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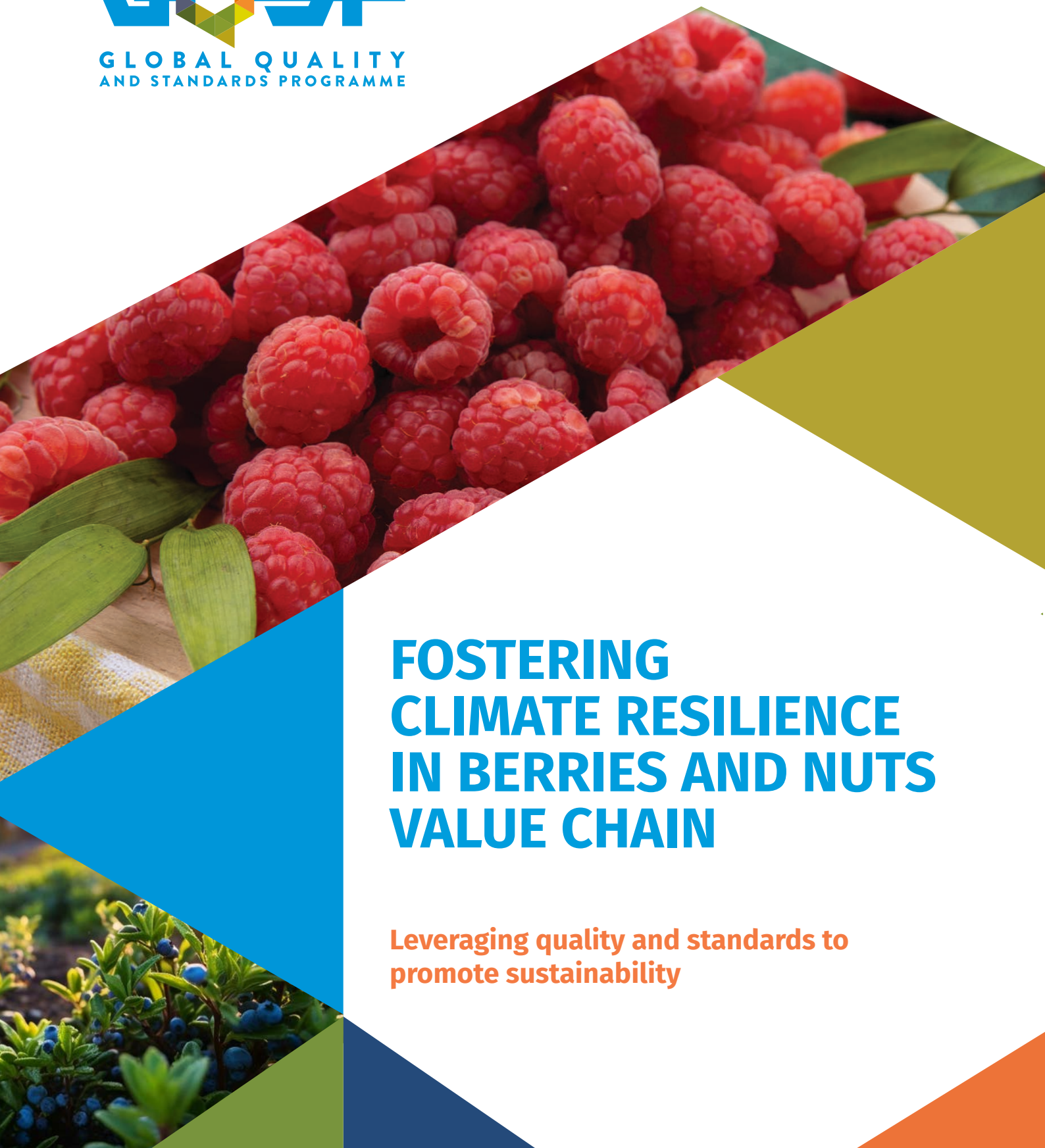

FOSTERING CLIMATE RESILIENCE IN BERRIES AND NUTS VALUE CHAIN

Leveraging quality and standards to promote sustainability

Acknowledgements

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GLOSSARY OF TERMS

B&N	Berries and Nuts
EU	European Union
GAP	Good Agriculture Practices
GHG	Greenhouse Gas
GQSP	Global Quality and Standards Programme
ISID	Inclusive and Sustainable Industrial Development
ISO	International Organization for Standardization
NGO	Non-Governmental Organization
NQIS	National Quality Infrastructure System
QIS	Quality Infrastructure System
SDG	Sustainable Development Goal
SECO	State Secretariat for Economic Affairs (Switzerland)
SME	Small and Medium-sized Enterprise
SMETA	Sedex Members Ethical Trade Audit
UNFCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
FAO	The Food and Agriculture Organization
UNDP	United Nations Development Programme
NDVI	Normalized difference vegetation index
MY	Marketing Year
MT	Metric tons
VC	Value Chain
LULUCF	Land Use, Land Use Change and Forestry
IDP	Internally Displaced People

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CONTEXT

Funded by Switzerland through the State Secretariat for Economic Affairs (SECO), this publication has been developed under the Global Quality and Standards Programme (GQSP) Ukraine in partnership with the Ministry of Economy of UkraineThe project's primary goal is strengthening Ukraine's national quality infrastructure to enhance the competitiveness of its berries and nuts (B&N) value chains. Supporting Ukraine's integration into regional and global trade, , the GQSP focuses on improving the ability of its small and medium-sized enterprises (SMEs) to comply with international standards and market requirements.

A cross-cutting objective of the GQSP is climate resilience across all project activities. In recent years, Ukraine's agricultural landscape has undergone significant environmental stress, evidenced by extreme weather events such as droughts, frosts, and changing seasonal patterns, as well as the conflict-related disruption of traditional agricultural practices. In light of these vulnerabilities, climate resilience is more than a supplementary goal. The GQSP's focus is a core component of ensuring that Ukraine's B&N value chains remain sustainable, productive, and competitive in the global and local markets.

This publication assesses the climate-related implications facing Ukraine's B&N sector and identifies opportunities to address these implications by applying quality measures and standards. Its actionable recommendations for stakeholders across the value chain – from producers to policymakers – will help them strengthen climate resilience, improve resource management, and ensure Ukraine's agricultural sector's long-term sustainability. The insights and findings of this assessment can drive sustainable practices, enhance productivity, and position Ukraine's B&N sector as a leader in climate-smart agriculture.

In this critical moment for Ukraine, strengthening its B&N sector'sclimate resilienceis essential for both economic growth and the industry's sustainability in the face of future environmental and geopolitical challenges.

EXECUTIVE SUMMARY

A robust quality infrastructure system (QIS) and alignment with global standards are essential for climate resilience, a principle that promises significant benefits for Ukraine's agriculture sector. As Ukraine navigates its complex geopolitical situation, fortifying the agricultural industry with strong climate resilience strategies can unlock new market opportunities, ensure sustainability, and meet international environmental benchmarks. This notion is particularly crucial for high-potential segments such as berries and nuts, where incorporating rigorous climate resilience practices can substantially boost Ukraine's international competitiveness.

In this evolving agricultural landscape, climate resilience measures are indispensable. Their integration is crucial for the daily operations and the sector's strategic long-term growth. Amid the ongoing conflict and the projected post-war reconstruction phase, climate resilience becomes even more pivotal. Increasing environmental vulnerabilities necessitate robust resilience and sustainability strategies within the sector. Supporting this shift is vital for its durability and expansion.

Accordingly, this study provides actionable recommendations to help stakeholders in Ukraine's berries and nuts sector mitigate climate change impacts. Using standards and quality measures will ultimately improve the sector's sustainability and climate resilience. This study identifies vulnerabilities, assesses the impact of climate change and external factors—including those determined by the armed conflict—and explores the role of standards in mitigating these effects.

By integrating the provided insights into their operations, the stakeholders can boost the berries and nuts sector's sustainability and economic viability. This strategic approach enhances climate resilience while ensuring that Ukraine's agricultural sector remains competitive on a global scale.

1. Introduction

Ukraine's berry industry encompasses a range of wild and cultivated berries, with strawberries, raspberries, currants, and highbush blueberries leading in the production of the latter. The country's total berry production in 2022 exceeded 154.59 thousand tonnes , with exports of 88.13 thousand tonnes to 97 countries. Catering to domestic and international markets, Ukrainian producers offer a variety of berry products, including frozen berries, juice concentrates, and mixed-fruit preparations. Despite market growth and competitive advantages like favourable climate and logistical edges, challenges like quality standards compliance and limited production capacity hinder further development. The launch of the "eWork" government programme in July 2022 supports entrepreneurship with grants for orchard and greenhouse development, particularly concentrated in Western Ukraine.

In Ukraine, the nut industry comprises a diverse assortment of nuts, including walnuts, cashews, almonds, and hazelnuts, with walnut cultivation dominating the nut-growing landscape. Southern Ukraine shows potential for growing almonds, pistachios, and hazelnuts, with the former yielding up to 2,500 kg/ha under favourable conditions. The nut business in Ukraine offers several advantages, including multiple sales channels, long storage duration, and high profitability. While walnuts are mainly consumed domestically or exported as in-shell nuts, the country imports other varieties to be used by confectionery factories or sold through retail channels.

Key stakeholders in the berries and nuts value chain in Ukraine include associations, NGOs, media initiatives, and educational projects. "Ukrainian Berry Association," "UKRSADPROM," and the "Ukrainian Nut Association" play significant roles in promoting and regulating the industry. Additionally, media and educational projects like "EastFruit" and "SAPIENZA. MEDIA" provide valuable insights and information to stakeholders in the agricultural community. These actors collectively contribute to the development and growth of Ukraine's berries and nuts industry.

The main Ukrainian legislation on climate change encompasses several regulatory frameworks addressing environmental challenges and sustainable development. These laws ratify international agreements, including the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, as well as national strategies like the "Ukraine-2020" Sustainable Development Strategy and pending actions like the Plan of Urgent Adaptation Actions, the Law of Ukraine "On Environmental Protection." National Strategy of Environmental Security of Ukraine until 2030, and Energy Strategy of Ukraine until 2050.

Efforts led by the Ministry of Environment, suppored by projects like EU4Climate, focus on updating environmental standards to align with EU legislation, particularly regarding the requirements and guidelines for quantification and reporting on greenhouse gas emissions and removals at the organizational level. However, challenges in implementing EU policies and achieving sustainable land use practices persist, as evidenced by unfulfilled initiatives and incomplete mechanisms. Urgent measures are needed to adopt programmes for conservation and promote agroecological agriculture, focusing on supporting organic farming and adapting to climate change in vulnerable regions. Reliable sources of climate information and analysis are essential for informed decision-making and risk assessment in such climate change mitigation and adaptation efforts.

In Ukraine, which boasts diverse soil and climatic conditions, climate-related hazards are increasingly evident, with rising temperatures and altered seasonal phenomena affecting agriculture. Over the past two decades, Ukraine has seen nearly uninterrupted warming. An average temperature increase of 0.8°C changed seasonal rhythms and an uptick in extreme weather events such as floods and droughts. Recent studies emphasize the need for innovative approaches to mitigate climate risks in agriculture, including soil fertility optimization, alternative farming models adoption, and the weather conditions-based planting times adjustment. Such adaptation strategies are crucial for ensuring agricultural resilience amid ongoing climate change challenges.

The water management situation in Ukraine's berries and nuts (B&N) value chain presents a mixed picture. In general, Ukraine is assessed as a medium-risk country according to the WWF methodology, with a slight increase in risk projected by 2030. Notwithstanding, detailed analyses of the main B&N regions reveal varying levels of water risk. The assessment based on data from the Water Risk Atlas in key areas of the B&N value chain in Ukraine reveals different risk degrees across different locations. In regions such as Kherson, Dnipro, Ukrainka, Zhytomyr, and Ivano-Frankivsk, the overall risk is categorized as low to medium (1–2), indicating a relatively low level of water-related challenges. However, areas likeRivne, Mykolaiv, Khmelnytskyi, Vinnytsia, and Lviv are classified as medium to high (2–3) in water risk, suggesting a moderate to significant threat levels. Notably, the water risk in Odesa is extremely high (4–5), indicating severe challenges in this region. The assessment also highlights the influence of major and minor basins, with areas along the Black Sea coast generally exhibiting higher water risk levels than those along the Dnieper, Dniester, and Vistula rivers. These findings

underscore the importance of ongoing monitoring and proactive water management strategies within the B&N value chain to mitigate potential risks and ensure sustainable agricultural practices in Ukraine's diverse climatic and hydrological landscape.

Ukraine's agricultural policies in the berries and nuts value chain face significant challenges. Despite the developing economy's abundant agricultural land resources, particularly its renowned black soil, the lack of sustainable land use practices has led to excessive land development and environmental degradation. For instance, a substantial portion of the land has already been transformed beyond permissible limits. The forestry value chain is also in crisis due to insufficient forestation levels. Moreover, the current biodiversity risk assessments highlight medium-level risks. To address these challenges and promote sustainable agricultural practices, concerted efforts are needed to implement policies that prioritize ecological balance, regulate land use, and mitigate environmental risks across the B&N value chain and beyond. In the context of Ukraine's berries and nuts value chain, greenhouse gas (GHG) emissions represent a significant environmental concern. As per the National Inventory of Anthropogenic Emissions and Absorption of Greenhouse Gases, Ukraine emitted 341.5 million tonnes of CO_2 equivalent (tCO_2e) in 2021. The energy value chain, mainly fossil fuel combustion, contributes most to GHG emissions, followed by the industrial and agricultural value chains. Agriculture, including the B&N production, accounted for 14.4% of total emissions in 2021, primarily from enteric fermentation and agricultural soil management. Despite this contribution, few B&N value chain companies have initiated GHG inventory calculations to assess their carbon footprint and implement climate mitigation strategies. This underscores the need for greater awareness and action within the value chain to address its contribution to GHG emissions and promote sustainability.

The current state of sustainability capacities, resource management, and adaptation strategies within the B&N value chain reveals several key insights. Firstly, a small number of companies in the value chain with ISO 14001 certification or a dedicated person responsible for environmental management suggests a lack of systematic implementation. Only big companies have begun conducting GHG inventories, indicating a nascent understanding of their carbon footprint. However, the prevalent energy and water consumption reduction goals among B&N companies suggest a growing resource management awareness. In terms of adaptation strategies, companies are diversifying sourcing locations and implementing climate-resilient crop varieties, sustainable land management, reforestation, and water conservation. Some companies have already initiated green projects, such as solar panel installation and water consumption minimization through optimized irrigation systems.

While direct sustainability programmes for the B&N value chain at the company level are lacking, some initiatives are accessible through associations and portals like OrganicInfo.ua, a platform promoting organic production and sustainability. An exemplary project this platform facilitates is the "Knowledge Transfer on Organic Farming and Climate Change in Agriculture," which aims to develop educational resources on organic farming's connection to climate change. Additionally, practices such as post-harvest berry cooling are recognized for maintaining produce quality and reducing food waste, contributing to overall sustainability in the value chain. Challenges in implementing climate resilience programmes include difficulties in obtaining climate-related forecast information, budget constraints, and the high cost of green technologies. While most companies fail to collaborate with external partners on climate-related capacity building, there is an interest in exploring the industry trends-focused training programmes in climate resilience, sustainable agriculture, employee professional development, and security measures. Ukraine's potential for berry and nuts farming underscores the importance of enhancing sustainability practices in the value chain.

The ongoing war's immediate and long-term indirect impacts on global food security include disruption to harvesting and shipping, severely affecting staple supplies and pricing. Military actions have hindered Ukraine's ability to transport agricultural products, resulting in labour shortages and disruptions to essential public services. The B&N industry in Ukraine faces challenges due to the complex situation caused by the war. Decreased consumption, supply shortages, and logistical disruptions have impacted the market towards higher prices and changes in purchasing patterns. Military actions like the occupation of territories significantly affest the entire agricultural value chain by creating logistics problems and resource shortages. Furthermore, according to Climate Focus research, greenhouse gas emissions directly attributed to the conflict have totalled at least 100 million t CO_2e (tonnes of carbon dioxide equivalent), . Post-war reconstruction accouns for half of these emissions. Damage to renewable energy facilities has underscored the importance of distributed renewable energy generation for ensuring resilience. Post-war recovery efforts will focus on rebuilding production capacities, supporting human capital, and enhancing agricultural education and science. Sustainable practices, technological advancements, and integra-

tion into global markets will be crucial for the value chain's long-term growth and resilience in the face of ongoing challenges.

Despite the conflict, Ukraine remains engaged in international climate initiatives, committed to integrating climate considerations into its recovery policies. The government has implemented several support programmes for agricultural producers, including tax relief, financial assistance, and deregulation measures to mitigate the conflict's impact on this value chain. However, challenges remain in abandoning fossil fuels and ensuring a just transition for affected communities. Overall, the climate sensitivity of Ukraine's recovery presents a significant test for the local government, its people, and the international community alike.

1.1. Berry value chain in Ukraine

The primary wild berries gathered and marketed include blueberries, blackberries, cranberries, elderberries, lingonberries, and aronia. Ukraine's primary production of cultivated berries includes strawberries (5431 thousand tonnes), raspberries (65 thousand tonnes), black and red currants (24.69 thousand tonnes), and highbush blueberries (1.82 thousand tonnes).

According to official statistics, Ukraine's total production of berries by in 2022 was over 154.59[1] thousand tonnes, with exports of 88.13 thousand tonnes of fresh and frozen berries to 97 countries worldwide.

