Agricultural War Damages, Losses, and Needs Review

Issue 3

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Executive Summary

Rapid Damage and Needs Assessment (RDNA)

This Report presents the details of the Rapid Damage and Needs Assessment (RDNA) that was carried out for **Agriculture Sector of Ukraine** as part of the second RDNA report prepared by the Government of Ukraine, World Bank, United Nations, and the European Union.[1] While the overall RDNA report makes a brief presentation of the sectoral results, this Report presents the results in detail and explains the methodology used for estimates. This Report does not cover the damages and losses in irrigation, food industry, and agricultural logistics, which are closely linked to agriculture, as they are covered by other work as part of the second RDNA.

$40.2 billion of damages and losses to the agricultural sector

One year of Russia's full-scale invasion has not only taken many lives, had a significant impact on Ukraine's economy and infrastructure, but also severely affected the agricultural sector. The report provides detailed information on the extent of the damages and losses suffered by the agricultural sector in Ukraine, highlighting the urgent and long-term needs for support and assistance to help the sector rebuild and recover. This is the third issue of the Review, which in contrast to the previous ones combines damages, losses and needs in the agricultural sector in a single report. The estimates presented in this issue are of **February 24, 2023**, exactly a year after the start of the full-scale invasion.

Compared to the previous issue of the Review, the regional coefficients and the data for fisheries and aquaculture sectors were introduced, which have resulted in methodology-induced differences with the previous estimates.

The impact of Russia's invasion of Ukraine on the agricultural sector after one year of the full-scale conflict is immense. Direct **damages** amount to **$8.7 billion** ($2.1 billion more than in the November 2022 Review) and indirect **losses**, including lower production of crops and livestock, as well as logistics disruptions and higher production costs, amount to additional **$31.5 billion** ($2.76 billion less than in the November Review. The lower value is due to the introduction of regional coefficients instead of using the national average. To cover the **needs** for reconstruction and recovery, **$29.7 billion** is required. Considering the colossal damages and losses, it is vital to continue supporting Ukraine's agriculture financially for it to perform at least on a pre-war level. This way one of the most important sectors of the Ukrainian economy will be on its way to prosperity, growth and modernization, contributing to Ukraine's post-war recovery and the global food and nutrition security.

Demining cost are not included in this report. For details see: World Bank. *Ukraine Rapid Damage and Needs Assessment: February 2022 - February 2023 (English).* Washington, D.C.: World Bank Group[1].

[1] https://documents1.worldbank.org/curated/en/099184503212328877/pdf/P1801740d1177f03c0ab180057556615497.pdf

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Acknowledgements

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[2] www.gfdrr.org.

01 Damages[3]

The monetary value of damages from the war is calculated based on physical assets that are destroyed, stolen, or partially damaged due to military actions and occupation. This assessment is indirect and uses the baseline of assets and fixed capital. Category-specific damage coefficients are established for each type of asset using information from the survey of the World Bank's Ukraine Rapid Damage and Needs Assessment by IPSOS, the global market research company, the surveys carried out by the FAO, and other nation-wide surveys. Coefficients for damaged livestock assets are derived from surveys presenting the war-related decrease in herd size for each main category. The results of the IPSOS and FAO surveys were used to evaluate the damages of the following categories: machinery and equipment, storage facilities, perennial crops, livestock, damaged outputs, and inputs.

02 Losses

Data from various sources and satellite data were used to evaluate the damage to soil and farmland as of February 24, 2023. Using data from the State Statistics Service of Ukraine (SSSU) and the Ministry of Agrarian Policy and Food of Ukraine (MAPF), the decrease in annual crop production was estimated. To approximate losses in perennial crop production, coefficients from the damage estimates were used, assuming the productivity would remain unchanged. Livestock production decreases were estimated using data from rural household and war impact surveys. Information from the SSSU was used to establish the baseline for fishery and aquaculture sectors. Finally, the increase in producer costs was evaluated by measuring the change in prices for fuel and fertilizers and multiplying the increase by the need for these factors of production.

