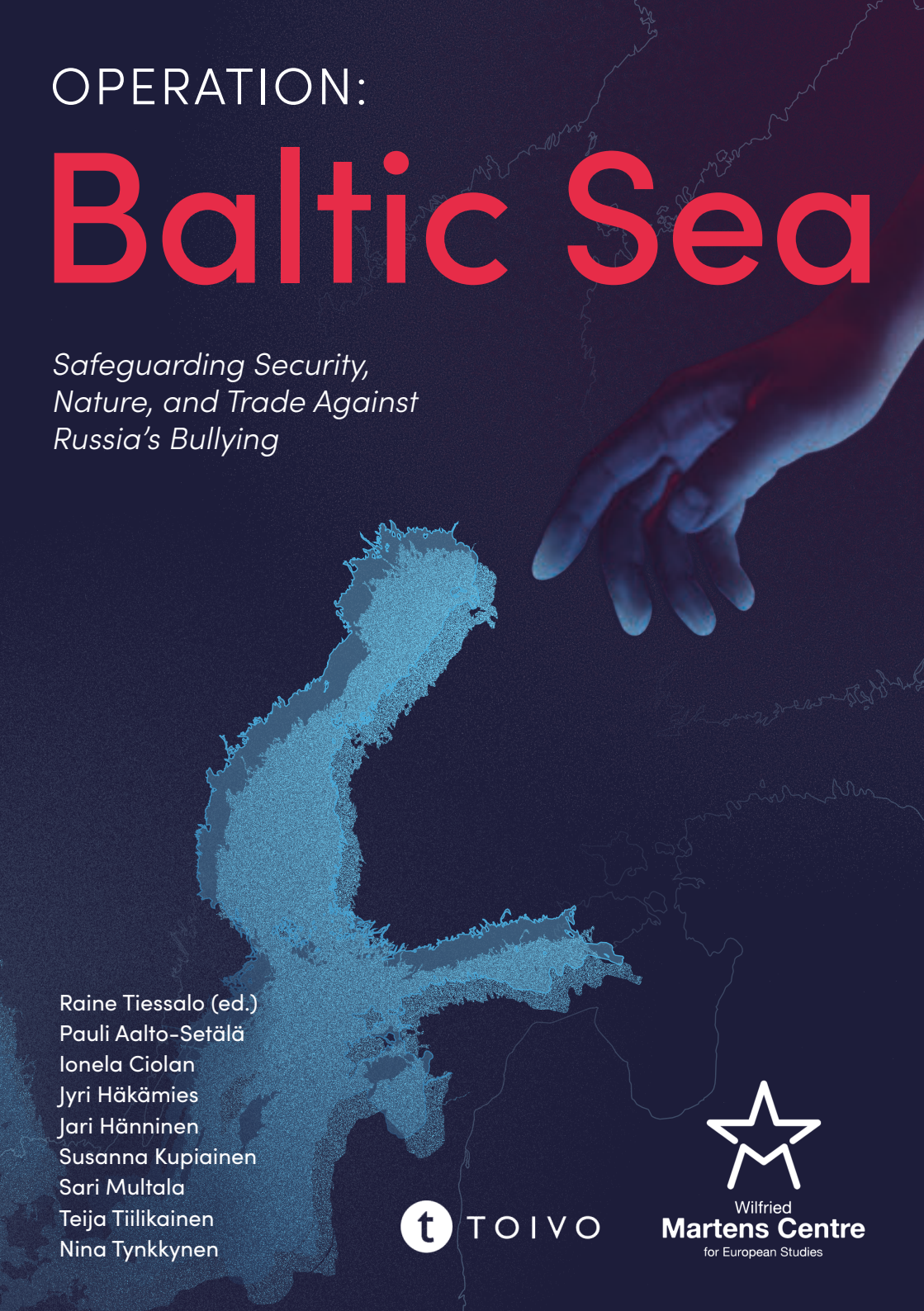
OPERATION:

Baltic Sea

Safeguarding Security, Nature, and Trade Against Russia's Bullying



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Wilfried Martens Centre for European Studies

OPERATION BALTIC SEA

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FOREWORDS

The passenger ferries shuttling between Helsinki and Tallinn form the busiest passenger route in the Baltic Sea. Every year, more than seven million travellers make the two-hour crossing for work and leisure alike.

Roughly half an hour after leaving either side of the Gulf of Finland, few passengers stop to think that the ferry enters in one of Europe's most geopolitically tense stretches of sea.

For about an hour the ferry sails through an exclusive economic zone where coastal states' powers are far more limited than in their territorial waters.

It is there, and from there, that Russia does much of its harm. On this same strip, Russia repeatedly violates the coastal states' airspace, and subsea telecommunications cables and gas pipelines have repeatedly been damaged or cut. Russia also seeks to influence citizens in other Baltic Sea states through information operations and by putting pressure on their borders, funnelling migrants from third countries to frontier crossings.

On the Baltic Sea – dubbed "NATO lake" since Finland and Sweden joined the Alliance in 2023 and 2024 respectively – there is a hostile troublemaker.

Russia's main objective is to sow confusion among the other Baltic Sea countries: to weaken them from within, expose their vulnerabilities and erode their support for Ukraine.

These security tensions also cast a shadow over trade. The Baltic Sea is especially vital for Finland, as around 95 per cent of its foreign trade in goods by volume – and about half by value – is carried by sea. Russia's undeclared hybrid warfare also hampers efforts to protect the Baltic Sea's fragile and unique environment: with Moscow excluded from regional co-operation, joint projects stall, while media and policymakers focus on immediate security threats and push environment questions down the agenda.

This report examines the Baltic Sea's current situation in terms of security, the economy and nature. It also sets out the authors' views on the future: what may happen, what should be done and, in the bigger picture, how the Baltic Sea can be saved.

The authors' message, as leading experts in their respective fields, is serious but hopeful. Russian harassment has prompted the Baltic Sea democracies to become more alert, to step up their preparedness and defence, and to build new forms of cooperation, especially within NATO and the EU. Their conclusion is clear: there is good reason to be hopeful about the Baltic Sea's future – the region's troublemaker can be brought under control when the democracies work together, firmly and without giving in, to defend our unique sea.

In Helsinki on 16 November 2025

Raine Tiessalo
Executive Director of Toivo Think Tank

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Russia Turns Up the Heat in the Baltic Sea Pressure Cooker – The West Closes Ranks

Teija Tiilikainen

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TEIJA TIILIKAINEN

Tension between Russia and the West is strongly reflected in the security situation around the Baltic Sea. Russia is constantly looking for new ways to weaken the security of the Baltic Sea states and to showcase its own strengths. Its methods include drone attacks, violations of airspace, GPS jamming and suspected acts of sabotage against underwater infrastructure, to name just a few. Even though the damage caused so far has not been extensive, each of these actions carries enormous risk potential.

Hybrid threats are difficult to counter. The Baltic Sea states must take even the smallest threats seriously and assess what broader objectives lie behind hybrid threat operations, Teija Tiilikainen writes.

Hybrid threats are closely linked to the ongoing geopolitical rivalry over global power and leadership. States that challenge the current international order can effectively consolidate their own position by weakening their counterpart. Hybrid threats are used above all to destabilise democratic states and societies over the long term.[1]

States that conduct hybrid threat operations, such as Russia and China, also seek to shield their own undemocratic systems of governance from the influence of democratic values. The effectiveness of hybrid threats stems from their ambiguous nature, the difficulties of preparedness and the challenges in identifying those responsible for the operations.[2]

Modern societies are increasingly dependent on various technologies, which creates new vulnerabilities for hostile actors to exploit. At the same time, the global geopolitical setting encourages these actors to deepen their mutual co-operation.

Hybrid threats are carried out using a wide array of tools. Different forms of mischief or sabotage and damage to critical infrastructure are physical means, while operations targeting people's minds are psychological tools. Through such psychological operations, a hostile state seeks to weaken societies' sense of security, erode social cohesion and trust, and manipulate the information environment. Hybrid threat operations gain their impact by exploiting the target's own vulnerabilities and by preventing the identification of those responsible.

1 Weissman, Mikael: Hybrid warfare and hybrid threats today and tomorrow: towards an analytical framework. Journal on Baltic Security 5(1):17-26. Giles, Keir: Russia's "New" Tools in Confronting the West: Continuity and Innovation in Moscow's Exercise of Power. Research Paper. Chatham House (March 2016).

2 Aukia, Jukka & Lucjan Kubica: Russia and China as Hybrid Threat Actors: The shared self-other dynamics. Hybrid CoE Research Report 8 (March 2023).

Because vulnerabilities differ, the choice of tools is also adjusted accordingly. The end result is a situation in which the target countries' weaknesses have been laid bare and their means of protecting themselves against attack have been shown to be inadequate. This feeds the perception of the adversary's omnipotence and the political weakness of the target states.

Given the tense geopolitical situation, different hybrid threat operations may also be conducted as tests in anticipation of a more serious conflict. The growing number of hybrid threat operations can therefore also be seen as a way of probing Western countries' reactions and preparedness. At the same time, the unity of the EU and NATO can be tested – for example, how effectively the West is able to deploy its common defensive instruments.