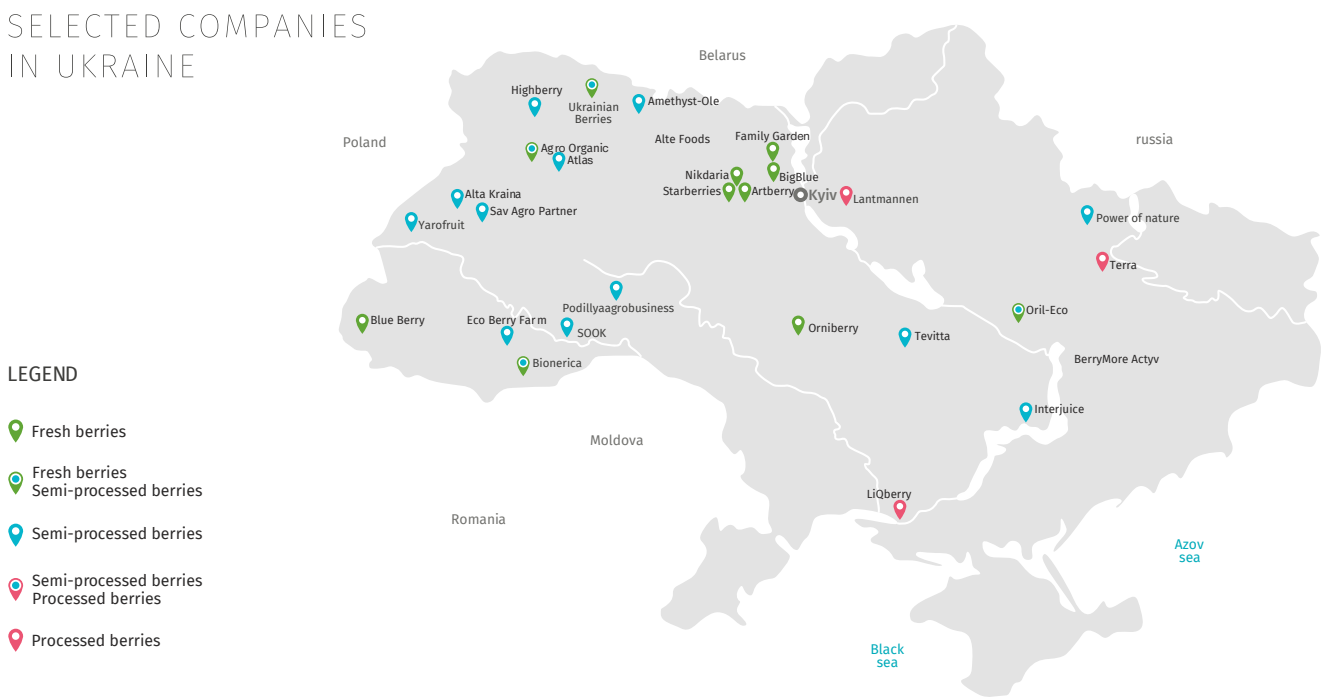
Berry products marketed by Ukrainian producers include a wide range of wild and cultivated berries. Ukraine's booming berry export has demonstrated immense growth since 2014 (expansion of 25% in volume over nine years), being of the most attractive returns on investment in Ukrainian agriculture.[2]

Most processed products entering the domestic and export markets are quick-frozen berries and berry mixtures, juice concentrates, single-varietal purse, mixed-fruit preparations, and a wide range of easy-to-use quick-frozen combinations.

To meet changing market trends, Ukrainian producers rapidly expand their preparation of packaged, quick-frozen, wild, and cultivated berries that meet standards (Annex 1).

The map below illustrates the geographical distribution of the selected companies in Ukraine, highlighting various regions producing and processing berries (Figure 1).

Figure 1: Geographical location of key berries companies based on the Ukrainian berry industry catalogue



Source: https://uaberries.com/novyny/novyny-asotsiatsii/2023

1 https://drive.google.com/file/d/1xNtz1W3UVz5HdCAtKtlzIr3YQo1Jemq7/view
2 According to the 2023 catalogue created by the Ukrainian Berry Association.

Many companies are concentrated in the western part of the country, including regions such as Zhytomyr, Vinnytsia, and Lviv. These areas are known for their favourable climatic conditions and fertile soil, ideal for berry cultivation. Regions around Kyiv also show a dense presence of berry companies, reflecting the importance of central logistics and market access.

The presence of fresh and processed berry companies across various regions underscores the sector's comprehensive value chain's growth potential in domestic and international markets.

Table 1: Overview of key berry value chain companies

	Company name	Foundation	Location	Production volumes, 2023, tonnes	Certifications
1	Artberry, LLC	2011	Kyiv Region	700	Global G.A.P GRASP, SMETA
2	Blue Berry, LLC	2013	Zakarpatian Region	500	GlobalG.A.P., GRASP, SEDEX, UKRSEPRO and standard FSSC 22000 in process.
3	Family Garden, LLC	2016	Kyiv Region	750	ORGANIC, GLOBAL, GAP, SMETA, BRC
4	Grass Avenue, FE	2012	Zhytomyr Region	270	Global G.A.P., GRASP
5	Nikdaria, LLC	2017	Zhytomyr Region	450	Global GAP, GRASP, SMETA, SEDEX, HACCP
6	Yahydky, ASC	2016	Kyiv Region	250	ORGANIC, GAP, GLOBAL GRASP
7	Yulia, FE	2002	Cherkasy Region	250	HACCP, ISO 22000, ISO 9000, GLOBAL, GAP
8	Agro Organic, LLC	2016	Rivne Region	250	ORGANIC, HACCP, BioSuisse
9	BerryMore Actyv, LLC	2017	Dnipropetrovsk Region	120	GLOBAL
10	Bionerica, LLC	2013	Ivano- Frankivsk Region	800	ORGANIC, GS1, IFCSMS, IOAS, ISO/IEC
11	Oril-Eco, Ltd	2018	Dnipropetrovsk Region	180	ORGANIC, HACCP, FSSC 22000
12	Alta Kraina	2008	Ivano- Frankivsk Region	4500	Organic FSSC22000, BRC, Sedex
13	Alte Foods, LLC	2011	Zhytomyr Region	3000	ORGANIC, BRC, FSSC 22000, Kosher
14	Amethyst-Ole, LLC	2011	Zhytomyr Region	2500	ORGANIC, HACCP, ISO 22000, ISO 9000, NATURLAND
15	Eco Berry, FE	2017	Ivano- Frankivsk Region	10000	ORGANIC, ISO 22000, Food and Drug Administration (FDA)

Based on the frozen fruit market investigation,[3] the competitive advantages of Ukrainian frozen berry producers include favourable climatic conditions ensuring high product quality, geographical localization and logistics, and low resource costs shaping the production expenses.

Obstacles to further frozen berry market development in Ukraine include non-compliance with the official EU product quality standards, the absence of large, organized cooperatives for berry cultivation, and insufficient production capacity for freezing fresh berries.

"eWork," the new government programme was launched on 1 July 2022. Through the "Diia" platform, applications can be submitted for non-repayable grants to start a new business, expand small and medium-sized enterprises (SMEs), and acquire new career skills (Cabinet of Ministers Resolution dated 21 June 2022, No. 738 "Certain Issues of Granting Business Grants").

The grant programme for the creation or development of orchards subsidizes from 140,000 to 400,000 hryvnias per hectare. The orchard areas must cover

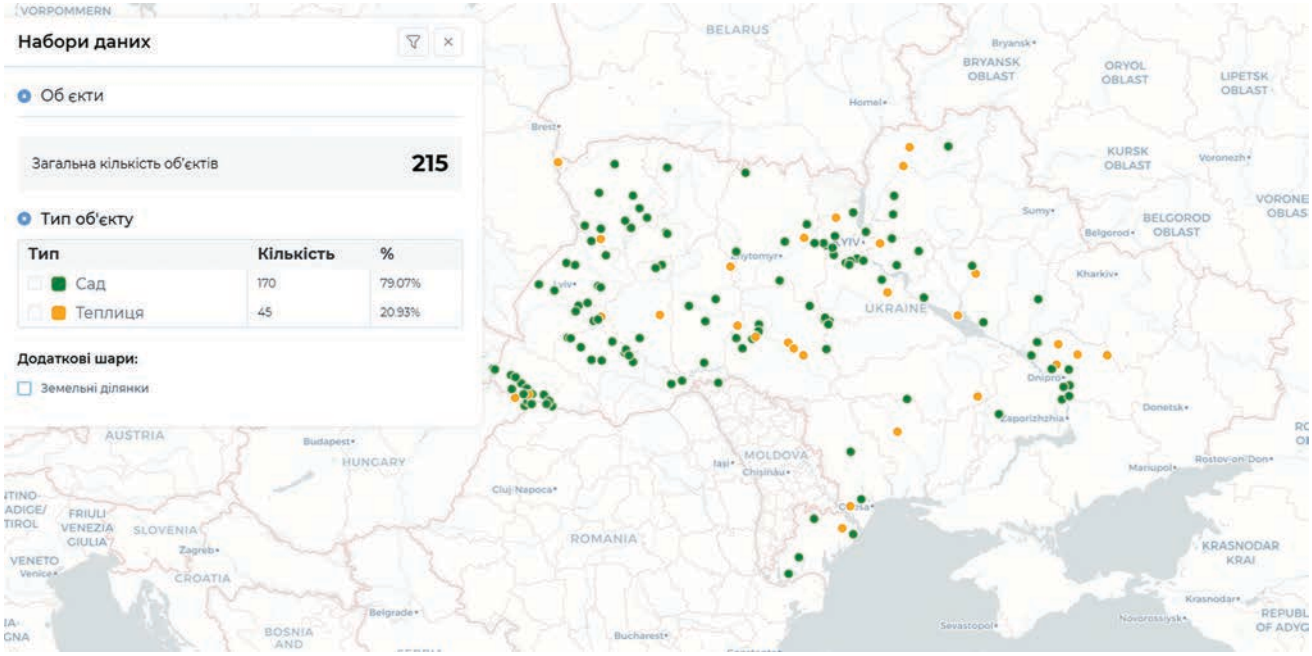
3 https://core.ac.uk/download/pdf/322822084.pdf

between one and 25 hectares on one or adjacent land plots, with the main condition being creating new jobs or attracting new members to work on the farm.

The grant programme for establishing or developing greenhouse farming will help farmers secure up to 7 million hryvnias.

The majority of the new greenhouse and orchard plantations are located in Western Ukraine (Figure 2).

Figure 2: MinAgro map of plantations financed by grants



Source: [Є робота. Онлайн моніторинг садів та теплиць. (minagro.gov.ua)]

With 525 ha of plantation financed from total 2570 ha, the Zakarpatska region is the leader in the plantation. The top five plantations are hazelnut and walnut, apple, blueberry, raspberry, and strawberry.[4]

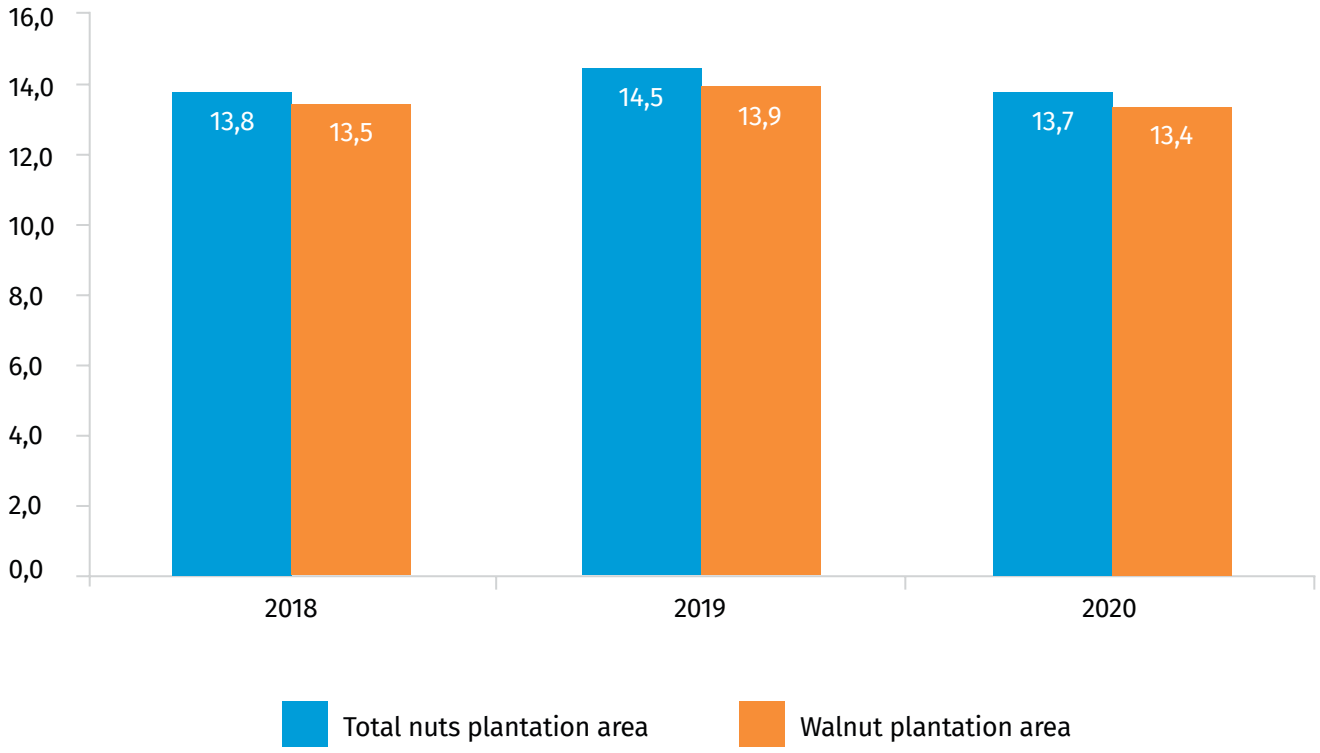
1.2. Nut value chain in Ukraine

According to the United Nations Food and Agriculture Organization (FAO), the nut market is one of the fastest-growing value chains in global horticulture. Each year, global nut trade increases by an average of 7.8%, comparable to the growth rate of the berry market. Currently, over ten main nut types are cultivated worldwide. Cashews, the world's best-selling nut, see remarkable growth of 17.2% annually, or USD 760 million.[5] Trends in vegan and paleo diets, which avoid allergens like gluten and lactose, drive the rapid growth of the global nut market. Due to their high protein combined with healthy fats and carbohydrates, nuts are vital to these diets. The proliferating health-conscious consumers also boost demand for nuts. Meanwhile, traditional walnuts lag behind cashews and almonds in growth rates due to their less versatile consumption and processing. As a result, the market share of walnuts is gradually declining. Lesser-known niche nuts like hazelnuts, Brazil nuts, and macadamias experience the highest sales growth, with global exports increasing by 25–40% annually.

In Ukraine, the assortment of nuts available is diverse- It includes walnuts, Brazil nuts, cashews, pistachios, almonds, hazelnuts, and more, as well as peanuts, which though botanically legumes, are traditionally considered nuts. The nut business in Ukraine falls under two types: enterprises engaged in cultivation and sales, and companies involved in importing, packaging, and selling nuts. The first type typically focuses on walnut cultivation, which occupies 97.8% of the nut-growing area in fruit-bearing age.[6]

4 https://public.tableau.com/app/profile/fsuw/viz/_16687835152330/Dashboard1
5 Details in the link
6 Details in the link

Figure 3: The area of nut plantings in thousand hectares from 2018–2020



Apart from walnuts, several other nut types are grown. Southern Ukraine is a potential region for growing almonds, pistachios, and hazelnuts. According to agronomists' estimates, with favourable conditions, an almond harvest of up to 2,500 kg/ha[7] can be obtained. The first almond harvest can be obtained in 2 – 3 years after planting, with the maximum yield reached in the 5th – 6th year. Hazelnut cultivation in Ukraine has already begun , with a harvest volume of 0.04 thousand tonnes in 2020.

The nut business in Ukraine has several advantages:

- Compared to other fruit and berry crops, nuts have longer storage duration, more sales channels, , and relatively stable high-selling prices.
- Yields increase with each fruiting year, and under proper care, plantings can remain productive for 10-15 years or more, depending on the type and variety-specific agricultural practices, among other factors.
- Nut cultivation requires practically no additional care conditions.
- High profitability of production.

With a small portion used by the confectionary industry and hardly ever processed, walnuts in Ukraine are consumed by the population and exported as in-shell nuts or low-quality kernels. All other types of nuts available in the Ukrainian market are imported.

The importing nut business enterprises can be further divided into:

- Enterprises that import nuts for their own production needs. These include confectionery factories and bakeries that use nuts for baking cakes, pastries, and cookies.
- Enterprises engaged in nut packaging and subsequent sales through stores, retail chains, cafes, restaurants, etc.

7 Details at the link

Table 2: Overview of the key nut value chain companies

	Company name	Foundation	Location	Production volumes, 2023, tonnes	Certifications
1	WalNut	2012	Odesa Region	260	ISSO 22000:2018
2	NIK	2005	Cherkasy Region	No information	ISSO 22000:2018
3	Yasmina	2005	Cherkasy Region	3000	ISSO 22000:2018
4	Orex Ukraine	2015	Kharkiv Region	No information	No information
5	Milkor	2010	Zakarpatska Region	No information	No information
6	Ecosad	No data	Dnipropetrovsk Region	No information	No information

Most walnuts harvested in Ukraine are produced by individuals or small private family farms, harvesting trees on their farms and nearby land. This category of producers is not typically concerned with applying fertilizers and agrochemicals and uses manual labour for harvesting and shelling walnuts. Harvested walnuts are typically sold to intermediaries, who assemble export-designated batches. Production areas farmed in such an extensive manner have decreased in the last several years. For the calendar year (CY) 2015, over 95% of the total Ukrainian walnut production was on small, private family farms. These farms represented 73% of the total Ukrainian walnut production area for CY2022. The USDA Foreign Agricultural Service predicts this downward trend in walnut production on family farms will continue in the medium to long term as ageing trees are losing their productivity and are felled. However, it is noteworthy that family farms still enjoy a dominant position in production volumes as they hold an absolute majority of the bearing tree area compared to industrial growers—81% for CY2022 (Tree Nuts Annual Report, 29.07.23, UP2023-0029).[8]

Since 2009, Ukrainian farmers have begun developing walnut orchards for commercial purposes. The average size of these commercial orchards ranges from 20 to 50 ha. Some regions, especially Central and Southern Ukraine, require irrigation to secure expected yields, while orchards in the northern part are at risk of bearing lower yields because of the cooler climate. That is why around 30% of all commercial walnut gardens are located in the Vinnytsia region (Central Ukraine), according to SSSU data for CY2022.

Key stakeholders in the berries and nuts value chain in Ukraine encompass associations, non-governmental organizations (NGOs), as well as media and educational projects. Associations like the "Berry Farming of Ukraine," "UKRSADPROM," and the "Ukrainian Nut Association" promote industry standards, providing support, and facilitating market access for producers. Additionally, NGOs such as the "Rural Women's Business Network of Ukraine," the "Institute of Environmental Management and Balanced Nature Use," and the "Phytosanitary Association of Ukraine" play crucial roles as advocates for sustainable practices and environmental management in agricultural community.

Media and educational projects like EastFruit, SAPIENZA.MEDIA, and AgroPortal.ua provide vital information, analysis, and updates on the agricultural sector, contributing to the overall knowledge base and awareness among stakeholders. These entities collectively disseminate best practices, enhance competitiveness, and support the sustainable development of Ukraine's berries and nuts sectors. Annex 2 of this document lists the key stakeholders in the industry.

8 https://pacificnutproducer.com/2023/07/05/walnut-production-consumption-in-ukraine-falling/#:~:text=Most%20walnuts%20harvested%20in%20Ukraine,for%20harvesting%20and%20shelling%20walnuts

2. Analysis of climate change implications and sustainability for selected VCs and the Ukrainian QIS

2.1 Overview of Ukrainian legislation and standards on climate change and agricultural policies in the B&N sector

Several strategic initiatives shape agricultural policies in Ukraine's berries and nuts sector, boosting its resilience and development. The key adopted policy is a comprehensive strategy for the horticulture sector. This strategy focuses on increasing productivity, enhancing produce quality, and expanding market access. Designed to align with the EU standards, the initiative facilitates integration into European markets and improves global competitiveness. The strategy also emphasizes sustainable practices and technological advancements to enhance efficiency and environmental stewardship.

