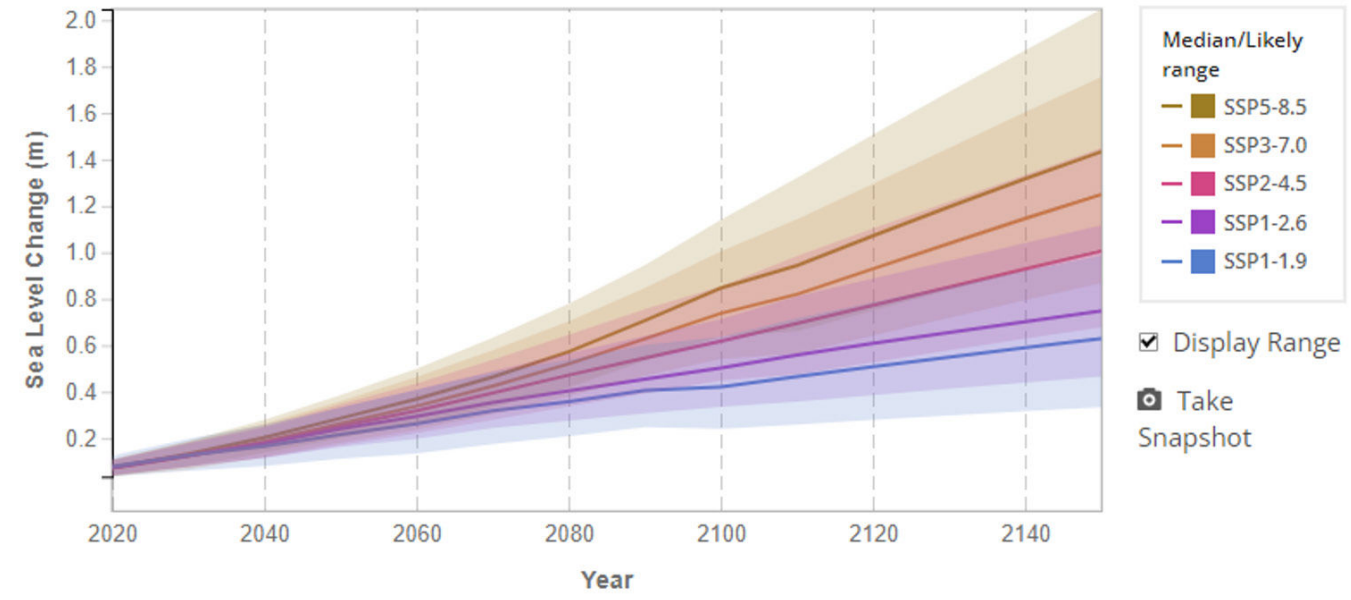
36 Robert McSweeney, 'Explainer: What the New IPCC Report Says about Extreme Weather and Climate Change', Carbon Brief, 10 August 2021, https://www.carbonbrief.org/explainer-what-the-new-ipcc-report-says-about-extreme-weather-and-climate-change/.

37 McSweeney.

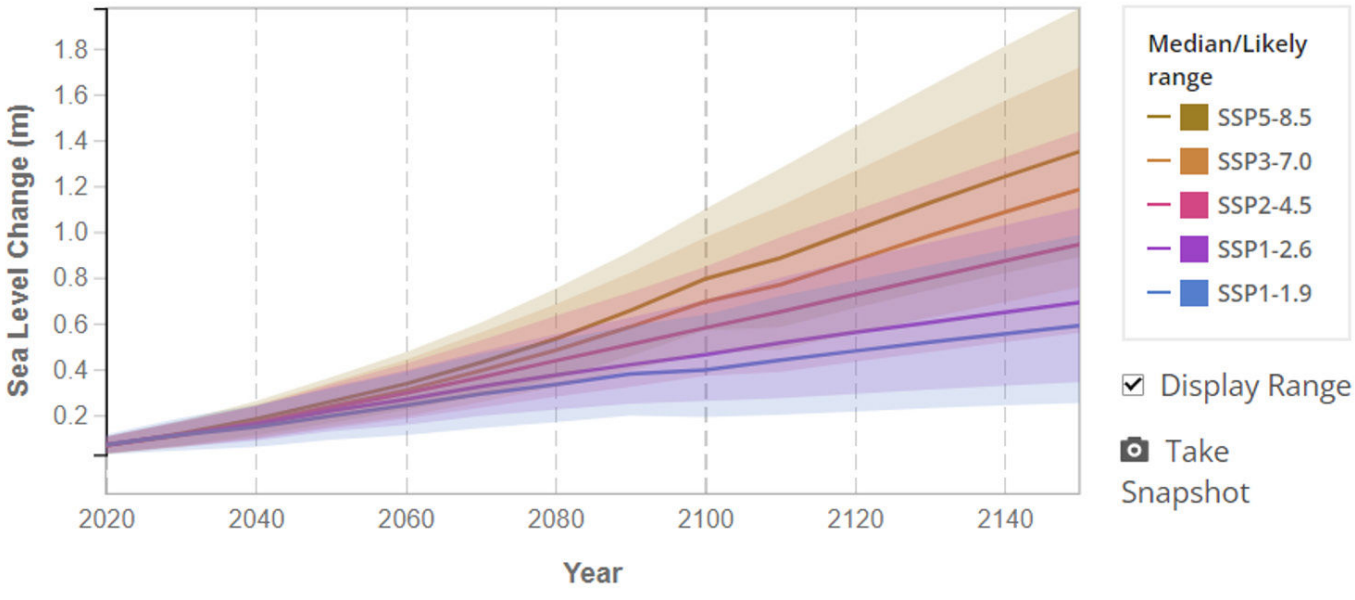
38 Victoria Bekiempis, 'New York City Reels after Flash Flooding Chaos and Powerful Downpours', *The Guardian*, 30 September 2023, sec. US news, https://www.theguardian.com/us-news/2023/sep/30/new-york-city-flash-flooding-aftermath; Melissa Eddy, 'Floods in Germany: Hundreds Missing and Scores Dead in Western Europe - The New York Times', The New York Times, 15 July 2021, https://www.nytimes.com/2021/07/15/world/europe/flooding-germany-belgium-switzerland-netherlands.html.

Figure 2. IPCC Sea-Level Rise Scenarios, Alexandria Egypt



The Libyan city of Benghazi, with a wider metropolitan population of approximately 1.5 million, can be seen in Figure 3.

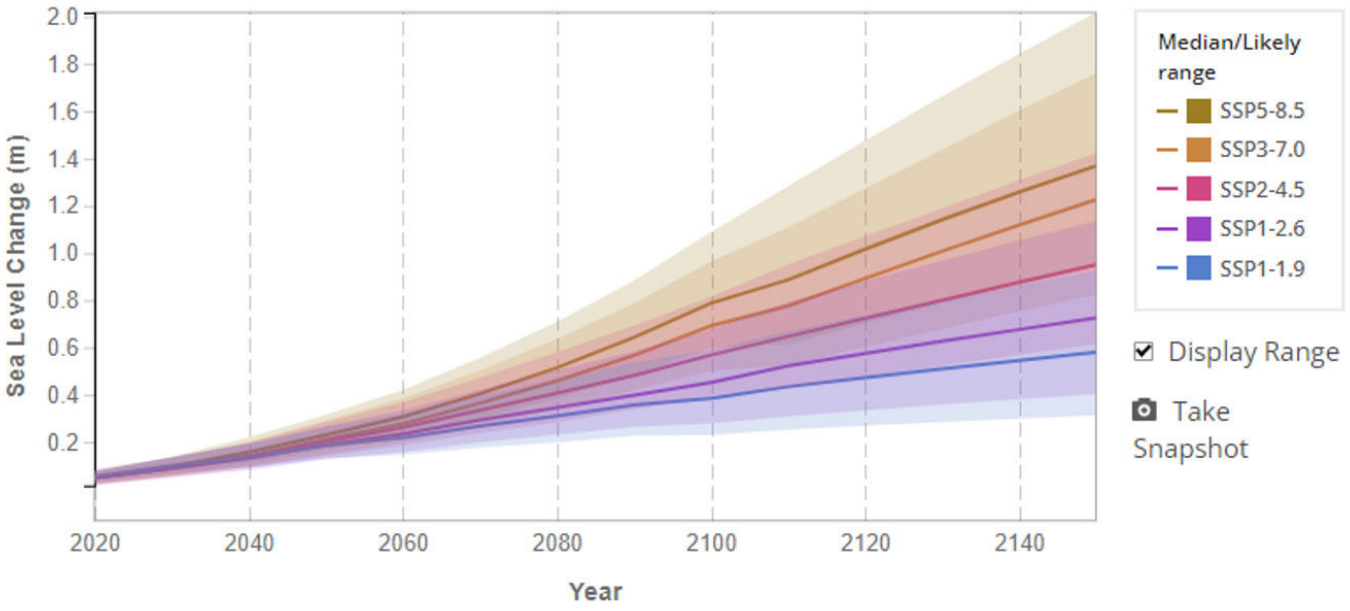
Figure 3. IPCC Sea-Level Rise Scenarios, Benghazi Libya



Both Egypt and Libya are projected to see some rise in sea-levels by 2050, with higher rates seen by the end of the century. This increased risk and related challenges to infrastructure, population movements and even state stability in these two states has been raised as serious security concerns into the coming decades.[39]

Sea-level change will also impact key areas upon which many naval forces rely, particularly for the UK and France in the Indo-Pacific. The following three cases, Singapore, New Caledonia and the Chagos Archipelago (British Indian Ocean Territory) show marked increases in sea-levels in each of these three areas that provide support to naval forces in the region. For example, the Chagos Archipelago includes the British/American naval base Diego Garcia, which provides important logistical support to forces in the Indian Ocean, Persian Gulf and Western Pacific.

Figure 4. IPCC Sea-Level Rise Scenarios, Singapore



[39] 'State and Trends in Adaptation Report 2022', State and Trends in Adaptation 2022 (Rotterdam: Global Center on Adaptation, 3 November 2022), https://gca.org/reports/sta22/.

Figure 5. IPCC Sea-Level Rise Scenarios, New Caledonia (FRA)

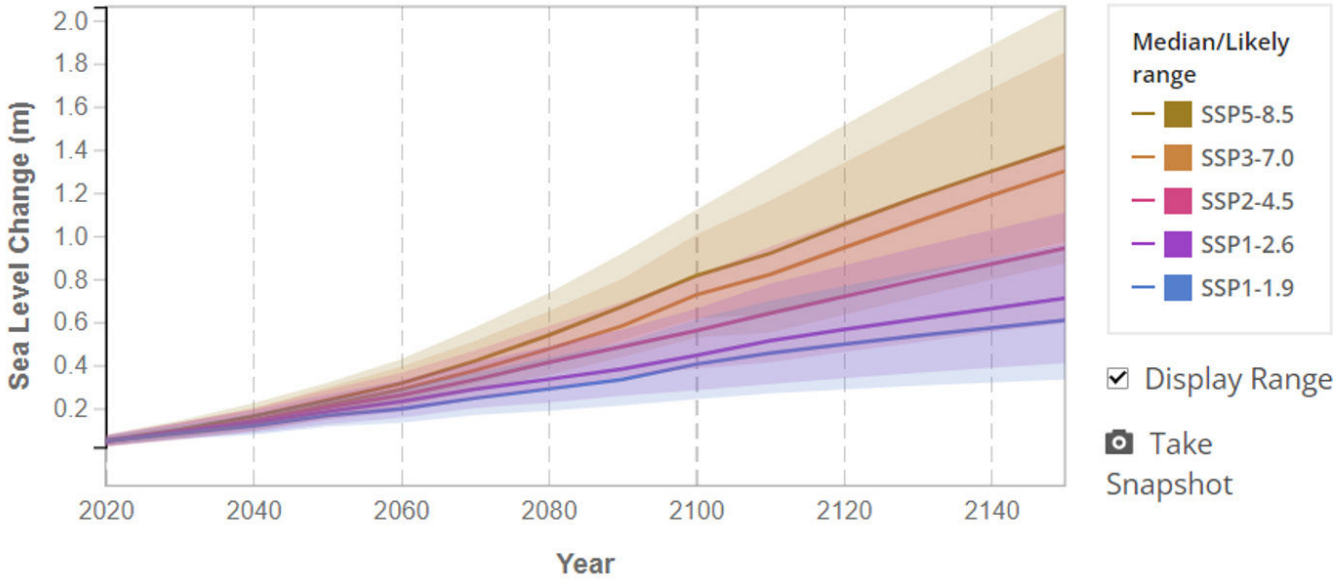
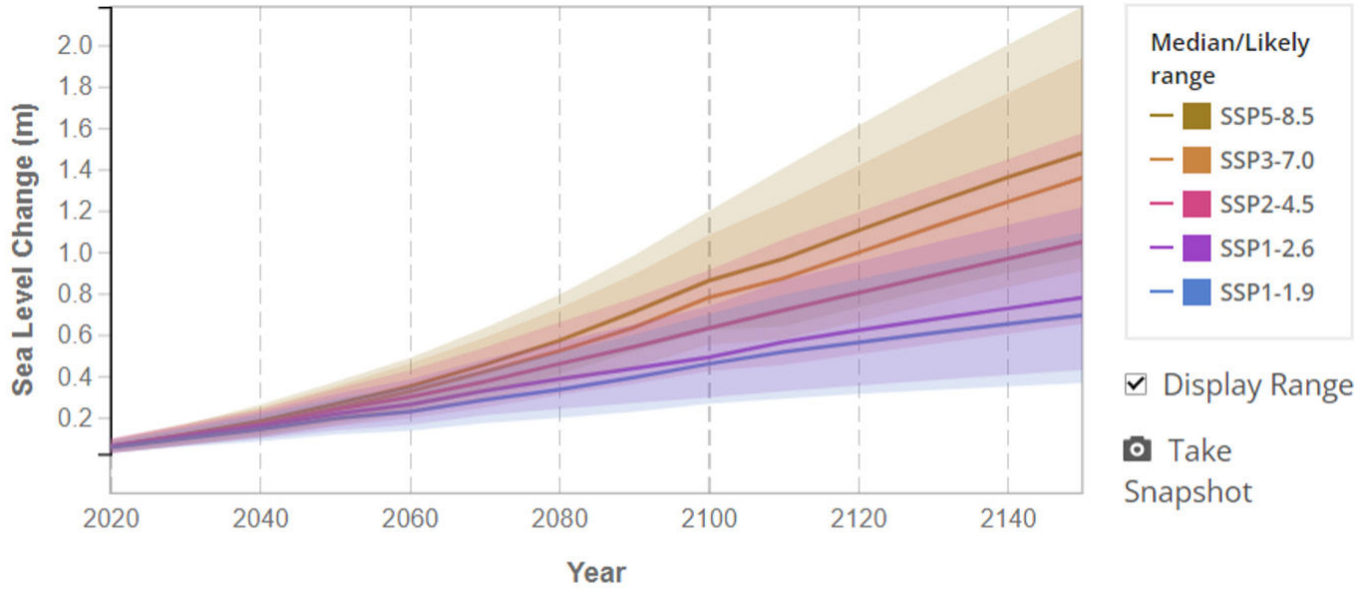


Figure 6. IPCC Sea-Level Rise Scenarios, Chagos Archipelago (UK)



These projected changes to sea-levels have led militaries to invest heavily in mitigation measures to ensure the continued viability of this infrastructure and the communities that surround. For example, the city of Norfolk, Virginia and the US Army Corps of Engineers have begun a ten-year, $2.6 billion project to update coastal protection measures and improve existing infrastructure. This is to ensure the safety both surrounding cities but also to safeguard Naval Station Norfolk, Naval Support Activity – Norfolk and Naval Air Station Oceana, the largest area of naval activity in the world that serves as homeport to several aircraft carriers and two

NATO headquarters. Such investments will be necessary by ministries of defence around the world.[40]

Finally, by 2040-50 the Northern Sea Route over Russia will have likely become more navigable.[41] While only about 5% of global trade is likely to be diverted through this route, it will effectively be a maritime commons almost exclusively controlled by Russia with likely access to China.[42] Indeed, 95% of what currently transits the NSR originates in Russia with a destination in China.[43] By 2040-50, the trend will be set for the NSR to become a Sino-Russian economic and military transit corridor that can circumvent the chronically unstable or American-dominated shipping lanes.

Climate change is already a proven driver of conflict that is near guaranteed to fuel crises around the world through extreme weather events, some of which are long-lasting such as droughts, and will thereby also affect water and food security.

3.3. **Conclusions**

The impacts of climate change will tax the resources of defence ministries around the world. Be it providing humanitarian response, using engineers to aide mitigation, or having to operate in areas experiencing climate disasters, it will be a vital consideration for force and capability planning. When considering how other states, namely Russia and China may make use of the opportunities provided to them by climate change, the challenge only multiplies. Incorporating these activities as well as the need for climate adaptation into planning efforts will remain critical.

Climate change is already a proven driver of conflict that is near guaranteed to fuel crises around the world through extreme weather events, some of which are long-lasting such as droughts, and will thereby also affect water and food security. Fisheries, seaside industries, agricultural areas and ports that both the global South and North rely upon greatly are at risk of drying up and becoming unusable. The technical knowledge, unique and survivable capabilities, and network of naval bases maintained by the RNLN, and its partners allows for contributions to adaptation, mitigation, and emergency response to humanitarian disasters driven by climate change.

For Dutch and other European naval forces, even the more conservative climate change scenarios will lead to concrete impacts. First, legacy maritime infrastructure, particularly in the Indo-Pacific, will be less available to forces seeking to maintain a presence there, like France and Britain, simply due to it being physically unusable because of sea-level rise. Second, with the increase in storm intensity, those states with the responsibility for vulnerable territories will need to invest more heavily in capabilities to facilitate humanitarian responses, such as amphibious landing craft, medical ships and logistics vessels. This will inevitably require trade-offs with other 'warfighting' capabilities, though for those states with territories in storm prone areas this trade-off is already a foregone conclusion. RNLN expertise in certain areas such as logistics, medical response, and port maintenance could be offered to partner states, especially in the Caribbean Naval Command area of responsibility.