03 Needs

For the Needs assessment, the methodology was used from the Post-Disaster Needs Assessment Guidelines developed by the GFDRR, World Bank Group, European Union, and United Nations[4], as well as discussions with MAPF, Ministry of Finance, development partners, and other stakeholders

[3] For a detailed methodology see Annex 1. Methodology, page 14

[4] GFDRR, World Bank Group, European Union, United Nations. 2017. Agriculture, Livestock, Fisheries & Forestry. PDNA Guidelines Volume B 49 pp. https://www.gfdrr.org/en/publication/post-disaster-needs-assessments-guidelines-volume-b-2017

Agricultural Damages: **$8.7 billion**

02

Damages are valued in terms of the monetary values of physical assets, which are destroyed (and stolen) or partially damaged (but still suitable for repairing/recovery) due to military actions and occupation. They reflect the destruction of tangible assets and inventories. The damages are estimated for the following categories: agricultural machinery and equipment; storage facilities; livestock, bees, fisheries and aquaculture; key perennial crops; and stolen or lost inputs and outputs. Considering all the damages in these categories, **the total value is estimated at $8.7 billion.**

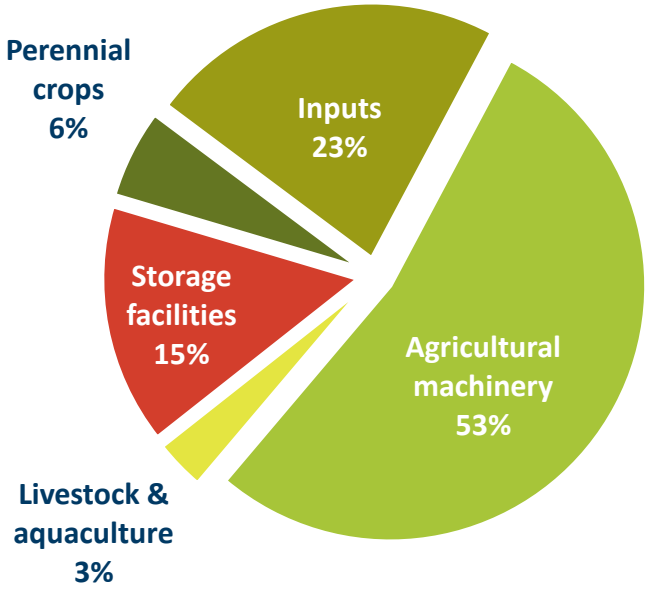

Figure 1. The structure of agricultural war damages by category

Source: own estimates based on the results of the IPSOS survey, nation-wide rural households survey and the "Impact of the war on agriculture producers" survey

Agricultural machinery and storage facilities damages: **$6.0 billion**

The largest category of damages is destroyed or partially damaged agricultural machinery and special equipment, which accounts for $4.7 billion or almost half of the total agricultural war damages. Tractors are the biggest type of damaged machinery when converting to monetary value and are estimated to make up $2.0 billion, followed by seeders (excluding fertilizer seeders) at $646.9 million and harrows at $442.1 million respectively. Moreover, many storage facilities for grains, food or other agricultural commodities were totally or partially damaged. The value of the damages for this sub-category is $1.3 billion. Together with the agricultural machinery and equipment damages, the damages reached $6.0 billion, which is $1.2 billion more than in the November 2022 issue of the Review.

Using the baseline of 2019, **more than 17% of all agricultural machinery and equipment in Ukraine are estimated to be severely damaged and destroyed**. Overall, it will take a lot of time, costs and efforts to repair or completely replace agricultural machinery at least to the baseline level. The approximate reconstruction costs can be found in the Agricultural War Needs section below.

Damages to livestock, bees, fisheries & aquaculture: $277.6 million

Farm animals are dying both, directly because of the hostilities, and because the farmers cannot access the farm or provide animals with feed and veterinary services. In total, 2,230 cows, pigs, goats, sheep, poultry and approximately 87 thousand bee colonies died because of the war, without considering other injures or harms. The damages to livestock and bees are estimated to be worth of $265.6 million, while the fisheries and aquaculture were damaged to the extent of $12.0 million.