Additionally, USAID-supported Agricultural Resilience Initiative (AGRI) plays a significant role. Supporting farmers with financial resources and enhanced market infrastructure, this initiative bolsters Ukraine's agricultural sector by improving access to inputs such as seeds, fertilizers, and equipment,. AGRI-Ukraine aims to mitigate the ongoing conflict's impact on agriculture, ensure food security, and maintain the economic viability of the agricultural sector.

Local and international NGOs and associations support these efforts by providing technical assistance, advocacy, and capacity-building initiatives. These organizations help disseminate best practices and foster innovation, ensuring the sector's growth aligns with national priorities and global trends.

Ukraine's legislation offers a variety of tools to support the development of its agricultural market. This toolkit includes tariff protection, non-tariff trade regulations, and domestic price measures. Key legislative instruments include:

- The "Concept of Rural Development in Ukraine until 2025" (2015) which establishes rural area development priorities.
- The Law "On State Support of Agriculture in Ukraine" (2014) sets the foundation for agricultural policy priorities and measures.
- The "Strategy for Attracting Private Investment in Agriculture for the Period until 2023" (2019) aims at boosting agricultural exports, ensuring national food security, and enhancing the agricultural sector's sustainable growth and effectiveness.

Agricultural producers in Ukraine benefit from the Single Tax, calculated as a percentage of agricultural land value. This tax, established on 1 July 1995, and adjusted according to the general consumer price index, replaces three taxes: profit tax, land tax—for land used in agricultural production— and special water use fee.

Additional support measures include:

- Fund for Partial Credit Guarantee in Agriculture which provides credit guarantees to small and medium-sized farms and agricultural enterprises cultivating up to 500 hectares of land.
- State Support for Agriculture Insurance offering reimbursement to agricultural producers for up to 60% of insurance costs.

A significant milestone was the 2021 resolution on the State Agrarian Register, which standardizes the maintenance and administration of the register and its data. Established in November 2020, the register integrates information on agricultural producers and their property.

From 2002 to 2019, an annually extended moratorium prohibited agricultural land sales in Ukraine, though leasing for cultivation was allowed. As of July 2021, Ukrainian citizens can purchase up to 100 hectares of land, with the limit set to increase to 10,000 hectares for Ukrainian citizens and legal entities as of January 2024 (based on a recent study "Agricultural Policy Monitoring and Evaluation 2022: Reforming Agricultural Policies for Climate Change Mitigation").

Together, these policies and initiatives underscore a comprehensive approach to developing the B&N sector, focusing on sustainability, resilience, and market integration.

Examples of existing regulatory frameworks in climate change include:

- Laws on ratification of UNFCCC and Kyoto Protocol
- A National Plan on the realization of the Kyoto Protocol
- "Ukraine-2020" Sustainable Development Strategy
- A Plan of Urgent Adaptation Actions (pending approval)

Supported by the EU4Climate project, the Ministry of Environment spearheaded the development of new environmental standards for monitoring, quantifying, and reporting greenhouse gas emissions. The existing outdated 2013 standards do not align with EU legislation. Updating them is crucial for implementing the EU Directive on Emissions Trading System in Ukraine.

The new standards projects include:

1 Greenhouse Gases. Part 1. Requirements and guidelines for quantification and reporting of greenhouse gas emissions and removals at the organizational level.

   • DSTU ISO 14064-1:20__ (ISO 14064-1:2018, IDT)

2 Greenhouse Gases. Part 2. Requirements and guidelines for quantification, monitoring, and reporting of emission reductions or removal enhancements at the project level.

   • DSTU ISO 14064-2:202__ (ISO 14064-2:2019, IDT)

3 Greenhouse Gases. Part 3. Requirements and guidelines for validation and verification of greenhouse gas assertions.

   • DSTU ISO 14064-3:20__ (ISO 14064-3:2019, IDT)

4 General principles and requirements for bodies validating and verifying environmental information.

   • DSTU ISO 14065:20__ (ISO 14065:2020, IDT)

European strategies like Farm to Fork Strategy, EU Adaptation Strategy, EU Biodiversity Strategy for 2030, EU Soil Strategy for 2030, etc., promote a systemic approach to environmental and climate issues considering the role and potential effects on the agricultural value chains. However, Ukraine is yet to adopt the provisions set by the EU, e.g. efficient water use by the agricultural value chain policy.

An attempt to begin legislative and regulatory support for the creation of an ecologically balanced structure of agricultural land was made in the Concept of Balanced Development of Agroecosystems in Ukraine for the period up to 2025 and approved by the Order of the Ministry of Agrarian Policy of Ukraine No. 280 of 20 August .2003. It is provided for: "...to carry out a scientifically based transformation of the structure of agricultural land in order to form a balanced ratio between individual components of agroecosystems and ensure environmental safety and balance of the territory, in particular, to increase the share of agricultural land of extensive use (hayfields, pastures) in accordance with scientifically based indicators and reduce the area of arable land to 37–41% of the country's territory by withdrawing from arable land slopes with a steepness of more than 3 degrees, lands of water protection zones, degraded, low-productive lands". However, these measures were not transformed into concrete mechanisms for their practical implementation and as a result, remained unfulfilled.

Based on the latest overview, the implementation of the current tasks is envisaged by the Sustainable Development Goals of Ukraine until 2030. The plan envisions reducing the arable land from 32.5 million hectares to 28.4 million hectares by 2030, effectively withdrawing 4 million hectares from cultivation. At the same time, the area of agricultural lands of extensive use like hayfields and pastures should be increased from 7.8 million hectares to 9.5 million hectares, increasing their share in the total territory of the country to 15.8% and in relation to agricultural lands up to 23% (Goal 15 "Protection and restoration of terrestrial ecosystems"). The document also recognizes the urgent need to introduce "such sustainable land use practices that do not deplete or pollute soils and on the other hand, that clearly restore degraded and eroded land". However, the recommendations for achieving the goals fail to include state influence mechanisms for solving these associated problems. These are absent from other government documents, although half of the allotted time was left before the results of the planned tasks were summed up.

In this context, adopting a programme for conserving degraded and war-damaged agricultural land with a state structure is urgent. Such an initative should include the governance of land plots for conservation, mechanisms of interaction between the state and the plot owners, the period of their stay in conservation, etc. For instance, a similar programme has been in place in the United States since 1985. At the same time, the agricultural law sets the national limit on the area of land that can be conserved, notably 6.3 million hectares in 2023. In addition, the Western European practice of temporary withdrawing the eroded land from cultivation necessary. Scientists from the Institute of Agriculture of the National Academy of Sciences and other institutions propose approaches for solving this problem.

The Code of Sustainable Agriculture should set the conditions for transitioning to agroecological agriculture. The conditions should reflect the provisions of the EU regulations on the economical use of the natural resource potential of agriculture, which form the cross-compliance system and regulate the adaptation of agriculture to climate change.

Regions with the most disturbed lands and the highest expected impacts from climate change, particularly in the steppe and eastern forest-steppe zones, will face the greatest challenges adapting to new economic conditions in Ukraine According to the United Nations Food and Agriculture Organization (FAO), short crop rotations combined with wheat and corn, drought-resistant legumes, and cereals like soybeans, chickpeas, millet, sorghum, and peanuts are the most suitable for such soil and climatic conditions.

One of the most critical areas in transition to agroecological agriculture is organic farming, designed to maintain and improve the health of the soil, plants, animals, people, and the planet as a whole. Ukraine should follow the example of EU member states and adopt a programme to support organic agriculture. In

Poland, for example, such support is provided during the transition period and in the period of established farming. Field, vegetable, fruit, and fodder crops, as well as growing grasses and sowing pastures receive financial support

Climate trends and projections are available at the global, regional, national, and occasionally local levels, usually considering the following:

- Average annual and seasonal temperature
- Number of hot days and nights and frequency of heatwaves
- Average yearly and seasonal precipitation
- Number of days above and below precipitation thresholds
- Number (frequency) of extreme weather events

Among the reliable sources of climate information are the following:

- International Panel on Climate Change publications, including special reports and the Fifth Assessment Report, and international online resources with climate data and climate change models
- WMO and regional climate centres' publications
- National communications to the United Nations Framework Convention on Climate Change
- Country statements, positions, and presentations at international conferences

  National policies, programmes, and plans related to environmental issues, natural resources, and adaptation to climate change

  Peer-reviewed international research

Understanding the climate trends and projections of a country and a region provided the basis for this study's analysis of climate change risks and hazards. However, the weaknesses in the data and uncertainty in the projections may limit its findings.

2.2 General climate situation overview

In Europe, in 2017, due to climate change, agricultural losses amounted to over USD 2 billion solely for fruit and vegetable crops. Crop yields in Germany decreased by 50% for apples and pears, 40% for cherries, and 60% for plums and prunes.

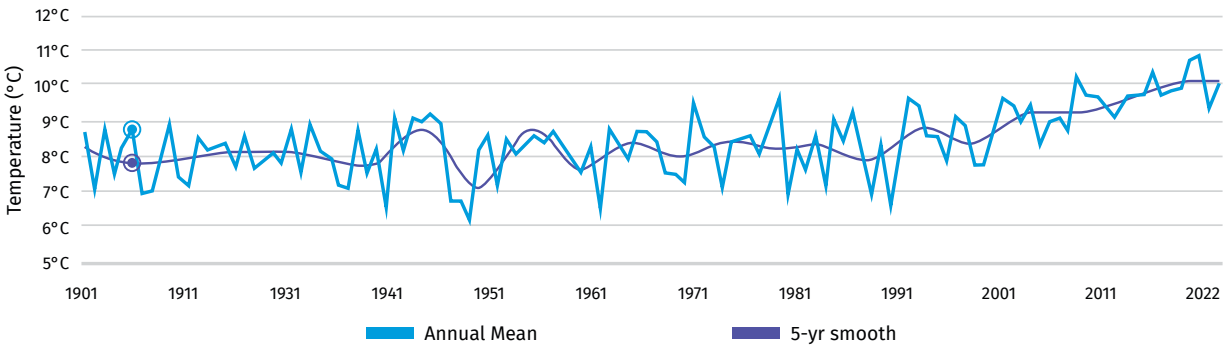
With its diverse soil and climatic conditions, Ukraine offers excellent opportunities for fruit and berry crops as well as vegetables.

Ukraine predominantly experiences a temperate climate, with the exception of a subtropical Mediterranean climate in the southern coast of Crimea. The country enjoys sufficient sunshine and year-round rainfall, highly concentrated during the summer season, fromMay to August. Rainfall varies depending on the area and seasonal variation patterns.

Ukraine's annual mean temperature spans 7 to 9°C. Mean summer temperatures from May to August range from less than 18°C to 22°C, while their winter counterparts, from December to March, vary between-4.8°C and 2°C. Precipitation occurs predominately in the summer to fall months, with the highest rainfall in June and July(67 mm).

Historical temperature data in Ukraine for the period 1901–2022, produced by the Climatic Research Unit (CRU)[9] of University of East Anglia, shows a slight average increase (Figure 4):

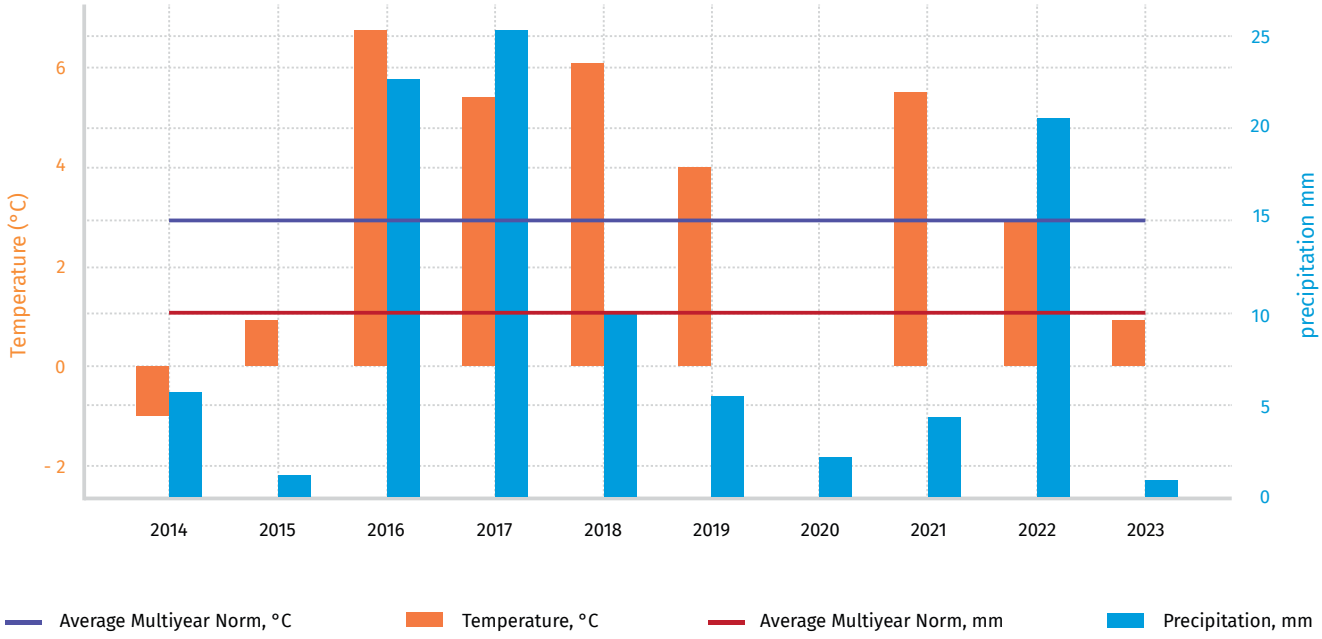
Figure 4: Observed Annual Average Mean Surface Air Temperature of Ukraine, 1901–2022



Source: Climatic Rese arch Unit (CRU)

9 https://www.uea.ac.uk/groups-and-centres/climatic-research-unit

Figure 5: Average hydrothermal indicators 2014–2023 show that the amount of precipitation has decreased from 25.3 to 20.4 mm during 2018–2023



Source: https://www.apk-inform.com/uk/exclusive/topic/1533083

Over the past two decades, the consequences of climate change in Ukraine have become increasingly evident. During this period, the average temperature has risen by 0.8°C, increasing by 1–2°C in January and February 2017.[10] These changes have led to alterations in the rhythm of seasonal phenomena such as tornadoes, spring floods, and droughts. Such rates of global warming in the future could result in significant climatic changes, putting various ecosystems at risk of disappearance.

Captured by the questionnaire, the key B&N value chain companies reported the following climate change phenomena they have been facing within last three years (2022–2024):

Table 3: Main climate change phenomena assessment

Assessment question	Answer	%
Have you observed any climate-related hazards influencing your business over last 3 years including:	Extreme Temperatures	47%
	Flooding	13%
	Drought	15%
	Other: Frost during spring, summer	30%

10 https://journals.indexcopernicus.com/api/file/viewByFileId/581332

Most B&N value chain companies faced extreme temperatures and frost events.

According to EastFruit, Ukrainian berry growers are facing significant losses of the blackberry harvest due to catastrophic frosts The prolonged night frosts have led to losses of up to 90% in some farms.

The most severe situation is observed in the northern regions of the country. According to Yevhen Kharlan, Director of Development and Strategy at LLC "Nikdaria," on the night of 14 May 2024, the temperature dropped to minus 6-8°C, resulting in substantial losses. Kharlan describes this anomaly as unprecedented in seven years of experience in the blackberry industry.

Although some blackberries were in the budding stage, crop losses amounted to approximately 50%. Various frost protection methods proved ineffective. Nearly every farm has been affected, and Kharlan estimates overall losses on the Ukrainian market to be over 50%.[11]

The blackberry market this year could experience severe disruptions, likely failing to meet the domestic demand for this fruit. Overall losses will only be assessed after all necessary statistics have been collected.

Climate change risk assessment aims to identify threats that may arise or intensify due to climate change, assess their probability, and evaluate the corresponding consequences in order to respond appropriately and mitigate their risks. The associated risks are dynamic, changing over time depending on the shifts in population, land use, economic growth. Additionally, these risks vary spatially and have different consequences.

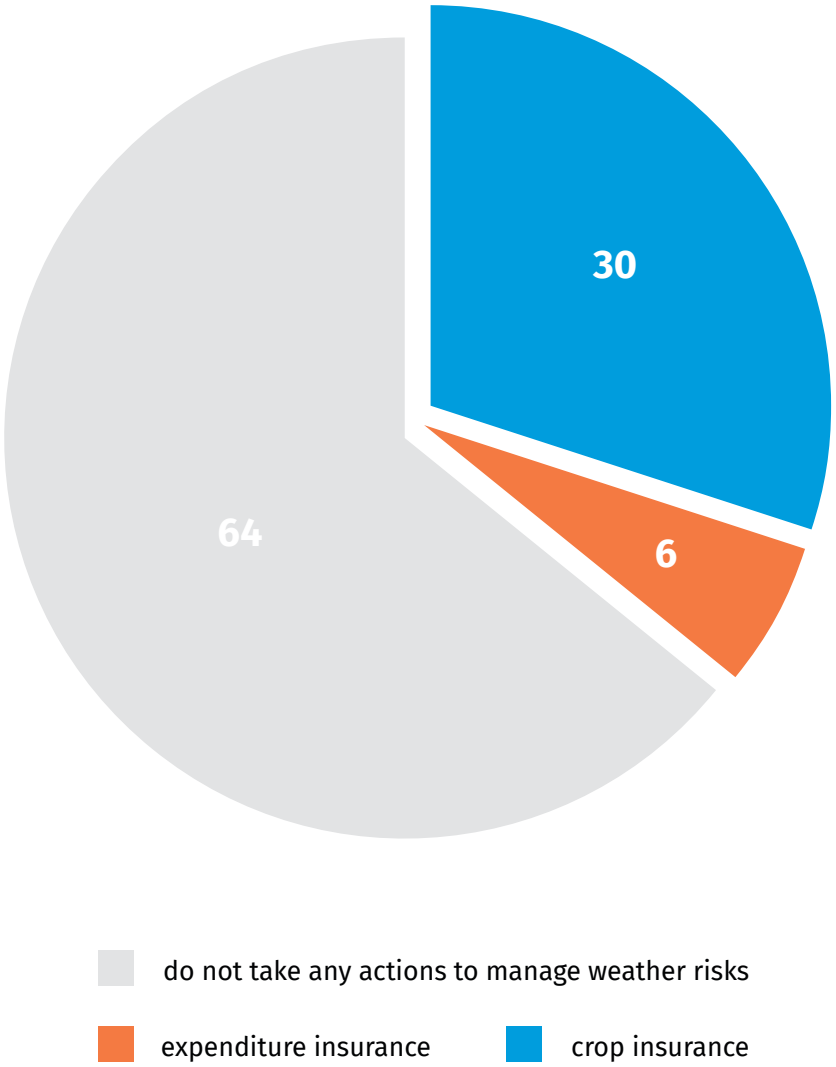
Since 1989, Ukraine has experienced an almost uninterrupted warming period, with the average annual air temperature increasing by nearly 0.9°C. In 75% of cases, it has been 0.8–1.5°C higher than usual. This development has led to seasonal phenomena's rhythm change, captured by the spring floods and snowfall during early blossoming. Additionally, extreme weather events have increased in frequency. Floods along the Danube in 2005, in Dnister and Transcarpathia in August 2008, droughts across Ukraine in 2007, and record snowfalls in western and central regions in March 2013 and the south in December 2009 impacted the economic outcomes of many agricultural activities. Since 2000, there has been a trend of increasing summer temperatures, posing a threat of more frequent droughts.