Russia's Hybrid Warfare in the Baltic Sea

Hybrid threat operations targeting the infrastructure of Baltic Sea states have involved various forms of disruption and sabotage. Data cables, gas pipelines, railway networks and satellite navigation systems have all been targeted. Various Russian cyber-influence tools have likewise become familiar in the region.[3]

Russia and Belarus have also directed so-called instrumentalised migration against several states in the region. This involves the deliberate channelling of asylum seekers towards the borders of the target state. The aim is to undermine societal stability. Uncontrolled entry of asylum seekers is used to create political dilemmas

3 Sari, Aurel: Protecting maritime infrastructure from hybrid threats: legal options. Hybrid CoE Research Report 14 (March 2025).

for decision-makers, who are forced to reconcile their obligations to territorial security with those stemming from international human rights conventions.

For a long time, Russia has also been waging aggressive information warfare in the Baltic Sea region. Through such operations it seeks to steer civil society perceptions of decision-making and foreign policy of their own country in a direction favourable to itself. The ongoing conflict is turned on its head by claiming that Western states threaten Russia's security and political integrity, while criticism of Russia's war of aggression against Ukraine is portrayed as "Russophobia", that is, hostility towards Russia. Information operations also draw heavily on the tools of history politics – manipulating historical interpretations for political purposes.[4]

A 'NATO Lake' Has Encircled Russia

Russia's hybrid threat operations in the Baltic Sea region also serve specific regional objectives. NATO's enlargement to include Finland and Sweden has changed the strategic balance in the Baltic Sea and weakened Russia's position as a coastal state. In this new situation, Russia seeks to safeguard the fulfilment of its key interests. These include, for example, securing critical sea lines of communication and maintaining access to key military bases.

Russia has responded to this change in its position both through its military structures and its strategy, by emphasising the combined importance of the Baltic Sea and the Arctic for Russian

4 Russia's interpretation of great-power conflict and of its own role in it is reflected, for example, in its most recent Foreign Policy Concept. (The Russian Foreign Policy Concept, 31 March 2023).

security. This shift has been made concrete in the 2024 reform of its military districts, through which Russia reinstated the old Leningrad Military District in order to underline the military weight it attaches to the region. The joint naval exercises that Russia has conducted in the Baltic Sea together with China are likewise used to signal Russia's great-power ambitions in the area.[5]

Attacks and disruption directed against critical infrastructure in the Baltic Sea region – gas pipelines, data cables, satellite positioning systems and airspace – fuel instability. They serve as a reminder that a major power such as Russia is capable, if it so chooses, of paralysing the critical functions of a society, whether as part of a more serious military conflict or for other reasons.

In seeking to undermine societal stability around the Baltic Sea, Russia has chosen different tools from those it uses in its neighbouring regions and countries to the south. Election interference and the erosion of trust in democracy are more difficult in the EU member states around the Baltic Sea, as their domestic political climate is not as easily manipulated to Russia's advantage.

Russia has therefore opted, in the case of the Baltic Sea states, for instruments such as belligerent rhetoric and the destabilisation of border security or critical societal functions. Threats targeting critical infrastructure at sea and in the airspace likewise indicate that Russia lacks, towards most Baltic coastal states, the same toolbox that it employs in its southern neighbourhood.

The Baltic Sea countries are strongly committed to providing both political and military support to Ukraine. With its hybrid threat operations, Russia therefore seeks to weaken civil society commitment to supporting Ukraine, by forcing their leaderships to turn attention in these countries to their own security and preparedness needs.

5 Hansen Splidsboel, Flemming: Russian military thinking about the Baltic Sea and the Arctic. DIIS Policy Brief (14 February, 2025).

NATO and the EU Supporting the Baltic Sea States

Western democracies woke up too late to the growing role of hybrid threats in the policies of authoritarian states. Although the Baltic Sea states are accustomed to Russia's unconventional attempts at influence, the aggressiveness and ruthlessness of its recent policy have come as a surprise. In most Baltic Sea states, hybrid threats have in recent years been met, among other things, by tightening national legislation and developing new tools to counter information operations. Societies' strong dependence on digital systems has in turn pushed cybersecurity to centre stage and focused attention on protection.

At the same time, the role of key international actors in countering hybrid threats has become more prominent from the perspective of the Baltic Sea region. The EU has adopted numerous political and legislative measures aimed at strengthening member states' ability to counter hybrid threats. These include important steps to reinforce critical infrastructure and cybersecurity. After the many attacks against underwater infrastructure in the Baltic Sea in recent years, the EU has stepped up its policies to protect undersea assets.[6]

The international Joint Expeditionary Force (JEF), led by the United Kingdom, also launched an operation in 2025 to identify vessels that could threaten underwater infrastructure in the Baltic Sea.

In January 2025, NATO established a dedicated Baltic Sentry operation to counter hybrid threats targeting the Baltic Sea's undersea infrastructure. Since then, NATO has also reinforced its role in responding to airspace violations and drone attacks in the region. Co-operation aimed at ensuring a shared situational picture and

6 EU Action Plan on Cable Security; Joint Communication to the European Parliament and the Council, JOIN (2025) 9 final.

developing common procedures for crisis situations has intensified among the Baltic EU and NATO member states, as well as between the two organisations themselves.

Hybrid threats have gained increasing prominence in NATO policy in recent years, and the alliance is seeking to use its instruments to create deterrence also against these threats. Firstly, NATO has declared its readiness to apply its collective defence mechanism under Article 5 also in situations involving a significant cyber or hybrid threat. Secondly, NATO has taken a firmer grip on the alliance's resilience by directing member states to strengthen their own resilience, for example by setting baseline requirements and priority areas. These measures are also intended to secure the smooth functioning of NATO's military system in a conflict situation.

Russia Has Not Succeeded – Yet

So far, Russia has not achieved its objectives with its operations in the Baltic Sea region. It has not been able to erode social trust and cohesion in the countries of the region, nor has it succeeded in weakening support for Ukraine. On the contrary, Russia's actions have brought the Baltic Sea states together in an unprecedented way. At the same time, the EU and NATO have increasingly focused their attention on the region's security challenges.

Russia has nevertheless demonstrated its willingness to continue its hostile activities, using an ever-changing array of tools. It will keep systematically exploiting the political and societal vulnerabilities it identifies in the region. The dependence of the Baltic Sea's small and medium-sized states on the EU's and NATO's ability to provide security in the area constitutes one such vulnerability – and Russia can be expected to exploit it to the full whenever an opportunity arises.

Euro-Atlantic Responses to Russia's "Boiling Frog" Strategy in the Baltic Region

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IONELA CIOLAN

Russia's "boiling frog" strategy is turning the Baltic region into the main testing ground for a continuous, low-intensity campaign of hybrid warfare against Europe. By exploiting vulnerabilities that fall below NATO's traditional thresholds – from undersea infrastructure and airspace violations to cyber attacks, disinformation and instrumentalised migration – Moscow is steadily pushing the limits of what is tolerated. Euro-Atlantic responses, from deterrence by denial and strengthened Eastern Flank posture to new initiatives such as Baltic Sentry and Eastern Sentry, are raising the cost of hostile action, but gaps in political will, legal frameworks and future US engagement still leave the Baltic a critical – and increasingly contested – front line, Ionela Ciolan writes.

Russia is increasingly perceiving itself as being at war with Europe and has been waging a sophisticated campaign of hybrid warfare across the continent. It systematically exploits vulnerabilities that lie outside the traditional definitions of security and are therefore unlikely to trigger a conventional NATO response.

As in the "boiling frog theory", the Kremlin is conducting a continuous, low-intensity, high-plausible-deniability strategy that normalises hybrid attacks against European countries. Moscow continues to test and expand the boundaries of what is deemed acceptable, carrying out acts that should provoke outrage and then escalating further when the West fails to respond decisively. The recurring patterns of disruption across Europe in recent years illustrate how Russia's hostile actions are gradually becoming the status quo.[1] This stems from a combination of limited political will to mount stronger, more decisive responses and the inherent difficulty of addressing activities that exploit the societal, political, legal and institutional gaps between national, European and international frameworks.

The growing intensity of this hybrid assault is nowhere more evident than in the Baltic region, where Russia is testing its broader strategy against Europe. In recent years, a multitude of hybrid warfare tactics have emerged, ranging from the destruction of undersea infrastructure and airspace violations to the jamming of GPS signals, sabotage operations and cyberattacks. Furthermore, disinformation campaigns continue to proliferate through social media, exacerbating social polarisation and deepening regional

1 Keir Giles, "Russian disruption in Europe points to patterns of future aggression", *Chatham House*, 1 May 2024, https://www.chathamhouse.org/2024/05/russian-disruption-europe-points-patterns-future-aggression?fbclid=IwY2xjawNxVNVleHRuA2FlbQIxMQABHucTlY1LDKAUONbbvlMX-GCwslhKnxmuDGXqjP3arMjy9z1J-b-tStMN514Xa_aem_6F-PbcnuRyUxD5gCfmTBRA

instability. At least 11 undersea cables, which are vital for global communication and energy transmission, have been damaged, fuelling suspicions of deliberate sabotage or hostile grey-zone operations.[2]

More recently, in autumn 2025, Moscow escalated its hybrid actions through a series of drone incidents and airspace violations. These ranged from three armed Russian MiG-31 aircraft violating Estonian airspace for over ten minutes, to large-scale violations of Polish airspace by Russian drones, and airspace violations reported by Finland, Lithuania and Latvia. These incidents have prompted two meetings of the North Atlantic Council under Article 4, as well as the launch of the "Eastern Sentry" to enhance NATO's posture along the entire eastern flank, by reinforcing the capabilities of allies also through effective air defence.[3]

