

NATO's Most Vulnerable Flank, but Not for the Reasons We Think

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For centuries, maintaining the food supply was a critical requirement for military success. The campaigns of the Roman legions and Napoleon's army required large amounts of food and fodder. This requirement forced military leaders to plan for and develop logistical networks that fed troops and animals as the area of operations expanded by hundreds or even thousands of miles, as in the case of the Roman Empire or Napoleon's invasion of Russia.¹ While still important, food security became a less pressing consideration in the planning of modern military operations because of rapid improvements in food production, food preservation technologies, and global transportation infrastructure.

Nevertheless, the COVID-19 pandemic and the Russian invasion of Ukraine in 2022 revived concerns about global food security and highlighted the need for countries to build resiliencies across different parts of the civil society. In that context, NATO encourages its member nations to build societies resilient enough to cope with major shocks. It is codified in NATO's Article 3 and includes improving seven baseline requirements for civil preparedness.² The current study focuses on the

need for NATO members to ensure that their food and water resources are resilient to disruptions.

As the war in Ukraine heightened concerns over possible spillovers of violence and instability into neighboring nations, this study identifies and analyzes a major vulnerability amongst three NATO's members—Estonia, Latvia, and Lithuania (hereinafter the Baltic states). In 2022 and 2023, food prices surged across all members of the European Union (EU) due to market disruptions from the COVID-19 pandemic and the Russian invasion of Ukraine. These impacts were partially offset by the EU's self-sufficiency in many agricultural products; however, food inflation was noticeably higher in the Baltic states. This was because these nations are small open economies, vulnerable to volatile global commodity markets, and more dependent on imports of food products and fertilizers from Russia, Belarus, and Ukraine.³ A possible conflict with Russia, ranging from full-scale military operations to low-level hybrid warfare, could severely threaten food security in the Baltic states. Such concerns are warranted because of their vulnerable



Fruits and vegetables at a city market in Riga, Latvia. Much of the Baltic states' population living in rural areas rely partially or entirely on homegrown foods such as these, and families with access to land are better poised to maintain food security even during times of economic stress. (Photo by Adobe Stock)

geographic location, which is almost surrounded by Russia, Belarus, and the Baltic Sea.

This study is based on the premise that the Russian military could turn the Baltic Sea into a contested area and severely or completely disrupt maritime traffic there. Concurrently, Russian armed forces could attempt to occupy the Suwalki Gap, which is a sixty-to-one-hundred-kilometer strip of land along the Polish-Lithuanian border that stands between the Russian Kaliningrad Oblast and Belarus.⁴ Both moves would cut off the Baltic states from the rest of Europe and make any resupply operations in the region (including transportation of key food products) extremely challenging.⁵ Moreover, trade weaponization is not a new phenomenon in the Baltic region. For example, Lithuania faced a de facto Soviet trade embargo shortly after the country declared independence.⁶ In addition, and similar to what it has been doing in Ukraine, the Russian military could engage in a systematic destruction of agricultural infrastructure and

farmland, and theft of agricultural equipment across the Baltic states.⁷ It is important to understand that small disruptions in one specific section in modern and interdependent food systems can result in significant ripple effects across the rest of the supply chain. For instance, the regional livestock sector (and, therefore, meat and dairy production) would face significant challenges if the Baltic states are no longer able to import critical feed grains such as corn. Lastly, a large presence of Russian and NATO troops conducting military operations in this relatively small geographic region would likely put significant stress on local food systems. Those pressures would be further exacerbated by the movements of hundreds of thousands of refugees and internally displaced populations (IDPs) across the region as they try to escape the conflict.

To our knowledge, no study has assessed the resiliency of the Baltic states' food systems against a possible Russian military aggression. The present study fills the

literature gap by first presenting an overview of food production and trade in the region. Then, it identifies the strengths and weaknesses of these food systems under various scenarios and proposes possible solutions to strengthen food resiliency in the region. The findings from this study identify the need for early actions and planning by Baltic states and NATO military leadership and policymakers. This includes actions geared toward building resilient regional food systems so they can withstand a major disruptive event such as a Russian military invasion or a naval blockade that cuts off the Baltic states from the rest of Europe.