Changes in the cold season and spring temperature regimes have expedited planting by two weeks in recent years. Across Ukraine, precipitation has reduced, negatively affecting soil moisture and contributing to drought spreads in the northern regions. Over the last decade, natural-climatic zones shifted northward by 100–150 km. Presently, the southern parts of Kyiv and Zhytomyr regions can be considered areas of unstable moisture supply.

The minimization of adverse weather effects, based on the surveyed results of agricultural producers in Kyiv, Kirovograd, and Khmelnytskyi regions, is mainly achieved through crop insurance (30%) and expenditure insurance (6%). However, most respondents (64%) take no actions to manage weather risks, citing either insufficient funds or a perceived lack of necessity[12] (Figure 6):

11 https://east-fruit.com/uk/plodoovochevyi-biznes/intervyu-uk/katastrofichni-zamorozky-yahidnyky-ukrayiny-vtratyat-50-vrozhayu-lokhyny/
12 https://journals.indexcopernicus.com/api/file/viewByFileId/581332

Figure 6: Key climate mitigation actions in agro, three regions in Ukraine analyses



Source: IPG study based on key B&N sector company interviews

According to recent studies, new methods and approaches to land resource management are necessary to mitigate the risks of agricultural operations, especially in unstable climatic zones. These include optimizing soil fertility and cultivated crop productivity with specific proposals on what, how, where, and when to grow using certain technologies. Strategies for domestic agricultural enterprises to adapt to global climate change could involve the use of zero-tillage, alternative farming models like Biointensive Mini-Farming, Biodynamic Agriculture, Effective Microorganism Technologies, and Low Input Sustainable Agriculture, borrowed from abroad to improve soil structure, restore natural fertility, and promote the formation of ecologically sustainable agro-landscapes. Weather condition-based shifts in planting times and corresponding adjustments to other processes could also be a part of these technological changes. The same goes forusing of drought- and heat-resistant seed varieties or hybrids.

2.3 Water management situation in the B&N value chain overview

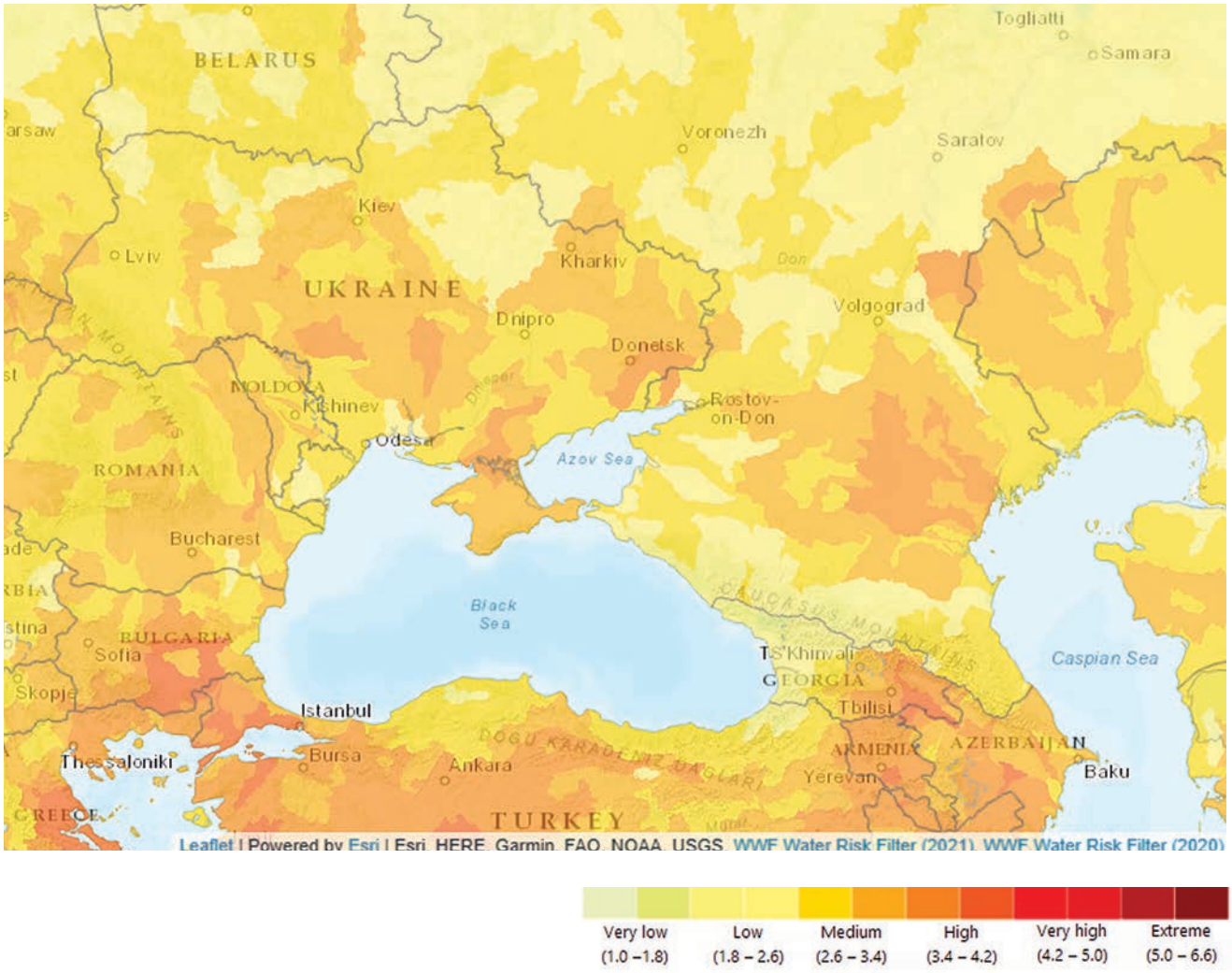
Ukraine is assessed based on a WWF (World Wide Fund for Nature) methodology as a medium risk country:

Figure 7: WWF Water Risk Filter

Basin Risk		Risk Score	Ranking
Phisical Risk		2,94	137
1	Water Scarcity	2,6	105
2	Flooding	2,83	106
3	Water Quality	3,91	122
4	Ecosystem Services Status	3,08	184

Source: WWF Water Risk Filter – Country Profiles

Figure 8: Map of Ukraine WWF Water Risk, current scenario



Source: WWF Water Risk Filter – Country Profiles

Based on the global dataset, using the average industry weighting, the figure shows the area-weighted average risk scores of the selected country or territory.

For more details, refer to the Water Risk Filter Methodology in Data & Methods.

Very low	Low	Medium	High	Very high
(1.0 — 1.8)	(1.8 — 2.6)	(2.6 — 3.4)	(3.4 — 4.2)	(4.2 — 5.0)

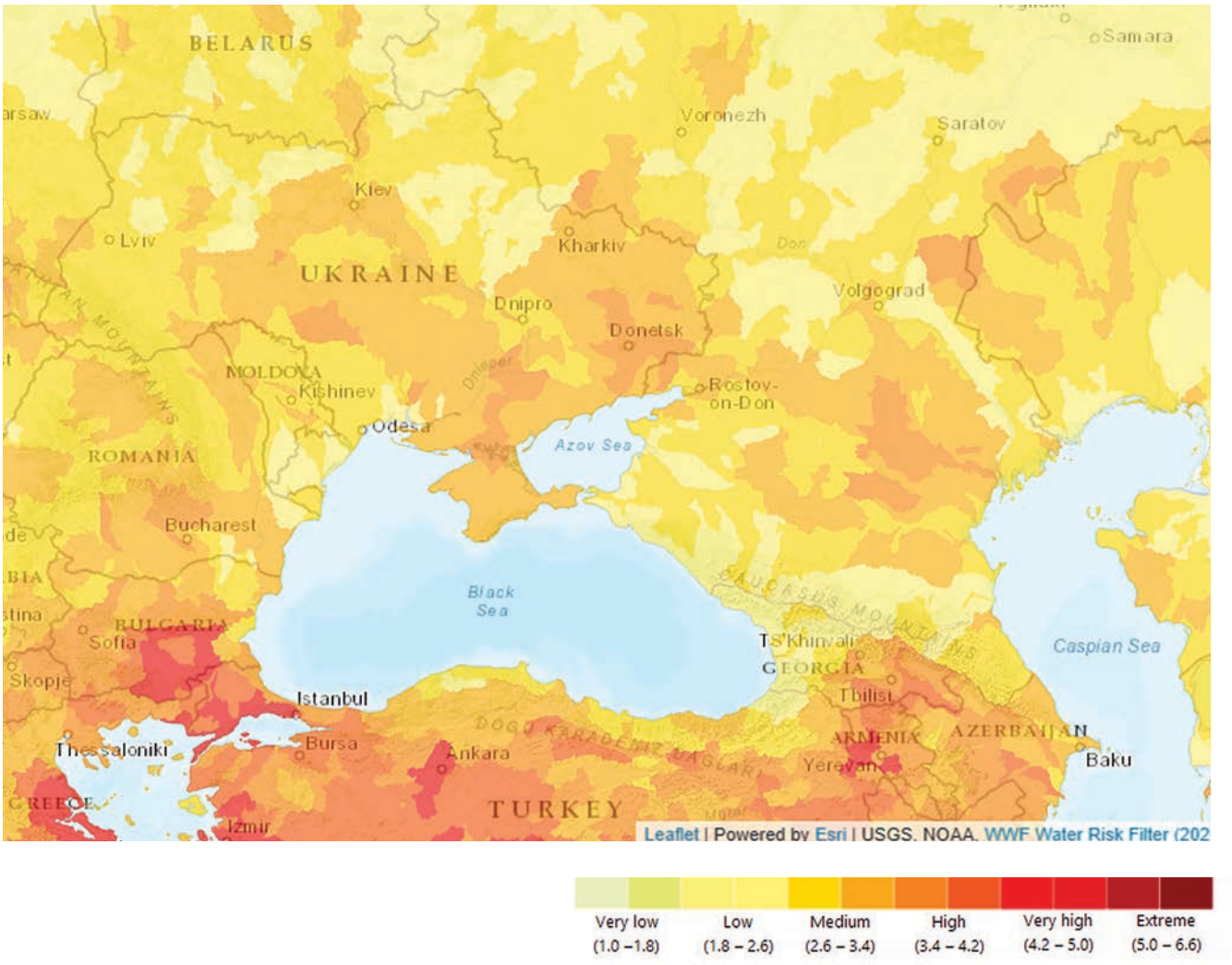
The 2030 trend scenario presented in Figure 9 shows a slight risk level increase

Figure 9: WWF Water Risk Filter, 2030 scenario

Basin Risk		Risk Score	Ranking
Phisical Risk		2,98	132
1	Water Scarcity	2,72	123
2	Flooding	2,57	99
3	Water Quality	3,97	119
4	Ecosystem Services Status	3,29	181

Source: WWF Water Risk Filter – Country Profiles

Figure 10: Map of Ukraine WWF Water Risk, 2030 scenario



Source: WWF Water Risk Filter – Country Profiles

Table 4 exhibits the detailed water risk analyses of the central berry regions of Ukraine,performed via the Water Risk Atlas: Aqueduct Water Risk Atlas (wri.org)

Table 4: Detailed water risk analyses of the main berry and nut regions of Ukraine

Region	Address	Latitude	Longtitude	Major Basin	Minor basin	Overall water risk
Kherson	Kherson region, 73000	46.635417	32.616867	Dnieper	Dnieper Delta	Low - Medium (1-2)
Dnipro	Dnipropetrovska oblast, 49000	48.464717	35.046183	Dnieper	Dnieper	Low - Medium (1-2)
Ukrainka	Kyiv region, 08720	50.1381207	30.7373521	Dnieper	Dnieper	Low - Medium (1-2)
Zhytomyr	Zhytomyr region, 10000	50.2615588	28.6666776	Dnieper	Dnieper	Low - Medium (1-2)
Rivne	Rivne region, 33001	50.6190674	26.2521127	Dnieper	Pripyat	Medium - High (2-3)
Mykolaiv	Mykolaiv region, 54000	46.9660801	32.003246	Black Sea, North Coast	Southern Bug	High (3-4)
Khmelnytskyi	Khmelnytskyi region, 29000	49.422983	26.987133	Black Sea, North Coast	Southern Bug	High (3-4)
Vinnytsia	Vinnytsia region, 21000	49.233083	28.468217	Black Sea, North Coast	Southern Bug	High (3-4)
Odesa	Odesa region, 65000	46.4702111	30.7306393	Black Sea, North Coast	Lake Khadzhideyske / Lake Kuyalnytske	Extremely High (4-5)
Ivano-Frankivsk	Ivano-Frankivsk region, 76000	48.9200616	24.7089157	Dniester	Dniester	Low - Medium (1-2)
Zakarpattia region	Zakarpattia region, 76000	48.6208	22.287883	Danube	Uzh	Medium - High (2-3)
Lviv	Lviv region, 79000	49.839683	24.029717	Vistula	Bug	Medium - High (2-3)
Kropyvnytskyi	Kirovograd region, 25000	48.5070977	32.2641984	Black Sea, North Coast	Southern Bug	High (3-4)

The water risk assessment in key regions of the berries and nuts value chain in Ukraine, based on data from the Water Risk Atlas, reveals varying levels of water risk across different locations. In regions such as Kherson, Dnipro, Ukrainka, Zhytomyr, and Ivano-Frankivsk, the overall water risk is categorized as low to medium (1–2). However, in the regions Rivne, Mykolaiv, Khmelnytskyi, Vinnytsia, and Lviv, the water risk is classified as medium to high (2–3), suggesting moderate to significant water-related risks. Notably, in Odesa, the water risk is identified as extremely high (4–5), indicating severe water-related challenges in this region. The assessment also highlights the influence of major and minor basins, with areas along the Black Sea coast generally exhibiting higher water risk levels than those along the Dnieper, Dniester, and Vistula rivers. These findings underscore the importance of region-specific water management strategies and the need for proactive measures to mitigate water-related risks in Ukraine's berries and nuts value chain.

2.4 Biodiversity and soil analysis overview

World Bank classifies Ukraine's economy as developing. Meanwhile, Ukraine holds a third of the world's black soil, with 58% of its territory designated for agricultural land. At the same time, some environmental analysts believe that ecological depends on maintaining a 40:60 ratio of transformed to natural econsystems. However, the lack of sustainable land use in Ukraine has led to excessive land development.[12]

Approximately 72% of land resources have already been developed,[12] exceeding the permissible 60–65% of the total area, with land degradation reaching 58% against the norm of 40%. For comparison, this indicator does not exceed 32% in the developed European countries. Additionally, due to the absence of sustainable land use, Ukraine's forestry sector is in crisis with 15.7% forestation compared to the optimal 22–25%. Eroded lands take 57.4% of the country's total area, with this indicator increasing annually by 60–80 thousand hectares. Moreover, about 20% of Ukrainian lands are unsuitable due to soil saturation with toxic compounds. Meanwhile, the production volume expansion largely relies on the potential of engaged land resources.[13]

Based on the current situation assessed via the WWF platform, the biodiversity risk scenario is categorized as medium, as shown in Figure 11.