Security and Preparedness in the Baltic Sea Region

A major wave of rearmament and defence strengthening is underway across the Baltic Sea region. Poland is spearheading this drive, aiming to build Europe's largest land army with a target force of 300,000 troops. By 2030, Warsaw also plans to have approximately 1,100 tanks in operation, including the domestically produced

2 Klaudia Maciata, "Fortifying the Baltic Sea - NATO's defence and deterrence strategy for hybrid threats", *NATO Review*, 5 May 2025, https://www.nato.int/docu/review/articles/2025/05/05/fortifying-the-baltic-sea-natos-defence-and-deterrence-strategy-for-hybrid-threats/index.html

3 NATO, "Statement by the North Atlantic Council on recent airspace violations by Russia", 23 September 2025, https://www.nato.int/cps/en/natohq/official_texts_237721.htm

PT-91, the US Abrams, the South Korean K2 and the German Leopard, which will surpass the combined tank fleets of Germany, Italy, UK and France. Central to this defence build-up is the Eastern Shield initiative, a vast defensive project spanning 700 kilometres along Poland's eastern border with Russia and Belarus, its most important fortification effort since the Cold War.[4]

Moreover, defence investments, force expansion and civil–military preparedness are accelerating at an unprecedented pace across the Baltic states. Estonia, for example, plans to increase defence spending to 5% of GDP by 2026, while reinforcing its conscription-based reserve model with expanded territorial defence units. It is also investing substantially in rapid military mobility infrastructure, advanced artillery systems, cyber defence and unmanned capabilities, while strengthening its whole-of-society resilience to achieve comprehensive national readiness. For its part, Latvia also intends to increase its defence spending to 5% of GDP by 2026. The country's efforts focus on bolstering its air, land, digital and coastal defence capabilities, as well as expanding the production and stockpiling of drones, counter-drone systems, and ammunition. At the same time, Riga is investing heavily in cybersecurity and civil resilience to ensure that military readiness and societal preparedness advance together. Regarding Lithuania, the country has announced record defence spending of 5–6% of GDP by 2026, an expansion of conscription, and the establishment of a NATO-integrated division comprising three brigades. All three countries have withdrawn from the Ottawa Treaty to enable the deployment of anti-personnel mines, and are currently constructing the Baltic

4 Martin Fornusek, "As Poland builds Europe's largest military, Russia's tactics reveal its gaps", *The Kyiv Independent*, 8 September 2025, https://kyivindependent.com/ukraine-war-shows-gaps-in-polands-military-drive/

Defence Line: a defence fortification network comprising bunkers, barriers and pre-positioned equipment along their borders with Russia and Belarus.[5]

As NATO's newest member, Sweden is revitalising its civil defence, expanding conscription and re-establishing military strongholds in key strategic areas, such as the High North and Gotland. Meanwhile, Finland maintains one of Europe's most comprehensive defence systems, with 280,000 available troops, supported by a reserve force of around 900,000 citizens. Its robust whole-of-society approach integrates national defence into everyday life. Through significant investments in air defence, submarines, fighter aircraft and icebreakers, Sweden and Finland are jointly strengthening the Baltic-Nordic defence architecture and reinforcing the security and defence posture of the North-Eastern flank.

Securing the Baltic Front: NATO's Responses

The Baltic Sea region is of crucial importance to the security of the European continent and the wider Euro-Atlantic community. In the past decade, following Russia's annexation of Crimea, NATO has strengthened the security and defence posture on the Eastern Flank through enhanced forward presence, deploying four multinational battlegroups under the framework of an allied country acting as the lead nation, with other allies contributing on a voluntary and rotational basis. Furthermore, the alliance has adapted and enhanced

5 Veronika Slakaityte & Izabela Surwillo, "The Baltic Sea region reminds us deterrence is more than frontline strength", *The Danish Institute for International Studies*, 14 May 2025, https://www.diis.dk/en/research/the-baltic-sea-region-reminds-us-deterrence-is-more-than-frontline-strength

its Baltic Air Policing missions to protect the skies over the Baltic countries. A second Air Policing presence has been established at Ämari Air Base in Estonia, in addition to the one at Šiauliai Air Base in Lithuania, which has been active since the countries joined NATO in 2004.[6]

Finland's and Sweden's accession to NATO have further elevated the region's strategic importance, prompting it to be referred to as "NATO's lake". The two Nordic neighbors contribute to the Alliance with strong defence capabilities and a shared perception of regional threats, creating a more cohesive and resilient Nordic-Baltic security environment. Both are also members of the U.K.-led *Joint Expeditionary Force*, a rapid-reaction coalition of ten northern European NATO nations ready to respond swiftly to crises in the Baltic Sea region.[7] Their membership has bolstered the Alliance's capacity to counter conventional and hybrid threats but have also brought a change in the alliance's position towards whole of society security and civil-military preparedness.

The North Atlantic Alliance responded to Russian war of aggression against Ukraine by adopting a *deterrence by denial posture* guided by the principle of "repel, don't expel". This approach focuses on preventing possible aggression by growing the military presence and readiness, ensuring that any hostile act is met with an immediate and decisive response.[8] As such, at the 2023 Vilnius

6 NATO Allied Air Command website, "Baltic Air Policing", https://ac.nato.int/missions/air-policing/baltics

7 Andres Kasekamp, "NATO's Greatest Test: Baltic Security in Trump's Shadow", *Georgetown Journal of International Affairs*, 21 May 2025, https://gjia.georgetown.edu/2025/05/21/trump-and-nato/

8 Mark F. Cancian & Sean Monaghan, ""Repel, Don't Expel", Strengthening NATO's Defence and Deterrence in the Baltic States", *Center for Strategic and International Studies*, 6 July 2023, https://www.csis.org/analysis/repel-dont-expel

Summit, NATO marked a turning point in its defence plans, driven by the growing realisation that Europe could face armed conflict on its soil once again. The new defence plans move NATO's focus from a *forward presence to forward defence*, shifting away from the prospect of reclaiming occupied territory to preventing any incursions from occurring in the first place.

NATO's "deterrence by denial" concept has also been expanded to cover the hybrid domain. This includes upgraded early-warning systems, improved situational awareness in maritime and cyber environments, and stronger civil-military coordination. Although NATO has had a strategy to counter hybrid threats since 2015 and reached a consensus in 2016 that "hybrid actions against one or more Allies could lead to a decision to invoke Article 5",[9] the speed, scale and intensity of hybrid warfare, facilitated by rapid technological innovations, has determined NATO to revise its strategy and operational procedures.

In 2024, the Alliance introduced its first Digital Transformation Implementation Strategy, a comprehensive initiative to modernise NATO's digital infrastructure and improve its capacity to counter hybrid threats. It includes steps to beef up defences against cyberattacks and disinformation campaigns, as well as ways to secure critical infrastructure such as undersea cables and energy networks.[10]

The growing vulnerability of subsea infrastructure, including communication cables, pipelines and energy networks, has become a key strategic concern for NATO and its Allies. In response to this

9 NATO website, "Countering hybrid threats", 7 May 2024, https://www.nato.int/cps/en/natohq/topics_156338.htm#:~:text=NATO%20has%20a%20strategy%20for%20countering%20hybrid,*%20The%20European%20Union%20(EU)%20*%20Ukraine

10 NATO website, "NATO'S Digital Transformation Implementation Strategy", 17 October 2024, https://www.nato.int/cps/en/natohq/official_texts_229801.htm

challenge, the Alliance has taken concrete steps to enhance protection and resilience in this area. It has established the Critical Undersea Infrastructure Coordination Cell at its Headquarters and the Maritime Centre for the Security of Critical Undersea Infrastructure at its Maritime Command in Northwood, United Kingdom. These entities enhance intelligence sharing, operational coordination and the Alliance's capacity for a rapid response to emerging threats. NATO also maintains a strong maritime presence through its two standing naval forces: the Standing NATO Maritime Group 1 and the Standing NATO Mine Countermeasures Group 1. These groups play a vital role in major exercises such as BALTOPS, testing and refining advanced warfighting and hybrid defence capabilities.[11] They integrate air, land and maritime assets to ensure readiness for complex, multi-domain contingencies, including cyberattacks and critical infrastructure sabotage.

As such, NATO's deterrence strategy in the Baltic Sea relies on maintaining a continuous military presence and a high level of situational awareness. And to top that, in January 2025, NATO launched the *Baltic Sentry*, a dedicated military activity in the Baltic Sea designed to strengthen Allied responses to destabilising actions. The Baltic Sentry operation is designed to strengthen NATO's deterrence and defence capabilities by bringing together the maritime surveillance systems, naval assets and private-sector partners to provide real-time situational awareness and a rapid response across the region's most vulnerable areas. The initiative uses new technologies to detect and track suspicious vessels, as well as advanced undersea monitoring capabilities developed in collab-

11 Klaudia Maciata, "Fortifying the Baltic Sea - NATO's defence and deterrence strategy for hybrid threats", *NATO Review*, 5 May 2025, https://www.nato.int/docu/review/articles/2025/05/05/fortifying-the-baltic-sea-natos-defence-and-deterrence-strategy-for-hybrid-threats/index.html

oration with industry. Although the operation has the potential to significantly reduce the risk of attacks on undersea cables and pipelines, its success hinges on the consistent assignment of sufficient military resources, Baltic Allies' willingness to operate beyond their national waters, and the reinforcing of multilateral coordination mechanisms.

Uncertain Horizons in the Baltic Sea

The Baltic Sea's role as a vital maritime trade corridor and home to extensive networks of critical undersea infrastructure, not to mention its significant potential for new energy development, has gained renewed prominence amid the recent surge in hybrid attacks. However, these very attributes also make the region vulnerable to such threats that blur the line between peace and conflict.