40 'Tackling the Climate Crisis', US Department of Defense, accessed 19 December 2023, https://www.defense.gov/Spotlights/Tackling-the-Climate-Crisis/.

41 Yu Zhang et al., 'Changing Arctic Northern Sea Route and Transpolar Sea Route: A Prediction of Route Changes and Navigation Potential before Mid-21st Century', *Journal of Marine Science and Engineering* 11, no. 12 (December 2023): 2340, https://doi.org/10.3390/jmse11122340.

42 Malte Humpert, 'The Future of the Northern Sea Route - A "Golden Waterway" or a Niche Trade Route', The Arctic Institute - Center for Circumpolar Security Studies, 15 September 2011, https://www.thearcticinstitute.org/future-northern-sea-route-golden-waterway-niche/; Tiago Tecelão Martins, 'Arctic Ambitions: China's Engagement With the Northern Sea Route', The Diplomat, 24 November 2023, https://thediplomat.com/2023/11/arctic-ambitions-chinas-engagement-with-the-northern-sea-route/.

43 Humpert, 'China Pushes Northern Sea Route Transit Cargo to New Record'.

4. **Scenario one:** 'A Hot War in Cold Waters'

This is the first of four illustrative scenarios through chapters 4 through 8. The scenario descriptions, nominally set in the 2040-50 timeframe, have a similar build-up: (1) the wider background and/or context that give rise to the scenario; (2) the scenario setting itself; (3) the security interest for the Netherlands at stake; (4) what (potential) roles the Royal Netherlands Navy (RNLN) must perform in order to achieve its objectives; (5) ditto for (potential) tasks; (6) the framework for the deployment of naval forces, including the allies and partners whom to join forces / cooperated with; (7) and the capabilities required. Each scenario chapter ends with (8) conclusions that can be drawn from the scenario regarding the demands on the Dutch Navy by the 2040-50 period.

4.1. **Background / context**

This scenario is predicated on assessments made by defence officials that a total reconstitution of the Russian military is possible by the mid-2030s, if not sooner. In this event, US intelligence reports, showing troop movements of Russian soldiers to Kaliningrad, Saint-Petersburg and Belarus, combined with the rapid construction of fuel and ammunition depots, instil fears of a possible invasion of the Baltic states, using the Suwalki corridor. Emergency meetings held by the European Security Council (ESC) fail to reach a consensus on action, as different threat perceptions lead to a variety of opinions.

4.2. **Scenario setting**

In 2040-50, Murmansk is on its way of becoming a new global trade hub. Despite the decades long sanctions levied against Russia for its invasion of Ukraine, activity in the port is now burgeoning because of the fully operational Northern Sea Route (NSR), which lies entirely within Russia's exclusive economic zone (EEZ). Cutting the length of the trade route between East and West by 40%[44] and bypassing potential geopolitical hotspots such as the Malaccan strait, Chinese usage of the NSR has exploded, building further on its 'unlimited friendship' with Russia.[45]

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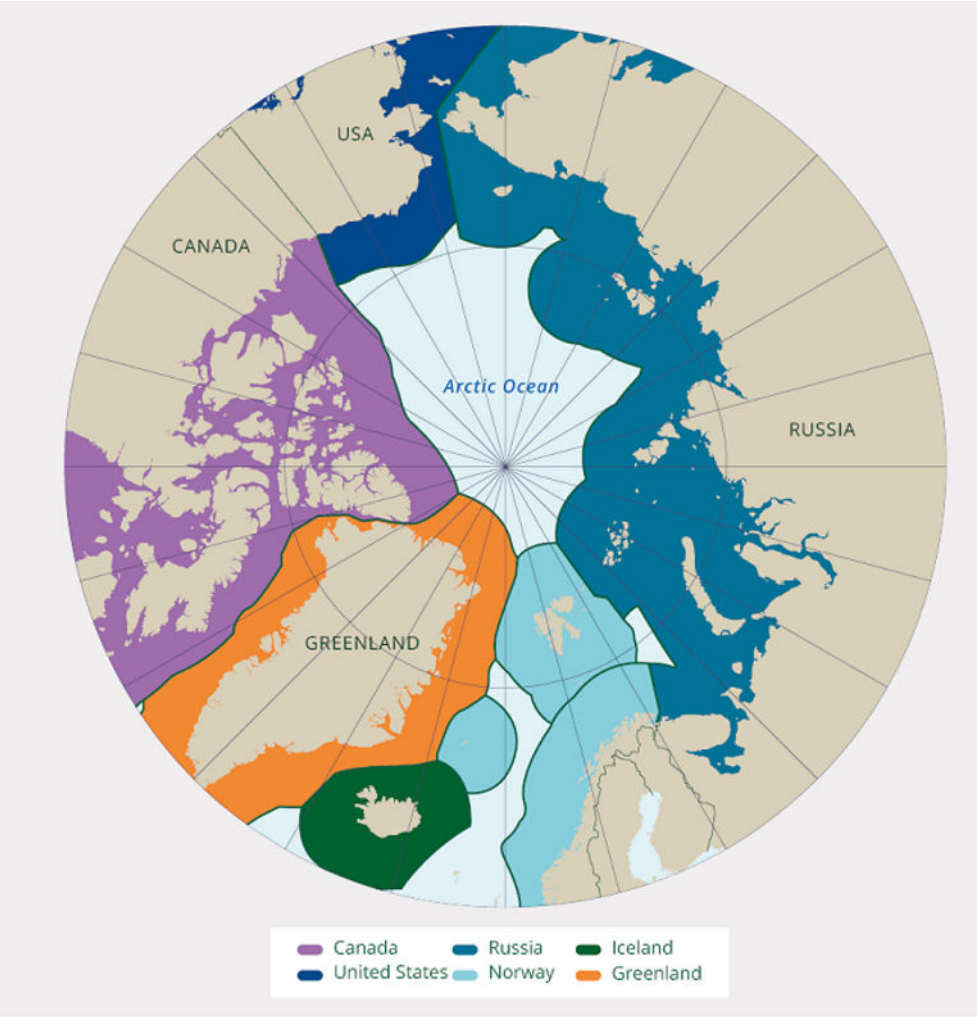
44 'How Viable Is Arctic Shipping?', *The Economist*, accessed 6 May 2024, https://www.economist.com/the-economist-explains/2024/01/18/how-viable-is-arctic-shipping.

45 'Moscow, Beijing Declare Russian-Chinese Friendship Has No Limits, No "Forbidden Areas" - Russian Politics & Diplomacy - TASS', accessed 6 May 2024, https://tass.com/politics/1398071.

Thanks to climate change, once barren land now flourishes, significantly increasing Russia's arable lands in the North[46] and making it a champion of Northern African countries as it provides wheat, grain and barley at strongly reduced prices. Russia's oil and gas production, now completely diversified from the West, is fully focused on the insatiable demand of countries such as India, Pakistan and China that are still heavily reliant on fossil fuels. The end of Russia's isolation and its concurrent re-engagement with the global economy and its close economic relationship with China, has remade the Arctic into an area of major economic potential.

Thanks to climate change, once barren land now flourishes, significantly increasing Russia's arable lands in the North and making it a champion of Northern African countries as it provides wheat, grain and barley at strongly reduced prices.

Figure 7. Arctic EEZs and international waters of the central Arctic Ocean[47]



After a meeting with the Chinese president, Russia's leader suddenly proclaims the NSR to be a forbidden route for Western powers. The few Western ships present on the NSR during the speech, are swiftly seized by Russian forces. A Norwegian frigate sailing from Kirkenes to escort a ship from Murmansk on its way to Europe gets hit by a Russian torpedo, killing two sailors and wounding a dozen more.

46 Elena Parfenova, Nadezhda Tchebakova and Amber Soja, 'Assessing Landscape Potential for Human Sustainability and "Attractiveness" across Asian Russia in a Warmer 21st Century', *Environmental Research Letters* 14, no. 6 (2019): 065004.

47 House of Lords, 'Our Friends in the North: UK Strategy towards the Arctic', p51, 2023.

In a televised speech, Russia's leader condemns the intrusion of Western military forces and notifies the nation that a general mobilisation will take place to prevent further incursions of foreign powers into Russia. Meanwhile, Russia's armed forces in both Kaliningrad and Saint Petersburg appear to be on the verge of invading the Baltic states.

NATO commanders, caught by surprise by the suddenness of the Russian actions, mobilise the forces under their authority to prepare for a Russian invasion of the Baltics. Given limited numbers, European leaders urge the US to provide additional troops and materiel through the ports of Antwerp and Rotterdam during an Article 5 North Atlantic Council session called by Norway, Sweden and Finland. While political and logistical support is promised, no troop surge is forthcoming.

To limit Russia's capacity to destroy allied surface vessels, seabed infrastructure, or ports, NATO issues a stern warning, declaring the EEZ of all NATO allies inaccessible for Russian vessels. NATO Standing Maritime Group 1 is tasked to move into the northern Norwegian Sea. In addition, all submarines detected in these areas will be attacked without further warning. This measure intends to keep Russian submarines in Kaliningrad and Severomorsk, the locations of the Russian Baltic Fleet HQ and the Russian Northern Fleet HQ.[48]

The Russian surface fleet, vulnerable because of the heightened range and accuracy of anti-ship cruise missiles[49], appears to return to its bases, signifying its limited role in the conflict. As a result, NATO forces decide to dedicate most of their maritime capacities to anti-submarine warfare (ASW). It also decided that marine forces can be deployed to the Arctic regions of NATO allies to impose additional costs on any attempted surge of forces out of the Russian bastion.

4.3. **Security interests of the Netherlands**

The role that the Royal Netherlands Navy (RNLN) could play and the tasks it may perform are dependent on the strategic calculus that will be made on the political level. Are the Dutch national security interests threatened by the actions of the Russians? And if this is the case, to what extent? Based on those answers, we can start to gauge the level of involvement from the RNLN. The disruption of international relations by the targeting of NATO forces directly impacts most Dutch national security interests ranging from freedom of the seas to alliance commitments.

Ranging from the 'violation of the integrity of the territory of the Kingdom of the Netherlands'[50] in case missiles would be launched towards the port of Rotterdam, a major logistical hub for allied supplies, the 'disruption of daily life'[51] or the 'violation of the effectiveness and legitimacy of multilateral institutions'[52], it would be imperative for the Kingdom of the Netherlands to fully participate in any action to counter these threats.

48 Nick Childs, 'Gauging the Gap: The Greenland–Iceland–United Kingdom Gap – A Strategic Assessment', 2022.

49 Frank Bekkers et al., *Geopolitics and Maritime Security: A Broad Perspective on the Future Capability Portfolio of the Royal Netherlands Navy* (The Hague Centre for Strategic Studies, 2019).

50 Mark Rutte, 'De Veiligheidsstrategie Voor Het Koninkrijk Der Nederlanden', p41, 2023, https://www.rijksoverheid.nl/documenten/publicaties/2023/04/03/veiligheidsstrategie-voor-het-koninkrijk-der-nederlanden.

51 Ibid.

52 Ibid.

4.4. (Potential) roles for the RNLN

With all Dutch national security interests challenged and the Dutch explicit desire to be a reliable NATO ally[53], it is near certain that the RNLN would play a significant role in any operations. The RNLN would be expected to contribute to a set of objectives and generated forces by NATO. Based on the scenario described, NATO's tasks would be to limit the movement of Russia's submarine forces, to minimise potential attacks on allied surface vessels, seabed infrastructure and littoral infrastructure such as ports.

Translating these objectives into discrete tasks, three can be identified. First, the RNLN would be asked to provide the necessary ASW capabilities. Second, the RNLN would be asked to monitor it's the Northern flank's maritime space by providing maritime patrol capacities. Third, the RNLN would be included in protecting major logistical hubs such as the port of Rotterdam from possible incoming missiles.

4.5. (Potential) tasks for the RNLN

Anti-Submarine Warfare (ASW) below surface

Taking into consideration Russia's inability to compete numerically against all NATO countries combined, it will have to carefully select its actions, trying to maximise its impact given its relatively limited number of submarines.

The following two actions are therefore the most likely choices for Russian forces: first, protecting the nuclear-armed submarines (SSBNs) in their bastions in the Arctic Sea (see Figure 8. Doctrine since Soviet times, SSBN protection was expected to be a major goal in ensuring a secure nuclear second-strike capability.[54] Still valid in 2019[55], there is no reason to assume that this strategic calculus will change significantly soon. Second, using a small number of submarines to pass through the Greenland-Iceland-UK (GIUK) gap and launch attacks on the open ocean against NATO's sea lines of communication, thereby raising NATO's costs and testing its coherence.[56]

53 Anke Bijleveld-Schouten, 'Defensievisie 2035' (Ministerie van Defensie, 2019).

54 Rene Balletta and Sidharth Kaushal, 'An Asymmetric Approach to the Use of Maritime Forces in Competing with Russia', p19, (Royal United Services Institute, 1 February 2024), https://rusi.orghttps://rusi.org.

55 Ibid.

56 Nick Childs, 'Gauging the Gap: The Greenland–Iceland–United Kingdom Gap – A Strategic Assessment' (IISS), accessed 11 May 2024, https://www.iiss.org/en/research-paper/2022/05/gauging-the-gap-the-greenland-iceland-united-kingdom-gap-a-strategic-assessment/.

Figure 8. Russia's bastion zone[57]

Based on the scenario where NATO decides to outlaw Russia from the EEZ of its members means that potential conflicts between submarines are likely. Russia's desire to maintain sea control in the vicinity of their bastions (see Figure 8), clearly overlaps with the EEZ of Norway (see Figure 7). This would quite likely lead to a confrontation between submarines on the border of the Norwegian sea and the Barents Sea.

A second location of interest is the area around Kaliningrad, where the Russian Baltic fleet is headquartered. While almost impossible to break through the Danish straits currently, given the limited offensive power of the Baltic fleet[58], the proximity to other NATO allies such as Sweden or Finland would make a confrontation with Russian submarines almost inevitable.

A third location is the North Atlantic Ocean, where seabed infrastructure might form an interesting target. In addition, the presence of Russian submarines in this area would force the alliance to dispatch submarines to this large zone, limiting the number of submarines available for the other areas.

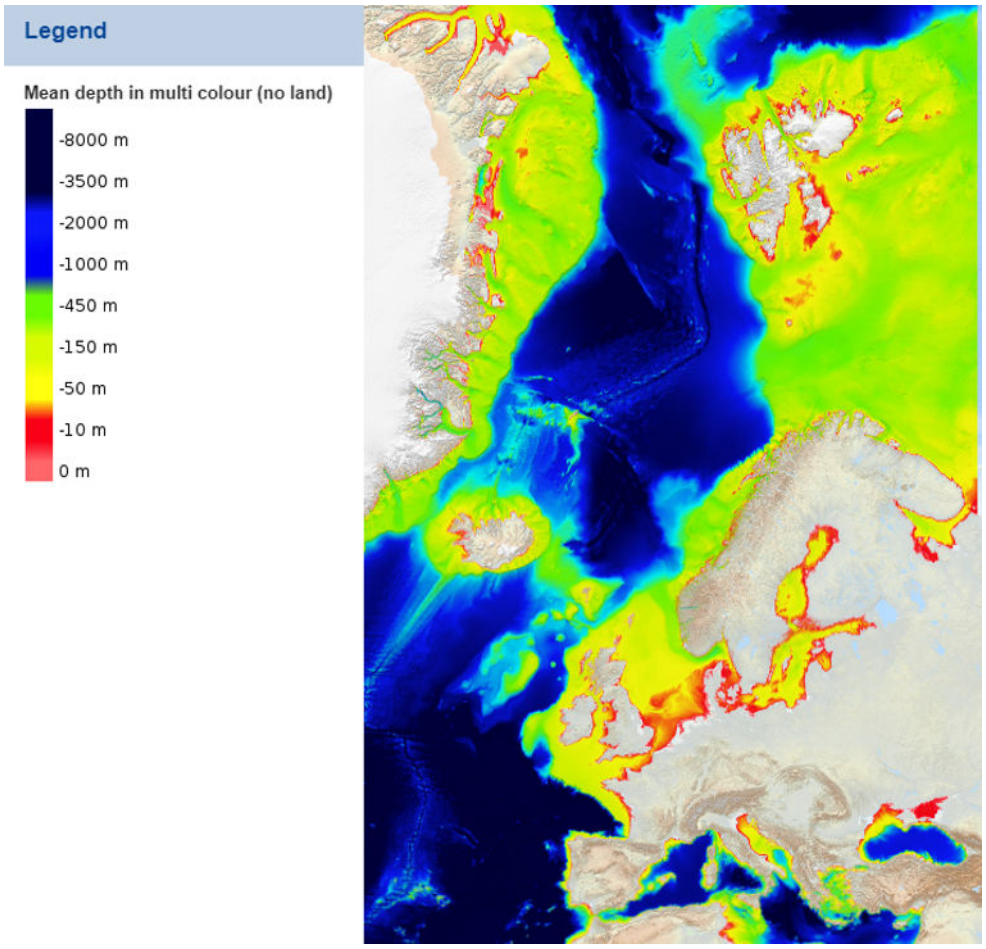
ASW capabilities are of vital importance to the NATO alliance. Having large numbers of nuclear- and diesel-electric powered (SSNs and SSKs, respectively) submarines available[59] NATO is well equipped to be present across the alliance's maritime space. However, the distribution of the SSK's and SSN's is still of importance as it will determine where the RNLN would be most likely situated.