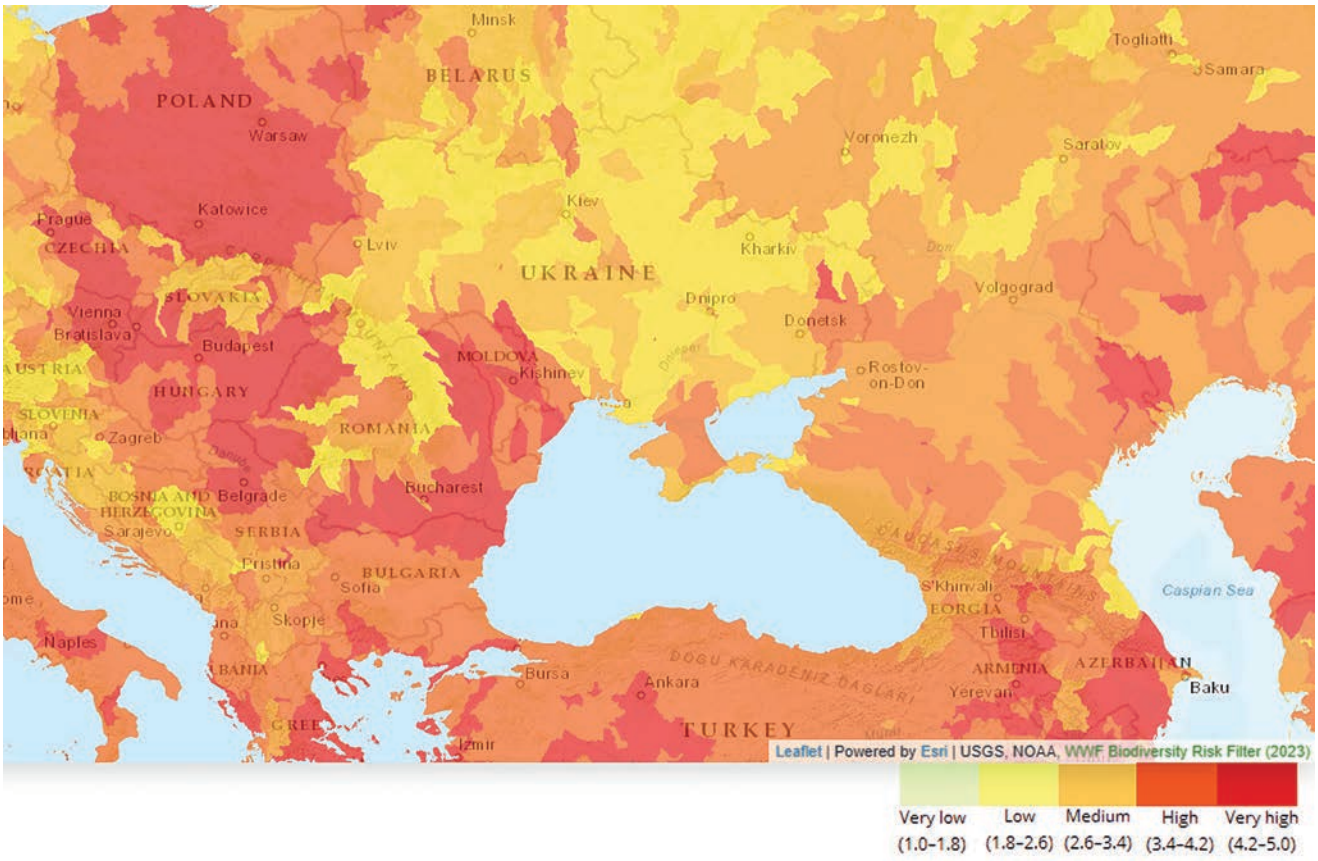
Figure 11: Biodiversity risk scenario

Scape risk		Risk Score	Ranking
Phisical Risk		3,25	46
1	Provisioning Services	3,03	27
2	Regulating & Supporting Services - Enabling	3,95	169
3	Regulating Services - Mitigating	2,77	74
4	Cultural Services	3,17	113
5	Pressures on Biodiversity	2,92	146

Source: WWF platform

13 https://agro-business.com.ua/agro/idei-trendy/item/8376-hlobalni-zminy-klimatu-parnykovyi-efekt.html

Figure 12: Biodiversity risk map



Source: WWF platform

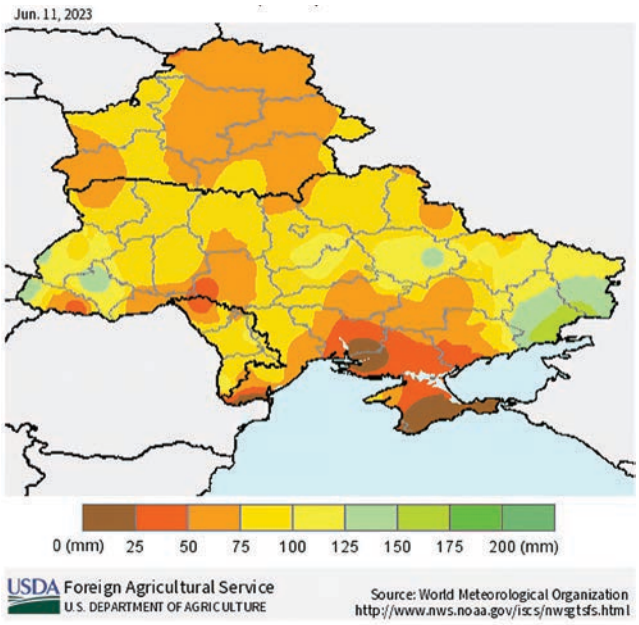
Therefore, actions must be taken for bringing sustainable agricultural practices to all land users.

Soil situation overview

The available information about subsurface soil moisture, captured by theFigure 13 below, does not suggest improving growth conditions in the short term.

Based on normalized difference vegetation index's (NDVI), Post forecastswalnut production for MY2023/24 at 106,470 MT, similar to the previous year,-However, the projection may be revised downwards if soil moisture continues to deteriorate. Individuals or small private family farms harvest most walnuts on their farms or the surrounding land. This category of producers usually uses manual labour for harvesting and shelling walnuts. applying no fertilizers or agrochemicals. Intermediaries, who assemble batches designated for export, typically are the primary buyers of the harvested goods.

Figure 13: Subsurface soil moisture



2.5 Greenhouse gas situation in the B&N sector overview

According to the National Inventory of Anthropogenic Emissions and Absorption of Greenhouse Gases, Ukraine's greenhouse gas (GHG) emissions in 2021 totalled 341.5 million tonnes of CO_2 equivalent or 327.3 million tonnes excluding the land use, land-use change, and forestry (LULUCF) sector. While total GHG emissions and absorptions were decreased by 62.5% compared to 1990, they increased by 7.5%. i.e.23,857 thousand tonnes of CO_2 equivalent, relative to 2020.

The energy sector is the largest contributor to GHG emissions in Ukraine accounting for approximately 64% of total emissions in 2021, excluding the LULUCF sector. About 76% of emissions in this sector result from burning fossil fuels for electricity and heat generation in the energy industry, industrial production, and transportation, while the remaining 24% arise from the extraction, transportation, and storage of solid, liquid, and gaseous fuels.

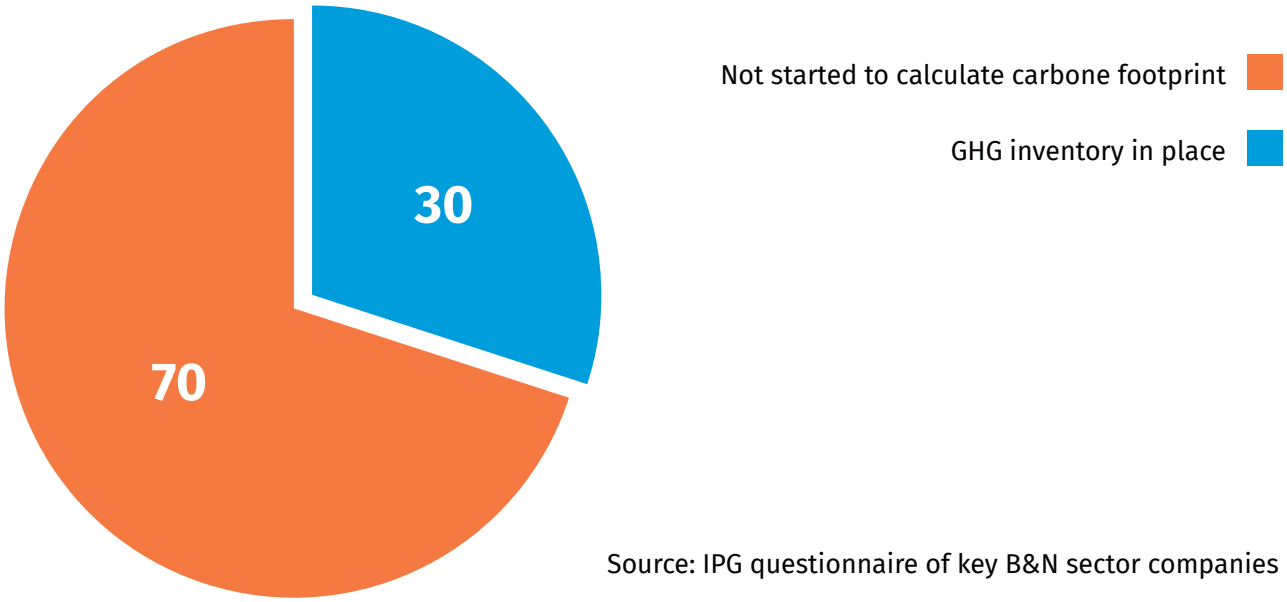
Approximately 18% of GHG emissions occur in the industrial sector, which includes emissions from industrial production and raw material consumption, excluding energy use accounted for in the energy sector. Traditionally, the sector's largest share of emissions comes from metallurgy (about two-thirds), the chemical industry (approximately 17%), and the fabrication of mineral products such as cement and lime.

The agricultural sector accounted for 14.4% of total GHG emissions without LULUCF in 2021. Its main sources of emissions in 2021 were enteric fermentation and agricultural soils, accounting for 15.0% and 80.0% of the total emissions in the sector, respectively.

However, agriculture has become the largest source of emissions in this sector. In recent years (2018–2019 and 2021, the farming sector has had higher emissions than metallurgy. The level of emissions is significantly influenced by the area, yield, and structure of crops harvested from these lands, as well as the application of fertilizers.

According to a survey among the B&N sector companies only a few have started GHG inventory calculations to understand their carbon footprint to take climate mitigation actions.

Figure 14: Assessment results on GHG inventory calculation by companies within the B&N sector



Source: IPG questionnaire of key B&N sector companies

3. Awareness and current capacity assessment of VC actors, the enabling environment, and service providers

This part of the assessment analyzes the broader institutional and policy framework governing Ukrainian berries and nuts market in sustainability and climate change matters. It assesses the adequacy of existing regulations, incentives, and support mechanisms for promoting sustainability and resilience to climate change impacts. Furthermore, the assessment evaluates the capacity and effectiveness of service providers, such as extension services, technical assistance providers, and research institutions, to deliver relevant information, training, and advisory support to stakeholders in the value chain.

Before 2022, Ukraine's economy exhibited high carbon intensity- The energy, industry, and agricultural sectors collectively generated 74% of the emissions in 2021. A reduction in Ukraine's GDP following the collapse of the Soviet economy, compounded by Russia's annexation of Crimea and the conflict in eastern Ukraine, led to a decline in GHG emissions from 942.8 MT-CO_2 in 1990 to 327.3 MT-CO_2 in 2021. Despite its responsible reporting on emissions and reductions as an Annex 1 party to the UNFCCC, this decrease primarily resulted from Ukraine's economic downturn rather than deliberate climate mitigation measures. Notwithstanding, Ukraine maintains systems for assessing anthropogenic emissions and GHG absorption, along with an electronic registry of carbon units.

In 2016, Ukraine ratified the Paris Agreement, setting a 40% reduction target against 1990 levels, which allowed for significant emissions growth. Over the subsequent five years, Ukraine developed a suite of climate policies and regulations. The updated 2030 climate target submitted to the UNFCCC in 2021 aimed at decreasing emissions by a margin compared to 2019 while fostering economic growth. Ukraine signalled its intention to align with the European Green New Deal by mid-2020. Deliberations regarding its implementation were ongoing prior to February 2022.

Ukraine is highly susceptible to climate change impacts, including heightened aridity in southern regions, increased occurrences of floods, wildfires, and heatwaves, as well as long-term risks such as sea-level rise. Adaptation efforts, encompassing national initiatives and localized projects in river basins, began approximately a decade ago. The country's national adaptation strategy and action plan extend until 2030, promoting nationwide and sector-specific planning. Furthermore, Ukraine has been crafting its inaugural National Adaptation Communication to the UNFCCC.

Public awareness of climate change was relatively robust nefore 2022. A 2020 United Nations Development Programme (UNDP) study revealed that 82.5% of respondents acknowledged it as a significant issue in Ukraine. Though notably notably pronounced among individuals aged 18–24, this sentiment transcended gender, age, and educational demographics . Subsequent research indicated that this awareness had risen to 91% in 2022.

A questionnaire examined the key VC actors' current capacities in implementing sustainable production methods, resource management, and adaptation strategies to mitigate climate-related risks. Additionally, the assessment sought to identify existing initiatives, training programmes, or support mechanisms for enhancing sustainability practices within the value chain.

3.1 Current sustainability capacities, resource management, and adaptation strategies to mitigate climate-related risks

Sustainable management capacities

To gain an overview of the current state of environmental management system implementation, the following questions were asked:

Table 5: Assessment results on environmental management system certification in the B&N sector companies

Assessment question	Companies with ISO 14001 implemented in the B&N sector	%
Environmental management system certification	Most companies focused on GAP; no focus on ISO certifications	15%

Table 6: Assessment results on responsibilities for environmental management in the B&N sector companies

Assessment question	Appointed responsible person for climate programme and environmental management	%
Does your company have an employee responsible for environmental management (part-time, full-time or as a part of other duties)? Please, provide the job title of the responsible person.	Safety engineer	15%
	Director of the company	15%
	No responsible person	70%

Based on the answers, companies in the B&N sector are not implementing systematic management approach for environmental aspects and climate change and there is no dedicated person for climate programme and environmental management.

GHG and climate mitigation

Table 7: Assessment results on GHG inventories in the B&N sector companies

Assessment question	Percentage from big, medium and small companies	%
Does your enterprise conduct greenhouse gas inventories?	Big companies	50%
	Medium companies	0%
	Small companies	0%

Only big companies took the first step in understanding a company's footprint and developing decarbonization and climate mitigation strategies by launching GHG inventory processes, . Conducting greenhouse gas inventories allows these enterprises to measure their emissions, identify the key sources of GHGs, and implement effective strategies to reduce their environmental impact. This process is critical for aligning with global climate goals and ensuring sustainable operations in the B&N sector.

Developing a comprehensive understanding of GHG emissions across different company sizes is vital. While larger companies already engagein these prac-

tices, medium and small enterprises must be supported with initiating GHG inventories. This can be facilitated through policy incentives, access to financing, and capacity-building programmes emphasizing the importance of sustainability and climate resilience in the agricultural sector.

Addressing these gaps will help mitigate the adverse effects of climate change, while enhancing the overall competitiveness of Ukrainian B&N sector. Implementing these practices aligns with global standards and contributes to the sector's sustainable development.

Resource management

Table 8: Assessment results on resource management in B&N sector companies

Assessment question	Percentage from big, medium and small companies	%
Does your enterprise have goals/plans in place for:	Reducing energy	50%
	Water withdrawal or water consumption	50%
	Transition to alternative energy sources	50%
	Waste reduction	15%

Energy and water consumption are priorities for most B&N sector companies. These enterprises have set goals or plans to reduce energy usage and water consumption, and transition to alternative energy sources. However, waste reduction efforts are significantly lower, indicating an area that requires more attention. The focus on reducing energy and water consumption reflects the sector's recognition of the importance of sustainable resource management. Implementing such measures helps reducr operational costs and minimizes environmental impacts, which is crucial for maintaining ecological balance and ensuring long-term sustainability. Transitioning to alternative energy sources is another significant step towards reducing the carbon footprint and promoting renewable energy use within the sector.

However, the relatively low emphasis on waste reduction highlights a gap in the current resource management strategies. Increasing waste management efforts could further enhance these companies' sustainability profile.. Adopting circular economy principles, improving waste recycling processes, and developing more efficient waste management systems are among the ways to achieve this goal.

Overall, enhancing resource management practices across all areas will contribute to a more sustainable and resilient B&N sector in Ukraine. This movement will align with global sustainability goals and the country's efforts to promote environmental stewardship and sustainable agricultural practices.

Adaptation strategies to mitigate climate-related risks

Table 9: Assessment results of climate adaptation plans among the B&N sector companies

Assessment question	Percentage from big, medium and small companies	%
What climate adaptation plans or measures does your company have, if any?	Climate-resilient berry and nut varieties	15%
	Sustainable land management	15%
	Reforestation	15%
	Water conservation measures	15%
	Green infrastructure (energy-saving techniques)	15%
	Diversifying sourcing locations	30%
	Emergency response strategy	15%
	Other, please specify	Extreme frozen system; solar panels, meteosystem

One of the companies mentioned meteostations installation project to address the lack of forecast prediction information available.

Some companies, like Gras Avenue, FE with its solar panels, have already started green project implementation.

Irrigator Ukraine, LLC implemented a water consumption minimization project. The blackberry cultivation project optimized soil conditions using drip irrigation and fertigation. LIN drip tubing ensured uniform moisture distribution, while a fertigation system with automated pH and EC control provided a consistent nutrient mix, reducing labour costs. Process automation, facilitated by a SAPIR2 controller, minimized human intervention and maximized the potential of the fertigation system. Tensiometers in each irrigation cell allowed for precise soil moisture monitoring, enhancing water efficiency and yield quality.

Figure 15: Automatization of blueberry watering system in Volyn Region

Source: Автоматизація поливу і фертигації лохини у Волинській області — АЯУ, UBA (uaberries.com)

3.2 Existing initiatives, training programmes, and support mechanisms aimed at enhancing sustainability practices within the value chain

Internet search of sustainability-related programmes and initiatives for the B&N sector companies showed no results about such programmes at the company level.

Some initiatives are available via associations and information portals for agro companies.

For example, a specialized information portal OrganicInfo.ua promotes organic production, organic food, and sustainability. OrganicInfo is a project of the information centre “Green dossier,” an international environmental charitable organization established in 1994. “Green dossier” aims to integrate principles of sustainable development into society, country policies, and governmental programmes by providing objective environmental and social information through mass media, local communities, authorities, and businessess.

The main climate-related initiative implemented by that platform in 2021–2022 was the "Knowledge Transfer on Organic Farming and Climate Change in Agriculture." Carried out by the Multicultural Ukraine NGO and the Organic Ukraine West NGO in Rivne Oblast, the project revolved around developing educational materials like handbooks or video lectures on organic farming and its connection to climate change. These artefacts explore farming practices that promote environmental sustainability, based on research and implementation experiences from educators in the United States (https://organicinfo.ua/news/organic-knowledge-transfer/).

Another sustainability practice, crucial for maintaining the quality of berries and fruits is post-harvest berry cooling. Rapidly reducing their temperature after harvest helps slow down the ripening process and preserve freshness, flavour, and nutritional value. Decreasing food waste and enhancing overall sustainability of the value chain, this practice ensures that produce reaches consumers in optimal condition, Післязбиральне охолодження ягід та фруктів – запорука високої якості (jagodnik.info)).

Table 10: Assessment results on difficulties with implementing climate resilience programmes among the B&N sector companies

Assessment question	Percentage from big, medium and small companies	%
What difficulties do you have with implementing climate resilience programmes?	Problems obtaining necessary climate-related forecast information	30%
	No dedicated budget	15%
	High cost of green technologies	15%

Around 30% of survey respondents faced problems obtaining climate-related forecast information with 15% mentioning budget concerns and the high cost of green technologies among the encountered difficulties

The majority of companies do not collaborate with external partners on capacity-building efforts related to climate:

Table 11: Assessment results on collaboration between the B&N sector companies and external partners, such as government agencies, NGOs, or research institutions

Assessment question	Answer	%
Does your company collaborate with external partners, such as government agencies, NGOs, or research institutions, to support capacity building efforts related to gender and climate?	Yes	15%
	No	85%

Companies are willing to explore possibilities and receive more information include:

Table 12: Assessment results on training programsprogrammes needs among the B&N sector companies

Assessment question	Percentage from big, medium and small companies	%
What programsprogrammes would your company like to explore?	Information on industry trends in the field of climate resilience	85%
	Trainings about climate-related programsprogrammes, sustainable agriculture, diversity, and inclusion practices, etc.	60%
	Professional/qualification trainings for employees	60%
	Security measures and climate risk mitigation strategies	85%

Industry trends in climate change and climate risk mitigation strategies proved to be the most appealing trainings.

Ukraine is an extremely promising country for berry and vegetable farming.

With its diverse soil and climatic conditions, Ukraine offers excellent opportunities for various fruit and berry crops as well as vegetables. Regarding state support, a grant for orchard, berry, and nut crops has been successfully operating for the past three years.

The grant programme for the berry and nut sector in Ukraine was launched in July 2022 to support agricultural producers. During its initial phase, the programme aimed to establish 1,000 greenhouses and approximately 10,000 hectares of fruit and berry plantations.