Overview of Agricultural Sectors in the Baltic States

Historically, agriculture has contributed significantly to the economies of the Baltic states; however, important socioeconomic events shaped and transformed this sector. For centuries, food production in the region was under a feudal system dominated by Polish and German landlords, which was later replaced by a collectivization of agriculture imposed by the Soviet Union. During

this period, the Baltic states were leading suppliers of meat and dairy products to the Soviet Union.⁸ Furthermore, much of the Baltic states' population living in rural areas relied partially or entirely on homegrown foods such as vegetables. This reliance was stronger in Lithuania, and it highlights how families with access to land are better poised to maintain food security even during times of economic stress.

Following the collapse of the Soviet Union, the Baltic states transitioned to a market economy and designed their own farmland redistribution policies. During this transition period, these countries experienced economic setbacks, and local food production and food security levels declined. With the EU accession in 2004, the agricultural sector in these countries fell under the EU's common agricultural policy. Since then, the region's agriculture has been through a modernization process, and food production has steadily improved.⁹ Nevertheless, because of its northern climate, this region can only produce a limited range of crops (e.g., certain grains and potatoes) and must import food products such as fruits and vegetables from more temperate latitudes.

Latvia. The food and beverage sector is Latvia's second-largest industrial

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Her Danish Majesty's Ship *Esbern Snare*, the standing NATO Maritime Group 1 flagship at the time, and Japan Maritime Self-Defense Force training squadron ships (JMSDF cadet training vessel *JS Kashima* and destroyer *JS Makinamiin*) sail in the Baltic Sea during a passing exercise 21 August 2018. A conflict with Russia could turn the Baltic Sea into a contested area, significantly affecting the food supply chain of the Baltic states. (Photo courtesy of NATO)

sector and accounts for 23 percent of the nation's total manufacturing output.¹⁰ Grains and dairy are the leading agricultural sectors and account for 42 percent and 21 percent of Latvia's agricultural output in 2022, respectively.¹¹ In addition, grain production accounted for much of Latvia's sown agricultural area and the bulk of domestic agricultural operations, which are normally large- or medium-sized farms. Vegetables, fruits, and berries account for a much smaller share of the country's agricultural output. The main livestock products in Latvia include raw milk, eggs, and meat for slaughter. Latvia's main agricultural exports include dairy products, canned fish, fruit and berry preserves, meat products, grains, confectionery goods, and alcoholic and nonalcoholic beverages.¹²

While the production of livestock products is dispersed across Latvia's six regions, there is also a significant degree of geographical concentration in the central regions of Pierīga, Vidzeme, and Zemgale—84 percent for meat in slaughter, 63 percent for raw milk, and 98

percent for eggs. The regions of Zemgale and Kurzeme account for the largest share of overall grain production; however, the geographic distribution varies across different grains.¹³

Lithuania. Agriculture and the overall agri-food sector are significant contributors to Lithuania's economy. Combined, agricultural area and forests cover 85 percent of the country's territory, and most Lithuanian farms are medium to large and family owned.¹⁴ Over half of the Lithuanian agricultural operations are focused on crop production, while 10 percent are strictly focused on animal production. Like Latvia, cereals and milk production are the leading agricultural activities, followed by livestock and poultry. With a robust dairy sector, Lithuania exports half of its milk and dairy production (mostly in the form of cheese). Furthermore, this country is self-sufficient in beef and poultry meats, eggs, and most grains. Most of the crop production (e.g., grains, oilseeds, and vegetables) occurs in the north central counties of Siauliai, Panevezys, and Kaunas.¹⁵

The location of Lithuania's livestock production varies across different species. Cattle and dairy operations are mostly concentrated in the northwestern part of the country (e.g., Taurage, Siauliai, and Panevezys Counties). The bulk of Lithuania's poultry industry is in the southeastern counties of Vilnius and Kauna, whereas Panevezys and Marijampole Counties are where most pig farms are located.¹⁶