57 Childs, 'Gauging the Gap: The Greenland–Iceland–United Kingdom Gap – A Strategic Assessment', p14.

58 'Is the Baltic Sea a NATO Lake?', accessed 30 May 2024, https://carnegieendowment.org/research/2023/12/is-the-baltic-sea-a-nato-lake?lang=en.

59 'Submarine Modernisation Plans and New Sub-Surface Dynamics', IISS, accessed 13 May 2024, https://www.iiss.org/online-analysis/military-balance/2024/05/submarine-modernisation-plans-and-new-sub-surface-dynamics/.

Figure 9. Mean depth arctic waters[60]



Looking at a median depth map of the area's involved (see Figure 9), we can distinguish between three different zones:

- The first zone, **the Baltic Sea**, is a shallow area with an average depth of only 57 meters.[61] As a result, it would make sense for the alliance to predominantly use SSK submarines as they are smaller in size, require less water under its hull and have a higher manoeuvrability at lower speeds.[62] The traditional advantages of the SSN, such as its high speed and endurance, are not considered to be relevant in these enclosed environments in the vicinity of allied ports. Submarine operations in the Baltic would be difficult for any force, and SSKs could rather be deployed in other areas to greater effect.
- The second zone, on **the border between the Norwegian sea and the Barents Sea**, displays another dynamic. First, the depths of the Norwegian Sea and the Barents Sea, 2000 meters and 350 meters respectively[63], take away any SSN depth-restriction. Next, as described above, we expect the Russians to have a strong submarine presence to defend

60 'EMODnet Map Viewer', accessed 13 May 2024, https://emodnet.ec.europa.eu/geoviewer/.

61 'The Baltic Sea in Numbers - Marinefinland.Fi', accessed 12 May 2024, https://www.marinefinland.fi/en-US/Nature_and_how_it_changes/The_unique_Baltic_Sea/The_Baltic_Sea_in_numbers.

62 'The Right Submarine for Lurking in the Littorals', US Naval Institute, 1 June 2010, https://www.usni.org/magazines/proceedings/2010/june/right-submarine-lurking-littorals.

63 International Council for the Exploration of the Sea, 'THE BARENTS SEA AND THE NORWEGIAN SEA', 27 September 2011, https://web.archive.org/web/20110927064618/http://www.ices.dk/committe/acom/comwork/report/2007/may/Barents%20and%20Norwegian%20Seas.pdf.

its SSBN's, leading to a more aggressive posture in an attempt to achieve sea control close to its bases.[64] This necessitates the utilization of SSN's as their increased speed and endurance allows them to achieve the best position for attacks, evade counterattacks, reattack remaining units trying to flee and avoid detection itself[65], all of which are essential in ASW.

- The third and final zone, **the Atlantic Ocean**, is the deepest with an average depth of 3,338 meters.[66] Based on the size and the depth of the zone, as well as Russia's intentions to target this area, it would be best to have SSN's deployed here. Given the limited availability of SSN's in comparison to SSK's and the fact that this region would be of secondary importance to the Russians, a mix of SSN's and SSK's could suffice.

Uncrewed underwater vehicles (UUVs) will also play an important role in underwater ASW. Its low cost, compared to crewed ships means that it can undertake a variety of high risks operations in forward positions, potentially inflicting severe damage to enemy submarines. Additionally, integrating UUVs with ASW frigates would generate a synergy that significantly enhances overall ASW capabilities, serving as a defensive perimeter or as an enabler for increased offensive capabilities.

First, UUV's can take greater risks to gather intelligence on enemy ship movements, thereby serving as forward surveillance.[67] Additionally, UUV's can use their active sonar in a forward position, thereby drastically increasing the detection capabilities of crewed submarines, as it would enable them to stick to passive detection, allowing the UUV to perform wide area searches.[68] Finally, UUV's could also serve to lay mines in forward positions.

It should be noted however that even unmanned systems still require a pilot, possibly a co-pilot (depending on the size and mission), a dedicated lead technician, and a weapons officer. Each of these positions would then require training over an entire career.

ASW above surface

Maritime Patrol Aircraft (MPA), especially unmanned MPA, are an important element in ASW. Outfitted with specialized equipment such as sonar, sonar buoys and torpedo's, they are uniquely qualified to track and attack enemy submarines. Although attempts are made to develop the capability to target aircraft from submarines[6970] the simultaneous transition to unmanned MPA's will most likely offset this new capacity, ensuring the relevance of MPA[71] This means that MPA's will most likely be able to continue to freely roam the skies on the lookout for Russian submarines.. Recognizing the continued relevance of MPAs, Norway is already making steadfast progress on an agreement that would allow US and UK MPAs to use its Evenes Air Station in the High North for increased surveillance of Russian submarines[72].

64 Childs, 'Gauging the Gap: The Greenland–Iceland–United Kingdom Gap – A Strategic Assessment'.

65 'The US Navy: How Fast Is Fast?', US Naval Institute, 1 November 1996, https://www.usni.org/magazines/proceedings/1996/november/us-navy-how-fast-fast.

66 M. Fava Fava, 'Atlantic Ocean: Map Data Climate Info. A Complete 2022 Guide', *Ocean Literacy Portal* (blog), 7 June 2022, https://oceanliteracy.unesco.org/atlantic-ocean/.

67 Balletta and Kaushal, 'An Asymmetric Approach to the Use of Maritime Forces in Competing with Russia', p30.

68 Ibid.

69 IDAS guided missile system – submarine self-defense

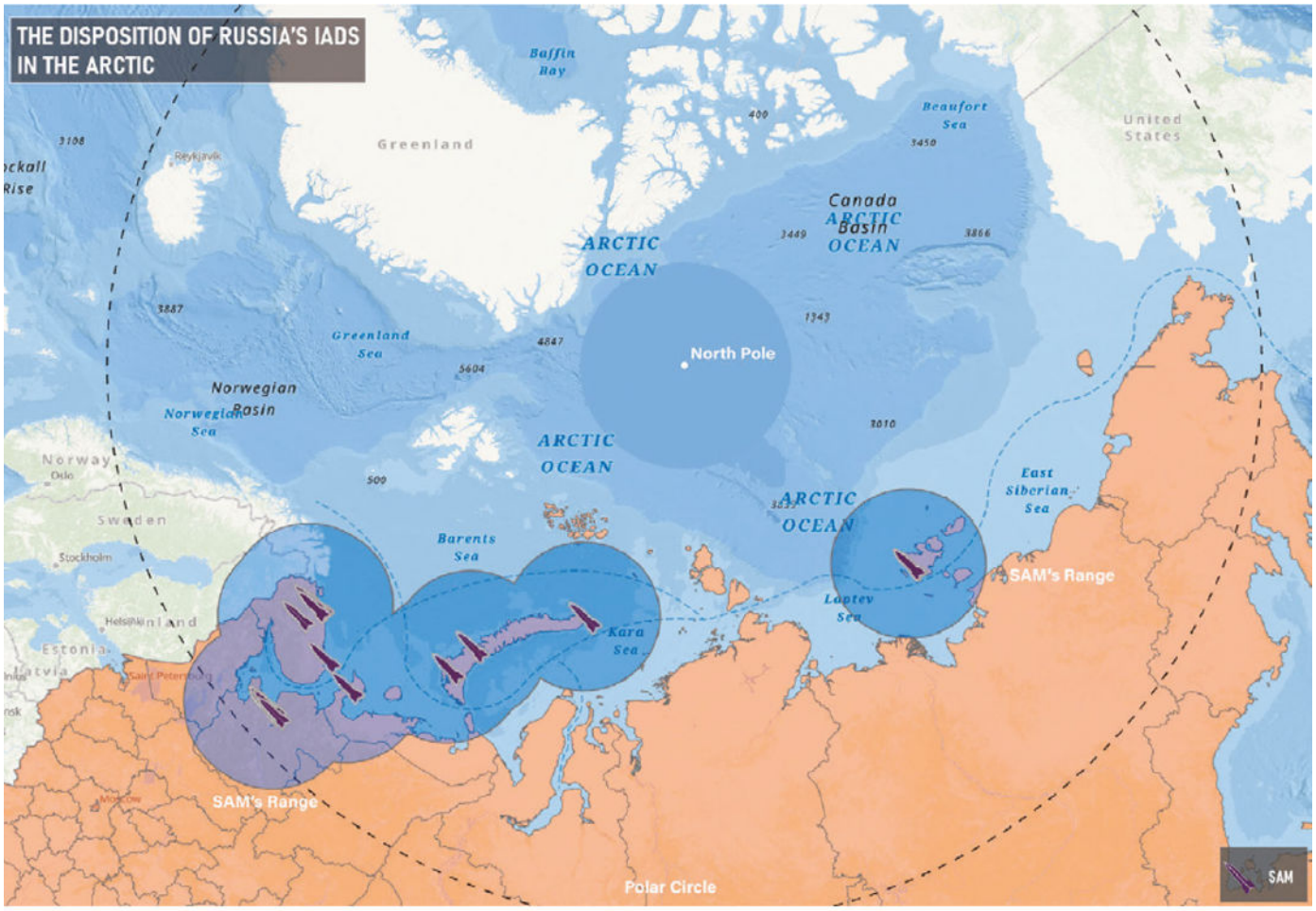
70 IDAS - Interactive Defense and Attack System for Submarines

71 A new era beckons for UAVs at sea

72 From Astri Edvardsen, 'Norway Explores Cooperation With the US and UK on Maritime Surveillance in the High North', accessed 25 May 2024, https://www.highnorthnews.com/en/norway-explores-cooperation-us-and-uk-maritime-surveillance-high-north.

Since MPAs are expected to remain useful for the foreseeable future, alternative methods to counter them will also continue to be developed. Integrated Air Defence Systems (IADS) and enemy fighter jets for instance will try to make it impossible for (unmanned) MPA to operate freely. Russian IADS in the High North for instance dissuade MPA's from freely scanning the seas (see Figure 10), with the same situation applicable for Kaliningrad[73].

Figure 10. Russian Integrated Air Defence Systems in the Artic[74]



This means that to have MPA monitoring the seas, the airspace needs to be safe which in turns requires air dominance. Given the defences in both locations, this will be very difficult to achieve. In any case, the usage of F-35's and ships equipped with long range surface to air missiles to deter Russian MPA's from detecting allied submarines remains necessary.

73 Robert Dalsjö, Christofer Berglund and Michael Jonsson, *Bursting the Bubble? Russian A2/AD in the Baltic Sea Region: Capabilities, Countermeasures and Implications* (Swedish Defence Research Agency, 2019).

74 Sidharth Kausha et al., *The Balance of Power between Russia and NATO in the Arctic and High North, p74,* (Routledge, 2022).

ASW on the surface

Based on the increased range and accuracy of anti-ship missiles (AshM)[75], as well as the effectiveness of drones in coastal areas against larger ships such as frigates[76], it will be increasingly difficult for large ships to provide additional firepower for operations such as the destruction of enemy air defences (DEAD), or even ASW. Therefore, we conclude that for this scenario, the ASW will be limited to below and above surface actions.

Marines and missiles

Equipping mobile marine forces with capabilities such as various classes of ground-launched missile systems would allow for the quicker creation of A2/AD bubbles by NATO forces to restrict the movement of Russian forces in and around their northern bastion. Firing the Naval Strike Missile (NSM) from land vehicles is already being experimented with by the US Marine Corps as part of the Navy/Marine Expeditionary Ship Interdiction System (NMESIS) project.

Air defence

The extended range and precision of modern cruise missiles, such as the Kalibr missile with a reach of up to 2,500 kilometers, enable Russian submarines to strike critical infrastructure across Europe. The primary submarine base of the Russian Federation in Severomorsk, located approximately 2,400 kilometers from Rotterdam, underscores this capability, as it could target the Dutch port without leaving its own waters. Figure 11 illustrates the extensive range of the Kalibr missile, highlighting the breadth of its reach. Infrastructure of great strategic importance, such as the port of Rotterdam[77]—essential for moving materials and troops from the US to Europe—must therefore be protected by adequate air defense capabilities.

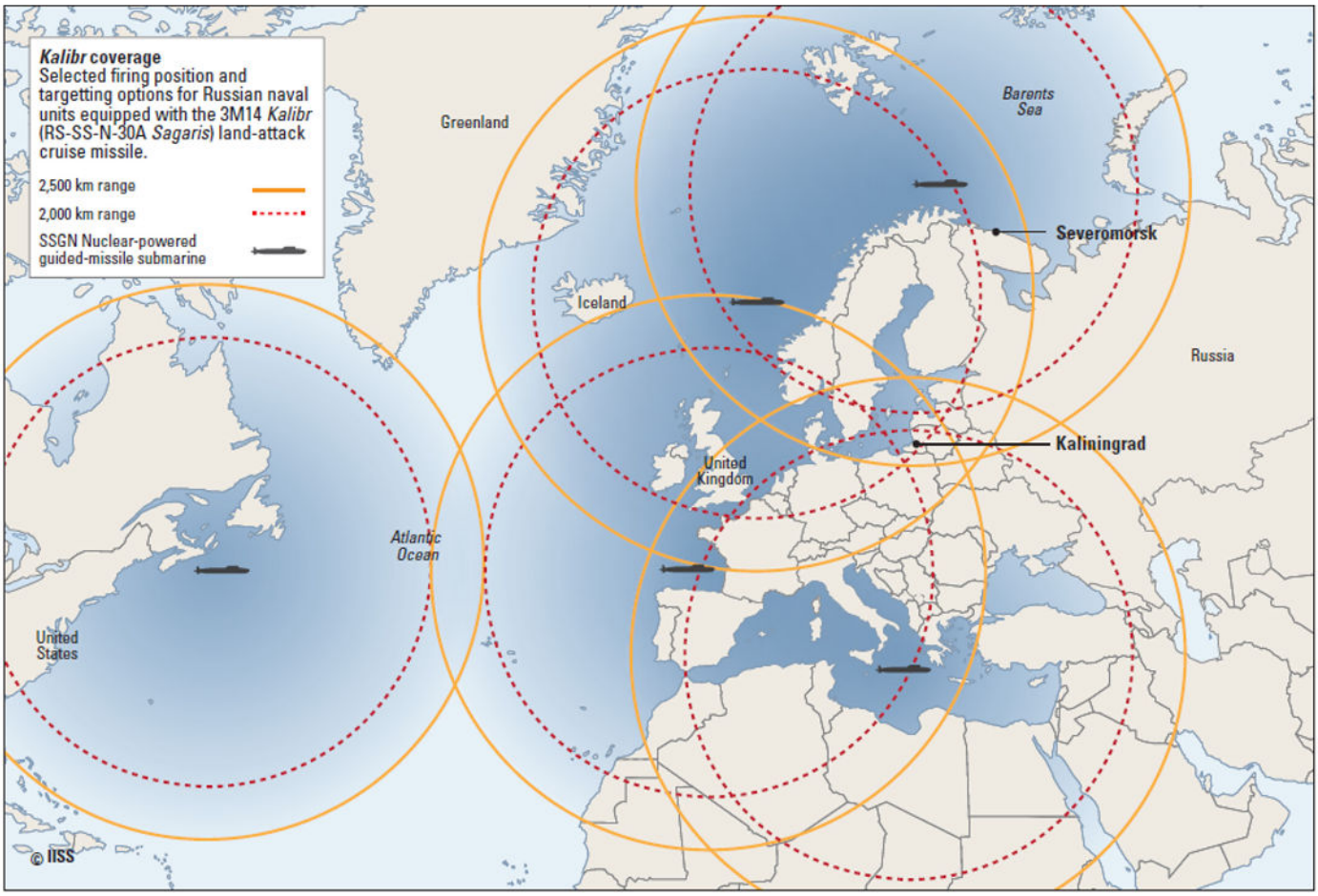
The primary submarine base of the Russian Federation in Severomorsk, located approximately 2,400 kilometers from Rotterdam, underscores this capability, as it could target the Dutch port without leaving its own waters.

75 Bekkers et al., *Geopolitics and Maritime Security: A Broad Perspective on the Future Capability Portfolio of the Royal Netherlands Navy*.

76 Nick Childs, 'Ukraine: Unconventional Impact at Sea?', IISS, accessed 23 May 2024, https://www.iiss.org/en/online-analysis/military-balance/2022/11/ukraine-unconventional-impact-at-sea/.

77 Paul van Hooft and Lotje Boswinkel, 'Surviving the Deadly Skies', p63.

Figure 11. Long range precision land attack cruise missiles[78]



In addition to regular land-based air defence, such as the PATRIOT Surface To Air (SAM) missiles, it could be necessary to also rely on frigates with air defence capabilities. Especially, as outlined in the scenario above, with a seemingly limited role for surface ships, it could be of interest to protect key maritime infrastructure or littoral areas using a variety of frigates.

The US, with its AEGIS Ballistic Missile Defence system (ABMD) that is specifically designed for warships to intercept and destroy short and medium-range ballistic missiles[79], would serve as a prime example of a frigate that could augment the missile defence of a region.

4.6. Framework and partners

Russia's direct aggression against NATO allies and their forces at sea would almost certainly lead to an invocation of NATO's Article 5 clause and lead to the involvement of other NATO allies in both direct and supporting roles. There are a variety of frameworks that could come into play in such a scenario through NATO, the EU and elsewhere. Given the uncertainty by 2040-50 about the US commitment to Europe, it is quite possible that the EU's 42.7 mutual

78 Childs, 'Gauging the Gap: The Greenland–Iceland–United Kingdom Gap – A Strategic Assessment', p25.

79 Ronald O'Rourke, 'Navy Aegis Ballistic Missile Defense (BMD) Program: Background and Issues for Congress', 2024.

defence clause could be invoked rather than NATO's Article 5 in the event of Washington of any ally not agreeing to its invocation. In the event of a continued robust US footprint in Europe, the US would likely take a lead military and diplomatic role in the crisis through NATO. Should a significant US drawdown occur, coalitions of other allies would almost certainly form, though not necessarily under a NATO flag.