Under the programme's terms, the first thousand participants applying to establish greenhouses could receive up to 70% coverage of project costs, with a maximum grant amount limited to UAH (Ukrainian hryvnia) 7 million. For those not among the first thousand applicants, the state made a commitment to finance up to 50% of the costs.

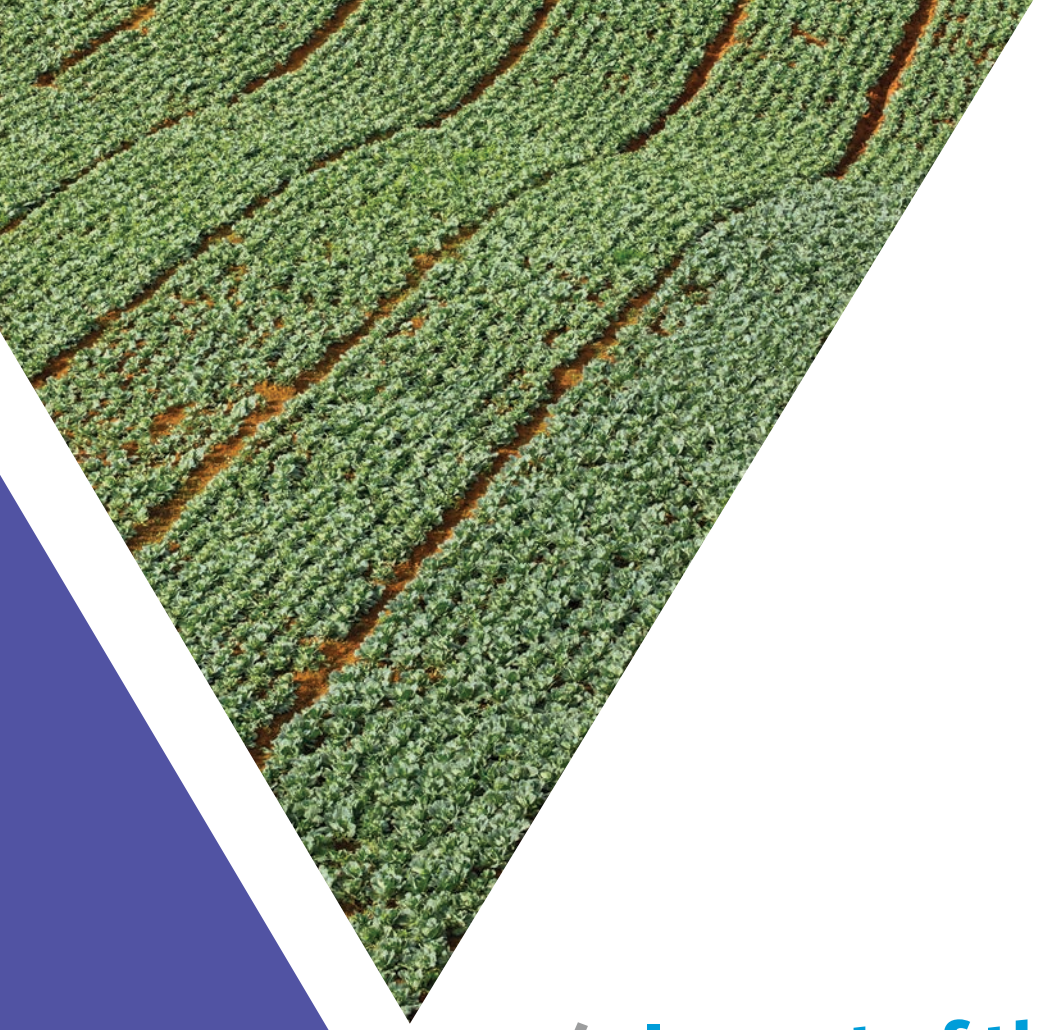
However, the programme faced several challenges. Within a year and a half, only 42 grants were approved for greenhouse construction, and 160 for the establishment of orchards and vineyards covering a total area of 2,300 hectares.[14] The head of the "Ukrsadprom" association, Oleksandr Matviets, noted that continuous monitoring reflects farmers' willingness to cooperate with the government. Some farmers who have recently received approval for their applications and started preparatory work in Ternopil faced inspections.

Other challenges are the grant's requirements. For example, the land designated for grant-funded plantations must be agricultural and in ownership or use for at least seven years. Furthermore, only selected crops are elibile for planting under the grant programme. Lastly, all crops must be registered in the State Register of Varieties suitable for distribution in Ukraine.

Despite these initial complications, the programme saw increased grant approvals after simplifying conditions. By 21 March 2024, 42 grants for greenhouse construction covering anarea of 53 hectares were approved, totalling UAH 221 million. For orchards, 160 grants amounting to UAH 700 million were approved, creating 2,300 hectares of plantations. According to the programme's criteria, applicants for orchard grants must commit to employing between five and ten permanent workers and 125–425 seasonal workers, depending on the crop.

In conclusion, this programme has contributed to the positive expansion of plantations in recent years.

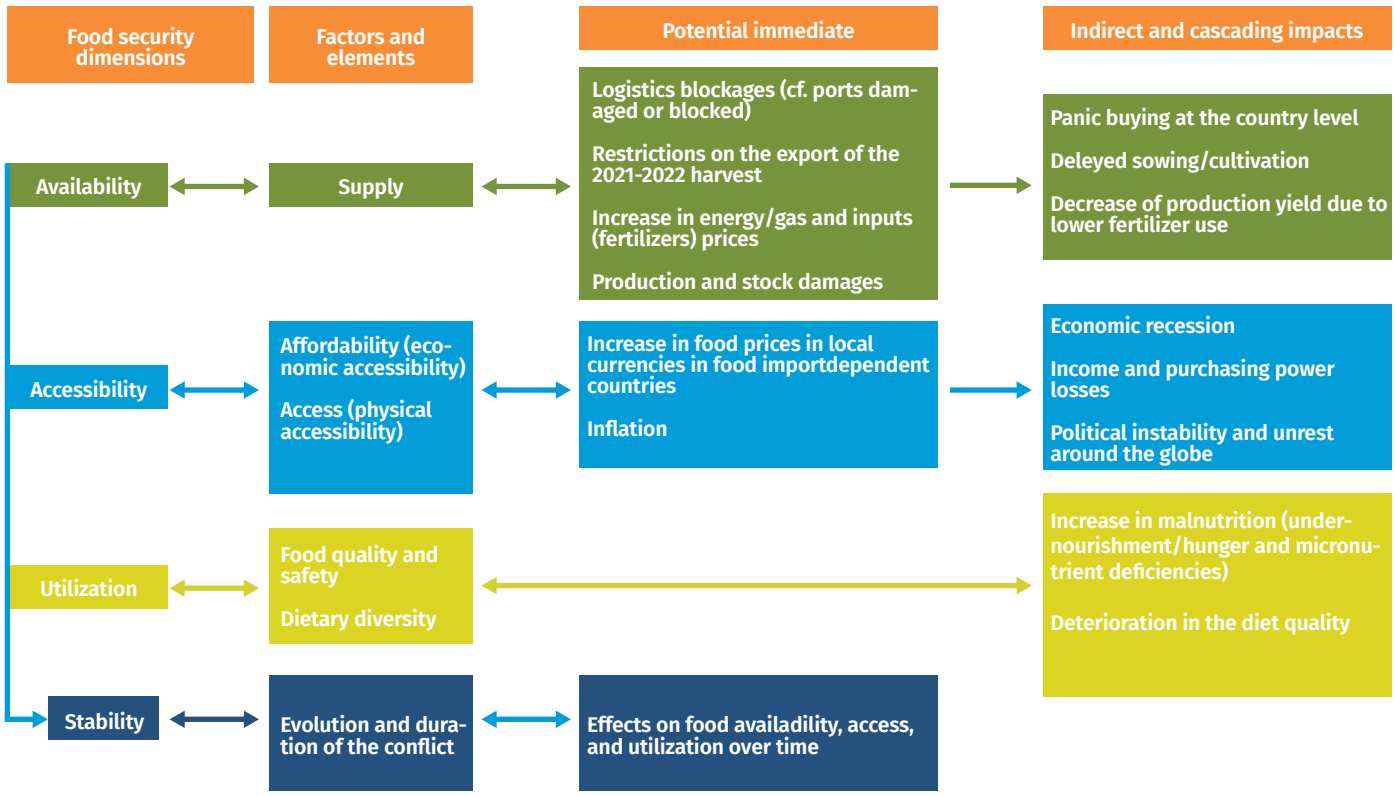
14 https://www.epravda.com.ua/publications/2024/03/26/711609/



4. Impact of the armed conflict on climate and environmental change

The latest analyses show the armed conflict generated a multitude of immediate and long-term indirect impacts on global food security (https://www.mdpi.com/2304-8158/11/15/2301):

Table 16: Impact of the armed conflict in Ukraine on global security



Source: https://www.mdpi.com/2304-8158/11/15/2301

Direct and immediate consequences are seen in food security, disturbing harvesting, and shipping. Conflict also severely affects staple supplies and pricing. Firstly, military actions might have short- and long-term consequences on Ukraine's ability to transport agricultural products inside and beyond its borders, especially when port facilities and railroads are destroyed.

Instead of utilizing Ukrainian ports, potential alternatives include exporting through Poland or Romania. In recent weeks, Western leaders have endorsed these options. Though such alternative methods may enhance exports, experts maintain they are insufficient to fulfil global food demand. Indeed, challenges are numerous. For instance, the Ukraine's rail gauge differs from that of most EU nations.

Secondly, the war has already prevented farmers from working their fields. The conscription and population displacement resulted in labour shortages. Disruptions to essential public services are also expected to negatively affect agricultural activities. This situation is aggravated by reduced access to and availability of critical agricultural inputs like fertilizers.

Climate Focus research's interim assessment, focused on four conflict-affected activity areas concludes that GHG emissions during the seven months of the full-scale warfare total at least100 million tCO_2e. This amounts to the total GHG emissions in a country like The Netherlands over the same period. As the impact of this conflict is yet to be considered fully, these figures are likely underestimating the actual emissions level. The longer the warfare continues, the higher the final figures will be.

The post-war reconstruction of civilian infrastructure accounts for half of the GHG emissions. Emissions from warfare take a smaller share according to the limited information available at the time this comprehensive analysis was made.

Transport emissions from refugees and internally displaced people (IDPs) are relatively low.

The second interim assessment concludes that GHG emissions attributable to twelve warfare months totalled to 120 million tCO_2e, equating to the annual

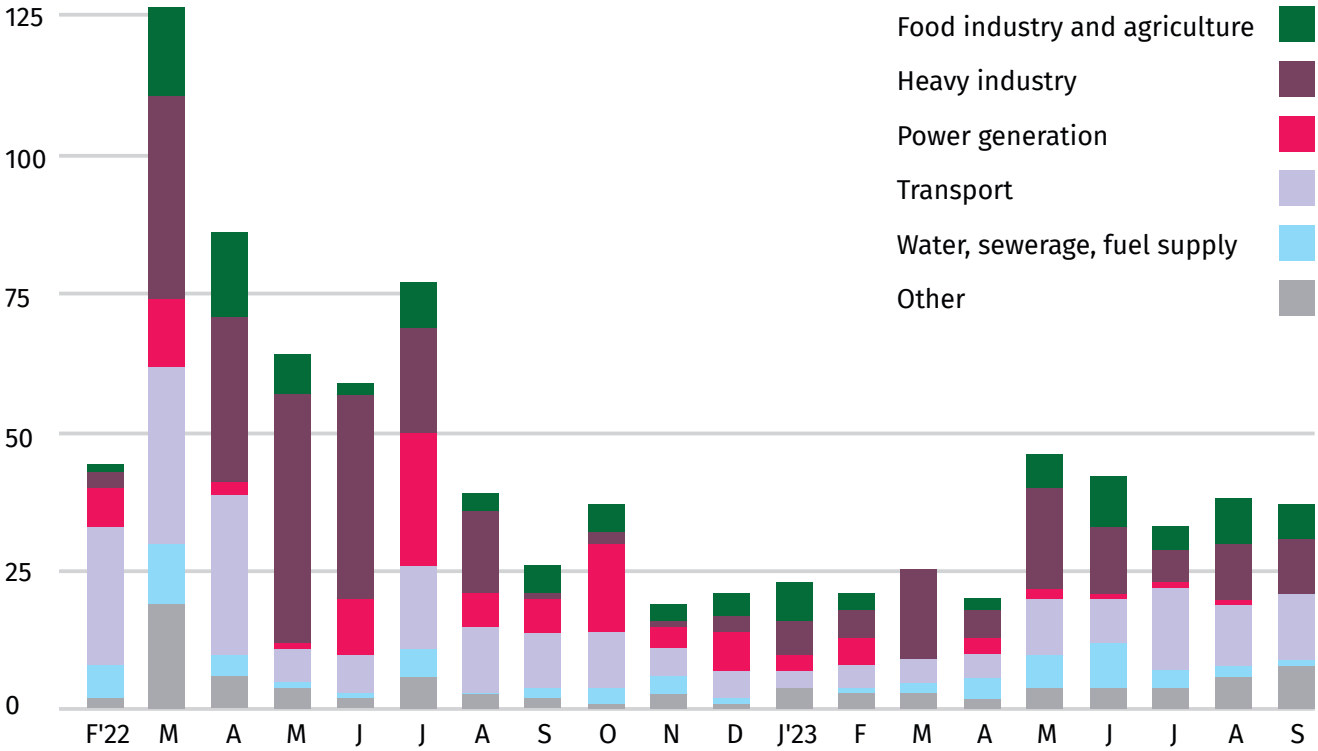
GHG emissions produced in a country like Belgium. Compared to the first assessment, which covered seven months of the war, emissions did increase but at a slower rate due to limited movement of the front line and winter conditions. The second assessment benefitted from new insights into the situation in Ukraine, which allowed for corrections to be made to imrpova accuracy.

The ongoing armed conflict in Ukraine has not significantly shifted the government's stance on climate change. They remained engaged in international climate initiatives, including the submission of emissions inventories. Due to the two-year reporting delay in UNFCCC reporting, the submission for 2023 pertains to emissions in 2021, reflecting conditions prior to the current developments. Meanwhile, Ukraine's national environmental security and adaptation strategy seems to remain active.

One notable change resulting from the conflict has been Ukraine's utilization of environmental forums and processes to highlight its impact. This was particularly evident at the UNFCCC's COP27 meeting, drawing attention to the interplay between conflict, occupation, and emissions. Additionally, as suggested by the recent study, the conflict has affected the regional aspects of climate action, complicating exchanges on climate policy, disaster risk reduction, and water cooperation (https://ceobs.org/ukraine-conflict-environmental-briefing-the-climate-crisis/).

Domestically, factors influencing conflict emissions include those directly generated by military activity, including land, marine, and aviation fuels, extending to urban, landscape, and fires from the damaged energy infrastructure. Changes in energy production can also influence emissions, whether through the increased use of domestic generators or shifts in the used fuel types. In addition, the emissions from activities may be displaced internally or extraterritorially. Internal displacement patterns and demographic shifts should be considered, as do the adverse effects of reduced industrial or economic activity in some sectors.. Warfare activities aside, it is anticipated that the carbon cost of reconstruction will be among the highest

Table 17: Impact of incidents with the potential impact on climate by sector, number of incidents aggregated per month



Source: Zoi Environment Network, 2023

In addition to diverting human and financial resources away from climate mitigation and adaptation, damage linked to the conflict has also undermined Ukraine's ability to reduce its emissions—although this must be viewed in the context of reduced economic output overall. The fighting has damaged numerous renewable energy facilities, many of which remain subject to occupation. These include solar and wind farms, mostly concentrated in the southeast of the country.

The energy crisis Ukraine faced after Russia targeted its generating and transmission infrastructure has helped underscore the resilience that distributed renewable energy generation can provide. During the 2022–2023 period, Ukrainian cities have worked on climate and energy plans, developed new projects, and searched for financing. Implementing pilot renewable energy projects for critical infrastructure, NGOs and international partners have supported municipalities with i.

The loss of the Kakhovka Dam meant the loss of hydropower capacity, although its main purpose was grid balancing rather than generation. The government has declared its readiness to rebuild the dam, sparking environmental concerns among Ukrainian NGOs. More widely, if the conflict results in the long-term loss of nuclear and renewable energy capacity and electricity needs remain stable or grow, Ukraine may meet this demand by shifting to fossil fuel electricity, whether produced locally or supplied from the EU.

The massive disruption to natural landscapes and agricultural areas is likely to impact Ukraine's domestic carbon cycle significantly. Degraded natural landscapes and the vegetation loss reduce carbon storage potential. REECFM's study found that the loss of carbon storage capacity from forest fires attributable to the war is around 100,000 tonnes CO_2e per year. The REECFM suggests that Ukraine's forests capture and store 50 million tonnes of CO_2e annually. This is equivalent to 15% of Ukraine's GHG emissions in 2020. The impact on carbon storage in other natural and semi-natural ecosystems, particularly the cultivated fields that have suffered the most from wartime landscape fires, remains to be assessed.

The interplay between forest and nature management, agricultural production, land abandonment, and carbon storage is more complex, and warrants future research into the impacts and consequences of the conflict.

Despite Ukraine's commitment to carbon neutrality by 2060, the costs of conflict and the challenges of recovery are expected to heavily impact its mitigation plans. This reinforces the importance of integrating the transition fully into recovery policies. Ukrainian civil society has been calling for the country's recovery to be green and sustainable since May 2022. For Ukraine to meet its own domestic targets, both mitigation and adaptation muest be foregrounded in the post-conflict recovery and reconstruction. The recovery process has been suggested as a unique opportunity, whether in terms of Ukraine's green energy transition, low-carbon construction techniques, and industrial decarbonization, or environmental recovery and nature-based solutions.

Civil society-driven projects are already demonstrating how these goals can be achieved but will need to be scaled up nationally. This will require regulatory action at the governmental level, and implementation at the regional (oblast) level, for instance on building regulations, decentralized energy markets as well as emissions reporting. Throughout this process, Ukraine will look to align itself with the EU's Green New Deal.

Human capacity to drive the energy transition must be strengthened through capacity building and training in low-carbon construction and energy installation. Ukraine's historical fossil fuel dependency also creates major challenges. For instance, designing and managing a just transition for former coal mining communities in Donetsk and Luhansk regions, currently divided by the frontline. While the Ukrainian government has reaffirmed its commitment to phase out state-owned coal power plants by 2035, action plan is yet to be developed.

Adaptation projects are ongoing despite the conflict. For example, as part of Ukraine's Oblast Climate Change Adaptation Strategy, the EU-backed Apena3 project has been assessing the climate vulnerability of different economic sectors across three pilot regions, Lviv, Mykolaiv and Ivano-Frankivsk since 2021. Mykolaiv Oblast continues to be highly exposed to the conflict. Elsewhere, UNDP and partners have recently trained municipal representatives from more than 100 towns and cities in analyzing climate risks and adaptation planning.