Damages to perennial crops: $489.8 million

This category of damages is related to berries and stone and pome fruits. The estimates were made based on the hectares of land where these perennial crops had been cultivated. The damages to stone fruits add up to $232.1 million, to pome fruits to $206.7 million, and to berries to $51.0 million. The total amount of damages to these crops is $489.8 million, which is $141 million more than in the November 2022 Review.

Stolen and lost outputs and inputs: $2.0 billion

Agricultural inputs are being damaged and stolen, although the exact figures are hard to make. Using the indirect estimates and the information from the media, there were approximately 124 thousand tons of fertilizers lost or stolen during one year of the war, which translates into $67.4 million of damages. Additionally, the amount of lost and stolen fuel and crop protection items is estimated to be worth more than $21.2 million and almost $6.7 million, respectively. About $1.9 billion of crops, especially grains and sunflower seeds, were lost and stolen. Overall, the monetary value of stolen and lost inputs and outputs estimates to $2.0 billion.

Agricultural Losses: **$31.5 billion**

Besides direct damages, Russia's invasion of Ukraine has had indirect effects on the agricultural sector, resulting in losses of approximately $31.5 billion after one year of war. These losses encompass the foregone revenue due to lower quantities of goods produced and additional costs that producers bear due to the war, such as losses of farmland due to soil damage, decreases in annual and perennial crop production, livestock, fisheries and aquaculture production, and decreases in producers' revenues due to logistics disruptions, lower prices for export-oriented commodities, and higher production costs.

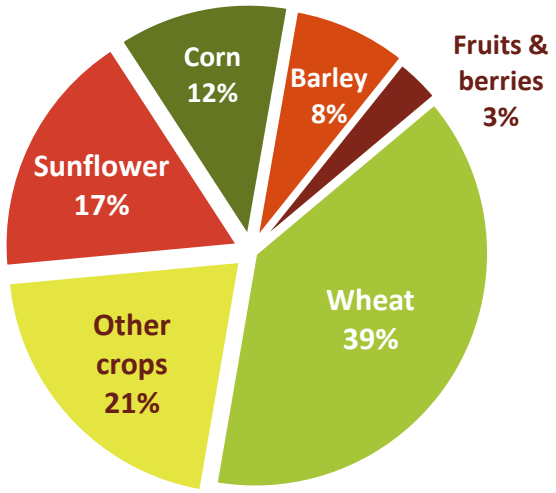

Figure 2. Structure of crop losses due to lower production

Source: own estimates based on the data from SSSU and MAPF

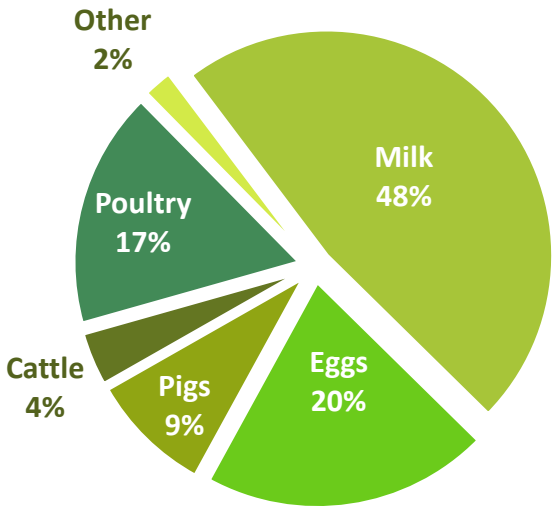

Figure 3. Structure of livestock losses due to lower production

Source: own estimates based on the results of the nation-wide rural household survey and the "Impact of the war on agriculture producers" survey.

Crop losses due to lower production: **$14.3 billion**

The production of crops has been significantly impacted by Russia's invasion, with losses estimated at astonishing $14.3 billion or nearly half of all agricultural losses estimated. The most substantial production losses are for wheat, which accounts for $2.9 billion, followed by sunflower at $2.5 billion, and corn at $1.7 billion. Together with perennial and other crops, this category makes up almost $11.0 billion, which is $0.2 billion less than in the previous Review issued in November 2022.