Outside of the treaty frameworks, European action could be coordinated through other forums such as the UK-led Joint Expeditionary Force (JEF), made up of Denmark, Finland, Iceland, Norway, Sweden, Estonia, Latvia, Lithuania and the Netherlands. From a military perspective, the JEF could be an ideal format in this scenario given 1) the heavy maritime focus in JEF and 2) its near-exclusive focus on preparing and exercising for Arctic warfare contingencies.

Given the uncertainty by 2040-50 about the US commitment to Europe, it is quite possible that the EU's 42.7 mutual defence clause could be invoked rather than NATO's Article 5 in the event of Washington of any ally not agreeing to its invocation.

4.7. Capabilities

ASW below the surface

The RNLN would currently be unable to quantitatively fulfil the possible NATO role for its submarines in this scenario. In the case of a large-scale conflict to protect its own territory or that of allies, such as the scenario described above, NATO expects the RNLN to have three submarines ready.[80]

Current plans aim to dismantle two of the existing four *Walrus*-class submarines to increase the ability to service the remaining two with spare parts and keep the remaining two readily available for future operations.[81] This lack in capacity has been noted by NATO, mentioning in its 2022 NATO defence planning capability review that the RNLN will have some gaps in quantitative terms as a result of introducing new vessels, as well as qualitative shortcomings in its ASW capacities.[82]

By the 2040-50 mark, however, the RNLN will be able to answer requirements for the type of scenario above. Should the procurement of four new *Orka-Class* submarines, two by 2037 at the latest[83], succeed it will be able to perform the tasks outlined in the scenario.

In case the RNLN would have a sufficient mass of UUV's at its disposal, it could further increase its capabilities by using uncrewed ships for high-risk operations such as trying to detect Russian submarines from forward positions, or laying mines, to effectively lock the submarines in its bases.

ASW above surface

ASW above the surface is mostly performed by MPA's. However, the RNLN MPAs have decreased from 13 P3 Orion aircraft in 1990 to 0 in 2019[84], thereby eliminating the possibility of any Dutch contribution in the near future.

80 'B-Brief Project "Toekomst van de Nederlandse Onderzeedienst"', p7. Kamerstuk 34 225 nr 24 van 13 december 2019.

81 'D-Brief Project "Toekomst van de Nederlandse Onderzeedienst"', Kamerstuk 34 225 nr 52 van 15 maart 2024, p4.

82 'NATO DEFENCE PLANNING CAPABILITY REVIEW 2021/2022 THE NETHERLANDS' (NATO, 7 October 2022), P3.

83 D-Brief project 'Toekomst van de Nederlandse onderzeedienst', p14.

84 Ibid, p67

The lack of MPAs is a serious capacity shortfall, which presently limits the contributions of the RNLN. The RNLN will have to invest in procurement, crew recruitment, training and sustainment if it targets a role in NATO's possible ASW missions above the surface. Importantly, this investment should think beyond the legacy Orion platform and consider unmanned systems that can provide the same functionality. This would include smaller crews (mainly ground station crews) and pose less risk in the event of combat.

Air Defence

Dutch air defence capabilities are currently limited. It remains doubtful whether the three Patriot batteries[85] that the Netherlands currently possesses would be capable of defending the vital infrastructure of the Kingdom. Already, NATO lists that shortfalls are present in the Dutch aerospace capabilities, explicitly mentioning the slow addition of Patriot batteries.[86]

However, the RNLN does have four *Luchtverdedigings- en Commandofregatten* (LCFs), specifically designed for air defence that allows them to protect other ships in their vicinity from both incoming aircraft and missiles.[87] As a result, they have the potential to also defend littoral infrastructure such as the port of Rotterdam against incoming cruise missiles.

Additionally, the Ministry of Defence has recently presented the parliament with a description of the future generation LCF, explicitly stating its desire that the new LCFs would enhance the Kingdom's Integrated Air and Missile Defence (IAMD) capabilities, aiming to protect against new threats such as hypersonic weapons.[88] With an estimated delivery by 2041[89], this new generation of frigates could ensure the readiness of the RNLN in case of a 2040-50 conflict.

The RNLN's ability to fulfil its promised capabilities to the NATO alliance in case of a major conflict with Russia, seems mixed at best in the short term.

4.8. **Conclusion**

The RNLN's ability to fulfil its promised capabilities to the NATO alliance in case of a major conflict with Russia, seems mixed at best in the short term. Crucial for its future capabilities will be the course of its procurements of new submarines and frigates. Already, the RNLN has had to downgrade its number of submarines from four to two for a multi-year period while waiting for the next generation to be constructed. Therefore, the capabilities of the RNLN would range from 'below expectations' in 2030, to 'in line with expectations' in 2040-50. In addition, new developments such as UUV's will play an ever-increasing role in the future of maritime warfare. The final note is that procurement costs will have to be balanced with the needs of recruitment, retention and training of personnel, which could form a much more serious long-term challenge.

85 Ministerie van Defensie, 'Patriot-luchtverdedigingssysteem - Materieel - Defensie.nl', onderwerp (Ministerie van Defensie, 4 May 2023), https://www.defensie.nl/onderwerpen/materieel/bewapening/patriot-lucht-verdedigingssysteem.

86 'NATO DEFENCE PLANNING CAPABILITY REVIEW 2021/2022 THE NETHERLANDS', p4.

87 Ministerie van Defensie, 'Luchtverdedigings- en commandofregat (LCF) - Koninklijke Marine - Defensie.nl', webpagina (Ministerie van Defensie, 22 June 2023), https://www.defensie.nl/onderwerpen/materieel/schepen/luchtverdedigings--en-commandofregatten-lcf.

88 'A-Brief Projecten "Vervanging LC-Fregatten" En "Bewapening Maritieme Lucht- En Raketverdediging"', Pub. L. No. Kamerstuk 27 830 nr 426 van 1 maart 2024, p2.

89 A-brief projecten 'Vervanging LC-fregatten' en 'Bewapening maritieme lucht- en raketverdediging', p7.

5. **Scenario two:** 'Death on the Nile'

5.1. **Background / context**

Barring an economic miracle or another sudden political revolution, the Egyptian state is on a trajectory for continued mismanagement, instability and likely crisis in the coming decades.

By 2040-50, Egypt could very well be sitting on top of a powder keg of intersecting crises: state fragility and military intrusion in the economy and politics; climate risks in the Nile Delta and the Mediterranean; a continuously growing population (nearly 160 million by 2050) with few economic opportunities and at risk of resource scarcity. Barring an economic miracle or another sudden political revolution, the Egyptian state is on a trajectory for continued mismanagement, instability and likely crisis in the coming decades.[90]

Egypt also plays a vital role in Middle Eastern, North African and global politics. It's relative economic weight, large military and regional ties make Cairo an important hinge on issues ranging from the Israeli/Palestinian conflict to civil conflict in Libya, political crises in Lebanon and secure trade through the Suez Canal. It often plays a political counterweight to Türkiye. It has been involved in the Saudi war in Yemen, played both mediator and spoiler in Sudan and plays host to a massive number of refugees from Gaza and elsewhere. There has been a boiling insurgency conducted by the Islamic State in Iraq and Syria (ISIS) for over a decade.

5.2. **Scenario setting**

Over the course of the 2040s, Egypt has continued to face serious structural economic challenges in the face of a worsening recession caused by the collapse of energy prices and debt defaults amongst major world powers, namely the US and China. Flooding in the Nile Delta has caused internal displacement for tens of thousands, as many flee what are becoming permanently higher shorelines and riverbanks. Several weak agricultural cycles have led the UN's World Food Programme to warn of famine conditions across much of North Africa.

A new government, under the leadership of al-Sisi's successor, seeks to curb military involvement in the economy and open pathways for state stimulus to soften the blow of the recession. Military officers, seeing a risk to their dominant economic position, lead a coup and force the president's resignation.

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90 Gamal Essam el-Din, 'Egypt's Population Is Expected to Reach 157 Million in 2050: Head of NPC', *Ahram Online*, 12 February 2023, https://english.ahram.org.eg/News/487971.aspx; Imad K. Harb, 'Egypt Is in Serious Trouble Seven Decades after Its Free Officers Revolution', *Arab Center Washington D.C.* (blog), 25 July 2023, https://arabcenterdc.org/resource/egypt-is-in-serious-trouble-seven-decades-after-its-free-officers-revolution/; Frederic Wehrey and Ninar Fawal, 'Cascading Climate Effects in the Middle East and North Africa: Adapting Through Inclusive Governance' (Washington, D.C.: Carnegie Endowment for International Peace, 24 February 2022), https://carnegieendowment.org/research/2022/02/cascading-climate-effects-in-the-middle-east-and-north-africa-adapting-through-inclusive-governance?lang=en.

This time, however, the military fractures, with the coup plotters and their forces facing resistance amongst reformers that are loosely aligned with opposition parties in the parliament. Street skirmishes in the NAC, Cairo and Alexandria quickly spiral into a civil war, with battle lines dividing many cities between old and new factions vying for power. A brutal siege of Cairo begins with pro-coup forces surrounding the old capital and most populous city. Having acquired a majority of the anti air capabilities of the Egyptian army, they establish localised A2/AD bubbles, including around the beleaguered capital. Continuous air and missile strikes target the city and its inhabitants. Port Said, a centre for anti-coup forces, has been under continuous attack and has effectively closed the Suez Canal.

Within a year, state capacity in the various competing regions collapses under the strains of the multiple interlocking political, economic and climate crises. Internally displaced persons (IDP) camps become flooded with new refugees, while some attempt to make dangerous border crossings across the Gulf of Aqaba to Saudi Arabia and water crossings to Cyprus and Crete. These escalating flows of displaced people intensify regional tensions, prompting Turkey and Greece to urgently demand a comprehensive and coordinated international response to address the humanitarian disaster and stabilize the region. Various responses from the UN, EU and even NATO have been considered that have included the imposition of no-fly zones (NFZ), the establishment of safe areas along the Mediterranean, the imposition of a maritime blockade against pro-coup areas and operations to keep the Suez Canal open. Importantly, the recognised government of Egypt has requested international assistance in overcoming its various crises. Further, an emergency summit of the Arab League has endorsed international efforts to resolve the conflict and pledges military support to any UN-sanctioned effort.

Additionally, the "vitality of the economy of the Kingdom of the Netherlands" would also be impacted through the blockage/blockade of the Suez Canal as 12-15% of world trade goes through the canal.

5.3. **Security interests of the Netherlands**

The role that the Royal Netherlands Navy (RNLN) could play and the tasks it may perform are dependent on the strategic calculus that will be made on the political level. Are the Dutch national security interests threatened by the unfolding situation in Egypt? And if this is the case, to what extent? Based on those answers, we could start to gauge the level of involvement from the RNLN. The best explanation of the Dutch national security interests can be found in the 2023 National Security Strategy (NSS). The scenario described above would firstly increase the "instability of states bordering the Kingdom of the Netherlands and in direct vicinity of the European Union" as well as violating "the functioning and legitimacy of or adherence to international treaties and norms on human rights" [91]

Additionally, the "vitality of the economy of the Kingdom of the Netherlands"[92] would also be impacted through the blockage/blockade of the Suez Canal as 12-15% of world trade goes through the canal.[93] Based on these assessments it would make sense for the RNLN to contain, stabilise and possibly contribute to ending the conflict.

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91 Mark Rutte, 'De Veiligheidsstrategie Voor Het Koninkrijk Der Nederlanden', p41, https://www.rijksoverheid.nl/documenten/publicaties/2023/04/03/veiligheidsstrategie-voor-het-koninkrijk-der-nederlanden.

92 Ibid

93 'Red Sea, Black Sea and Panama Canal: UNCTAD Raises Alarm on Global Trade Disruptions | UNCTAD', 26 January 2024, https://unctad.org/news/red-sea-black-sea-and-panama-canal-unctad-raises-alarm-global-trade-disruptions.

First, the conflict should be contained to prevent widespread disruption of the region. The imposition of a no-fly zone to limit the aerial assaults on Cairo could reduce the attacks on civilians and would therefore be vital in mitigating civilian harm and limiting the chance of regional disruption. Additionally, large shipments of humanitarian aid would need to be passed on through Port Said to prevent a humanitarian catastrophe from taking place.

As the RNLN is not able to achieve these objectives on its own, it would need to collaborate with partners that share the same objectives. In this case, other European countries, especially those bordering the Mediterranean would face serious instability if no action were to be taken. Therefore, we assume that most European countries would act together with the United States which currently has an interest in maintaining stability within the Middle East and keeping the sea-routes open [94] and will continue to do so in the future. To ensure regional stability, it is decided to launch authorise a NATO operation at the request of the Arab League, leveraging the inclusion of both Turkey and Greece to minimize the risk of escalation between the two.

5.4. (Potential) roles for the RNLN

As the Dutch national security interests are challenged directly and since the Kingdom of the Netherlands aims to remain a reliable NATO ally, able to deliver specialist capabilities complementary to those of other NATO members[95], it would most likely play a significant role in the operation. Based on this assessment, we expect the RNLN to play a strong supporting role in the main tasks that will arise from the different objectives that NATO will set. As described above, NATO's main objectives would be to enact a NFZ around Cairo and provide civilians with humanitarian aid through Port Saïd.

Translating the objectives into tasks, we arrive at three distinct tasks for the RNLN, providing air defence and air attack capabilities for the NFZ and providing humanitarian aid. It should be noted however that the tasks listed below will always be in cooperation with other NATO countries.

5.5. (Potential) tasks for the RNLN

Air Defence

Ships that would provide humanitarian aid to the civilians would become vulnerable to Anti-Ship-Ballistic-Missiles (ASBM) and Anti-Ship-Cruise-Missiles (ASCM) attacks launched from land, as well as Air Launched Missiles (ALM) from enemy aircraft.

The Egyptian military has a sizeable air force, including multiple F16 fighter jet squadrons, adding up to 250 F16's[96]. While these types might be obsolete by 2040-50, there is no indication that the Egyptian army would let its air force capabilities significantly degrade in the

94 Joseph R. Biden, 'Biden-Harris White House National Security Strategy, October 2022', p42.

95 Bijleveld-Schouten, 'Defensievisie 2035'.

96 'Chapter Six: Middle East and North Africa', p347, *The Military Balance* 124, no. 1 (31 December 2024): 328–95, https://doi.org/10.1080/04597222.2024.2298594.

meanwhile. This means that protection against air launched Anti-Ship-Missiles (AShM) such as the AGM-84L *Harpoon* and the AM39 *Exocet* should be present.

This protection can be delivered by frigates that have air defence capabilities. The US, with its AEGIS Ballistic Missile Defence system (ABMD) that is specifically designed for warships to intercept and destroy short and medium-range ballistic missiles[97], would be a must-have in the area to ensure the safety of a number of ships. However, it is unsure whether the ABMD could stop all the missiles being launched towards other ships, or if the US would commit a force at all. Should missile attacks into the Red Sea extend over a longer period, such as during the 2023-2024 Houthi strikes against Red Sea shipping, capacity would be needed to protect the heavy volume of traffic. Therefore, having excess capacity to intercept missiles would be of importance. This is where European frigates would come into play and perform the role of back up to American destroyers in case, they spent all their ammunition or risk being overwhelmed by missiles. Therefore, it would be plausible that the RNLN will be called upon to provide air defence capabilities through the deployment of a frigate to the Mediterranean.

While the emergence of drones might change the functionality of an NFZ, being able to have offensive deep strike capabilities to destroy land-based air defence or other vital infrastructure remains important for clearing the largest threats to both manned and unmanned aircraft.

Air Attack

Establishing a NFZ is a challenging task and combines both the Suppression of Enemy Air Defences (SEAD) and the Destruction of Enemy Air Defences (DEAD). To achieve these objectives, it is important to clearly specify the actions undertaken to see what tasks the RNLN could perform.

Of crucial importance in the establishment of a NFZ is limiting the number of casualties by destroying as much of the air defence capabilities as possible prior to inserting planes into the area. The coup plotters, having acquired a majority of the anti air capabilities of the Egyptian army, established regional A2/AD bubbles, including around the beleaguered capital. In the most recent example being the 2011 NFZ in Libya, this was done by launching 112 Tomahawk missiles from US and UK ships.[9899] Afterwards, when the risk of being shot down had decreased significantly, planes were able to enter the area and target the remaining air defences and simultaneously prevent non-coalition forces from entering the area.

While the emergence of drones might change the functionality of an NFZ[100], being able to have offensive *deep strike* capabilities to destroy land-based air defence or other vital infra-structure remains important for clearing the largest threats to both manned and unmanned aircraft. Therefore, in this scenario it is possible that the RNLN could be asked to help supress enemy air defences by deploying a frigate to the mediterranean.

Force protection

This scenario has a clear role for the Marines Corps, who would be called upon to execute a range of tasks that can best be categorised as force protection, though arguably goes well beyond this function. The rapid deployment capability of the Marines allows them to entire into complex areas and create areas of relative security. This would be vital in such a scenario.

97 O'Rourke, 'Navy Aegis Ballistic Missile Defense (BMD) Program: Background and Issues for Congress'.

98 'Defense.Gov News Article: Coalition Launches "Operation Odyssey Dawn"', 26 June 2015, https://web.archive.org/web/20150626152249/http://www.defense.gov/news/newsarticle.aspx?id=63225.

99 Stephen Wrage and Scott Cooper, *No Fly Zones and International Security: Politics and, Strategy, p151* (Routledge, 2019).