Estonia. The economic importance of Estonia's agricultural sector is in line with the two other Baltic states and above the EU's average. Forests cover 50 percent of Estonia's territory, while agricultural land accounts for almost 25 percent. Like its neighbors, crops account for the largest share of Estonia's agricultural total output (50 percent), followed by the animal sector (40 percent) with dairy being the main contributor.¹⁷ Estonia is a net food exporter with dairy products, meat, and fish amongst its main agricultural exports; however, it relies on imported horticulture products, feed grains, and certain processed foods products.¹⁸

Assessing Resiliency of Food Systems in the Baltic States

This section analyzes the resiliency of the food systems in the Baltic states against a potential military conflict with Russia. This is done by presenting strengths, weaknesses, and recommendations. While these countries boast highly productive agricultural sectors and food security due to modern infrastructure and the EU's Common Agricultural Policy, a closer look reveals vulnerabilities that could be exploited in a conflict scenario. By addressing these vulnerabilities and building resilience, the Baltic states can better withstand potential disruptions to their food systems and protect their populations in the event of a conflict.

Strengths of Food Systems in the Baltic States

Cyber capabilities against cyber security threats to the agricultural sector. As a result of years of government policies and incentives, the Baltic states became a hotspot for technology-focused entrepreneurs and have achieved a leading global role in financial technology.¹⁹ For example, Estonia is well known for its thriving high-tech industry and for having much of its government's functions now digitalized. However, becoming such tech-savvy societies also created new

vulnerabilities to external cyber threats. In the case of an increasingly digitalized agricultural sector, operational improvements such as fully automated grain elevators and milking systems are also vulnerable to cyberattacks during time-sensitive activities (e.g., milk storage or grain harvesting). Cyberattacks could also be aimed at infrastructure that directly or indirectly supports the production and movement of food products (e.g., sea-ports and railways), irrigation channels, or power plants necessary for optimal agricultural production.

Nevertheless, these countries have enhanced their cybersecurity capabilities as a response to a series of extensive cyberattacks by Russian hackers in 2007 and 2022.²⁰ As a result, the region's critical agricultural infrastructure is likely to be resilient against state-sponsored cyber threats prior to and during a conflict with Russia.

Organic farming. Following the Russian invasion of Ukraine, global prices of chemical fertilizer surged as major producers such as Russia, Belarus, and China restricted exports. This contributed to food inflation worldwide and forced countries to find alternative fertilizer suppliers. The Baltic states were no exception as they have traditionally depended on imports of chemical inputs from Russia and Belarus. However, despite being geographically small, the Baltic states are global leaders in organic farming. The percent of organic farmland as a share of the total agricultural land in 2021 was 23 percent in Estonia, 15 percent in Latvia, and 9 percent in Lithuania—for comparison, the global average is 1 percent.²¹ Certain agricultural products have larger shares of organic production than others. This represents resiliency because organic farming forbids the use of chemical inputs. Hence, a significant share of food production in the Baltic states would not be impacted by disruptions in the availability of chemical fertilizers or pesticides.

Well-Developed Food Processing Industry

The Baltic states' food processing industries offer a systematic built-in resiliency. Such capacity to process a portion of domestic agricultural production gives these countries an advantage when compared with other nations that need to import most of their processed food requirements. In the event of a conflict, the food processing industry could be repurposed within the Baltic states as part of a war effort. More specifically,



Sunset in Latvian farmland. A conflict with Russia could severely threaten food security in Latvia and the other Baltic states. (Photo by Adobe Stock)

food processing technologies could be applied to extend the shelf life of food products and stocks that would be critical in a context of disrupted regional trade. As an example, much of the fresh milk production (a key agricultural product in these countries) could be processed into less perishable food products such as cheese.

Vulnerabilities of Food Systems in the Baltic States

Geography. Following the invasion of Ukraine by Russia, global commodity traders were pessimistic about the former's ability to continue to export its grain production. However, while negatively impacted by the war, this supply chain proved to be quite resilient. Larger than expected volumes of grains continued to flow out of Ukraine via the Black Sea and the alternative land routes at the western border—including the Solidarity Lanes set up by the EU. Such successes were possible thanks to intense diplomatic efforts and close coordination among

Ukrainian farmers, various governments, and transportation networks.²²

Nevertheless, it would be challenging to replicate the Ukrainian success story in the Baltic states because of geographic differences. The Baltic states are surrounded by either Belarus or Russia except for the Suwalki Gap, where Lithuania borders Poland. If Russian forces occupy the Suwalki Gap, movement of goods in and out of the Baltic states would have to be entirely conducted through seaports such as Klaipeda (Lithuania), Riga (Latvia), or Tallin (Estonia).²³ However, that trade could be severely restricted as the Baltic Sea becomes contested or if kinetic attacks, cyberattacks, or sabotage operations disrupt seaport operations.