Coming at a time of unprecedented international concern over the accelerating climate crisis, Ukraine's climate-sensitive recovery is likely to be viewed as a test for its government and people and the international community alike. Fossil fuels play a major and expanded role in short and mid-term economic recovery plans despite the government's aims to fully decarbonize the energy sector by 2050 through the renewable and nuclear energy technology development . While energy providers and international partners promote nuclear reactors, civil society remains concerned over the repeated relegation of climate and environmental considerations in international recovery conferences.

4.1 B&N sector influence

"Currently, we observe a complex situation in the berry industry. Berries are not classified as essential goods. The main consumer segment of berry crops was women and children, many of whom have left the country. As a result, berry consumption has decreased. The absence of berries from the southern regions, which are temporarily occupied, has led to a supply shortage meeting demand. This primarily applies to garden strawberries, the prices of which were quite high due to increased logistical costs and plant protection products. Additionally, many distribution companies, especially those supplying plant protection products, have stopped providing products on credit. If previously a farmer could pay, for example, 30% for the products and 70% after the harvest, this year companies are working on advance payment terms. As a result, many producers applied less fertilizer and used fewer plant protection products," says Volodymyr Voyevodin, Marketing manager specializing in special crops direction at BASF company (Ягідництво в Україні: стан і перспективи | Журнал Ягідник (jagodnik.info)).

Recent Analysis of the agriculture sector of Ukraine during the war, identifies the main problems military actions in Ukraine generated for the agricultural sector:

1. Occupation of Ukrainian territories: destruction of production capacities, infrastructure, issues with organizing planting campaigns, lack of feed for animals, suspension of agricultural enterprises, a large number of mined areas (approximately 100,000 hectares in Chernihiv, Luhansk, Donetsk, Kharkiv, Kherson, Zaporizhzhia, and Kyiv regions).

2. Logistics problems: blocking of export routes for agricultural products (including ports), destruction of transportation infrastructure, disruption/desynchronization of logistic chains both domestically and internationally.

3. Market and consumer power problems: Reduction of the domestic market volume and decrease in the purchasing power of most Ukrainians. The deficit of meat and dairy products consumed by Ukrainians, which existed before the war, has significantly increased during wartime.

4. Insufficiency of resources for agricultural production: fuel shortages, lack of feed, deficit of certain types of fertilizers, shortage of plant protection products, issues with material and technical support, as well as rising prices for agricultural production inputs.

5. Labour force issues: internal and external migration, mobilization into the Armed Forces of Ukraine, increasing unemployment rates, and psychological issues faced by personnel working under constant stress and anxiety.

6. Theft of Ukrainian agricultural machinery and products: looting grains (more than 600,000 tonnes), oil, vegetables, fruits, etc.

4.2 The prospects for the agricultural sector in the post-war economy

The Russo-Ukrainian conflict will continue for an uncertain time. However, understanding what awaits the agricultural sector in the post-conflict period matters now. Typically, amrecovery and growth can be expected, During this period, the agricultural industry will have its growth zones:

- The key factor in the agricultural sector development is human capital: the main task is to return and create comfortable working conditions for personnel in the agricultural sector.
- Development of agricultural education and science: support for agricultural professions, upgrading the skills of personnel, including digital skills; support for research in the agricultural sector; development of innovations in the agricultural sector.
- Creation of resilient supply chains in regions: development of small and medium-sized enterprises.
- Integration with competitive products in world markets, especially in the EU.
- Adaptation to climate change; sustainable and ecological agriculture.
- Technological development and digitization of the agricultural sector.

Additionally, the development of agricultural education and science, the creation of sustainable chains in the regions, integration with competitive products into world markets, adaptation to the climate, sustainable and ecological agriculture, technological development, and digitalization of the agricultural sector are vital for the recovery of the agricultural sector.

5. Recommendations

Despite the identified challenges, the results indicate that companies—whether integrated or not—and associations in Ukraine's B&N sector possess valuable resilience capacities. This is reflected in the proactive approaches taken at different levels to address current and anticipated resilience and sustainability challenges.

At the same time, some dimensions need attention to improve value chain actors' capacity to prevent, anticipate, absorb, adapt, and transform in response to future shocks and risks. The tables below suggest areas for strengthening anticipatory, absorptive, adaptive, and transformative capacities, based on resilience gaps identified through the project's research and discussions with stakeholders.

The tables include examples of positive resilience responses taken by the consulted companies. It is noteworthy that including a practice presents no endorsement of any specific organization or project. Rather, these are presented to provide positive examples for strengthening resilience. While organized by individual resilience capacity, many of the strategies and actions presented can contribute to multiple concurrent resilience capacities.

Table 13: Recommendations to build anticipatory capacity

Recommendations	Why it is important?	Existing initiatives and good practices	Relevant stakeholders
Conducting risk assessments at the company level and along the value chain.	To identify and create awareness of the main risks the value chains and their operations face, and to detect the value chain's segments and actors at most risk. Risk assessments are also crucial to identify if and where the industry operations are creating new risks. Conducting risk assessments as part of the businesses' due diligence should be an integral to their business plans , taking a proactive approach to prevent disasters from occurring, reduce vulnerability, and minimize losses.	Blue Diamond company has set up a sustainability platform with annually tracked key performance indicators. This praxis gathers information to monitor progress towards more sustainable business performance and identify potential gaps. From Our Hearts to Your Hands | Blue Diamond	SMEs, big and medium size B&N sector companies
	To improve the sectpr's preparedness for future hazards. Risk-management plans should be combined with adequate budgeting and accountability mechanisms for more responsible anticipatory and response actions. The socialization of the plan among value chain actors and capacity development on how to implement it are also crucial.	DOLE Food has developed a Water Plan - 100% optimized water management on all Dole-managed farms to be applied to all packaging plants by 2025 achieving net zero CO_2 emissions at farm level in the Dole-led operations by 2030.	SMEs, big and medium size B&N sector companies, associations (network to collaborate on developed plans)

Recommendations	Why it is important?	Existing initiatives and good practices	Relevant stakeholders
Improved access to weather insurance and other financial instruments.	Financial instruments can offer producers and companies financial protection against losses due to adverse weather or market events. Currently, the lack of adequate budgeting to respond to shocks with restricted availability and awareness about financial instruments may limit the companies' capacity companies to prepare, respond and adapt to shocks.	According to EastFruit, Ukrainian berry growers are facing catastrophic frosts, resulting in significant losses in the blackberry harvest. Prolonged night frosts have led to losses of up to 90% in some farms. The most severe situation is observed in the northern regions of the country. According to Yevhen Kharlan, Director of Development and Strategy at LLC "Nikdaria," the temperature dropped to minus 6-8 degrees Celsius on the night of May 14, resulting in substantial losses. Kahrlan described the anomaly as unprecedented in his seven years spentin the blackberry industry. Farmers, seeking to mitigate risks associated with adverse weather conditions or diseases affecting berry crops, can secure insurance coverage. Government subsidies provide up to 60% compensation for insurance premiums. Given the vulnerability of berry cultivation to weather fluctuations, farmers must cdscsdcsdcsdcarefully assess insurance terms, select reputable providers, and ensure accurate reporting of crop yields and production costs to facilitate fair compensation. Agronomists' field assessments before finalizing insurance agreements are crucial for streamlined claim processes and prompt compensation payouts (https://consoris.com.ua/rast/).	Government subsidies to cover insurance; promote weather insurance possibilities through associations and specialized media for the B&N sector companies

Recommendations	Why it is important?	Existing initiatives and good practices	Relevant stakeholders
Implementation of adaptation practices to extreme weather events and climate change.	The use of better natural resources management practices can support producers in their efforts to adapt to precipitation, humidity, and temperature changes. Some of these may include mulching, organic manure, intercropping and agroforestry systems to preserve soil moisture, nutrients and temperature, while reducing the chemical fertilizers use. Water management practices like supplementary irrigation or water harvesting can promote more efficient use of water resources. Implementing living fences can protect crops from strong winds, whileregulating humidity and temperature levels around the main crops. Integrated pest management techniques can diminish the strong dependence on agrochemicals, with positive environmental and health impacts.	In the farming enterprise "Berry Land" located near Chernihiv, in the village of Kyselivka, 0.4 hectares of film tunnels were installed for berry cultivation, thanks to the "eWork" grant programme, as reported by "Chas Chernihivsky." Due to unpredictable weather conditions in northern Ukraine, the decision was made to construct tunnels to protect crops and enable better control over plant development, according to Serhiy Remenets, a representative of "Berry Land." Currently, shielded from frostvegetable seedlings are growing instead of berries in the tunnels. The investment in tunnels has already proven beneficial, as they saved the seedlings from May frosts. Growing vegetables in country's north is considered perilous, but the tunnels have mitigated this risk. Last year, seedlings were grown outdoors, resulting in their poor conditions. However, this year, the seedlings are in excellent condition, thanks to the protection provided by the tunnels (Господарство з Чернігівщини вирощуватиме ягоди в тунелях | (jagodnik.info)).	Create a platform with overview of adaptation practices for farmers via associations or specialized media. NGOs and international organizations: provide trainings on best practice sharing in theB&N sector of adaptation practices to extreme weather events and climate change.

Recommendations	Why it is important?	Existing initiatives and good practices	Relevant stakeholders
Adoption of practices to adapt to non-climate shocks and stresses.	To respond and adapt to market changes (demand and prices), future pandemics, safety issues, among other risks. By adding a degree of redundancy and flexibility in the value chains, e.g. applying simultaneous processes (expanding the products and services offered, diversifying export markets and the input/output supplier base) can help value chain actors adapt to sudden market disruptions.	Fructovyi Sad AT exemplifies proactive responding to climate change in its farming practices. The farm strategically selects berry varieties based on their adaptability to regional climate conditions and market demands. For instance, the Duke variety, known for its stability and resistance to frost, is favoured despite recommendations against planting this type in certain regions. Instead of focusing on late varieties like Elliot, less suitable for the region, the farm opts for the early ones to maximize profitability. Additionally, to optimize yields and crop health, Fructovyi Sad AT implements systematic farming practices, including tailored pruning techniques and foliar micronutrient applications. The farm's meticulous approach extends to soil management, utilizing mulching to enhance soil fertility and moisture retention. By closely monitoring performance metrics, such as yield consistency, Fructovyi Sad AT identifies and capitalizes on the most productive areas of the farm. Ultimately, their approach underscores the importance of adapting cultivation practices and varietal selection to local conditions and market dynamics in mitigating the impacts of climate change on agricultural production YAgidnyk_VEB_1_36.pdf (jagodnik.info).	Create a platform with overview of adoption of practices to adapt to non- climate shocks and stresses for farmers via associations or specialized media, promote climate resilient berry and nut varieties. NGOs and international organisations: provide trainings or round table on best practice sharing in the B&N sector companies of adoption of practices to adapt to non- climate shocks and stresses.

Recommendations	Why it is important?	Existing initiatives and good practices	Relevant stakeholders
Investments in climate-proofing farm infrastructure and technology.	Climate-proofing infrastructure and technology are relevant for preventing and absorbing shocks, as well as, adapting to future risks. Efficient irrigation infrastructure could help address the strongest stresses and risks like extreme temperatures, droughts, and irregular rainfall. Nature-based solutions. e.g. slope stabilization measures, soil bunds, living fences, windbreaks, can protect production systems from landslides, waterlogging, and frosts. Sustainable mechanization investments can enhance productivity at different stages of the value chain and compensate for the lack of labour available in some industries. Infrastructure investments must be risk-assessed and aligned with institutional regulations to prevent unintended negative effects. For example, water withdrawals for irrigation and aquifer levels need close monitoring to avoid their depletion and pollution through fertilizer runoff and salinization. Heavily mechanized processes can also reduce the demand for (unskilled) labour, and possibly increase local employment.	Commissions of district state administrations will provide funding to support berry cooperatives for the purchase or reimbursement of expenses related to planting material, drip irrigation systems, fertilizers, and plant protection agents under the Comprehensive Programme for Support and Development of Agriculture for 2021–2025 (Фінансова підтримка сільськогосподарських кооперативів, які здійснюють діяльність в галузі ягідництва (loda.gov.ua)). When it comes to profitability and consistent sales of berries, high and stable yields are crucial factors. At ORNIBERRY, a young enterprise specializing in berry cultivation, success hinges on several key elements. These include careful selection of varieties, soil preparation, proper irrigation and fertilization systems, efficient production chain management, meticulous adherence to planned operations, risk assessment, and a well-defined risk mitigation strategy. Currently, their yields reach 10 tonnes per hectare, a testament to their meticulous approach. Variety selection plays a pivotal role in yield stability, and ORNIBERRY has analysed the adaptability of eight varieties to their region's conditions. Their focus remains on cultivating popular and in-demand varieties, aligning with market trends and consumer preferences. Preparing the soil is a critical step in berry cultivation, where attention to details such as drainage, soil pH, and nutrient content is essential for success. Additionally, regular and timely irrigation, alongside precise nutrient dosing, are key aspects of their cultivation practices. ORNIBERRY's location in Shabastivka, Cherkasy Oblast, has attracted workers from neighboring regions, especially during challenging times when safety and working conditions were major concerns. Despite the adversities, the company obtained GlobalG.A.P. and GRASP certifications in 2022, demonstrating their commitment to quality and sustainability. Moreover, amidst the turmoil of the war, ORNIBERRY successfully harvested its planned yields and initiated collaborations with major Ukrainian supermarket chains for the first time (YAgidnyk_VEB_1_36.pdf (jagodnik.info)).	Governmental subsidies for climate-proofing infrastructure and technology upgrade projects for individual farmers, medium size companies of the B&N sector. Promote awareness about nature-based solutions to improve climate resilience via media platforms and associations. Grants and programmes financed by government and international organizations for sustainable mechanization investments and infrastructure.

Recommendations	Why it is important?	Existing initiatives and good practices	Relevant stakeholders
Investments in technologies, infrastructure and practices that reduce loss and waste.	Loss and waste management reduces the risk of economic losses and other potential health and sanitation hazards. Investment in practices or technologies like cool value chains, improved packaging and storage facilities that make processes more efficient, can increase the capacity of value chains to swiftly adapt to changes in market demands and consumption patterns.	Investments in technologies to reduce waste and loss, such as extreme freezing, are highly beneficial, even for small enterprises. Extreme freezing, or shock freezing, rapidly cools products to low temperatures, preserving their quality and extending shelf life. This technology reduces waste by maintaining the nutritional value and freshness of perishable goods like berries. For small businesses, implementing such technology can enhance product quality, reduce spoilage, and potentially open new markets by offering premium, long-lasting products. Thus, investing in such technologies is a strategic move to minimize waste and improve sustainability (http://www.jagodnik.info/shokove-zamorozhuvannya-yagid-dostupne-i-dlya-malyh-pidpryyemstv/). Fertigation, the integration of fertilization with irrigation, optimizes nutrient delivery to plants, enhancing nutrient absorption and ensuring balanced nutrient supply throughout the growth stages. This method is particularly effective when used in conjunction with drip irrigation systems, which target the root zone efficiently. Automated irrigation programmes offer precise control over nutrient application, adjusting dosage based on plant needs and environmental conditions. Equipped with specialized controllers, fertigation systems monitor key parameters like pH, electrical conductivity, pressure, and water flow rate, they ensure accurate and timely nutrient delivery. By integrating with weather sensors, these systems activate irrigation when necessary, conserving water resources and preventing overwatering. Fertilizer application occurs in three stages: pre-irrigation, fertilization, and system flushing, ensuring proper nutrient distribution and system maintenance. Fertigation systems are versatile and suitable for a wide range of perennial crops covering large areas. They enable precise dosing, rapid adjustment, and remote management, optimizing resource utilization and reducing labour costs. Real-time data from fertigation systems can be accessed via mobile applications, providing growers with actionable insights for informed decision-making and efficient crop management (YAgidnyk_VEB_1_36.pdf (jagodnik.info).	Create a platform with overview of loss and waste management techniques and technologies for farmers via associations or specialized media. Grants and programmes financed by government and international organizations for operational efficiency improvements for the B&N sector companies.

		Hall Hunter, a UK-based company, recently acquired a new sorting machine, the Elifab Berry Class 12-track, alongside two automatic fillers for plastic trays from their partner Elifab - Mat Exakta. The new sorting and packing line will be installed soon and become fully operational by the end of May 2024. Hall Hunter's focus is on increasing efficiency, reducing labour costs, and improving product quality. The technologies implemented are expected to significantly reduce the need for labour, potentially doubling productivity while maintaining sorting accuracy. Alan states that they are transitioning from 26 to 12 people per shift, resulting in substantial labour savings. With the new technologies, they can be more flexible and precise in sorting, ensuring work is done according to specifications. Hall Hunter exemplifies the transformative impact of adopting advanced technologies in agriculture. By investing in Elifab-Ellips technology and Mat Exakta fillers, the company is revolutionizing its operations, streamlining processes, and achieving growth goals. Focused on innovation and quality, Hall Hunter is well-positioned to lead the blackberry industry in the UK in the future. They take pride in their partnership with Hall Hunter and hope for close collaboration to reduce costs and further improve efficiency. YAgidnyk_VEB_1_36.pdf (jagodnik.info)	

Recommendations	Why it is important?	Existing initiatives and good practices	Relevant stakeholders
Environmental protection programmes development at company level.	To reduce risks to hazards, ensure healthy ecosystems with co-benefits to production systems and ensure continuity of the operations. This can also minimize losses, damages, and the associated costs. This can be done by shifting to the adoption of more sustainable practices along the value chains, and by integrating natural resource management considerations in the business policies.	Ukr Walnut LLC is a leading Ukrainian company specializing in the production and export of high-quality kernels and in-shell walnuts. They are among the first to offer unique blanched, skinless walnut kernels. The company producing 100% organic products, adheres to strict quality control standards, and has a unique private custom code for easier clearance in European markets. They emphasize fast delivery, flexible pricing, and a robust regular customer discount system, making them a preferred partner for importers, retailers, and wholesalers globally. The company holds ISO 9001, ISO 14001 and ISO 45001 management systems certifications.	Increase awareness about the environmental management system implementation benefits for medium size companies via conducting ISO 14001 training for the B&N sector companies (could be organized by associations).
Build stronger multi-stakeholder collaboration, including local communities, research institutions, and governments at different levels.	Improved information sharing and alignment to the vision throughout the value chain actors and other stakeholders will support timely and better-informed decision-making and planning. Forward-looking institutions and regulations are needed to allow the access to services and systems (e.g early warning systems, social protection, weather-indexed insurance, affordable credit lines, and R&D investments) that promote the adoption of more transformative approaches and increase the resilience of the B&N sector.	To foster stronger collaboration in Ukraine's B&N sectors and address sector challenges and opportunities, initiatives such as the "Nuts of Ukraine" platform facilitate dialogue among stakeholders, including local communities, research institutions, and governments. Similarly, UA BERRIES engages in partnerships with local farmers, research organizations, and government bodies to promote sustainable berry production practices and improve market access. These collaborations enhance knowledge sharing, facilitate technology transfer, and support policy advocacy efforts for advancing the interests of stakeholders across the value chain.	Governmental organizations and NGOs to further increase collaboration between stakeholders, including local communities, research institutions, and governments, addressing sector challenges and opportunities.