Winter crops and their harvest of 2023 have also been affected, with wheat having the highest level of losses – $2.7 billion. While the decrease in production of other winter crops, such as barley, rye, and rapeseed, are not as dramatic, they are still significant. The overall approximate production loss of winter crops has increased by $0.3 billion compared to the November 2022 Review and now amounts to $3.3 billion.

Livestock losses due to lower production: $1.7 billion

The livestock losses are estimated at $1.7 billion, which is $1.3 higher than in November 2022 Review. This is because in the current estimation the regional coefficients are used as opposed to the national average in the previous issue.

The most significant losses due to decreased herd are in milk and egg production. They amount to $254.2 million and $159.7 million, respectively. The losses for other livestock and animal products due to the decrease in herd, including pigs, cattle, poultry, sheep, goats, beeswax, and honey, account for $210.5 million. The losses due to the decrease in livestock productivity account for $1.1 billion, with milk, poultry, and eggs having the highest value of losses. The exceptionally high numbers of livestock killed, stolen, and harmed in any way have resulted in shortages of some animal products. Eggs and milk alone add up to $732.4 million.

Other losses: $15.6 billion

In the previous Review it was noted that Russia's invasion of Ukraine had a significant impact on the farm-gate prices of export-oriented commodities. This was primarily caused by Russia's naval forces' blockade of Ukrainian ports, leading to a decrease in domestic prices. Although the Grain Deal allowed the export of some portion of the commodities since August 2022, the exporting volumes remain low and the shipment costs high. Other logistics disruptions have also contributed to the decrease in the prices for export-oriented commodities, which in total was estimated to induce $14.5 billion of losses.

Another consequence of the invasion is inflation and a global rise in prices, particularly for essential agricultural inputs such as fuel and fertilizers. This has led to increased production costs for Ukrainian agricultural producers, with fertilizers costing $377.1 million and fuel costing an extra $467.4 million. The cost of recultivation of the land affected by battles and missiles is also taken into consideration as it directly affects the amount produced. Consequently, the losses resulting from higher input prices and land recultivation together are evaluated to cost more than $1 billion.

Furthermore, the fisheries and aquaculture sector, which was not evaluated in the previous issue of the Review, has also suffered losses due to lower income, higher input prices, and additional costs. The total losses in this sector are estimated at $53.8 million.

Regional distribution of losses

It is worth mentioning that all regions of Ukraine (excluding Autonomous Republic of Crimea, which is not included in the estimates), have borne agricultural losses due to the war. The losses range from $45.0 million in Zakarpattya Oblast to $3.0 billion in Kharkiv Oblast with the latter making up more than 10% of Ukraine's agricultural losses. Zaporizhya Oblast, which is partially under occupation and highly affected by missile attacks, ranks second in losses, accounting for $2.5 billion. It is followed by Kherson and Vinnytsia Oblasts at $2.1 billion and $2.0 billion respectively.