The future security and stability of the Baltic region will be shaped by the outcome of Russia's war against Ukraine, as well as by the evolving dynamics of the transatlantic partnership and U.S. defence policy under the Trump administration. The positioning of Europe and Ukraine in the forthcoming U.S. National Defence Strategy and Global Posture Review will be pivotal in determining the scope and direction of U.S. defence engagement in Europe. And, by extension, the credibility of NATO's deterrence posture along its Eastern Flank. The recently announced drawdown of US forces from Romania, Bulgaria, Hungary and Slovakia, coupled with reports of potential reductions in Pentagon funding for defence cooperation programmes with the Baltic States, raises serious concerns over the disproportionate impact of these policy shifts on the Alliance's most exposed front.

In this ever-changing security landscape, Russia could try to exploit any perceived divisions within NATO by carrying out limited provocations along the Estonian or Latvian borders to test the Alliance's resolve. Such actions would directly challenge NATO's collective defence principle, leaving the Baltic states dangerously exposed in the event of hesitation or disunity. Meanwhile, the gradual disengagement of the U.S. from Europe highlights the urgent requirement for Europeans to take on more strategic responsibility and establish themselves as genuine security providers for their own continent. Building a solid culture of military cooperation is essential to ensure Europe's capacity to defend itself, even without – or with limited – U.S. support. Thus, the question is no longer whether to strengthen the European pillar within NATO, but how rapidly Europe can do that. And the Baltic region is where this crucial test might take place.

Shadow Fleets: The Baltic Sea's Lurking Oil Spill Threat

Pauli Aalto-Setälä

Member of Finnish Parliament and Member of Baltic Sea Parliamentary Conference

PAULI AALTO-SETÄLÄ

An oil spill in the Baltic Sea would be devastating for the fragile archipelago ecosystem. It would strike marine life, tourism, and food production. Because an increasing number of tankers are subject to EU and US sanctions, Russian oil shipments have shifted to the so-called "shadow fleet" — an opaque web of tankers sailing under flags of convenience such as Panama, Liberia, or the Marshall Islands, Pauli Aalto-Setälä writes.

On 15 December 2024, two Russian oil tankers, Volgoneft-212 and Volgoneft-239, collided in the Kerch Strait between the Black Sea and the Sea of Azov. A severe storm tore Volgoneft-212's hull in two, and Volgoneft-239 ran aground. The vessels carried 9,200 tonnes of heavy M-100 fuel oil, of which Russian authorities said 2,400 tonnes spilled into the sea. As with much information originating from Russia, that figure is not reliable. One crew member died. Several seafarers suffering from hypothermia were rescued by helicopter.

The spill caused massive environmental damage. Heavy fuel oil drifted as far as 250 kilometres to Sevastopol, contaminating, among other places, the beaches of the resort town of Anapa and the Opuk Nature Reserve in Crimea. Some of the oil sank to the seabed and remains there.

The vessels did not have internationally accepted insurance cover. Ukrainian authorities accused Russia of environmental destruction, of concealing the spill and downplaying it.

The wrecks — over 50-year-old tankers registered in St Petersburg — now lie on the seabed far from us. Readers may ask whether these wrecks could have posed a danger to the Baltic coastal states, such as Finland? The danger was real. The accident could just as well have happened in the Baltic Sea. Both vessels have operated regularly in the Baltic. A verified sighting exists of Volgoneft-239 only a few months before the disaster: the ship's AIS transponder was active in the Bay of Vyborg, in the northern part of the Gulf of Finland, in July 2023.

Unseaworthy Tankers

An oil catastrophe could happen in the Baltic Sea. The Gulf of Finland is Russia's most important oil export route. Through it, some 30–40 percent of Russian oil is shipped. In 2024, the value of Russia's crude oil and oil-product exports was about 176 billion euros, according to the International Energy Agency (IEA).[1] Oil exports finance Russia's war against Ukraine.

Because a huge number of tankers are already on EU or US sanctions lists, transport assignments are handled by the shadow fleet sailing, for example, under the flags of Panama, Liberia, or the Marshall Islands. Ownership and responsibility are deliberately obscured through complex corporate structures, and no direct link to Russia can be found.

Problematic — in addition to financing Russia's war of conquest — are the poor condition of the vessels and the weak seamanship of some crews, which together pose a significant environmental risk for the Baltic basin.

According to Lloyd's List, ships are classified as part of the shadow fleet when they are over 15 years old, have hidden ownership, and participate in sanctioned transports. Many of the vessels are, in fact, unseaworthy and lack Western insurance. More than ten have appeared on the Paris MoU "black list" of maritime administrations, meaning they fail to meet international safety requirements.[2]

1 Reuters, 15 January 2025, https://www.reuters.com/markets/commodities/russias-oil-exports-fell-2024-revenue-rose-38-billion-iea-says-2025-01-15/

2 Hermes Kalamos, 12 August 2025, https://www.hermes-kalamos.eu/russias-shadow-fleet-a-maritime-network-to-evade-sanctions-its-operations-destinations-and-comparison-with-the-fleets-of-iran-and-venezuela/

In January 2025, the Panamanian-flagged tanker Eventin — linked to the "shadow fleet" — lost propulsion and drifted off Germany's Baltic coast near Rügen. The vessel was carrying about 100,000 tonnes of oil and was towed to safety by German authorities.

An oil spill is the biggest environmental threat to the Baltic Sea. A major accident could destroy the sea life of the fragile archipelago for decades, if not a century. It would devastate not only the Baltic Sea's ecological status but also tourism and food production.

I have repeatedly raised the risks posed by the shadow fleet. At the Helsingør Baltic Sea Conference in 2024, I called for sanctions to be extended to the enablers of the shadow fleet, such as flag states and logistics companies. No agreement has yet been reached. The United States could, if it wished, pressure buyers such as China and India, which would largely halt the trade even before chartering.

In Finland, the MARISEC project has been underway in 2025 to assess the role of new technologies in supporting environmental damage response along the Baltic Sea coast. Run by Merikotka maritime research centre, the Kymenlaakso Rescue Department and South-Eastern Finland University of Applied Sciences Xamk, the project aims to strengthen the region's ability to respond to oil and chemical incidents by compiling best practices, testing the performance of oil-spill response equipment, and drawing up an action plan for development and exercise needs.

The MARISEC project and the Finnish Border Guard's 2024 Annual Report highlight two other risk factors alongside the poor condition of vessels: GPS jamming and the performance of oil-spill response equipment. GPS jamming has become more common, especially in the Gulf of Finland since Russia's 2022 invasion of Ukraine.[3]

3 Finnish Border Guard, 10 June 2025, https://raja.fi/en/-/gps-interferences-encountered-by-vessels-have-increased-boater-remember-the-traditional-navigation-methods-and-the-captain-s-responsibility

It complicates navigation and increases the risk of grounding. The interference has been traced to the Kaliningrad area.[4]

The Finnish Border Guard is commissioning two new offshore patrol vessels equipped with state-of-the-art oil-spill response systems, and co-operates daily with other NATO countries. The Finnish Coast Guard has also elevated its oil-spill response readiness.

As of October 2025, the European Union had imposed sanctions on 557 shadow-fleet vessels. In May 2025, the EU took its biggest step so far when it published its 17th sanctions package, which added 189 new vessels and thus nearly doubled the number of sanctioned ships. The sanctions include an oil price cap, EU port entry bans, and service prohibitions such as bunkering and insurance, as well as individual sanctions on actors enabling the shadow fleet. In addition, Sweden and Finland have not only tightened controls but have begun inspecting insurance certificates of vessels operating in the Baltic Sea.

Finland is actively involved in two international cooperation groups of the Baltic and North Sea coastal states. The Shadow Fleet Expert Group shares information, prepares sanctions, insurance-inspection measures, and efforts to influence flag states. The Shadow Fleet Task Force includes, in addition to the coastal states, the G7 countries to ensure global coordination of sanctions.

4 Spire, 27 June 2025, https://spire.com/blog/space-reconnaissance/gnss-interference-report-russia/

Flaws in International Maritime Law

Over the Christmas holidays in 2024, Finnish authorities demonstrated their readiness to take action by boarding and storming Eagle S, a tanker linked to Russia's shadow fleet. The vessel was suspected of damaging the Estlink 2 power interconnector and several data cables between Finland and Estonia.

On 26 December, about half an hour after midnight, Police and Border Guard rapid-response units fast-roped from helicopters to the tanker's deck, took control of the bridge, and seized the vessel in Finnish territorial waters. The operation escorted the ship to the Svartbäck inner anchorage near the port of Kilpilahti in Porvoo, where the National Bureau of Investigation could conduct its work safely. The transfer was carried out successfully on 28 December 2024 with two pilots and escort tugs. The Border Guard secured the operation with an offshore patrol vessel and several boat units, and the police secured the area, including the airspace.

Justice has not been administered as effectively. The Eagle S case exposed serious gaps in international maritime law. In October 2025, the Helsinki District Court ruled it lacked jurisdiction to hear criminal charges because the act occurred on the high seas within Finland's exclusive economic zone and the vessel had no Finnish ties.[5] The decision was based on the UN Convention on the Law of the Sea (UNCLOS), whose Articles 92, 94 and 113 limit criminal jurisdiction to the flag state or the states of the crew's nationality. The ruling prompted broad criticism.