Agricultural infrastructure. As previously discussed, it is plausible to assume that Russia would attempt to disrupt agricultural production and trade across the Baltic states prior to and during the kinetic phase of the conflict. This could happen through targeted cyberattacks, sabotage actions, and direct

attacks aimed at damaging agricultural equipment, food storage and processing facilities, agricultural input plants (e.g., fertilizers and seeds), seaports, etc. This is a warranted concern because Russia has inflicted direct damages to Ukraine's agricultural sector, estimated at \$8.7 billion as well as \$40.3 billion in losses associated with the decrease in production, lower prices, and higher operational costs.²⁴ Another significant development was the placement of a very large number of landmines

Similarity of crop production and interregional trade. Due to their geographic proximity, all three Baltic states have similar crop calendars. For example, wheat, barley, and rye are key crops produced in all three countries, and their planting and harvest seasons fall between April and October. The level of impact of Russian military aggression on the Baltic states' food systems will vary across different stages of agricultural seasons. As an illustrative example, disruptions

“Disruptions happening immediately before harvest season would catch these countries' crop inventories at their lowest levels—commodity stocks are normally consumed throughout the season and then replenished with the following harvest.”

in agricultural fields and forests and the threat posed by thousands of unexploded ordnances. To put it in perspective, Ukraine became, in 2023, the most heavily mined country in the world. As a result, it is estimated that five million hectares (or approximately 15.2 percent) of Ukraine's total farmland are unsuitable for agricultural use due to the presence of landmines or explosive ordnances or for being too close to the front.²⁵ An added complexity is the cost of demining—more than \$5,000 per hectare. Despite Ukraine government providing subsidies, demining remains too costly for many farmers and 170 have been killed while trying to do it themselves.²⁶

Despite all these adversities, Ukraine's food systems displayed great resiliency and managed to continue to produce and export significant volumes of grains and oilseeds.²⁷ However, the negative impacts from these types of disruptions to local food production in the Baltic states would be magnified by a Russian naval blockade and/or by the occupation of the Suwalki Gap. Furthermore, road and rail infrastructure within the Baltic states is already limited. An occupational force, whether friend or foe, would compete for the access and use of that infrastructure. In that context, Baltic governments will be challenged to deliver the existing stocks of food products at a set frequency to meet the ever-increasing demands of their citizens caused by gaps in the food supply chain.

happening immediately before harvest season would catch these countries' crop inventories at their lowest levels—commodity stocks are normally consumed throughout the season and then replenished with the following harvest.

Despite regional similarities in agriculture production, there is also significant agricultural trade amongst the Baltic states. For example, even though the Baltic states are typically net grain exporters, much of this trade occurs among the three countries. This represents a vulnerability because in the event of a conflict with Russia, this intraregional trade would certainly stop as the Baltic states focus on meeting their own domestic needs. For example, Latvia is a wheat net exporter, but it also imports significant volumes of wheat from Estonia and Lithuania. As another example, in 2022, Russia, Belarus, and the two other Baltic states accounted for 38 percent of the value of Estonia's food and live animal imports.²⁸

Dependency on food imports. All three Baltic states have an advanced and productive agricultural sector and have achieved self-sufficiency in many food products such as wheat or dairy products. However, the region's climate is not suitable to produce certain agricultural products such as corn or specific fruits and vegetables. Thus, the region must import those products to meet its domestic demand; the EU is a major supplier. This section identifies the main

Table. Food Products Where Baltic States Depend on Imports to Meet Their Domestic Demand

Baltic States	Grains and Oilseeds	Animal Products	Fruits and Vegetables
Lithuania	Corn, rye, and sunflower seed	Poultry and pork meat	Potatoes, vegetables, and fruits in general
Latvia	Corn	Poultry and pork meat	N/A
Estonia	Corn, durum wheat, and sunflower seed	Eggs, honey, pork, and poultry	Potatoes, vegetables, and fruits in general