Table “Sustainability and climate change improvements need in the B&N sector” provides an overview of additional risks identified during the assessment of the key B&N sector companies and proposed measures to eliminate them.

Table 14: Sustainability and climate change improvements need in the B&N sector

Risk identified	Proposed measures
Regulatory framework: No approved mechanism for GHG calculation and, therefore, no understanding of carbon footprint at the sector and company levels.	1) Approval of Requirements and guidelines for quantification and reporting of greenhouse gas emissions and removals at the organizational level. DSTU ISO 14064-1:20__ (ISO 14064-1:2018, IDT)
	2) Provision of training for the B&N sector companies on GHG Protocol overview and carbon footprint calculation.
Low awareness in the B&N sector about climate change and mitigation practices	1) Provision of industry specific information/booklets for berries and nuts associations about climate change risks and the best international practices for mitigation strategies in the B&N sector.
	2) Designing a workshop for the key B&N players and associations about climate change and resilience mechanisms.
Lack of human resources dedicated for climate-related questions at company level to develop and implement climate strategy.	1) Incorporating dedicated human resources for climate and sustainability programmes into grant programmes is essential. The evaluation of new technologies, quality standards, and processes should include an assessment from the perspective of climate change for each new project.
No environmental management system certification (ISO 14001) among medium and small companies in the B&N sector. Risk of no environmental risk assessment and environmental programmes.	1) Incorporating environmental management system certification requirements for big projects as a must before financing.
	2) Providing awareness training for the B&N sector associations and key players on basics of ISO 14001 standard.
Lack of cooperation between the B&N sector companies and external partners, such as government agencies, NGOs, or research institutions, to support capacity-building efforts related to gender and climate.	1) Organizing a workshop or round table dedicated to climate programme exchanges between NGOs, government agencies, and B&N associations.
Agricultural land damage due to war.	Adopting a programme for the conservation of degraded and war-damaged agricultural land.
Rivne, Mykolaiv, Khmelnytskyi, Vinnytsia, and Lviv Regions are currently in medium-to-high water risk areas and Odesa in a high-water risk zone.	Prioritizing rthe water conservation programme development for B&N companies in high and medium-to-high water risk regions thorough information campaign.

6. Conclusions

The berries and nuts sector in Ukraine demonstrates significant potential to mitigate climate change impacts by adopting sustainability practices and adhering to international standards. This conclusion draws upon the comprehensive assessments and findings presented in this document, highlighting the sector's strategic position in enhancing climate resilience and sustainable agricultural practices.

6.1 Leveraging International Standards for Sustainability

The adoption of international standards such as ISO 9001, ISO 14001, ISO 22000, GlobalG.A.P., and SMETA (Sedex Members Ethical Trade Audit) within the Ukrainian B&N sector provides a robust framework for ensuring quality, safety, environmental sustainability, and ethical trade practices.

The section below outlines how individual standards contribute:

- **ISO 9001:** Focused on quality management systems, this standard helps producers maintain consistent quality and continuous improvement. By adhering to ISO 9001, they can ensure that their operations meet customer and regulatory requirements, enhancing their global market competitiveness.
- **ISO 14001:** Emphasizing environmental management crucial for minimizing the sector's impact on climate change, ISO 14001 helps producers reduce their ecological footprint, improve resource efficiency, and comply with environmental regulations.
- **ISO 22000:** Effectively managing food safety risks from far to fork, this food safety management standard integrates Hazard Analysis and Critical Control Points (HACCP) principles. Compliance with ISO 22000 is vital for maintaining high safety criteria in the B&N value chain.
- **GlobalG.A.P.:** This standard covers good agricultural practices and addresses food safety, environmental sustainability, as well as worker health and safety. Adoption of GlobalG.A.P. ensures that Ukrainian producers meet stringent international criteria, thereby improving their marketability.
- **SMETA:** This audit methodology focuses on labour standards, health and safety, environmental management, and business ethics. SMETA practices ensure that producers operate ethically and responsibly, meeting the growing consumer demand for ethically produced goods.

6.2 Results from Assessments and Implementation Outcomes

Producers complying with international standards have significantly improved their access to local and global markets. European Union (EU) markets, which demand high-quality and safe produce, more readily accept products meeting GlobalG.A.P. and ISO standards

Certification under these standards has increased consumer confidence and preference, driving higher sales and better market positioning for certified producers.

Implementing ISO 14001 and other environmental standards will help reduce resource consumption, waste generation, and GHG emissions. Such environmental improvements enhance the sector's sustainability and help imeet national and international environmental goals, complementing global efforts to combat climate change.

6.3 Increased Operational Efficiency and Productivity

The adoption of quality management standards like ISO 9001 has streamlined operations, reduced inefficiencies, and improved overall productivity. The recommended introduction of modern technologies has further boosted productivity. Precision farming techniques and climate-resilient crop varieties have resulted in higher yields and better-quality produce, as highlighted in the assessments.

6.4 Economic Benefits and Risk Management

Financial mechanisms like the Fund for Partial Credit Guarantee in Agriculture have provided small and medium-sized farms with much-needed financial support. The assessments indicate that access to low-interest loans and subsidies has enabled these farms

to invest in sustainable practices and technologies, resulting in higher profitability and reduced financial risks. State support for agricultural insurance has also been pivotal.

6.5 Strategic Recommendations for Future Actions

The recommendations section of the document describes key recommendations to further strengthen the sector's climate resilience and sustainability. The focus fields are:

- **Scaling Up Adoption of Standards:** The sector needs to expand the adoption of international standards. Targeted training programmes, awareness campaigns, and government incentives to encourage certification among producers, can achieve this goal..
- **Enhancing Capacity Building:** Farmers and processors' continuous education and training on sustainable practices, resource management, and climate adaptation strategies are essential. These programmes should be address the specific needs and challenges producers in the berries and nuts sector face.
- **Investing in Research and Development:** Increased investment in research focused on climate-resilient crop varieties, sustainable farming practices, and innovative processing technologies is critical. Collaboration with academic institutions and research organizations can drive innovation and the sector-oriented practical solutions.
- **Strengthening Policy and Regulatory Frameworks:** Policy reforms should be geared towards creating a supportive environment for sustainable practices. This includes providing subsidies for sustainable inputs, tax relief for compliant businesses, and stricter enforcement of quality and environmental standards.
- **Promoting Public-Private Partnerships:** Effective collaboration between the government, private sector, and international organizations can drive the successful implementation of sustainability initiatives by leveraging resources and expertise. Such partnerships are vital for scaling up the best practices towards widespread impact.

The B&N sector in Ukraine stands at a pivotal point where the integration of sustainability practices and adherence to international standards can significantly enhance its climate resilience. The positive outcomes from the assessments underscore the sector's potential to not only thrive in the face of climate challenges, but also contribute to achieving broader environmental and economic goals.

By adopting a holistic approach encompassing quality management, environmental stewardship, financial support, and continuous capacity building, the sector can achieve sustainable growth and secure a competitive edge in the global market. These efforts will benefit the producers while ensuring long-term food security and environmental sustainability, aligned with Ukraine's national priorities and global climate commitments.

Despite the numerous challenges of ongoing military conflicts, the Ukrainian B&N sector demonstrates a remarkable capacity for growth and adaptation.

Annex 1: Main Standards applicable in B&N

1. ISO Standards

ISO 9001:2015:

- **Scope:** This standard specifies requirements for a quality management system (QMS) where an organization needs to demonstrate its ability to consistently provide products and services that meet customer and regulatory requirements.
- **Application:** Applicable to any organization, regardless of size or industry, including those in the B&N sector.
- **Relevance:** Provides a framework for consistent quality and continuous improvement, crucial for meeting customer and regulatory demands in the highly competitive EU market.

FSSC 22000:

- **Scope:** A comprehensive food safety certification scheme based on ISO 22000, ISO 22003, and additional technical specifications.
- **Application:** Covers food manufacturing, including perishable plant products like berries and nuts.
- **Relevance:** Recognized by the Global Food Safety Initiative (GFSI) for ensuring high food safety standards across the supply chain.

ISO 22000:2018:

- **Scope:** This standard specifies requirements for a food safety management system (FSMS) to ensure food safety throughout the food chain, up to the point of consumption.
- **Application:** Applies to all organizations in the food chain, from primary producers to food manufacturers, including those handling berries and nuts.
- **Relevance:** Embeds HACCP principles and integrates food safety with other management systems, ensuring comprehensive food safety practices.

ISO 14001:2018:

- **Scope:** A comprehensive food safety certification scheme based on ISO 22000, ISO 22003, and additional technical specifications.
- **Application:** Covers food manufacturing, including perishable plant products like berries and nuts.
- **Relevance:** Recognized by the Global Food Safety Initiative (GFSI) for ensuring high food safety standards across the supply chain.

2. Global G.A.P.

Integrated Farm Assurance (IFA):

- **Scope:** Covers all aspects of good agricultural practices (GAP) for producing fresh fruits and vegetables, including berries and nuts.
- **Application:** Primary aimed at producers to IFA ensures food safety, environmental sustainability, and worker health and safety compliance.
- **Relevance:** Widely adopted by EU buyers, provides a benchmark for sustainable and safe agricultural practices.

Produce Safety Assurance (PSA):

- **Scope:** Focusedon the safety of primary production, PSA addresses critical control points to prevent contamination.
- **Application:** Suitable for producers of berries and nuts, ensures high standards for the initial production stages.
- **Relevance:** Critical for maintaining the safety and quality of fresh produce to meet the EU regulatory and market expectations.

3. EU and UNECE Marketing Standards

EU Marketing Standards

- **Scope:** Specific and general marketing standards set by the EU for fruits and vegetables, including berries and nuts.
- **Application:** Mandatory for all operators exporting to the EU to ensure products meet its quality criteria.
- **Relevance:** Helps maintain consistent quality and conformity across the market, essential for market access and consumer trust.

UNECE Standards:

- **Scope:** International standards covering the quality of agricultural produce.
- **Application:** Can be used as an alternative to EU standards if compliance can be demonstrated.
- **Relevance:** Provides flexibility for exporters while ensuring high-quality standards are maintained.

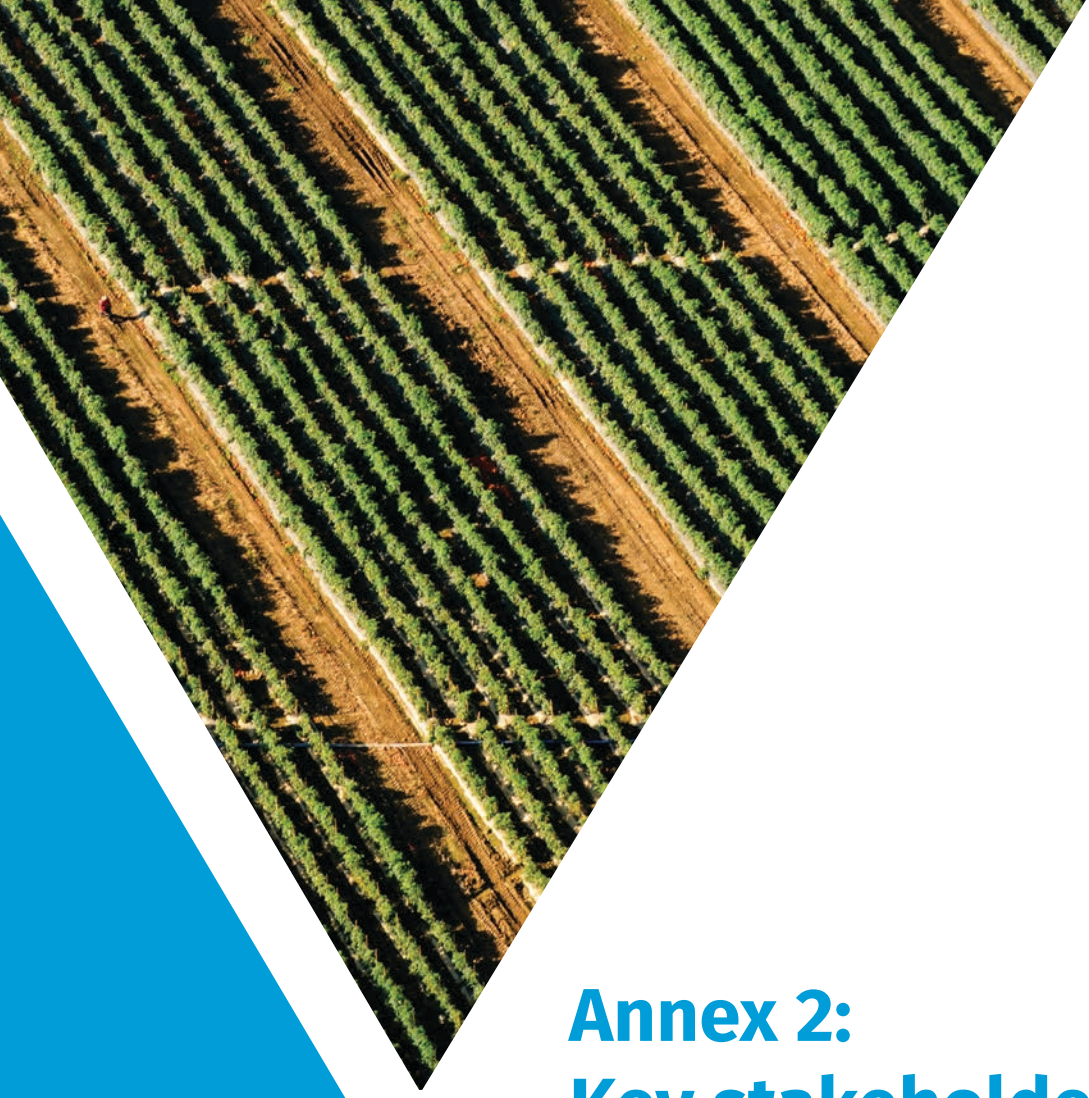
4. Organic Certification

EU Organic Certification:

- **Scope:** Standards for organic farming and processing, ensuring products are produced sustainably and free from synthetic inputs.
- **Application:** Requires compliance with EU regulations on organic production, including a mandatory conversion period and regular inspections.
- **Relevance:** Increasingly important for accessing premium market segments within the EU, where consumer demand for organic berries and nuts is growing.

5. SMETA (Sedex Members Ethical Trade Audit)

- **Scope:** A widely used social auditing methodology compiling the best practices in ethical trade audits, covering areas like labour standards, health and safety, environment, and business ethics.
- **Application:** Suitable for all sectors, including agriculture, and applicable to farms and processing facilities handling berries and nuts.
- **Relevance:** Ensures compliance with ethical standards and enhances social responsibility, increasingly demanded by consumers and retailers in the EU market.



Annex 2: Key stakeholders at berries and nuts value chain in Ukraine

1 Associations

- Association "Berry Farming of Ukraine"
  Website: uaberries.com
- Association "UKRSADPROM" (TC 179 Fruit, Vineyards, and Wine Production)
  Website: ukrsadprom.org
- Public Union "Association of Orchards, Vineyards, and Winemakers of Ukraine" (PU "UKRSADVINPROM")
  Website: ukrsadvinprom.com
- Ukrainian Fruit and Vegetable Association (UFVA)
  Website: fruit-ukraine.org
- All-Ukrainian Association of Importers of Vegetables and Fruits (AAIVF)
  Website: uaivf.com.ua
- All-Ukrainian Public Organization "Ukrainian Nut Association"
  Website: ukr-nuts.com.ua
- Nut Producers Association
  Website: ukr-nuts.com
- Podillya Association of Saplings and Hazelnut Producers "Golden Nut"
  Website: golden-nuts.com.ua

2 NGOs

- Rural Women's Business Network of Ukraine
  Website: Facebook Page
- Public Association "Institute of Environmental Management and Balanced Nature Use"
  Website: iem.org.ua
- All-Ukrainian Public Organization "Living Planet" (VO "Living Planet")
  Website: livingplanet.org.ua
- Phytosanitary Association of Ukraine
  Website: fau.org.ua
- All-Ukrainian Public Organization "Association of Agroecologists of Ukraine"
  Website: agroeco.org.ua
- Ukrainian Ecological Association "Green World"
  Website: zelenysvit.org.ua
- All-Ukrainian Public Organization "Clean Wave"
  Website: Facebook Page
- Association "Greenhouses of Ukraine"
- Seed Association of Ukraine
  Website: ukrseeds.org.ua
- Association "Ukrainian Seed Company"
  Website: unt.org.ua
- Association of Rural, Urban Councils, and United Communities of Ukraine
  Website: assogu.org.ua
- All-Ukrainian Public Organization "Community Association"
  Website: communities.org.ua
- All-Ukrainian Public Organization "Association of Agricultural Entrepreneurs"
  Website: dorada.org.ua
- All-Ukrainian Public Organization "Council of Women Farmers of Ukraine"
  Website: Facebook Page
- All-Ukrainian Agricultural Organization "Agrarian Chamber of Ukraine"
  Website: agrichamber.org.ua
- Public Association "Agricultural Union of Ukraine"
  Website: auu.org.ua
- Public Association "Agrifood Council"
  Website: afc.org.ua
- Public Association "All-Ukrainian Association of Peasants and Agricultural Producers"
  Website: N/A
- Public Association "All-Ukrainian Agrarian Forum"
  Website: unaf.org.ua
- Public Organization "Institute of Agricultural Market Development"
  Website: N/A
- Ukrainian Agricultural Confederation
  Website: agroconf.org
- Association of Producers of Certified Organic Products "Organic Ukraine"
  Website: organicukraine.org.ua

3 Key Media and Educational Projects Overview

- EastFruit: An international analytical platform for the fruit and vegetable business.
- SAPIENZA.MEDIA: The first agro-media holding in Ukraine.
- SEEDS: A project focusing on agricultural education and awareness.
- AGRI-GATOR: A platform providing comprehensive information and updates on agriculture.
- AgroPortal.ua: An online portal offering agricultural news, analyses, and resources.
- АгроФМ: A media outlet dedicated to agricultural news and information.
- НАУКОВО-МЕТОДИЧНИЙ ЦЕНТР ВИЩОЇ ТА ФАХОВОЇ ПЕРЕДВИЩОЇ ОСВІТИ: A scientific and methodological centre for higher and vocational education.
- Agroхаб: A platform providing various agricultural services, information, and networking opportunities.
- Educational Project "Агрокебети": An educational agriculture-focused initiative.

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