5 Reuters, 3 October 2025, https://www.reuters.com/business/media-telecom/finnish-court-deliver-verdict-baltic-sea-cable-breach-trial-against-tanker-crew-2025-10-03/

Prosecutors had sought unconditional prison sentences for the master and officers for aggravated sabotage and interference with communications, but the charges were dismissed. Finland ended up covering court costs and was left without criminal consequences even though the damages were over 60 million euros. The case illustrated that UNCLOS does not give coastal states sufficient tools to protect critical infrastructure when damage occurs in their exclusive economic zone or on the high seas. The process is not over: the Deputy Prosecutor General has announced an intention to appeal to the Court of Appeal.

Finland has helped set up a legal-experts group with other NATO Baltic countries. Finland is pushing shadow-fleet counter-measures and readiness upgrades in both EU and NATO fora. Within the International Maritime Organization (IMO), a review of rules on unlawful acts at sea is underway, with results expected in 2027.[6]

It would be beneficial if our national legislation could expand Finland's criminal jurisdiction where the consequences of an act materially affect Finland. This would clarify responsibilities and ensure that polluters pay for the damage they cause.

The Finnish Border Guard has raised its level of readiness. Visible exercises now include actions against hostile civilian vessels. In recent months, tankers' anchors have not been "accidentally" dropping at sea. Dangerous and accident-prone oil tankers still ply our waters. House arrest is not an adequate penalty.

6 Bimco, 1 April 2025, https://www.bimco.org/news-insights/bimco-news/2025/04/01-imo-legal-committee

Cooperation for the Baltic Sea Environment: Is Russia's Participation Necessary and Possible?

Nina Tynkkynen

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NINA TYNKKYNEN

When the Baltic Sea countries froze cooperation with Russia due to its war of aggression launched in 2022, St. Petersburg State University initiated the establishment of an international discussion forum in the name of Baltic Sea environmental cooperation. Although Russia is a necessary part of the cooperation, it is crucial to carefully consider under what conditions dialogue can be conducted without environmental issues being used as instruments of political influence, Nina Tynkkynen writes.

The Baltic Marine Environment Protection Commission (HELCOM) has long served as an example of successful regional environmental cooperation that has managed to navigate across political fault lines. The Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area was originally signed in 1974 during the Cold War, when the Baltic Sea was a geopolitically divided region. Through HELCOM, the governing body of the convention, cooperation has been maintained for five decades. During this time, around 260 recommendations have been issued, along with the Baltic Sea Action Plan (BSAP), which sets concrete goals and measures for coastal states to address various environmental problems, particularly eutrophication.

HELCOM's success is largely due to its ability to unite politically divergent states under common environmental goals. Although the tangible improvements in environmental conditions have been relatively modest, the cooperation has built trust and provided a channel for dialogue among the Baltic Sea coastal states. Despite political tensions, these states were for a long time able to commit to shared goals and to discuss together the future of the region.

Geopolitical Shift and Russia's Exclusion

The Soviet Union, and since the 1992 update of the convention, Russia, was a key partner from the beginning, participating in HELCOM meetings and committing to joint decision-making. Russia was particularly active in the early 2000s, hosting a ministerial meeting and seeking to strengthen HELCOM's role as a regional cooperation forum, partly as a counterbalance to the growing influence of the European Union in Baltic Sea environmental matters.

However, after the annexation of Crimea in 2014, Russia's participation began to wane, and with the war of aggression launched in 2022, HELCOM and its member states froze cooperation with Russia. Working groups have continued research and monitoring activities, but since decisions under the Helsinki Convention require unanimity, Russia's exclusion has paralyzed HELCOM's formal decision-making.

Practical Consequences for Baltic Sea Protection

Russia's exclusion has both practical and symbolic consequences for the protection of the Baltic Sea environment. Russia accounts for about ten percent of the Baltic Sea catchment area, but its rivers, especially the Neva, cause significant nutrient and oil discharges as well as harmful substances to the sea. The eastern parts of the Baltic Sea, such as the Gulf of Finland and the Kaliningrad region, form an ecologically and hydrologically interconnected whole. Without joint monitoring, data exchange and nutrient load management, the effectiveness of protection measures diminishes. Currently, comprehensive environmental data from Russia is unavailable, weakening assessments of the condition of the marine environment and the monitoring of the commitments.

Moreover, Russia's major Baltic Sea ports, such as St. Petersburg, Primorsk, Ust-Luga, and Kaliningrad, are key hubs for regional maritime traffic and energy exports. Cooperation is essential for maritime safety, oil spill response and accident preparedness. HELCOM has been one of the few forums capable of coordinating also these issues across political boundaries.

There are environmental challenges among Baltic Sea coastal states that cannot be solved through Russia. In Finland, for exam-

ple, eutrophication in the Archipelago Sea is an issue that needs to be locally addressed. However, from the perspective of the overall condition of the marine environment, Russia is an indispensable part of the solution. Without its involvement, the regional coverage of protection measures will inevitably remain incomplete.

Environmental Discourse in Russian Media and the Baltic Platform

What does Russia think about Baltic Sea environmental protection or related cooperation? Russia's official environmental discourse rarely addresses marine protection, but in spring 2023, several state and regional media outlets covered the ecological state of the Baltic Sea with unusual prominence. For example, the news agency *TASS* reported that restoring the Baltic Sea could be included in Russia's national environmental program by 2025, and *GTN Pravda* from the Leningrad region wrote about cooperation among Russia's western regions to promote watershed protection.

Around the same time, the *Baltic Platform* was introduced as an international discussion forum initiated by St. Petersburg State University, focusing on shared issues in the Baltic Sea region. Over the past two years, the forum has organized several events on themes such as environmental protection and cultural heritage, with participants from European countries, including Finland.

Investigative media and analyses, such as the *VSquare* network's report (2024), have indicated that the Baltic Platform may be part of Russia's attempt to strengthen its influence in the Baltic Sea region and establish dialogue on terms favorable to itself. This is done by presenting environmental cooperation with Russia as essential, regardless of ongoing wars or geopolitical crises. Envi-

ronmental themes thus serve as a gateway to political dialogue and influence-building.

Initiatives like the Baltic Platform highlight the need to critically assess new forms of cooperation and the extent to which they genuinely support Baltic Sea protection. They also raise the question of under what conditions dialogue with Russia can be conducted in the future without environmental issues being used as a tool of political influence.

How Should Finland and HELCOM Respond?

The challenge for Finland and other Baltic Sea countries is how to maintain credible and effective regional environmental cooperation when one key partner is absent. EU's Strategy for the Baltic Sea Region and regional programs can at least partially compensate for HELCOM's paralysis and create a common policy framework without waiting for Russia's return. Overall, the role of the EU and the Nordic countries in Baltic Sea governance should be further strengthened in the current situation.

At the same time, it is important to maintain channels for technical-level cooperation and data exchange in cases when it is safe and transparent to do so. Although political dialogue is currently impossible, expert cooperation through scientific networks or international organizations could in the future offer pathways to rebuilding some level of trust. However, this requires transparent and independent contacts, which are difficult to establish anew.

For new forums like the Baltic Platform, it is crucial to carefully assess their background and sources of funding. Environmental cooperation can only function if it is based on trust, openness and shared standards. Finland can strengthen its position by offering

open databases, scientific collaboration and transparent mechanisms that ensure decision-making based on researched knowledge throughout the Baltic Sea region.

Removing Political Games from Environmental Protection

Russia's exclusion from HELCOM has revealed the structural vulnerability of Baltic Sea environmental cooperation and how tightly ecological and political security are intertwined. Yet, the state of the Baltic Sea and its fragile ecology demonstrate that environmental protection cannot be held hostage by geopolitical divides.

In the future, Russia's return to Baltic Sea environmental cooperation may be necessary, but it requires rebuilding trust and transparency, along with clear rules and monitoring mechanisms. Until then, Finland and HELCOM must strengthen their own decision-making and implementation capacity to ensure that Baltic Sea protection progresses even under difficult circumstances. The shared responsibility for the Baltic Sea must be upheld, but it must be based on honest cooperation, not on geopolitical games.

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Finland Needs Transport Connections Across the Baltic Sea to Strengthen Trade, Security, and Tourism

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JYRI HÄKÄMIES

Due to Russia's aggression and unpredictability, Finland's connections across the Baltic Sea must be strengthened ambitiously — Finland's competitiveness and security require it. Finland's exports and imports rely on cargo ships. Therefore, Finland should firmly take the next step and promote the adaptation of European rail gauge standards, as well as investigate fixed connections such as bridges and tunnels to Estonia and Sweden. The EU's rapidly increasing infrastructure funding provides an opportunity to move these projects forward quickly, Jyri Häkämies writes.

The business community has raised the issue of Finland's connectivity and attractiveness currently and in the coming decades. Earlier this year, we made several proposals to develop transport connections, especially from the perspective of maritime transport risks in the Baltic Sea. The security situation has deteriorated, which has been evident in acts of sabotage in the Baltic Sea and, especially recently, in airspace and territorial violations in countries around the Baltic Sea.

The maritime transport in the Baltic Sea is the top priority, and it is safeguarded through close cooperation between coastal states and the NATO. Tensions in the Baltic Sea and the shadow fleet used for Russian oil transports pose risks to the safety of traffic and the environment. Even a minor incident could paralyze maritime traffic — not only for military reasons but also if the insurance companies determine to price the risks for freight traffic to the pain threshold.

We have been preparing for such a situation with various exercises among ports and maritime operators, as well as by preparing for state guarantees for insurances. Securing maritime traffic in the Baltic Sea is essential for foreign trade as nearly one hundred percent of trade is transported by sea.