(Table by authors; supply balances published by three Baltic states' statistical agencies: Central Statistics Bureau of Latvia; Lithuania Official Statistics Portal, Ministry of Agriculture of the Republic of Lithuania, Agriculture and Food Sector; and Statistics Estonia)

imported food products that would be impacted by disruptions in trade into each of the Baltic states. This was achieved through an analysis of available supply balance sheets published by each Baltic state's national statistics agencies. The dependency on imports was determined each time domestic production was below domestic use of that specific food product. For example, in 2022, Latvia produced 38.7 thousand tons of pork but also consumed 84.0 thousand tons of pork and meat products.²⁹ Thus, it is determined that Latvia relies on imports to meet its domestic consumption of pork.

It must be noted that this formula does not account for the timing of the usage, only the net usage at year end close. Furthermore, the list of products shown in the table is an underrepresentation of the true universe of imported food products by the Baltic states because supply balance data was not consistent across the three countries. More specifically, data was either limited to main food product categories or simply not available—as the case of fruits and vegetables in Latvia. Nevertheless, results reveal that in the event of a conflict with Russia, all three Baltic states would deal with shortages of certain grains and oilseeds, specific animal proteins, as well as fresh fruits and vegetables.

Data also shows that in Lithuania, some of these imported products are also among the nation's most consumed food products.³⁰ In a domino effect fashion, the unavailability of these foodstuffs would lead to a greater consumption rate and faster depletion of other available food products (e.g., beef or dairy products). Another important consideration is that during a conflict, the Baltic states' fishing fleet would not be able to operate in the Baltic Sea. Because fish

is an important part of the region's diet, this would only add to food insecurity in the area.

In summary, a prolonged disruption to food imports will inevitably lead to malnutrition amongst large segments of the population in the region. According to the United Nations Food and Agriculture Organization, in 2022, the average per capita daily dietary energy requirement for the Baltic states was around 2,500 kcal, whereas the minimum requirement was nearly 1,900 kcal. Based on these metrics, disruptions to local food supplies that reduce average population's current calory intake by more than 23 percent would cause the region's population to go undernourished.³¹ What is more concerning, if the situation deteriorates into a humanitarian crisis, both government and nongovernment organizations (local and non-Baltic) would not be able to access conflict areas to deliver food assistance.

Large presence of military forces, refugees, and internally displaced populations. It is estimated that, in 2023, the combined population of the Baltic states was just over 5.6 million people.³² A large and prolonged presence of NATO and Russian militaries in this region would exert a significant pressure on local food systems. As an illustrative example, the presence of just one NATO corps in the region would require feeding near forty-five thousand additional people in an area that may be already experiencing food insecurity.³³ As evidenced by the conflict in Ukraine, Russian forces themselves may be less food secure than the countries they invade. This is because the existing Russian logistical systems are not well prepared to sustain large military operations.³⁴ Thus, it is plausible to have Russian military forces resorting to local food resources that are already damaged or weakened by earlier Russian military actions.

So far, the war in Ukraine resulted in 3.7 million IDPs and 6.5 million refugees.³⁵ A similar scenario should be anticipated in the Baltic states. Hundreds of thousands of civilians would move across the region as they escape the conflict. This, in turn, would put enormous pressure on local food systems and trigger humanitarian crises. Unlike what happened in Ukraine, it is unclear whether EU's assistance and other humanitarian organizations (e.g., United Nations High Commissioner for Refugees) would be able access the region to deliver food aid. Lastly, large flows of civilian populations would compete for and congest the same transportation infrastructure used by NATO and Russian military forces.