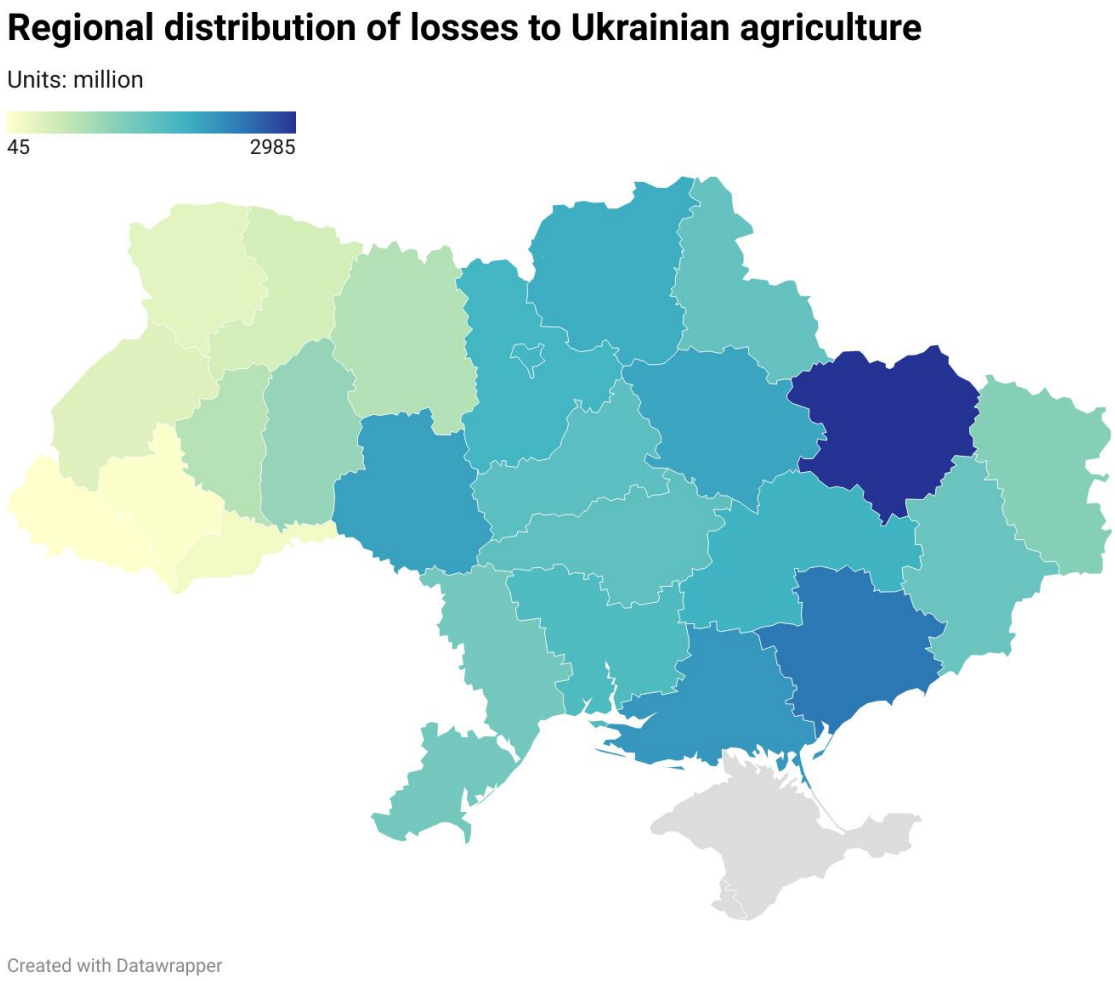

Figure 4. Regional distribution of losses to Ukrainian agriculture

Source: own estimates based on the results of the IPSOS survey

Recovery and Reconstruction Needs: **$29.7 billion**

Given the extent of the damages and losses suffered by the agricultural sector, it is unquestionable that it will require substantial resources for its revival. The cost of these resources is estimated as needs and are based on the objective to recover damages and losses described above. The category of needs can be broken down into two broad parts: reconstruction, which consists of replacement and repairs of the destroyed and damaged assets, and recovery - for restarting the agricultural activities affected by the war. Based on the estimates, the needs amount to $29.7 billion, consisting of $10.2 billion of immediate and short-term needs (2023-2026) and $19.7 billion of medium- to long-term needs (2027-2033).