In the coming years, it will also be necessary to find energy sources for maritime and air transport that meet climate targets. A current challenge for competitiveness is the availability and price of sustainable fuels. State actions are needed here. The state receives significant revenues from maritime and air transport through European emissions trading. The production and distribution of sustainable fuels should be promoted by allocating these emissions trading revenues to reduce the price difference compared to fossil fuels.

The business community supports connecting Finland quickly to the European rail network in the north. The connection to Sweden via Tornio and Haparanda enables direct export and import transports between our countries as well as passenger traffic to the rest of

Europe. The connection is also very important for Finland's security of supply. The government has started planning the Tornio-Kemi section with European track gauge. The next phase to Oulu and Rovaniemi is reportedly also progressing as a high priority to the EU Commission.[1]

Fixed Links to Sweden and Estonia

In the EU's upcoming budget period, security and military mobility seem to obtain increasing role in the transport infrastructure funding.[2] In July, the Commission proposed doubling EU transport infrastructure funding for the next budget period. Within this, funding for military mobility projects would be tenfold compared to the current period.

EU infrastructure funding will be targeted increasingly at projects connecting member states that are of key importance for competitiveness and security. This fits Finland's situation well, as we have not only important northern connections but also objectives for fixed connections across the Baltic Sea.

The business community's key proposal concerns the investigation of fixed Baltic Sea connections. There are three alternative routes: Helsinki–Stockholm, Vaasa–Umeå, and Helsinki–Tallinn. A fixed western connection would not only serve traffic, tourism, logistics and the economy, but also benefit security and security of

1 Finnish Government statement, 2 September 2025, https://valtioneuvosto.fi/en/-/25230764/european-track-gauge-to-northern-finland-reports-describe-solutions-benefits-and-disadvantages

2 European Commission statement, 16 July 2025, https://ec.europa.eu/commission/presscorner/detail/en/ip_25_1847

supply. It would also strengthen Finland's image, attracting investments and tourism.

Studies on the Tallinn tunnel were conducted about seven years ago. A preliminary study on the Vaasa–Umeå connection was completed this summer by the Finnish Transport Infrastructure Agency. However, a connection extending from Helsinki via Turku and Stockholm to Copenhagen has not been studied at all.

These three fixed connections should be studied so that they can be evaluated, compared, and prioritized side by side. Based on the comparison, Finland will have the basis to decide how to move forward together with neighbouring countries and the EU.

Next Steps

The business community's proposals have aroused interest in neighbouring countries and have also received positive feedback in Brussels. Much is already underway. In addition to studies and basic information, the next step is to consider how such large, decades-long, and multi-state projects are prepared and advanced. How to enable political decision-making, what is needed at each stage, where investor interest is directed, and what are the wishes and intentions of the users — companies and travellers.

The current era is hectic and dangerous in the chaos of crises and wars. Northern Europe experiences the risks of the Baltic Sea environment weekly and sometimes daily. The Baltic Sea and alternative international connections are a permanent lifeline for us in terms of export industry, tourism, trade, and citizens' mobility. Good and reliable connections strengthen competitiveness and promote Finland's attractiveness in many ways, especially as a platform for new investments and new growth.

Hydrogen as a New Backbone for Europe's Energy and Industry

Susanna Kupiainen

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SUSANNA KUPIAINEN

The €33 million BalticSeaH2 project is building a "hydrogen valley" across the Baltic Sea region, connecting hydrogen production, distribution, processing and use. The project strengthens economic security and strategic autonomy.

However, fragmented and complex support schemes, together with inconsistent regulation across countries, continue to slow down investments. Europe must also acknowledge that the green transition comes with a cost, Susanna Kupiainen writes.

Europe is in the middle of a major shift in how it powers its societies and produces essential materials. The goal is to cut emissions, reduce dependency on unstable fossil imports, and build a more resilient economy. At the centre of the change, hydrogen provides a way to transfer and store renewable energy and operate industries without relying on imported fossil fuels, which have long been a strategic vulnerability for Europe.

Hydrogen is a versatile element that can be used directly for energy, transport, or industrial processes. It can also be processed in several ways: together with bio-based CO_2, it can produce synthetic fuels for aviation and e-methanol for plastics, and with nitrogen from the air, it forms ammonia for fertilizers. Many industries have already been using hydrogen for decades, but it has traditionally been fossil-based hydrogen made from natural gas. To reduce emissions, industries need to replace this grey hydrogen with green hydrogen produced using renewable electricity.

This shift is not only about climate goals. Producing hydrogen and its derivatives domestically allows Europe to strengthen its security of supply, reduce exposure to volatile global markets and support the economy and jobs at home. Replacing imported fossil resources with green hydrogen supports both strategic autonomy and industrial competitiveness. Producing hydrogen is not a goal in itself; it is a tool to build a sustainable, resilient and competitive economy.

Turning Strategy into Practice: Hydrogen Valleys

Europe has recognised that the hydrogen economy value chains will not build themselves. It requires coordinated action across the value chain, from production and infrastructure to markets and regulation. One of the EU's key tools for this is the funding for hydrogen valleys.

A hydrogen valley is a geographical area where several parts of the hydrogen value chain are brought together in a coordinated way. Production is located near transport infrastructure, processing facilities and end users. Energy producers, industries, grid operators and technology developers work together to make the entire chain functional in practice.

Hydrogen valleys help identify and address the practical obstacles that can slow down development: missing infrastructure, unclear rules, fragmented permitting processes or insufficient demand. They provide a way to connect renewable energy generation with real industrial and transport applications, making the hydrogen economy tangible.

Hydrogen valleys are not just demonstration sites; they are early versions of the systems Europe will need at scale. They demonstrate how hydrogen can serve multiple sectors simultaneously, and they help test the regulatory, technical and commercial models needed to make this work across the continent.

BalticSeaH2: Building a Shared Hydrogen Economy

One of the most ambitious hydrogen valleys in Europe is BalticSeaH2, the first large-scale cross-border hydrogen valley in Europe. The project started in June 2023 and will run for five years. With a budget of around €33 million, co-funded by the European Union through the Clean Hydrogen Partnership, BalticSeaH2 brings together 40 partners from nine countries: Finland, Estonia, Latvia, Lithuania, Poland, Germany, Denmark, Sweden and Norway.

The Baltic Sea region is well suited for such a project. The area already shares gas infrastructure, electricity connections and busy maritime routes. The region has significant renewable energy poten-

tial. By linking these existing assets with new hydrogen production and use, the project can move more quickly towards real implementation.

The urgency of energy transition has become clear in recent years. Europe's heavy reliance on imported fossil resources has exposed it to price spikes and geopolitical instability. Energy is not only a climate issue but also a question of economic security and strategic autonomy.

Ammonia illustrates this well. Today, fertilizer production in Europe depends heavily on grey ammonia and fossil gas, both of which have often come from geopolitically unstable regions. By switching production to green ammonia produced from green hydrogen, Europe can make fertilizers domestically, reducing its dependence on imported fossil gas and grey ammonia and increasing both food and energy security in Europe.

Synthetic fuels for aviation and e-methanol for plastics production are also new green inputs for modern economies that can be made in Europe using hydrogen instead of importing their fossil counterparts. Domestic production would contribute not only to the green transition, but also to security of supply and competitiveness of the European economy.

BalticSeaH2 includes around 20 practical applications that cover different parts of the value chain, from hydrogen production to practical use in energy systems, industry and transport. One focus is the production of green ammonia, both as a fertilizer input and as a hydrogen carrier. Ammonia is easier to store and transport than hydrogen gas itself, which opens new opportunities for trade while supporting domestic industries.

What makes BalticSeaH2 stand out is its scale and cross-border approach. Hydrogen markets and infrastructure do not stop at national borders. By working together, the countries around the Baltic Sea can create shared value chains that benefit the whole region and provide a model for the whole Europe.

What's Standing in the Way of the Hydrogen Economy

While the potential is clear, building a hydrogen economy is not straightforward. Several issues still hold back development.

The first is demand. For the hydrogen economy to take shape, industries need clear signals that justify long-term investments. This means combining incentives for clean options with disincentives for continued fossil-based production. Demand creation mechanisms need to be simple, reliable and consistent, so that companies can make confident investment decisions. Fragmented or overly complex support schemes make the system unpredictable and discourage large-scale action.

Regulation is another challenge. Europe often relies on detailed and fragmented rules that vary across sectors or even counteract each other. For hydrogen to scale up, there needs to be clear, harmonised regulation that works across borders. Without it, development risks being slowed down by complexity and lack of predictability.

Finally, Europe needs to acknowledge the cost of transition. Green hydrogen is more expensive than grey hydrogen, at least in the beginning, when production is limited. Building domestic production capacity and infrastructure is an investment in competitiveness and strategic autonomy. It will require public support and a clear vision for the role of clean hydrogen in Europe's future economy. If this is not addressed, Europe risks remaining dependent on fossil imports.

Hydrogen Economy Future Starts Regionally

Hydrogen valleys like BalticSeaH2 make the hydrogen economy concrete. They bring strategy down to the regional level, linking renewable energy with society, industries, infrastructure and regulation in a way that can be scaled up. The Baltic Sea region offers a unique combination of existing infrastructure, renewable energy potential and industrial capacity. By acting together, the countries around the Baltic can build something larger than any one of them could achieve alone.