100 Ibid, p192

Additionally, should Marine Corps units become equipped with ground-launched Naval Strike Missiles in the near future, this could allow for not only a temporary security role, but also the establishment of a friendly A2/AD bubble to counter potential maritime threats and even contribute to the air attack mission with ground-launched capabilities.

Humanitarian aid

The provision of humanitarian aid to the thousands or even millions of IDP is a crucial task to prevent the conflict from spreading and avert regional escalation. Most of the humanitarian aid will be sent overseas from Europe towards Port Saïd, using large transport ships that can provide the necessary supplies.

A crucial element of humanitarian aid is civil-military coordination. While both have specific responsibilities, it is important that coordination is put in place to facilitate the distribution of aid while simultaneously minimizing friction and duplication. Clear communication is vital in establishing common goals and setting up the framework to achieve them[101].

The main tasks from a military perspective will be to provide a safe and stable surrounding in Port Saïd, an action plan to get the aid as widely spread as possible and deliver those capabilities that civilian actors are unable to provide, such as specialised strategic sealift, medical support and specialised engineering capabilities[102].

To perform these tasks effectively, marines will have to be present at the port and the main logistical arteries to establish a security perimeter that allows for an orderly distribution of aid. The consequence of this action is that boots will be on the ground, opening multiple avenues for escalation.

Given the high US involvement in the other two tasks described above, the geographic proximity of the European countries to the conflict and the focus on delivering humanitarian aid, there is a high likelihood that Europe will take the lead in this task. As a result, it is plausible that the RNLN will be tasked to dispatch transport ships to the mediterranean.

5.6. Framework and partners

The precise framework for such a complex, internationalised operation would be difficult to predict in detail. Different organisations (i.e., NATO, EU, UN) could become involved at different levels or not at all. For example, during the international intervention in Libya in 2011, there was an overall NATO mission (Operation Unified Protector) and different sub-divided tasks between national missions led by France, the UK, US and Canada. Meanwhile a United Nations Support Mission in Libya was established and the European Union initiated emergency humanitarian aide through the Commission's Civil Protection Mechanism.

The scale of the emergency described in this scenario could be more demanding than Libya. It would involve dozens of countries, organisations and NGOs all operating within the

101 'Civil-Military Coordination | OCHA', accessed 30 April 2024, https://www.unocha.org/civil-military-coordination.

102 'Civil-Military Cooperation in Emergencies - European Commission', accessed 30 April 2024, https://civil-protection-humanitarian-aid.ec.europa.eu/partnerships/relations/civil-military-cooperation-emergencies_en.

same spaces. For European navies, the most relevant partners will depend on the individual tasks. For defence tasks, such as air defence and SEAD, the most important partners will be those NATO/EU states with which forces are most interoperable (e.g., the French, UK, Belgian and Dutch navies). For humanitarian and logistical tasks, the most relevant partners would range from state partners, including in-country officials and NGOs implementing aide funded through international organisations.

5.7. Capabilities

Air defence

Today, the RNLN has six frigates, four of which are *Luchtverdedigings- en Commandofregatten (LCF),* specifically designed for air defence that allows them to protect other ships in their vicinity from both incoming airplanes and missiles.[103]

Future trends point towards improved sensors and more accurate precision strike capabilities, rendering surface ships even more vulnerable.

Future trends point towards improved sensors and more accurate precision strike capabilities, rendering surface ships even more vulnerable.[104] This reality seems to have already sunk in at the Ministry of Defence (MOD), which is currently looking to provide their next generation LCF's, delivered within the 2035-2040 timeframe, with upgraded air defence capabilities to defend against the newest developments such as hypersonic missiles.[105] With the SMART-L radar system on its frigates, the RNLN is in the possession of an advanced radar, specifically designed for Anti Air Warfare (AAW) and Ballistic Missile (BM) defence.[106] The SMART-L radar would be of immense value in this scenario and has already proved its functionality within NATO operations, as demonstrated in the *Formidable Shield* exercise.[107]

Based on these assessments the RNLN will be able to provide significant air defence capabilities to protect the ships providing humanitarian and help other ships enforce the NFZ. As mentioned by the MOD, the goal would be to always have two frigates ready to be deployed[108], allowing the RNLN to contribute significantly to the mission by deploying one or two frigates if needed.

Air Attack

Currently, the RNLN is not equipped for this task. The 127mm cannons installed on the four LCF's have a range of 30 kilometres[109], with the upcoming upgrade to Vulcan ammunition increasing the range to 100 kilometres[110]. While commendable, it is not sufficient to get through enemy defences situated further land inwards, where vital infrastructure often is situated.

103 Defensie, 'Luchtverdedigings- en commandofregat (LCF) - Koninklijke Marine - Defensie.nl'.

104 Bekkers et al., *Geopolitics and Maritime Security: A Broad Perspective on the Future Capability Portfolio of the Royal Netherlands Navy*.

105 A-Brief Projecten 'Vervanging LC-Fregatten En Bewapening Maritieme Lucht- En Raketverdediging', Kamerstuk 27 830, nr. 426 van 1 maart 2024.

106 '20230913_Newsalert_Thales_SMART L MM_1.Pdf', accessed 30 April 2024, https://www.thalesgroup.com/sites/default/files/database/document/2023-09/20230913_Newsalert_Thales_SMART%20L%20MM_1.pdf.

107 'Formidable Shield 2017: Thales SMART-L Radar Proves BMD Capability | Thales Group', 22 November 2017, https://www.thalesgroup.com/en/germany/news/formidable-shield-2017-thales-smart-l-radar-proves-bmd-capability.

108 Ibid, p2.

109 Defensie, 'Luchtverdedigings- en commandofregat (LCF) - Koninklijke Marine - Defensie.nl'.

110 Xavier Vavasseur, 'Leonardo to Supply New 127mm Main Guns for Netherlands Navy's LCF Frigates', *Naval News* (blog), 21 April 2020, https://www.navalnews.com/naval-news/2020/04/leonardo-to-supply-new-127mm-main-guns-for-netherlands-navys-lcf-frigates/.

Again, the RNLN's ability to perform air attack operations might change drastically in the nearby future, as the MOD has already informed the Dutch parliament of their desire to equip their next generation LCFs with Tomahawk missiles[111]. Having a range of more than 1000 kilometers, strong stealth capacities and enough explosive power to destroy most objectives, these missiles would be a vital addition to the offensive capabilities of the RNLN [112].

Based on these developments, the RNLN would be capable of performing air attack missions in the future, such as those necessary for initiating and maintaining a NFZ within a NATO framework.

Humanitarian aid

The RNLN has a history of providing humanitarian aid in crisis situations. The Joint logistic Support Ship (JSS) Karel Doorman provided 1,5 million kg of humanitarian aid to Sierra Leone in 2014. It was also used for humanitarian purposes in Sint Maarten in 2017 and 2020[113]. Being the largest ship of the RNLN with its 205 metres[114], it has a natural capacity to provide substantial amounts of aid, with its deck extensively used for stacking containers filled with humanitarian aid.

Additionally, the MOD has recently announced its ambition to develop six new amphibious transport ships[115]. These new ships would combine the roles of the current patrol boats and the amphibious transport ships. Explicitly mentioned in the function description is the capability of providing humanitarian assistance, coupled with the placement of marines on the ground[116].

Based on these developments, we feel that the RNLN has the capacity to provide humanitarian aid through its JSS and the amphibious capacities to insert marines or provide aid in less-than-ideal situations, through the development of their new amphibious transport ships.

5.8. **Conclusion**

In this scenario analysis, we looked at the impact of a humanitarian crisis on the borders of the EU on the RNLN. Based on the interests of the Kingdom of the Netherlands, we expanded on the roles and tasks that the RNLN would have to take on to safeguard the Dutch interests.

Since the RNLN is only a limited blue water navy[117] and given the size of the conflict, we looked at the partnerships that the RNLN would have to be part of to accomplish its tasks.

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111 A-Brief Projecten "Deep Strike Capaciteit Air" En "Verwerving Maritime Strike"', Kamerstuk 27 830, nr. 391 van 3 april 2023.

112 Ibid.

113 Ministerie van Defensie, 'Joint logistic Support Ship (JSS) - Koninklijke Marine - Defensie.nl', webpagina (Ministerie van Defensie, 3 May 2023), https://www.defensie.nl/onderwerpen/materieel/schepen/joint-logistic-support-ship-jss.

114 Ibid.

115 'A-Brief Project "Verwerving Amfibische Transportschepen"', Kamerstuk 27 830, nr. 427 van 6 maart 2024.

116 Ibid, p2.

117 Bekkers et al., *Geopolitics and Maritime Security: A Broad Perspective on the Future Capability Portfolio of the Royal Netherlands Navy, p61.*

We assumed that, given their cooperation and shared interests, it would be highly plausible that a NATO mission would be formed to pool resources and accomplish the tasks.

An interesting finding was that the RNLN would be ill-equipped for some of these tasks if this scenario was to happen tomorrow, such as providing air attack capabilities, but that the MOD seems to be aware of the most urgent shortfalls and has indicated its willingness to address these by the recent submission of letters to the parliament of proposed procurement processes.

If these procurement processes were to go ahead, we expect the RNLN to be well equipped for the tasks and roles expected from it in the future. This allows the RNLN and the Kingdom of the Netherlands as a whole, to assume the position of reliable partner within NATO, achieving a most sought-after goal by the Dutch government.

6. **Scenario three:** 'Clash of the Pacific Titans'

6.1. **Background / context**

With US military support no longer in the cards, and mindful of the destruction in Ukraine resulting from its years-long resistance against Russia, Taiwanese leaders could decide to agree to Beijing's terms before massive damage was inflicted.

By 2040-50, the world's geopolitical hotspot could well be South-East Asia. A settlement of the Russia-Ukrainian war along with a series of successful temporary blockade operations has given Beijing the sense of an opening for a possible 'reunification effort' with Taiwan. Studies demonstrating the enormous costs paired with an attempt to breach the blockade, may convince then US leaders that material support would be very difficult to achieve. With US military support no longer in the cards, and mindful of the destruction in Ukraine resulting from its years-long resistance against Russia, Taiwanese leaders could decide to agree to Beijing's terms before massive damage was inflicted.

The resulting shift in the regional balance of power, combined with allied unease of the Washington's limited reaction, may then create a backlash in Washington and reinvigorate US efforts to protect its remaining allies in Asia. While placing a premium on its allies in the Indo-Pacific, the South China Sea has lost a large part of its value to the US because of the fully functioning Northern Sea Route (NSR). Reducing the distance covered by cargo between Southeast Asia and Western Europe by 40%,[118] it has become a route of ever-increasing importance to all countries in the region, lowering the dependencies on the original trade route via the South China Sea to reach countries such as Japan and South Korea.

European states, despite also benefiting from the NSR, are more concerned with the sudden sharp commitment to the long-heralded US' pivot to Asia.[119] Being forced to take on more responsibilities as a security provider in its own region, the EU is pondering how to fill in this new role. With American nuclear weapons still present in Europe and European troop levels stabilising, the largest impact of America's actions is related to the maritime domain.

Reductions in the US 6th fleet and the eastward orientation of its 5th fleet leaves gaps to be filled. In addition to the strong reduction of the number of American vessels in the Euro-Atlantic, it also means that large bodies of waters such as the eastern part of the Mediterranean and the Red Sea now must be mainly patrolled by European navies.

118 'How Viable Is Arctic Shipping?'

119 Hillary Clinton, 'America's Pacific Century', *Foreign Policy* (blog), 2011, https://foreignpolicy.com/2011/10/11/americas-pacific-century/.

6.2. **Scenario setting**

Bolstered by the annexation of Taiwan China cautiously probes whether there are further opportunities to expand their maritime presence in the vicinity. Faced with a strongly militarised Japan and South Korea, Beijing decides to look to further consolidate its position in the South China Sea, relying on the nine-dash line to claim all territories in that area and accelerate the building of infrastructure on the Spratly and Paracel islands.

The Philippines Navy (PN), alarmed by Chinese ambitions in the area, publicly announces that it will use all elements at their disposal, including its submarines[120], to patrol their 'rightfully claimed' territories. Chinese officials retaliate by launching live-munition training exercises in the Spratly Islands. Fearing potential escalation, US officials try to persuade both parties to limit their presence in the Spratly Islands, to no avail.

When a close encounter between a PN submarine and a PLAN ASW (Anti-Submarine Warfare) frigate ends with a PLAN torpedo being shot at the PN submarine, the PLAN declares that all PN ships trying to enter the Spratly Islands will be fired upon. The Philippines, unfazed by China's escalatory language, invoke their Mutual Defence Treaty (MDT) with the United States.

The US, still impacted by the takeover of Taiwan, decides to react with full force, in the hope that China will retreat from the islands and cut its losses. However, the first US fighter jets appearing over the area take fire from a variety of anti-air defences installed on the islands. Surprised by the aggressiveness of the PLA and realising that a full-blown war might be erupting soon, the US president calls for an Article 4 consultation with NATO allies and asks for support and informs allies about its intentions in the conflict.

A French carrier group, already in the region as part of a rotational deployment, is waiting for instructions from the French President, who is in contact with the French ambassador to the EU Political and Security Committee (PSC). Having two options, it faces a dilemma. Does it withdraw from the conflict zone, or does it join in support of the US ships that are preparing for a large-scale conflict with the PLAN? The group would be reinforced by a surge in French submarine presence.

While the PSC would like to vote in favour of joining the US, to demonstrate its support for its allies and to show its resolve in upholding the rules based order, it is afraid that the utilization of the carrier group and any supporting vessels in the Indo-Pacific would drastically limit its capabilities closer to Europe. Reports of Russian and Iranian submarine activities in the Arabian Sea, further concern the PSC that sea lines of communication (SLOC) in the Red Sea and the Persian Gulf might be in danger of being disrupted. With only parts of a second carrier group present in Europe, the PSC is afraid that European states would not be able to defend these lines alone.

[120] https://www.navalnews.com/naval-news/2024/02/philippines-confirm-that-it-will-acquire-submarines/

6.3. **Security interests of the Netherlands**

The role that the Royal Netherlands Navy (RNLN) would play and the tasks it may perform are dependent on the strategic calculus that will be made on the political level. The extent of the actions undertaken by the Dutch government are based on the severity of the dangers to Dutch national interests.

The deterioration of maritime security in the direct environment of the Netherlands, coupled with a reduced US presence in the Euro-Atlantic, significantly impacts Dutch security interests as described by the 2023 Dutch National Security Strategy (NSS). While there may be government interest in joining any operations in the Pacific in a US-China scenario, this will come up against the myriad other state interests which will not go away.

First, the RNLN plays an important role in defending the islands in the Dutch Caribbean.[121][122] The Caribbean drug trade and flows of refugees and migrants from Venezuela, combined with the occurrence of natural disasters means that the RNLN needs to provide ships for both law enforcement and disaster relief.[123]

Second, as a seafaring country, the Netherlands is strongly dependent on international maritime trade, utilising maritime shipping for 90% of its imports and for 66% of its exports.[124] Therefore, the threat of disruption to a SLOC would be taken seriously, as it could negatively affect the 'vitality of the Dutch economy', one of the state's key interests.[125] As demonstrated by the Houthi rebels in Yemen, it does not take a tremendous amount of resources to disturb the flow of international trade.[126]

Next, there are the threats that would increase the 'instability of states bordering the Kingdom of the Netherlands and the direct vicinity of the European Union.'[127] States in the direct vicinity of the EU such as Libya and Syria border the Mediterranean Sea and are already unstable. Reductions in the enforcement of arms embargoes in Mediterranean could lead to increases in the smuggling of drugs[128], weapons[129], or human trafficking[130], all of which could further fuel the civil wars taking place in these countries as well as increasing the strain on southern European governments.

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121 Rijksoverheid, 'De Veiligheidsstrategie Voor het Koninkrijk Der Nederlanden'.

122 Defensienota 2024 | Beleidsnota | Defensie.nl

123 Ministerie van Defensie, 'Patrouilleschip (OPV) - Koninklijke Marine - Defensie.nl', webpagina (Ministerie van Defensie, 3 May 2023), https://www.defensie.nl/onderwerpen/materieel/schepen/patrouilleschepen.

124 'About The Dutch Maritime Network', Nederland Maritiem Land, accessed 18 April 2024, https://maritiemland.nl/en/about-the-dutch-maritime-network/.

125 Rijksoverheid, 'De Veiligheidsstrategie Voor Het Koninkrijk Der Nederlanden' p41, 2023, https://www.rijksoverheid.nl/documenten/publicaties/2023/04/03/veiligheidsstrategie-voor-het-koninkrijk-der-nederlanden.

126 Robert Wright, 'Ships Shun Red Sea and Suez Canal despite Reduced Houthi Menace', *Financial Times*, 12 February 2024, sec. Shipping, https://www.ft.com/content/1f0977aa-4b71-4e73-bf36-bf306ef4bbbe.

127 Rijksoverheid, 'De Veiligheidsstrategie Voor Het Koninkrijk Der Nederlanden' p41, 2023, https://www.rijksoverheid.nl/documenten/publicaties/2023/04/03/veiligheidsstrategie-voor-het-koninkrijk-der-nederlanden.

128 'Syria, Captagon and Geopolitics: From Magic Bullet to Placebo', 18 June 2024, https://rusi.orghttps://rusi.org.

129 Matthias Schwarz, 'From Legal to Illegal Transfers: Regional Implications of Weapon Flows to Libya', *PRIF BLOG* (blog), 10 December 2020, https://blog.prif.org/2020/12/10/from-legal-to-illegal-transfers-regional-implications-of-weapon-flows-to-libya/.

130 'The War Against Human Traffickers in Libya', accessed 20 June 2024, https://carnegieendowment.org/sada/2023/08/the-war-against-human-traffickers-in-libya?lang=en.