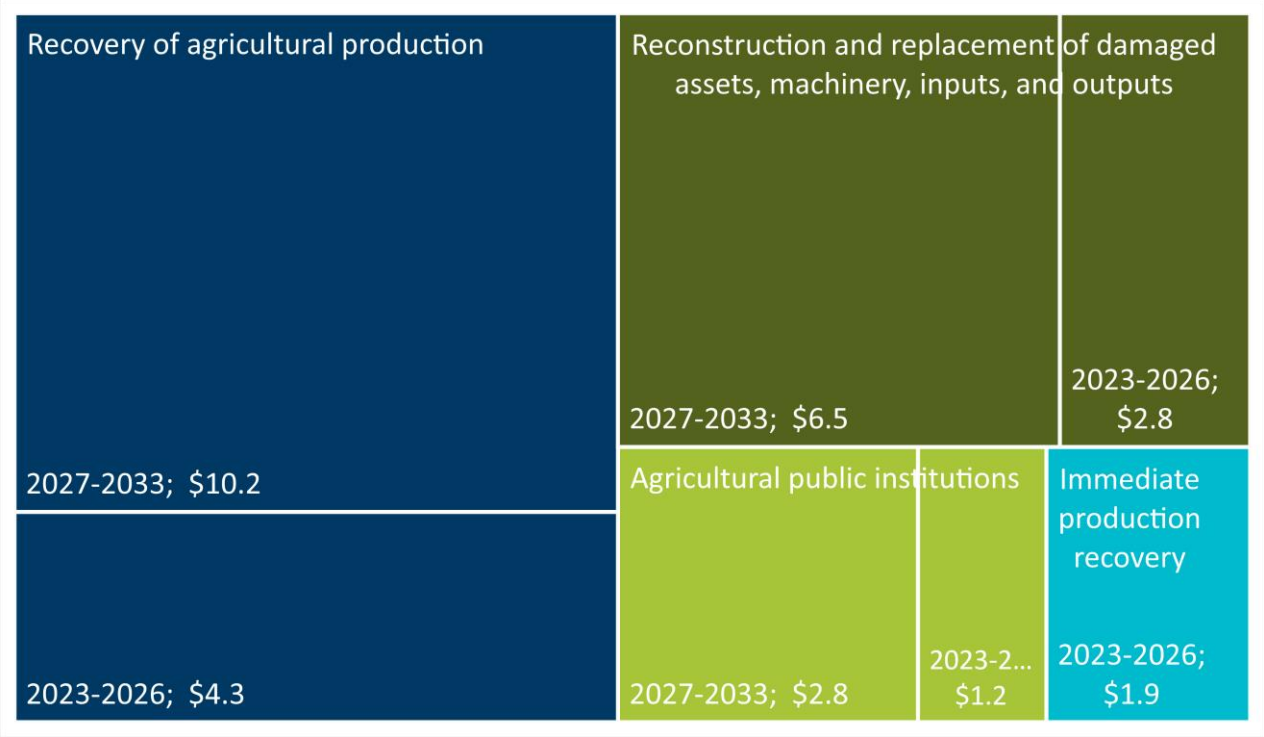

Figure 4. Structure of agricultural revival needs (in billion USD)

Source: own estimates relying on the Post-Disaster Needs Assessment Guidelines developed by the GFDRR, World Bank Group, European Union, and United Nations. See Table 1 for details.

Reconstruction Needs: **$9.3 billion**

The category of needs for supporting the reconstruction includes restoration of storage facilities, farm equipment and machinery, outputs and inputs, costs for recultivation of damaged farmlands, replanting perennial crops, and restoring livestock, fisheries, and aquaculture herds and facilities. Reconstruction needs mostly aim at a long-term period, and account for $9.3 billion.

After the year of the full-scale invasion, the largest category for the reconstruction needs is **replacing the damaged farm equipment and machinery**. The needs in this category are estimated at $4.7 billion, followed by the reconstruction of storage facilities, and outputs and inputs at $3.6 billion. Together with the rest of the components in this category, the total reconstruction needs in the agricultural sector amount to $9.3 billion.

Recovery Needs: $20.4 billion

The estimated recovery needs for the agricultural sector in Ukraine stand at $20.4 billion. These needs have been assessed as a combination of providing resources for affected producers to restart agricultural activities and ensuring the continued provision of public services. Immediate and medium- to long-term recovery needs have been identified to prioritize allocation of resources.

The urgent short-term needs for agricultural recovery (those that require immediate action) account to $1.9 billion. This includes interest rate compensation (BDF, credit program 5-7-9) at $900.0 million, partial credit guarantee fund for agriculture at $100 million, grants and inputs for agricultural production by small farms at $620.0 million, and matching grants for alternative energy generation of elevators and other agribusinesses at $250.0 million. These immediate recovery needs would significantly alleviate the adverse impacts of the ongoing war on the agricultural sector in Ukraine. Allocating funds towards interest rate compensation, grants for small farms, and matching grants for alternative energy generation would not only aid in the revival of the agricultural sector but also promote sustainable farming practices, which would further contribute to the country's food security and overall economic growth.