Hydrogen will not solve every challenge, and it should not be treated as a goal in itself. But it can help Europe cut emissions, reduce dependency, and build a modern industrial base that is not only sustainable, but also competitive and secure. This is why large European projects are focusing on it now: to ensure that the future energy and material system is built on sustainable foundations.

The project is co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Clean Hydrogen Partnership. Neither the European Union nor the granting authority can be held responsible for them.

Cleaning Up the Archipelago Sea, One Action at a Time

Sari Multala

Finland's Minister of Climate and the Environment

SARI MULTALA

By 2027, the Government aims to have agriculture in the Archipelago Sea catchment area deleted from HELCOM's Hot Spot List of the worst sources of pollution—removing Finland's last remaining Hot Spot. Finland cannot restore the Baltic Sea—or even the Archipelago Sea—on its own; international cooperation is needed, Sari Multala writes.

Having spent my summers since childhood sailing in the Baltic Sea and now serving as the environment minister, I have a very special relationship with the sea, and with the Baltic Sea in particular. I have seen how the state of the sea has changed. The status of the Baltic Sea is not yet good, but the Finnish Government is working hard to change this. The Government led by Prime Minister Petteri Orpo is committed to protecting the Baltic Sea. We need a clear, common objective and practical actions. As part of the Archipelago Sea Programme, the aim for the Government is to have agriculture in the Archipelago Sea catchment area deleted from HELCOM's Hot Spot List of worst sources of pollution by 2027. For me personally, it is very important that we succeed in this.

Hot Spots is a list of significant pollution sites in the catchment area of the Baltic Sea, including industrial sites, wastewater treatment plants and agricultural areas. The list was established in 1992 and it is maintained by the Baltic Marine Environment Protection Commission. The only Hot Spot we still have in Finland is non-point source pollution from agriculture in the Archipelago Sea catchment area, and now is the time to fix this.

The list follows the progress in the restoration work. Besides the area around the Baltic Sea it covers the whole catchment, which also includes Belarus, the Czech Republic and Ukraine.

The Government is strongly committed to taking action with a key focus on the catchment area of the Archipelago Sea. To combat eutrophication, measures have been taken to reduce nutrient loading from lands to the sea and improve nutrient recycling in the catchment area. Our intent is clear: proper nutrient recycling must be ensured and nutrient loading to the sea must be reduced. We have allocated about EUR 50 million in funding for measures to promote these within the next couple of years.

During this government term we have also acted through legislation: now, dumping snow into the sea and discharging exhaust

gas scrubber washwater, treated sewage and greywater into the sea in Finland's territorial waters are prohibited. The Baltic Sea needs protection, and these legislative acts impose strict bans to protect our sea.

In Finland, the regional water management plans and Finland's marine strategy with its programme of measures create the framework for the work to protect inland waters and the Baltic Sea. For effective implementation, it would be extremely important to allocate the funding based on impact.

At the moment, measures implemented in different parts of Finland are being funded by central government grants under the Ahti Programme concerned with improving the state of waters and marine areas. The measures aim to improve nutrient recycling, reduce the loading caused by nutrients and other harmful substances, and restore catchments and water bodies. Of the individual measures included in the programme, the application of gypsum on agricultural lands to prevent nutrient loading is probably the most well-known. The Government's Archipelago Sea Programme is part of the Ahti Programme and receives funding from this. In 2024 funding was also available through the EU's Recovery and Resilience Facility. In total, more than EUR 36 million in funding was granted from the Ahti Programme for various kinds of measures.

The Government will continue to implement the Archipelago Sea Programme and provide funding for measures, especially those concerning agriculture in the catchment area as it causes most of the loading that ends up in the sea. Our aim is to have agriculture in the Archipelago Sea catchment area deleted from HELCOM's Hot Spot List of the worst sources of pollution.

The Government published an assessment[1] of the situation with respect to Hot Sports in August. The report examined the fulfilment of the 23 criteria issued by the Baltic Marine Environment Protec-

tion Commission for deletion from the Hot Spots. Finland has made advances in agricultural water protection in the Archipelago Sea region, with 17 out of the 23 HELCOM criteria currently fulfilled.

Under the Archipelago Sea Programme, the application of gypsum on agricultural lands will continue and, in future, some financial support for the use of other soil improvers such as fibresludge and structure lime in the Archipelago Sea catchment area may also be possible. In this area, numerous measures are also implemented to promote cooperation in order to involve farmers and landowners more closely in actions to improve the state of waters. These include more precise handling and incorporation of animal manure, increasing the use of wintertime crop cover, buffer zones and catch crops, and farm-specific advice.

Pilots with Measurable Results

The programme also contains three pilot sites where even stronger measures are taken. On the shores of the Archipelago Sea, in the catchments of the Rivers Aurajoki and Paimionjoki and in the Kemiönsaari island municipality more intensive work is done to curb loading. For example, there are agricultural plots and ditches where targeted measures are implemented together with the landowners, and meters will be used to assess their impact. The planning of these measures is guided by the catchment area plans drawn up for each pilot area.

1 "Assessment of HELCOM Hot Spot No. 10 Agricultural runoff to the Archipelago Sea with the view to delete the Hot Spot by 2027", Publications of the Finnish Government 2025:81

Mynälahti in the Archipelago Sea area is one of the five demonstration areas of the ACWA Life project (Actions for Waters from Source to Sea) funded by the EU and implemented in 2026–2033. With a budget of EUR 27 million, the project is truly an extensive package. The aim is to identify models for removing the bottlenecks in the implementation of water management measures and reduce the loading ending up in the sea. To serve as a demonstration area requires that the work is done exceptionally well as these will be used as model areas for water management.

Our work on the Archipelago Sea and the pilot areas have been well thought out from the perspective of the Baltic Sea as a whole. With these specific sites we can monitor and measure the impacts more accurately. Thus we can make good use of what we have learned from these pilot areas, which can serve as kind of test laboratories for improving the state of the sea. We still have a lot to learn in order to find effective and scalable measures.

Diverse and multilateral cooperation is at the core of the Archipelago Sea Programme. Besides landowners, numerous active stakeholders are also involved. The ‘Pellon Perintö’ - ‘Heritage from the Field’ project launched by the John Nurminen Foundation extends intensified action in the pilot areas to the catchment area of the River Uskelanjoki. Almost 50 local farms participate by taking measures to protect waters.

Besides farms, we wish to have companies from the whole food chain and, more broadly, from other sectors involved in the work. Our aim is to attract companies to participate by promoting water stewardship commitments.

In the beginning of 2026 we will launch an experiment where we will test performance-based funding to promote water protection in agriculture. This is a very interesting experiment. The aim for this pilot project is to lower phosphorus levels in agricultural lands and, through this, reduce phosphorus loading. I hope that the results of

this experiment will attract wider interest in the EU as well. More performance-based thinking is needed both in the work for the environment and in support policy.

Finland cannot achieve a good status of the Baltic Sea or even the Archipelago Sea on its own. International cooperation is needed, and even now this continues almost as usual among the EU member states in the Baltic Sea area. Russia's shadow fleet obviously casts a dark shadow over the highly sensitive Baltic Sea and its shores. We must find new means to also address the growing environmental risks and, in particular, to prevent these. Despite this complicated situation in the Baltic Sea region, the Baltic Marine Environment Protection Commission HELCOM with its secretariat still serves as a key platform for cooperation on protecting the sea, and the EU Strategy for the Baltic Sea Region also supports this work.

The status of the Baltic Sea is not yet good, but there are already cautious indications that our work to improve its status is producing good results. This encourages us to continue the actions to improve the state of the Baltic Sea and further increase collaboration with its other coastal states.

Baltic Sea Life Suffers as Global Warming Makes the Water Fresher

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Many species are suffering from the decline in salinity in the Baltic Sea. For example, the distribution areas of fish species may change significantly in the future. The Baltic Sea ecosystem has always been characterised by change, and there is room for new species – which may even enrich the ecosystem. It is important to distinguish between natural and human-induced climate change, Jari Hänninen writes.

The warmest September on record was measured in 2025 across the globe. Climate change has a particularly strong impact on the Baltic Sea. In the Arctic region, the effects of climate change, such as rising temperatures, are more noticeable than in warmer latitudes. Climate change is raising the water temperature of the Baltic Sea, increasing rainfall, and intensifying extreme weather events (BACC Author Team 2008). Climate change as a phenomenon can be divided into two categories: natural and human-induced climate change. Both have their own impact on the Baltic Sea. It is important to distinguish between them.

Natural Climate Change Still Ongoing

Natural climate change is the result of long-term periodicity in solar activity, the most significant phenomenon of which is the ice age cycle. The most recent ice age in Finland is linked to events during the Weichselian glaciation. These events began around 116,000 years ago and ended around 11,500 calendar years ago. During the Weichselian glaciation, the continental ice sheet expanded and contracted several times, and remnants of its latest phase can still be found, e.g., in Greenland, Canada, and the snow-capped mountains of Norway. The continental ice sheet reached its maximum extent around 25,000 years ago. As solar activity increased again, the climate warmed and the continental ice began to retreat around 13,000 years ago. The present-day Baltic Sea was preceded by several lake and sea phases, which were caused by continental ice sheets damming meltwater, and occasionally the dams broke, releasing meltwater into the present-day Baltic Sea and, conversely, salt water into the main basins of the sea phases at that time. The present-day Baltic Sea is thought to have been formed

around 2,000–3,000 years ago (Tulkki 1984, Taipale & Saarnisto 1991, Kuusisto & Käyhkö 2004).