Closer to home, the North Sea is used for a range of activities, such as trade, communication and energy generation, steadily increasing its importance to the Netherlands.[131] The rising amount of underwater critical infrastructure in combination with heightened geopolitical tensions, has made protection of North Sea infrastructure already a key priority for the Dutch Government.[132] Actors such as Russia that have made investments specifically in anti seabed-infrastructure capabilities[133], could therefore exploit the difficulties in undersea surveillance to target energy and communication infrastructure, leading to 'the disruption of daily life'[134] in the Netherlands, another vital interest.

Possible Dutch support for US operations in the Indo-Pacific, would relate to trying to dissuade China from 'violation of state sovereignty, peaceful coexistence and peaceful conflict resolution,'[135] though the Dutch economic relationship, as with all of Europe, would have to be balanced against this interest. Further, given the range of areas above, such support may not be possible given more limited means that cannot be applied to a growing list of interests.

6.4. **(Potential) roles for the RNLN**

In this scenario, the RNLN could have two specific roles. One role would be to support the US in their endeavour to restore the rights of the Philippines to navigate in the vicinity of the Spratly Islands, while simultaneously deterring China from unilaterally claiming areas. Another role would be to provide security to its immediate maritime interests ranging from the North Sea to the Arabian Sea and everything in between. This second role would be done within the framework of the European Union or NATO, depending on the extent of American presence. Whether the RNLN will be able to perform two roles at the same time is the main question related to this scenario. In the second case at least, it would be require more European responsibility for European maritime security without an American backstop. To answer this question, we will look at the tasks that the RNLN already faces from fulfilling its role as a local security provider and see to what extent there is any spare capacity allowing for engagements further abroad.

6.5. **(Potential) tasks for the RNLN**

Protecting critical infrastructure in the North Sea

Since an ever-increasing amount of critical infrastructure is built outside of the territorial waters of the Netherlands, where the government has no authority to enforce security measures, proactively protecting the infrastructure is difficult.[136] As a result, actors with bad intentions should be deterred to undertake these actions in the first place.

131 Frank Bekkers et al., 'The High Value of The North Sea', n.d.

132 Rijksoverheid, 'De Veiligheidsstrategie Voor Het Koninkrijk Der Nederlanden' p31, 2023, https://www.rijksoverheid.nl/documenten/publicaties/2023/04/03/veiligheidsstrategie-voor-het-koninkrijk-der-nederlanden.

133 'Stalking the Seabed: How Russia Targets Critical Undersea Infrastructure', 20 June 2024, https://rusi.orghttps://rusi.org.

134 Rijksoverheid, 'De Veiligheidsstrategie Voor Het Koninkrijk Der Nederlanden' p41, 2023, https://www.rijksoverheid.nl/documenten/publicaties/2023/04/03/veiligheidsstrategie-voor-het-koninkrijk-der-nederlanden.

135 Ibid.

136 Bekkers et al., 'The High Value of The North Sea', p33.

A first category of threats emanates from below the surface, with UUVs and submarines specifically designed to manipulate items underwater posing the largest threats to underwater infrastructure. As most of these UUVs require a regular sized 'mothership' submarine to traverse large distances, the ASW capabilities designed for normal submarines remain useful for detection[137].

Below the surface, UUV connected to a regular submarine could patrol the North Sea to detect and potentially deter Russian submarines and its UUV from violating NATO territory or engaging in suspicious activities at the risk of being monitored and caught in illicit activities. On the surface, the RNLN could utilize the ASW frigates that are specifically equipped with torpedoes and sonar equipment, especially in combination with the NH-90 helicopters capable of performing ASW above surface or a future unmanned system.[138]

A second category of threats are the surface vessels. Situated next to the English Channel, the world's busiest waterway from where hundreds of commercial vessels make their way daily into the North-Sea[139], Russia's commercial vessels also play an important role. Dating from the Soviet era, civilian vessels have been co-opted into gathering surveillance and performing sabotage actions[140] which still is the case, with at least 160 Russian ships suspected to have spied on critical infrastructure in the North-Sea in the last decade.[141]

Detecting whether ships are spying is not easy and is done either manually[142] or through the usage of algorithms and machine learning to allow for the identification of irregular patterns.[143] Since both methods require an enormous amount of data, cooperation between the government and the private sector is essential to raise situational awareness and obtain more data points. Marked ships that would exhibit suspicious behaviour could subsequently be boarded, as the 1884 Cable Convention allows navies to board and search ship in international waters if they are believed to tampering with undersea cables.[144]

Protecting critical infrastructure in the North Atlantic

Based on the greater distances and depths involved in the Atlantic Ocean, in combination with fewer commercial vessels in the neighbouring areas, the main threat will emerge from Russian submarines below the surface, instead of surface level commercial vessels.

To deter these Russian submarines, ASW activities should be prioritised. Patrols of attack submarines below surface, ASW frigates on the surface and MPA's above surface would make it increasingly difficult for Russian submarines to engage in illicit activities, while increasing the risk of being caught red-handed.

137 'Stalking the Seabed'.

138 'D-Brief Project "Toekomst van de Nederlandse Onderzeedienst"', Pub. L. No. Kamerstuk 34 225 nr 52 van 15 maart 2024, p52.

139 'These Are the World's Most Vital Waterways for Global Trade', World Economic Forum, 15 February 2024, https://www.weforum.org/agenda/2024/02/worlds-busiest-ocean-shipping-routes-trade/.

140 'Stalking the Seabed'.

141 'Ruim 160 Russische schepen verdacht van spionage kabels en leidingen in Noordzee', De Tijd, 20 June 2024, https://www.tijd.be/politiek-economie/belgie/algemeen/ruim-160-russische-schepen-verdacht-van-spionage-kabels-en-leidingen-in-noordzee/10551030.html.

142 'Ruim 160 Russische schepen verdacht van spionage kabels en leidingen in Noordzee'.

143 'Stalking the Seabed'.

144 'Stalking the Seabed'.

Preventing Organised Crime in the Mediterranean Sea

The Mediterranean Sea has become a hotspot for the trafficking of drugs, weapons and humans. Civil wars in Libya and Syria render the local authorities incapable to control these flows, allowing migrants from the Sahel or drugs from Afghanistan to find its way to Europe through these countries.[145] Whilst several governments are trying to solve this at a national level, an important gap still remains when it comes to international cooperation[146].

International cooperation on the Mediterranean is currently limited to two operations.

- **EUNAVFOR MED Irini**, a European operation enforcing the arms embargo to Libya while additionally disrupting the operations of human traffickers and smugglers.[147] The results of the embargo have mixed at best, as a result of Turkey's continuous support of the opposition in Libya, refusing their ships to be checked on potential arms supply.[148]
- **Operation Sea Guardian,** a NATO operation focused on upholding the freedom of navigation in the Mediterranean as well as conducting maritime interdiction to suspect vessels, fighting the proliferation of weapons of mass destruction and protecting critical infrastructure.[149]

While these operations ensure safe passage through the Mediterranean for international maritime trade, criminal organizations remain active on the mainland and coastlines of the unstable states surrounding the Mediterranean. To halt organized crime from further expanding and potentially even destabilising southern parts of Europe, this means that at a minimum the same commitment should be freed up to continue guaranteeing safe passage through the Mediterranean.

To effectively deter potential terrorist attacks on container ships and conduct intercept suspected drug smugglers, the operations require both frigates and possibly a retention of ocean-going patrol vessels (OPV) should frigates be unable to fulfil this role in combination with their other tasks.

Preventing Organised Crime in the Caribbean Sea

Located close to Colombia and Venezuela, the Dutch part of the Caribbean has always been an interesting midpoint for the transportation of drugs, weapons and illegal immigrants.[150] The continuing political turmoil in Venezuela, situated only a few dozen kilometres from the islands, exacerbates this problem.[151] As a result, the RNLN has a permanent presence with at least one frigate to maintain the political stability of the islands. This involves patrolling the seas to intercept smugglers and help local police with law enforcement.[152]

145 Giacomo Persi Paoli and Jacopo Bellasio, 'Against the Rising Tide: An Overview of the Growing Criminalization of the Mediterranean Basin', 2017.

146 Persi Paoli and Bellasio.

147 'Operation EUNAVFOR MED IRINI: Mission', *Operation Irini* (blog), accessed 28 August 2024, https://www.operationirini.eu/wp-content/uploads/2020/07/6.RHIB-speeding-Copy.jpg.

148 'Operation IRINI: Statement by the Spokesperson on the Recent Inspection of a Turkish Vessel | EEAS', accessed 28 August 2024, https://www.eeas.europa.eu/eeas/operation-irini-statement-spokesperson-recent-inspection-turkish-vessel_en.

149 NATO, 'Operation Sea Guardian', NATO, accessed 28 August 2024, https://www.nato.int/cps/en/natohq/topics_136233.htm.

150 Adviesraad Internationale Vraagstukken, Veiligheid en rechtsorde in het Caribisch gebied p16, 2024.

151 Ibid.

152 Ibid, p25.

Disaster relief

The Caribbean part of the Kingdom is often struck by natural disasters such as hurricanes, with the notable example of hurricane Irma that damaged large parts of Sint-Maarten during her passage in 2017 and required over 1000 Dutch soldiers to maintain societal stability.[153] Both support ships and amphibious ships are therefore regularly used to deal with disaster relief situations after tropical storms, or in the case of health crises such as the corona crisis.[154]

Protecting Sea Lines of Communication in the North Atlantic Ocean

As the second most connected country in the world, protecting the SLOCs is of utmost importance for the Netherlands.

As the second most connected country in the world, protecting the SLOCs is of utmost importance for the Netherlands.[155] Not only are these sea lines important for international trade and therefore the vitality of the Dutch economy, but security reasons also come into play, with the ports of Rotterdam as the main point of access for US men and material in case of a Russian incursion of NATO territory.[156]

With NATO allies dominating the North Atlantic ocean, the only way adversaries could try to disrupt the SLOC 's between the US and Europe would be through the usage of submarines, which in turn would require the RNLN to utilise their ASW capabilities above, on and below water, as explained earlier in this section.

Protecting Sea Lines of Communication in the Red Sea and Persian Gulf

As demonstrated by the continuing Houthi attacks on cargo ships and oil tankers passing the Bab-El-Mandeb strait on their way to Europe[157], safeguarding the SLOC's also requires ships with defensive capabilities against incoming missiles and planes such as the RNLN's LCF's which are able to protect several ships at the same time. [158] With the US and the UK currently taking the lead in suppressing enemy fire and retaliating[159] and Europeans mainly providing defensive capabilities through operation Aspides [160] there might be a time where the Europeans and therefore the RNLN will have to fill in the gaps. As 20% of the world trade passes through the Gulf of Aden[161], it is no surprise that the RNLN ships are already active in region and are likely to continue to do so. Such SLOCs will remain no less critical in 2040-2050 than they are presently.

153 Ibid, p21.

154 Defensie, 'Joint logistic Support Ship (JSS) - Koninklijke Marine - Defensie.nl'.

155 'DHL Global Connectedness Report', 2024.

156 The Telegraph, 'Nato Maps out Plan to Block Russian Invasion', *The Telegraph*, 4 June 2024.

157 Robert Wright, 'Attack on Oil Tanker in Red Sea Threatens "Severe Ecological Disaster"', *Financial Times*, 24 August 2024, sec. Houthi movement, https://www.ft.com/content/7f886279-fecb-4410-b402-fbf85b9411b1.

158 Defensie, 'Luchtverdedigings- en commandofregat (LCF) - Koninklijke Marine - Defensie.nl'.

159 'US, U.K. Launch Strikes Against Houthi Targets in Yemen to Protect Red Sea Shipping', US Department of Defense, accessed 29 August 2024, https://www.defense.gov/News/News-Stories/Article/Article/3665898/us-uk-launch-strikes-against-houthi-targets-in-yemen-to-protect-red-sea-shipping/https%3A%2F%2Fwww.defense.gov%2FNews%2FNews-Stories%2FArticle%2FArticle%2F3665898%2Fus-uk-launch-strikes-against-houthi-targets-in-yemen-to-protect-red-sea-shipping%2F.

160 'EUNAVFOR OPERATION ASPIDES | EEAS', accessed 29 August 2024, https://www.eeas.europa.eu/eeas/eunavfor-operation-aspides_en?s=410381.

161 'About MSCHOA', accessed 29 August 2024, https://on-shore.mschoa.org/about-mschoa/.

6.6. **Framework and partners**

It is quite unlikely that there would be a NATO or common EU force responding to such a major contingency in the Pacific. By far the most important partner in this regard would be the United States Navy, which would provide the overarching theatre command role for coalition forces in the region. Secondarily, partnership with the Filipino forces would be vital.

6.7. **Capabilities**

Protecting Undersea Infrastructure

Since undersea infrastructure is most vulnerable from attacks underwater, we need to look at the RNLN ASW capabilities to see if and how the RNLN could defend it.

ASW can be performed above the surface, on the surface water and below the surface. The RNLN capabilities below surface would be connected to the number of submarines and UUV's that the RNLN could field in the vicinity of the underwater infrastructure to deter other countries from attacking it and to respond if other countries did decide to attack them. Currently the RNLN is in the process of replacing their submarines, reducing the number of submarines available from four to two for almost a decade, only moving back to four submarines by late 2030's.[162] As a result, the RNLN sub-surface ASW capabilities will be limited in the coming decade.

ASW can also be performed on the surface. Currently there are both M-frigates and LCF frigates that have the capacity to destroy submarines. However, these capabilities will be enhanced when the current two M-frigates will be replaced by two dedicated ASW frigates which are expected to be operational by the beginning of 2031.[163] In conclusion, this means that the RNLN surface ASW capabilities will increase strongly towards the end of decade.

ASW above the surface is mostly performed by MPA's. However, the RNLN MPAs have decreased from 13 P3 Orion aircraft in 1990 to zero in 2019[164], thereby reducing the Dutch ASW capacities above surface to the NH-90 maritime helicopter, which, amongst other functions, can be utilised for ASW. Therefore, above surface ASW capabilities will remain very limited. The lack of MPAs is a serious capacity shortfall, which limits the contributions the RNLN can give to the NATO alliance. The RNLN will have to invest in procurement, crew recruitment, training and sustainment if it envisions a role in NATO's possible ASW missions above the surface.

Preventing Organised Crime

The RNLN currently has four OPV's, with one permanently assigned to the Caribbean in a concerted effort to combat organised crime there.[165] While its main function is to guard the North-Sea, it occasionally also forms part of larger coalitions.[166] With organized crime most

162 D-Brief project 'Toekomst van de Nederlandse onderzeedienst'.

163 'D-Brief Project 'Vervanging M-Fregatten (ASWF)', Pub. L. No. Kamerstuk 27830 nr 393 van 3 april 2023 (n.d.).

164 Ibid, p67

165 Defensie, 'Patrouilleschip (OPV) - Koninklijke Marine - Defensie.nl'.

166 Ibid.

prevalent in the Mediterranean it means that the OPV's already have to be in three places at the same time. This requirement puts an untenable operational strain on the OPV's meaning that the number of OPV's should be increased if the RNLN would like to play a meaningful role in combatting organised crime in the Mediterranean. However, the OPV and Landing Platform Dock (LPD) ships are going to merge into one new class, the Amphibious Transport Ship (ATS) of which six are going to be built by mid-2030.[167] Made specifically for amphibious operations, it is also capable of providing humanitarian aid and combatting organized crime.[168] As a result, it seems like the RNLN capacity to combat crime will slightly improve, with the important caveat that no disaster relief operations are taking place at the same time.

Providing disaster relief

Disaster relief is an essential part of the RNLN tasks, especially in the Caribbean Sea. Therefore, having ships capable of performing emergency humanitarian tasks, such as the LPD, the Joint logistics Support Ship (JSS) and possibly even the M-frigate, are of good use. However, with only two LPD's available and one JSS, there is not a lot of spare capacity available, especially when these ships are being used in different constellations, for instance in amphibious operations or as logistics ship in an anti-piracy mission. Merging the OPV and LPD into ATS will only improve the capacity of disaster relief if the number of ships necessary for patrolling activities would remain low, an assumption that might not hold true.

Protecting Sea Lines of Communication

Protecting the SLOC is a task for the RNLN LCF and M-frigates, to keep the largest maritime trading routes safe and thus open for free trade. Currently the RNLN has four LCF frigates and two M-frigates with the M-frigates turning into dedicated ASW frigates by 2030. With only two ASW frigates it is highly unlikely that both will be operating at the same time for an extended period, probably limiting the ASW frigate to only one mission at a time. Given the need for ASW frigates in the North Atlantic Ocean, it is likely that the RNLN ASW capabilities will be focused in that area.

The four LCF frigates can be deployed in a number of regions, first and foremost to safeguard the seas surrounding Europe, such as the North-Sea and the Mediterranean. Next, choke-points such as the Bab El Mandeb strait and other hotspots such as the horn of Africa come to mind. However, it has to be taken into account that the RNLN can only operate two LCF's at the same time, with a maximum of three.[169] If one LCF is already part of a Standing NATO Maritime Group (SNMG) it means that in most cases only one LCF remains available for other missions.

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167 'Twee nieuwe scheepstypes op tekentafel - Materieelgezien', webpagina, accessed 2 September 2024, https://magazines.defensie.nl/materieelgezien/2024/02/twee-nieuwe-scheepstypes-op-tekentafel.

168 Ibid.

169 'Defensienota 2022 - Sterker Nederland, Veiliger Europa', Pub. L. No. Kamerstuk 36 124 nr 31 van 17 mei 2023, p6.

6.8. **Conclusion**

In this scenario we looked at the potential role of the RNLN in an emerging conflict between the US and China. More specifically, we attempted to see how the RNLN could combine its engagements as a regional security provider with engagements further abroad, listing all responsibilities emanating directly from its environment. We structured these responsibilities along four distinct operations, protecting undersea infrastructure, preventing organised crime, providing disaster relief and protecting sea lines of communication. Analysing the capabilities of the RNLN on these four distinct operations, led us to the following conclusions.