Lack of strategic food stockpiles and loss of local food production systems. To our knowledge, there is no evidence that the Baltic states have strategic food stockpiles that would allow them to absorb large shocks to their food systems such as a naval embargo by the Russian navy or the occupation of the Suwalki Gap. One may draw comparisons to China and Taiwan to highlight the importance of this shortcoming. As the military tensions between these two countries increase, these nations are concerned about the resiliency of their own food systems. As a result, their governments maintain food stockpiles large enough to feed their populations in the event of a major shock—for up to six months in the case of Taiwan and up to two years in the case of China.³⁶ When comparing geographical advantages and disadvantages, Russia with friendly land borders and a large land mass, most closely matches China. The Baltics, on the other hand, potentially cut off by a contested Baltic Sea and surrounded by enemy forces, more closely match the island of Taiwan.

A RAND Corporation study recommended the establishment of decentralized stockpiles and caches of key commodities that would support resistance activities in the Baltic states. These supplies would include food stocks and water purification systems, amongst other essential goods.³⁷ A geographic dispersion of reserve food stockpiles would make it harder for Russian forces to detect and neutralize them. Moreover, the destruction of decentralized stockpiles would not have cascading effects across a more integrated food storage system. Nevertheless, this strategy would only help military resistance in the Baltic states to remain

operational for a longer period but would not be sufficient to feed the greater civilian population.

The buildup of strategic food stockpiles would require large storage facilities (e.g., grain silos or cold storage warehouses), which are costly to build and maintain. Second, these facilities normally have a large footprint and would be vulnerable to attacks like those we witnessed in Ukraine. Hence, with the assistance of NATO, the Baltic states should develop defensive capabilities focused on protecting food storage facilities and key agricultural infrastructure against Russian kinetic aggression and cyberattacks. This could be achieved through centralized government programs of public-private partnerships.

Lastly, based on evidence from Ukraine, it is important that the Baltic states sustain and strengthen localized food systems that may be more resilient against major disturbances. This is because small family farms and rural households rely less on external resources and complex supply chains to secure their farm inputs—they employ household/local labor, apply organic fertilizers, and use local seed varieties. Furthermore, these small-scale farms tend to process parts of their own food and trade their production on local markets and via informal networks.³⁸

It was also observed that many IDPs in Ukraine relocated to rural areas where they became involved in subsistence farming and assisted local farmers.³⁹ Following the accession to the EU, the transition toward fewer and larger commercial farms gained momentum in the Baltic states. This transformation has happened at the expense of smaller family farming operations.⁴⁰ This loss of more resilient local food systems represents a threat to food security in rural areas in the event of a conflict with Russia.

Conclusion

The Baltic states all have highly productive agricultural systems comprised of a robust private agribusiness sector and supported by modern infrastructure and the EU's Common Agricultural Policy. As a result, the countries have a dependable food supply and high levels of food security. However, a military conflict with Russia would put these food systems under great stress and reveal serious cracks within them. Following NATO's resilience and civil preparedness framework codified in Article 3, this study assesses the resiliency of

the Baltic states' food systems against major shocks. For that, several strengths and vulnerabilities were identified and discussed in detail.

While the region has some important built-in resiliencies, the inability to import foods and the lack of strategic food stockpiles would pose a serious threat to regional food security. While these nations have achieved self-sufficiency in specific food categories (e.g., grains, dairy, and meat products), they remain dependent on imports of food products that cannot be locally produced due to the region's climate (e.g., feed grains, certain fruits, and vegetables). Food production and food security in the Baltic states could also be negatively impacted by Russian attacks on local agricultural infrastructure, a large presence of military forces, and influxes of refugees and IDPs.

It is critical that the Baltic states address the vulnerabilities identified in this study to strengthen the resilience of their agricultural and food sectors

against Russian military aggression. Such steps would be vital to the resilience of NATO's northeastern flank and would reduce Russia's ability to catch this region off guard. For example, a minimum level supply and communication lanes through the Baltic Sea must be maintained to avoid Russia putting the region in a chokehold and isolated from the other NATO neighbors. Furthermore, government policies and public-private partnerships should be developed to protect privately owned agricultural infrastructure against cyber threats, acts of sabotage, or kinetic attacks. Moreover, if properly protected, strategic food stockpiles could buy the Baltic states and NATO more time to liberate the region from Russian occupation while avoiding a widespread humanitarian crisis. Lastly, the Baltic states should preserve local and decentralized food systems (e.g., small-scale farming operations, local farmers markets and food processing, etc.), which tend to be more resilient to disruptions. ■

Notes

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