It is essential to remember that the Baltic Sea has always been a "sea of change". The same forces that created it are still at work today. These same forces will continue to shape the Baltic Sea in the future, as well. The most important force of change is land uplift, which is a result of the previous ice age.

The enormous mass of the continental ice sheet pressed down on the Earth's crust across the entire area of the present-day Baltic Sea. The release of this ice mass triggered a slow process in which the Earth's crust, due to the Earth's rotation, seeks to return to its original shape (Taipale & Saarnisto 1991). This process is estimated to continue for another 10,000 years, during which time the Earth's crust is expected to rise by 50–60 metres in southern Finland and by as much as 90–100 metres in the current Bothnian Bay area. In 10,000 years, the Baltic Sea will look completely different from today. For example, the Gulf of Bothnia will probably no longer exist, as its average depth is about 50 metres. The same fate awaits the Archipelago Sea, which has an average depth of 24 metres.

Climate Change Caused by Human Activity

Human-induced climate change is the result of a physical-chemical phenomenon known as the greenhouse effect. In this phenomenon, greenhouse gases, such as water vapour and carbon dioxide, cause the lower layers of the atmosphere to warm up by preventing the Sun's heat radiation from reflecting away from the Earth.

The greenhouse effect itself is a natural phenomenon. However, increased greenhouse gases resulting from human activity have significantly intensified the phenomenon. The most significant

greenhouse gases are water vapour (H_2O; 36–70% of the greenhouse effect), carbon dioxide (CO_2; 9–26%), methane (CH_4; 4–9%), and ozone (O_3; 3–7%). Of these, the increase in carbon dioxide and ozone is purely due to human activity, while the others are indirectly linked to global warming.

When we talk about climate change, we do not always consider that, actually, there are two overlapping phenomena affecting the climate in the same direction, namely natural and human-induced climate change. This makes it difficult to predict the effects of climate change. The pace of change is faster than what climate models simulating climate development have been able to incorporate. Models that lag behind make it difficult to prepare for problems (BACC Author Team 2008).

Rainfall and Winter Storms Bring Water to the Baltic Sea

The impact of climate change on the Baltic Sea comes through the Atlantic Ocean's climate regulation. The Baltic Sea has two water sources, fresh water and saline water, both of which originate in the Atlantic.

Fresh water is water that has evaporated from the Atlantic and, when forming clouds, is mainly carried eastward due to the Earth's rotation. Upon reaching the continent, the clouds condense and rain down on Europe (Hurrell *et al.* 2003). Saline water, on the other hand, is Atlantic seawater that flows in significant quantities from the North Sea to the Baltic Sea only during the harshest winter storms. This intrusion is called a Major Baltic Inflow (MBI) (Matthäus & Franck 1992).

Global warming has disrupted the balance between these two water sources since the 1980s. More water evaporates into clouds

over the Atlantic, and fresh water moves increasingly towards Europe. (BACC Author Team 2008, Hänninen & Vuorinen 2011).

In winter in particular, clouds follow the warm Gulf Stream, mainly towards northern Europe, and rain falls in the Baltic Sea catchment area. Winters have generally been mild, with sleet or rain falling from the sky instead of snow. This has increased the amount of fresh water in the Baltic Sea ecosystem, which has had a significant impact on life in the Baltic Sea (Hurrell *et al.* 2003).

The Supply of Salt Water is Running Out

Major Baltic Inflows only reach the Baltic Sea in midwinter during the most severe winter storms. Winter storms push North Sea water into the Baltic Sea across the shallow Danish Straits. Although winter storms in the North Sea have intensified, partly as a result of climate change, conditions for MBIs have deteriorated. This is due to increased rainfall and sleet. Before the 1980s, winter rain from the Atlantic fell as snow in the Baltic Sea catchment area. The snow accumulated in drifts or turned to ice and did not melt until the following spring. The Baltic Sea thus received a replenishment of its fresh water reserves only in the spring (Hänninen *et al.* 2000).

The same phenomenon has led to the surface of the Baltic Sea being higher in winter than before. When water does not accumulate as ice and snow in winter, but instead flows quickly along rivers into the main basin of the Baltic Sea, the water level is higher in winter. High water levels, on the other hand, cause the main flow of water to move away from the Baltic Sea towards the North Sea (Hänninen *et al.* 2000, Hänninen & Vuorinen 2011).

This has significantly reduced the flow of saline water into the Baltic Sea. The water is becoming increasingly low in salt, with no

end in sight. This has created a continuing trend toward freshwaterification, which has a major impact on life in the Baltic Sea (Hänninen et al. 2000, Hänninen & Vuorinen 2011).

Baltic Sea Species Struggle with Salinity

The Baltic Sea is so young (2,000–3,000 years old) that new species have not yet had enough time to evolve there. Its fauna is a mixture of lake and sea species that originally came from either freshwater bodies, the Atlantic and Arctic oceans, or the lake and sea phases that preceded the Baltic Sea. The Baltic Sea therefore has both freshwater and saltwater species (BACC Author Team 2008).

The salinity of the Baltic Sea's surface water is on average only one-fifth of that of the oceans. However, salinity is the most important factor affecting the distribution of organisms in the Baltic Sea, as lake and marine species have only a limited ability to adapt to salinity levels that are not optimal for them. For example, most marine species in the Baltic Sea, such as the Baltic herring, sprat, cod, flounder, bladderwrack and blue mussel, suffer from osmotic stress, in which they have to maintain their intracellular salt balance by pumping out excess fresh water from their cells. This consumes a considerable amount of energy, which in turn reduces the growth or reproductive potential of the organisms. At excessively high salt concentrations, intracellular physiological regulation is ineffective (Rajasilta *et al.* 2015).

Organisms Shrink

In addition, low salinity can also affect the availability of food. Marine species in the Baltic Sea may have to settle for smaller and less energy-rich prey species. For example, Baltic herring is a subspecies of Atlantic herring and is significantly smaller and less fatty than North Sea herring. This is due not only to osmotic stress, but also to the fact that Baltic herring has to feed on smaller, less energy-rich zooplankton than its relatives in the North Sea. Osmotic stress and a more modest diet are the main reasons why marine species in the Baltic Sea are smaller than their relatives in the ocean (Rajasilta *et al.* 2015).

Reproduction Becomes More Difficult

The freshening of the Baltic Sea and the rise in brackish water temperature also affect the reproductive success of organisms. Perhaps the best example of the effects of freshening is Baltic cod. In its breeding grounds in the southern Baltic Sea, cod spawn in the sea with free-floating roe, the buoyancy of which is affected by the density of the seawater. The density of water, in turn, depends on temperature and salinity; water is denser at low temperatures and high salinity.

The reproductive success of cod has been poor since the 1980s because the freshening and warming of the Baltic Sea in the spawning areas have reduced the buoyancy of the roe, causing it to sink close to the oxygen-depleted conditions near the bottom, which has been detrimental to cod reproduction through the destruction of the roe. A similar phenomenon has also been observed in floun-

der in the southern Baltic Sea, which has a similar reproductive strategy to cod.

The increased temperature of brackish water can also have a detrimental effect on the reproductive success of organisms in another way. It is known that elevated temperatures reduce the motility of Baltic herring sperm, which is likely to be important in the fertilisation of eggs. The same is certainly true for many other organisms, but there is not yet much research available on this (Rajasilta et al. 2015, Vuorinen *et al.* 2015).

Future Scenarios for Baltic Sea Marine Life

The scenarios for the future of the Baltic Sea have one thing in common: the water in the Baltic Sea will continue to become fresher and warmer, the only question is how much the temperature will rise. Species that thrive in low-salinity conditions will benefit from the freshening and will be able to expand their habitat to new areas.

In moderate scenarios, it has been estimated that the habitat of the vendace in the Bothnian Bay, for example, may expand significantly. The vendace in the Bothnian Bay has a low salt tolerance among freshwater fish, but by 2100, it could spread even to southern Gotland as a result of freshwaterification (Vuorinen *et al.* 2015).

At the same time, Baltic herring may retreat to the sea areas west of the southern tip of Sweden, closer to the salty waters of the Danish Straits. These changes will also affect trawling areas, for example.

In scenarios for the future of Baltic Sea biota, the statement above holds true: the Baltic Sea will continue to be a sea of change. The future of the Baltic Sea depends on how successful we are in mitigating climate change, particularly in terms of rising temperatures (Vuorinen *et al.* 2015).

New Species in the Baltic Sea?

The biodiversity of the Baltic Sea is low due to the fact that it is young. This provides opportunities for new species, which are not yet found in the Baltic Sea, to arrive. The Baltic Sea has plenty of potential ecological niches.

This is not necessarily a bad thing, even though the arrival of alien species in the Baltic Sea is often discussed in a rather negative tone in public. Due to the young history of the Baltic Sea, the spread of new species to new environments is normal. The sea of change should also be seen as an acceptable opportunity in terms of species diversity.

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This joint report by the Toivo Think Tank and the Wilfried Martens Centre for European Studies brings together eight experts to examine the tense situation in the Baltic Sea region from the perspectives of security, the economy and the marine environment.

It explores how Russia is waging its undeclared hybrid war in the Baltic Sea, how the other Baltic Sea states together with the EU and NATO have responded, and how they are preparing for the possibility that Russia might escalate further.

The contributions paint a picture of complex tensions that pose a real threat to security, trade and nature alike. As the threat has grown, Finland, Estonia, Lithuania, Latvia, Poland, Germany, Sweden and Denmark have moved quickly to close ranks and prepare to defend the Baltic Sea, including through new forms of co-operation with both the EU and NATO.

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