RNLN capacities to protect its undersea infrastructure, prevent organised crime in the wider Kingdom, to provide disaster relief and protect sea lines of communication in the event of limited US support is limited at best. As detailed in the capabilities section above, even reaching more ambitious growth targets does not mean the RNLN will be able to secure Dutch and European interests every all at once.

Looking at the main question of this scenario, it is the case presently and will be for the foreseeable future, that the RNLN lacks the capability to back up the US Navy in the Pacific while securing its other interests. In the event of a US-China conflict in the Pacific, European navies would become solely responsible for all the operations described above, drastically increasing the number of ships necessary to maintain stability in the European periphery.

The RNLN currently is equipped to perform only the most essential of tasks, often part of a larger coalition. If the US no longer forms part of that coalition, the RNLN will have to step up its investments to safeguard its direct interests, with only indirect support to the US in a faraway conflict remaining feasible.

7. **Scenario four:** 'Wild West in the High Seas'

7.1. **Background / context**

In 2040 the process of the green transition is expected to be in full swing to combat the damaging effects of climate change. Structural investments in green technologies and the resulting products, such as batteries in electric cars, will require an enormous increase in the supply of certain metals and rare earth materials.[170] Since supply will not be able to keep pace with the burgeoning demand, prices will increase, thereby increasing the effort of suppliers to look for the sought-after materials in other places.

In this specific zone, the nodules would add up to 7,3 billion tons of manganese, 58 million tons of cobalt, 340 million tons of nickel and 290 million tons of copper.

One of these places might be the Clarion-Clipperton Zone (CCZ), an area of about 4,5 million square kilometres in the Pacific Ocean, situated between Hawaii and Mexico (see Figure 12). Based on estimates from the International Seabed Authority (ISA), 21 to 30 billion tons of polymetallic nodules (potato-sized mineral concretions) rest on the seabed[171]. The reason these nodules are valuable is because they consist of different much sought after raw materials such as manganese, copper, nickel and cobalt[172]. In this specific zone, the nodules would add up to 7,3 billion tons of manganese, 58 million tons of cobalt, 340 million tons of nickel and 290 million tons of copper.[173]

Due to soaring raw material prices, the CCZ might well be a zone where large-scale deep-sea mining takes place. Despite environmental objections surrounding the disturbance of surface-based life we assume that the urge to combat climate change on the surface will overrule these concerns. Outside the territorial waters or even economic zones of any country (See Figure 13), the CCZ is fully situated in international waters. As a result, every country has the right to traverse or to perform fishing activities in this zone.[174] In addition, since the CCZ is an enormous zone, it would be a daunting task convincing other countries to fully circumvent it. In other words, while the exploitation of the seabed will be strictly delineated into different concessions granted by the ISA, the surface of these zones would be free for all to navigate.

170 IEA (2021), *The Role of Critical Minerals in Clean Energy Transitions*, IEA, Paris https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

171 'Technical Study 6: A Geological Model of Polymetallic Nodule Deposits in the Clarion-Clipperton Fracture Zone - International Seabed Authority', 11 January 2021, https://www.isa.org.jm/publications/technical-study-6-a-geological-model-of-polymetallic-nodule-deposits-in-the-clarion-clipperton-fracture-zone/.

172 IEA (2021), *The Role of Critical Minerals in Clean Energy Transitions*, IEA, Paris

173 Ibid

174 UN General Assembly, Convention on the Law of the Sea, -, 10 December 1982, https://www.refworld.org/legal/agreements/unga/1982/en/40182 [accessed 17 April 2024]

Figure 12. Clarion Clipperton Zone[175]

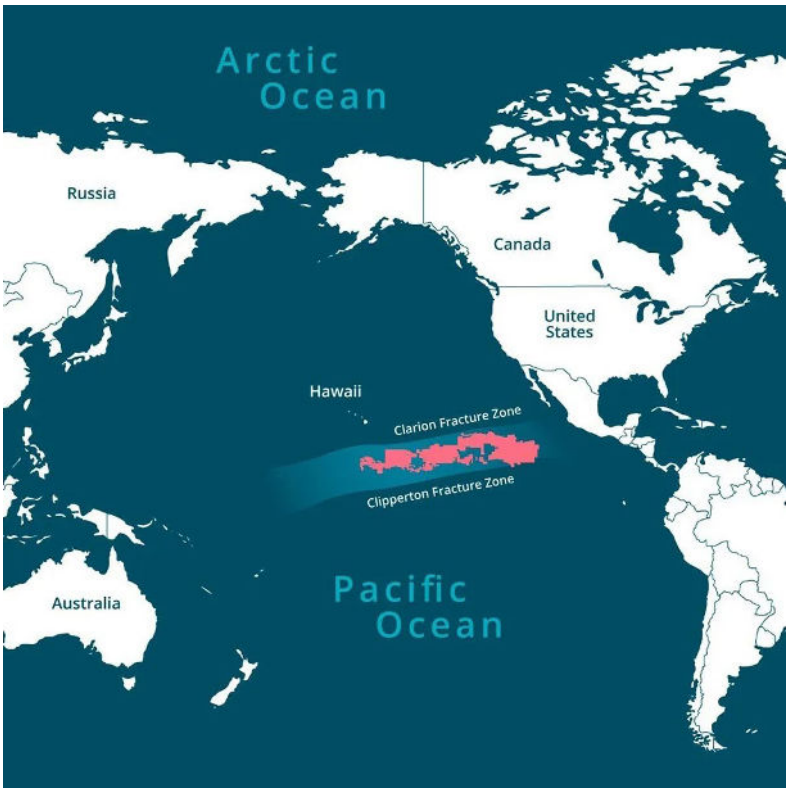
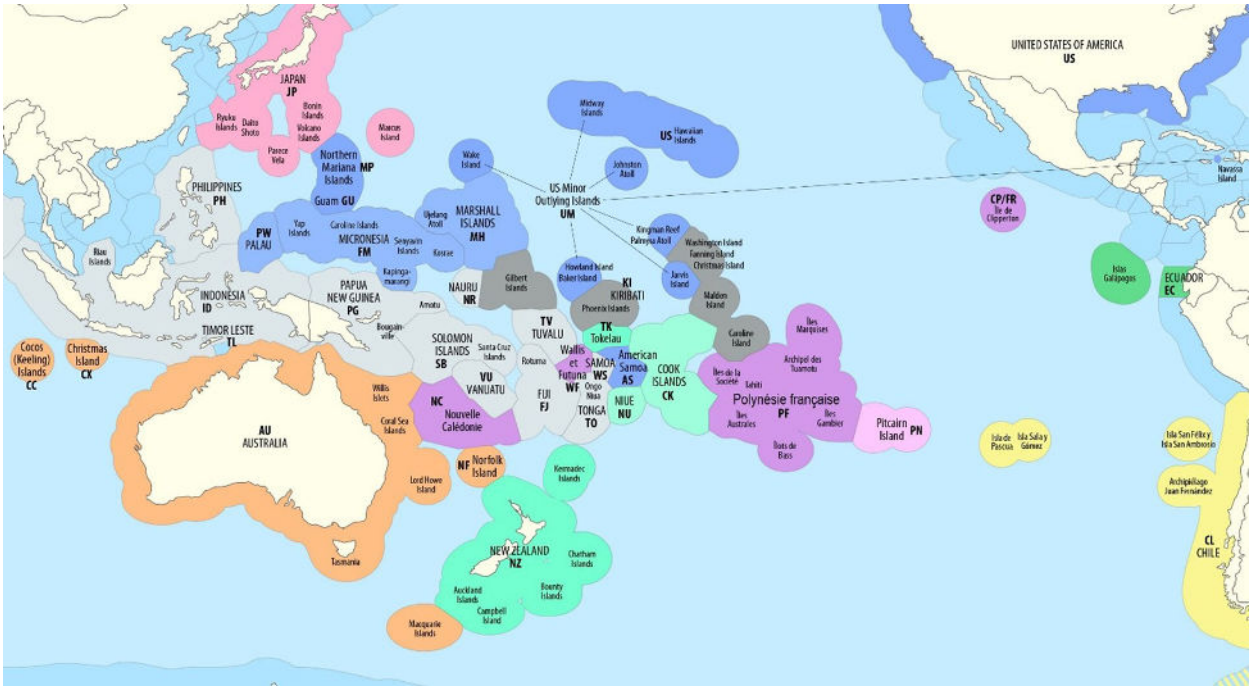


Figure 13. Exclusive Economic zones in the vicinity of the Clarion Clipperton Zone [176]



175 Majed Shafi, 'Deep Sea Mining: Environmental Boon or Bane?', *Medium* (blog), 12 April 2024, https://medium.com/@majed_shafi/deep-sea-mining-environmental-boon-or-bane-21fa6a8faef9.

176 'Wikiwand - List of Sovereign States and Dependent Territories in Oceania', Wikiwand, accessed 17 April 2024, https://www.wikiwand.com/en/List_of_sovereign_states_and_dependent_territories_in_Oceania.

7.2. **Scenario setting**

Who will enforce the rules that have been agreed upon by ISA and the UN and who will protect ships from actors that try to circumvent these rules? Since the countries that will be exploiting the seabed will include states from around the world, a solution will have to be discussed at the UN-level. Even in this case, however, it seems implausible that the US or China will allow the other to 'protect' their respective ships.

Reluctant to wait for the creation of a sound security framework, the avenue is that, with negotiations at the UN level, the individual countries with exploitation contracts will try to provide their own security. Since the US Pacific fleet is in Hawaii[177], it would come as no surprise that some countries would ask the US fleet for protection before any UN guidelines would have been approved. This would not be the case for the Chinese or Russians, each of which would try to maintain its own security.

Reluctant to wait for the creation of a sound security framework, the avenue is that, with negotiations at the UN level, the individual countries with exploitation contracts will try to provide their own security.

As a result, European countries may produce a European mission to protect European companies likely under the impulse of France, which is a proponent of strategic autonomy[178] and is in the possession of a blue water navy and substantial Pacific territories.[179] French Polynesia's Tahiti is close to the CCZ and could serve as a replenishment hub from which supplies could be delivered to the different ships and where small repairs could be performed.

The situation in the CCZ would be tense from the beginning. The lack of a comprehensive regulatory framework in combination with the large cost of the mining operation itself immediately exacerbates the uncertainty and thereby increases the urge for all actors involved to mitigate all risks. This situation would practically force state actors such as the US, France, or the UK to send out patrol ships from the beginning, to counter any disturbances that might arise from or between other actors near commercial activities. The subsequent continuous presence of US patrol ships would likely force the Chinese or Russians to also send their patrol ships to counter the US presence.

Due to the fragility of deep sea mining and the distance that is involved from the surface to the seabed, it would make sense to work with Unmanned Underwater Vehicles (UUV), that can bridge this distance and provide a overview of the mining operations on the seabed through the usage of sonar, or perhaps even camera's. This means that, in addition to the patrols taking place on the surface, UUVs will simultaneously scan the mining operations on the seabed and the immediate environment, serving as a sort of mobile security camera.

Importantly, industrial actors will outnumber military forces in the region at scale and may hire their own security measures to protect their investments. Depending on who exactly is hired and to which rules of engagement and laws they ascribe to, this could be a positive development in that military forces are not expected to become involved in protecting far-off industrial interests with limited capabilities.

While UUVs would be deployed as a monitoring tool, a strictly defensive action, there is no guarantee that other actors will perceive it that way. The resulting deployment of UUV's is

177 https://www.cpf.navy.mil/

178 Ana E. Juncos and Sophie Vanhoonacker, 'The Ideational Power of Strategic Autonomy in EU Security and External Economic Policies', *JCMS: Journal of Common Market Studies* n/a, no. n/a, accessed 15 April 2024, https://doi.org/10.1111/jcms.13597.

179 Kirchberger, Sarah. "Evaluating maritime power: the example of China." In *Power in the 21st Century: International Security and International Political Economy in a Changing World*, pp. 151-175. Berlin, Heidelberg: Springer Berlin Heidelberg, 2012.

again the type of action that according to the security dilemma could be perceived as potentially offensive, thereby further militarizing the area.

As a reaction, one could deploy offensive UUV's, capable of sabotage, to disrupt mining operations from other companies. Other actions include the usage of deep-sea mines, to prevent UUV's from 'wandering off' into the domain of other companies. Finally, actual submarines might be involved in patrolling, or crossing the allotted areas, to signal to their counterparts their commitment to protecting their areas.

7.3. (Potential) roles for the RNLN

The most likely role of the RNLN would be to contribute to European efforts to protect companies' commercial rights under international law, meaning that European and Dutch companies should be able to have uninterrupted freedom of action within the predefined framework of UNCLOS and the ISA. However, with a navy capable mainly of regional power projection, meaning that it can project power only a limited range beyond its Exclusive Economic Zone (EEZ)[180], the RNLN would be unable to act alone in the CCZ. Therefore, it should partner with other European countries that individually would try to accomplish the same goal as the RNLN.

7.4. (Potential) tasks for the RNLN

Patrolling the seas

The main objective would be to patrol the seas to allow European companies to have uninterrupted access to the areas that they are allowed to mine. The presence of patrol ships would more be centred around showing the flag in a collective operation rather than engaging in any more significant activities.

Given that the CCZ is a vast area we previously assumed that ships could freely navigate the zone as circumventing it would be difficult. Therefore, it would come as no surprise that countries would work with no-go zones that would ensure a certain distance from factory ships. Therefore, we assume that a two layered approach to patrolling the seas will be taken, that would drastically improve the efficiency of the patrol ships. The first layer would entail passively patrolling the borders of the allotted areas, centred around showing the flag. Since this area itself would be already enormous, it could take some time before another passage takes place. A second, more actively protected area would be the one surrounding the factory ships.

Search & rescue

The International Maritime Organization's (IMO) 1979 Search and Rescue (SAR) Convention established a global framework assigning coastal states specific geographical areas for SAR operations, ensuring worldwide coverage to rescue people in distress anywhere.[181]

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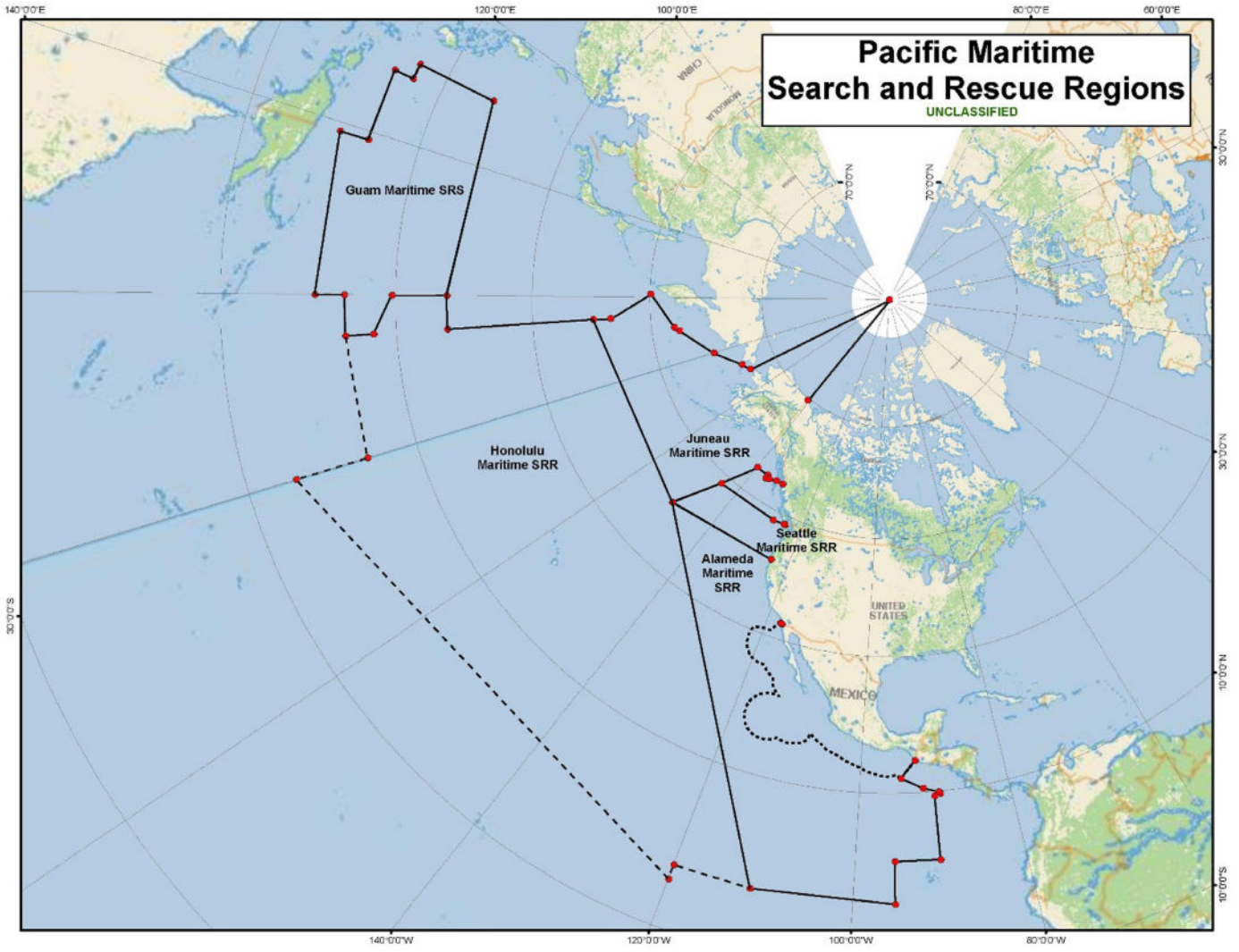
180 Bekkers, Frank, Patrick Bolder, Esther Chavannes, Willem Oosterveld, Rob de Wijk and Jan Frederik Braun. *Geopolitics and maritime security: A broad perspective on the future capability portfolio of the Royal Netherlands Navy*. The Hague Centre for Strategic Studies, 2019.

181 International Maritime Organization (IMO), International Convention on Maritime Search and Rescue, 1403 UNTS, 27 April 1979, https://www.refworld.org/legal/agreements/imo/1979/en/45159 [accessed 17 April 2024]

The Honolulu Search and Rescue Region (SRR), an enormous zone of about 25,8 million square kilometres, covers the entire CCZ (see Figure 14) According to the SAR convention, it means that the entirety of the CCZ should be monitored by the American authorities to perform SAR whenever necessary. Monitoring, communicating, dispatching and all other actions are being done by the Joint Rescue Coordination Center (JRCC) in Honolulu. Obviously, the burden of this task will increase dramatically if numerous ships from different countries will start to come together in the CCZ. It would therefore make sense for the US and the EU to reach an agreement on this topic, through the division of labour, or by effectively working out an arrangement where the EU pays the US for the costs of the carried-out interventions.

Figure 14. Pacific Maritime Search and Rescue Regions[182]



182 'GMDSS Areas and Search and Rescue Areas | Navigation Center', accessed 17 April 2024, https://www.navcen.uscg.gov/gmdss-areas-and-search-and-rescue.

Environmental monitoring

A final part could be environmental monitoring. Already today there is a strong movement against the exploitation of the seabed based on the fact that there are no real insights on how strongly deep-sea mining would impact the deep sea.[183] In addition, large numbers of species use the polymetallic nodes as part of their ecosystem, thereby greatly risking upsetting their ecosystems.[184] Finally, there are also concerns that the plumes, both from scraping the seafloor as well as the sediment that is considered not useful disposed by the factory ships, can seriously impact the marine environment.[185]

Private industry could be a significant partner in this scenario, so much so that states may eschew security provision from the military in favour of private security companies (PSCs) at sea.

We expect that during the beginning of the exploitation phase, the ISA will ask the countries sponsoring the companies operating on the seabed, to monitor whether companies are adhering to the stringent environmental regulation that will be in place. Since these environmental checks will slow down the process of mining, we expect tensions between states with differentiating enforcement, as well as between the companies themselves and the state services attempting to enforce rulings. Reluctant to do this for each individual European country, a European body is most likely to emerge tasked with centralising these controls. Given the Netherlands' strong ambitions regarding climate change and ecology as a whole[186], it would not come as a surprise if it played a leading role in supporting the organization with the necessary mandate and equipment.

7.5. Framework and partners

Since the RNLN could be called upon to sustain a multinational mission far from Europe, it would need partners that share the same objectives. We assume that, facing the same limitations, most other European countries involved in the CCZ will promptly come together at the European level to cooperate.

The EU is most likely to come up with any mission, to support and protect the companies that are mining in the CCZ. Based on the naval capabilities, it would make sense that France, with its blue water navy[187] and strong advocacy for European strategic autonomy[188], would take a leading role in these missions. France's overseas territories, such as French Polynesia which are situated (relatively) close to the CCZ, could serve as a base from where to resupply ships, perform small repairs and launch SAR missions if necessary.

Private industry could be a significant partner in this scenario, so much so that states may eschew security provision from the military in favour of private security companies (PSCs) at sea. Underwater surveillance is already used by private actors to secure ports and shipping,

183 The impact of deep-sea mining on biodiversity, climate and human cultures, IUCN NL, https://www.iucn.nl/en/news/the-impact-of-deep-sea-mining-on-biodiversity-climate-and-human-cultures/

184 Ibid.

185 Ibid.

186 Rijksoverheid stimuleert duurzame energie, Ministerie van Algemene Zaken, https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/meer-duurzame-energie-in-de-toekomst#:~:text=Nederland%20werkt%20aan%20een%20energiesysteem,2-reductiedoel%20van%2055%25.

187 Kirchberger, Sarah. "Evaluating maritime power: the example of China." In *Power in the 21st Century: International Security and International Political Economy in a Changing World*, pp. 151-175. Berlin, Heidelberg: Springer Berlin Heidelberg, 2012.

188 Ana E. Juncos en Sophie Vanhoonacker, 'The Ideational Power of Strategic Autonomy in EU Security and External Economic Policies', *JCMS: Journal of Common Market Studies*, https://doi.org/10.1111/jcms.13597.

and it is quite possible that given the possibility of lucrative contracts PSCs may seek to begin acting underwater as well. Again, depending on who is involved and the nature of their behaviour, this may be a positive development, freeing the hands of military assets to act elsewhere and avoiding a possibly messy legal situation of military forces being directly involved in providing industrial security.

Given the Netherlands' status as 'gate to Europe' and the strong connection between its economy and maritime trade[189], it would likely be asked to play a role within the European mission, to provide the capabilities and materiel that are vital for the success of the operation.

Given the travel distance involved in shipping the nodes from the CCZ to Europe and back, it might make more sense to find a third country that could serve as an intermediate hub for both offloading as well as refining. This would reduce the downtime on the factory ships that perform the mining, as well as limiting the need for additional refinement factories in Europe, meaning that a country from preferably Latin or Central America could be included in the process. Additionally, US or Canadian facilities could be made available, particularly in the event of supporting search and rescue operations.

7.6. **Capabilities**

Based on the scenario and the roles above, what capabilities would the RNLN need? This scenario shows that the RNLN should at least be able to operate in it as part of a larger coalition if needed. It is important to remember that this assertion adds another area where the RNLN will have responsibilities, in addition to the Netherlands Antilles in the Caribbean and the North Sea at home. Even though the RNLN will operate within coalitions, it will be of the utmost importance to develop and maintain the capabilities that are usable in all different domains, to fulfil its responsibilities, whilst keeping it within budgetary boundaries.

Based on the analysis of the roles and the responsibilities for the RNLN in this scenario and considering the responsibilities of the RNLN in other areas, we found that the RNLN would need increases in its capacity for maritime patrolling. We offer two specific avenues via which the RNLN could increase its capabilities in this field and thereby make it more likely that it will be able to deal with its future tasks and responsibilities. We argue that the RNLN should invest more in both unmanned maritime patrol aircraft and possibly patrol vessels.

Unmanned maritime patrolling.

To effectively contribute to patrols far from Europe, it would be necessary for the RNLN to patrol both surface and air, requiring frigates and air platforms. Currently the RNLN has limited capacity in both.

MPAs are well suited to rapidly scan a vast area and provide intel on what is taking place below, on, or above the surface, which is especially suitable for the enormous areas that will need to be covered in the CCZ. In addition, MPAs can be used in the different areas where the RNLN will be needing them. Based on the location, it can be on the lookout for boats

189 Mark Rutte, 'De Veiligheidsstrategie voor het Koninkrijk der Nederlanden', p 17., https://www.rijksoverheid.nl/documenten/publicaties/2023/04/03/veiligheidsstrategie-voor-het-koninkrijk-der-nederlanden.

smuggling drugs from Latin America into the Caribbean, looking for non-state activists in the CCZ trying to disrupt mining operations, all the way to searching for signals of Russian submarines near the GIUK gap.

Finally, if due to a problem with the amount of patrol vessels available, the RNLN is unable to provide any to the joint mission in the CCZ, it can always help the alliance by suggesting to provide MPAs, which to a certain extent could also serve as a substitution for gathering intelligence.

A second element is the limited amount of patrol boats that the RNLN has available. Currently, the RNLN has four patrol vessels[190], that could serve the purpose of patrolling the CCZ. However, even if they were replaced by a future generation of frigates, this amount would be still too small to fulfil its tasks in the Netherlands Antilles as well as the CCZ.

Since it takes about three to four ships to be able to continuously use one boat on a mission (the others being in repair, or returning from the mission), there is obviously a gap here that needs to be addressed. Based on the current situation, the RNLN would have to choose between sending a patrol boat between the CCZ and the Netherlands Antilles.

One could argue that one of the six frigates that the RNLN currently has could be used, but here again, it should be considered that two frigates can be deployed at the same time. Today there is already one that takes part in the coalition against the Houthis[191], which means that if there is another escalation at sea and NATO is to react, the RNLN will be forced to make choices between patrolling or taking part of the action.

7.7. Conclusion

In this scenario, we highlighted the impact of increasing sea based economic activities on the RNLN, more specifically that of deep-sea mining in the Clarion Clipperton Zone. We subsequently expanded on the tasks and roles that the RNLN would have to play within this domain to help Dutch companies enjoy the rights that were endowed upon them through international law.

Since the RNLN is currently only a limited blue water navy, we looked at the partnerships that the RNLN would have to take on to be able to accomplish its tasks. We assumed that, given their cooperation and shared interests, it would be that a European mission would be formed to pool resources to accomplish the tasks for all participating European countries.

We found that an element of the RNLN duties within such a coalition would be to patrol the CCZ, either on sea or above sea. However, based on the current capacity of the RNLN, we saw that there is a significant underdevelopment of the RNLN patrol capabilities, partly because of the retirement of its MPA branch, in combination with a reduction in the amount of patrol vessels and frigates.

190 International Institute for Strategic Studies. 2024, *The Military Balance 2024, p120, Volume 124, Issue 1, Chapter 3: Europe.*

191 'Nederland stuurt fregat met militairen voor missie in Rode Zee', 7 March 2024, https://nos.nl/artikel/2511842-nederland-stuurt-fregat-met-militairen-voor-missie-in-rode-zee.

However, given the heavy involvement of private industry and PSCs into the future, it is more likely that the RNLN and indeed most European navies may not be involved in such efforts at all. Security could well be outsourced to PSCs operating underwater assets. Such a development would require close monitoring and reporting by any Dutch actors using such services to ensure adherence to the applicable laws and regulations regarding private security and the law of the sea.

In conclusion, we found that should such ambitions arise in the future, the RNLN would be best served by reinstating their MPA branch with unmanned systems and increase their number frigates to strengthen their patrolling capabilities that will be much needed in the nearby future.

8. Conclusions

This study has looked at two key trends that may change maritime security, namely long-term structural changes in global trade and shipping patterns and climate change. With these long-term trends in mind, we examined four scenarios set in the 2040-50 timeframe: (1) competition over the extraction of deep sea resources; (2) instability in Egypt, the Suez Canal and the Red Sea; (3) conflict with Russia over the Northern Sea Route; and (4) great power war between the United States and China. Extrapolating from these trends, we point out the risks of over-specialising in one area as the wide range of contingencies demands flexibility across forces. Further, should any scenarios occur simultaneously in the context of the structural economic and climactic issues, European and Dutch capabilities would be under serious strain to cope.

Extrapolating from these trends, we point out the risks of over-specialising in one area as the wide range of contingencies demands flexibility across forces.

Climate change, explored in chapter 3, is by far the most consequential issue for national security in the longer-term. Sea-level rise and associated coastal flooding in Europe, along with severe heat waves and the related increased frequency of droughts and wildfires is and will increasingly pose a direct threat to life for Europeans across the continent. States that are heavily dependent on coastal infrastructure, such as the Netherlands and Belgium, will be at particularly high risk from sea-level rise by 2050, with a possible existential risk by the end of the century. The deaths, injuries and evacuations seen during severe floods in July 2021 across northwestern Europe could become a far more frequent phenomenon. Given that Dutch responsibilities extend to both Europe and the Caribbean territories, itself a volatile area of climate risk, nearly guarantees a strain on resources by the middle of the century.

Separately, shifts in the global system will lead to a reorganisation of trade power along the world's sea lanes (chapter 2). The continued abstention of the United States from global trade arrangements, especially in the Asia-Pacific, along with the soon to be leading position of China in the global economy and its growing navy, will almost certainly lead to a more 'globalised' naval presence along major trade routes. China's economic relations in forums such as BRICS, which is itself set to expand, will only solidify the shift of the global trade and economic balance away from the Atlantic area and into the Pacific. When coupled with climate change, which is set to open the North Sea Route (NSR) as a viable year-round trade route, the long-standing 'policing' role of the US Navy and its allies will be diminished. Economic competition is set to accelerate over resources as well, as the essay in this report on seabed resource extraction shows.

Crises will continue to emerge. Economic precarity, weak or corrupt governance, military competition and a worsening climate will collude to spark and exacerbate conflicts by 2040-50 just as they do now. Vulnerable populations across North Africa and the Middle East will continue to face risks from disasters, economic inequality and civil conflict. The present proliferation of civil conflicts in the Sahel, Sudan and Libya could reverse its trend towards increased stability, though it is doubtful such a stability would be in connection to increased stability or rights for those who live in those states. Conversely, as seen in the case of the Tigray conflict in Ethiopia, recent protests against the government in Kenya and the civil war in Sudan, conflict could just as well remain the norm. The challenge is to remain responsive to what such conflicts may bring and the resultant international action through either the United Nations or EU could mandate.

This study does not predict the future but extrapolates current trends and ties them to current policy debates within the setting of four future scenarios illustrative of security challenges in the international arena that may arise in the decades to come. The overarching finding of this study has been that European states, including the Netherlands, will need to consider prioritisation and task discretion in ways that have not been necessary in recent decades. Strategies will no longer be able to straddle all issues with a vision of being capable of doing everything everywhere, especially without the enabling capabilities of the US Navy should political trends continue, or a major war begin in the Pacific. The means to enable a more focused strategy on key areas still requires flexibility across platforms, however, as needs are more likely to ebb and flow in response to specific crises rather than be continuously needed in one area. The finding here then is that expansion across flexible capabilities will likely be the most necessary path forward and that reasonably increased numbers allow for a more persistent RNLN presence across a range of tasks.

Strategies will no longer be able to straddle all issues with a vision of being capable of doing everything everywhere, especially without the enabling capabilities of the US Navy should political trends continue, or a major war begin in the Pacific.

Accordingly, to safeguard Dutch interests and contribute to wider European security, the key capability needs for the RNLN are:

- **The quantity of air and missile defence frigates**. The versatility of these assets makes them ideal for a range of tasks that could arise in the Mediterranean, Red Sea, European theatre, or the Caribbean. While niche in the air defence role, the signalling presence of these assets can contribute to missions outside of their major tasks and can support other missions. Greater numbers will likely be needed however, particularly if the US is unable to provide such frigates in key areas. Plans to replace the current four De Zeven Provinciën-class frigates with four of a future class could be expanded to a larger number, pending other requirements such as personnel. An expansion of an additional 2-4 frigates would allow for much greater flexibility. Further, should such frigates be procured in cooperation with other states, such as Germany, greater interoperability can contribute to European-led operations as well.
- **Anti-Submarine Warfare (ASW) capabilities**. Like the frigates described above, the flexibility of submarines to contribute to tasks across regions argues strongly for their continued procurement and modernisation. The current plan to develop four *Orka*-class submarines by the 2030s to replace the current *Walrus* fleet could be expanded as well, with an eye towards reducing risk from a reduced US naval commitment in a contingency with Russia. Beyond submarines, ASW enabling capabilities such as unmanned MPAs, UUVs and USVs will likely also be necessary at sufficient capacity to maintain operations for longer periods of time. UUVs and USVs will likely be organic to future frigates, which itself will require experimentation and training. It is noted that unmanned MPA capabilities may be cost prohibitive in the medium-term.
- **Digital infrastructure.** Most of the capabilities listed here require a backbone digital infrastructure to improve data processing from the increasing mass of sensors. This will include reliance on onshore civilian industry capabilities, as well as leveraging non-military opportunities such as the European Maritime Safety Agency's Integrated Maritime Data environment programmes. Coordination between various systems onboard and between platforms requires secure and near-assured communications that can operate within disrupted, intermittent, and low-bandwidth environments. This is especially pressing in areas where climactic conditions make such connectivity more difficult, such as in the Arctic. International cooperation should also be stressed here, as interoperable digital systems will be vital in the event of a conflict, especially in operations undertaken under a NATO flag. The Dutch Maritime Data Environment project should be accelerated, and NATO'S Digital Transformation Implementation Strategy should be fully resourced and supported by Dutch ministries, including RNLN command.

- **Reinforcing the Marine Corps**. The flexibility and expeditionary capacities of the Marine Corps should be maintained in perpetuity. Further, the Corps could be expanded beyond its current two Marine Combat Groups (MCGs) and expand its special operations squadrons. The range of tasks that will be necessary in light of simultaneous crises will pressure the regular Army in such a fashion that naval infantry will have to provide even more combat capability. This expansion could be reinforced by expanded roles to establish A2/AD bubbles by equipping at least one MCG with the Naval Strike Missile and establish a land-attack missile role for the Corps. This could reduce burdens for the Army in challenging areas such as the Arctic while also providing a unique capability to NATO.
- **Offshore patrol roles/Landing platform docks**. OPVs offer the ability to respond to localised issues in the Caribbean and near Europe's coasts, while also being able to contribute to capacity building and naval diplomacy missions further afield if requested. The current plan to replace the *Holland*-class OPVs and the *Rotterdam*-class landing platform docks with six multi-use platforms is useful and allows for surge capacity across tasks. It should also be clarified that frigates could provide certain patrol roles, though this would be more limited in shallower littorals. Ensuring that at least two have sufficient medical capabilities would mitigate risks from concurrent disaster response crises.
- **Personnel recruitment and retention**. By far the most serious risk, ensuring that any expansion of the RNLN has sufficient crew capacity, replacements, onshore support staff and reserves will be crucial in both a national capacity sense and in a wider EU and NATO context. This includes maintaining technical specialties in logistics and medical crew and ensuring sufficient reserve depth in those areas. Further, recruitment for the Marine Corps should remain a priority.

The Hague Centre
for Strategic Studies

HCSS
Lange Voorhout 1
2514 EA The Hague

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