The long-term recovery needs amount to $14.5 billion. This mainly involves investment grants for various aspects of agriculture, such as climate-smart technologies for arable crops, horticulture (orchards and greenhouses), livestock development, integrated food-energy systems, and investment grants for fisheries and aquaculture. Programs to enhance climate resilience are especially important for Ukraine’s agriculture going forward, given the rapidly growing negative impact of climate change on the sector. Attention to climate mitigation (i.e., carbon reducing activities) is critical in view of accessing the EU market and future membership in the EU, which is pursuing the ambitious green growth strategy for its agriculture and food sector.

Additionally, support for agricultural public institutions is a vital component of the recovery strategy, as well as for transition to a greener growth. The war has significantly affected not only farmers and households but also increased the workload of public agricultural institutions and the demand for public services in the sector. To account for this demand, there is a need to not only maintain the current level of financing of key agricultural public institutions, initiatives, and funds but also to increase spending on public goods. Therefore, $4.0 billion should be devoted to the development of public institutions to ensure that the agricultural sector's recovery is well supported.

Table 1. Recovery and reconstruction needs (US$ million)

Category	Types of activities/investments	Short term (2023–2026)	Medium to long term (2027–2033)	Total (2023–2033)
Reconstruction needs	Reconstruction and replacement of damaged assets, machinery, inputs, and outputs	2,796.2	6,524.4	9,320.6
Service delivery restoration needs	Support for immediate production recovery	1,870.0	-	1,870.0
	Support for longer-term recovery of agricultural production	4,335.0	10,165.0	14,500.0
	Support to agricultural public institutions to accelerate recovery	1,203.0	2,807.0	4,010.0
Total		**10,204.2**	**19,496.4**	**29,700.6**

Source: own estimates relying on the Post-Disaster Needs Assessment Guidelines developed by the GFDRR, World Bank Group, European Union, and United Nations.

Annex 1. Methodology

Damages

War damages are calculated as the monetary value of physical assets that are destroyed, stolen, or partially damaged (but still suitable for repairing and recovery) due to military actions and occupation. The assessment is indirect, which is based on the baseline of assets/fixed capital in the form of machinery and equipment, storage elevators, perennials, livestock, and land, and the differentiation of territories by the supposed severity of the damages. In the regions with little military activities and no prior occupation, the damages were assumed to be zero.

To establish the category-specific damage coefficients for each type of damaged asset, we use information from the survey conducted for the World Bank's Ukraine Rapid Damage and Needs Assessment by IPSOS, augmented with findings from other sources, such as the findings of the nation-wide rural households survey[5] and the "Impact of the war on agriculture producers" survey. The IPSOS survey covers four regions of Ukraine - Kyiv, Sumy, Chernihiv, and Kharkiv regions. Because territories affected by the war have similar characteristics of the damages, we use the estimates for the Kharkiv region as a proxy for the Donetsk region and estimates from the Kyiv region as a proxy for the Mykolaiv region. For Zaporizhya and Kherson regions, it was assumed that 50% of assets were either completely or partially damaged. For the Luhansk region – it was assumed that 100% of assets in the region are either completely or partially damaged. The share of completely damaged assets among partially and completely damaged assets for these three regions is equal to the corresponding share for the Kharkiv region. For the share of damaged inputs and outputs in these regions – the share of damaged assets is proportionate to the share of farmland that was or still is under occupation in these regions and derived based on the results of the IPSOS's survey for the Kharkiv region.

We used the results of the IPSOS survey for the following categories of damaged assets – machinery and equipment, storage facilities, perennial crops, damaged outputs, and inputs. To derive the region-level coefficients for the damaged livestock assets, we used the results of the nation-wide rural households survey and the "Impact of the war on agriculture producers" survey that presents the war-related decrease in herd size for each of the main categories of livestock assets – cattle, pigs, sheep and goats, and poultry. The regional distribution of damages for these categories is derived from the results of the IPSOS survey and assumptions made for other categories of damaged assets. To derive coefficients for the share of damaged assets in fishery and aquaculture, we also used the results of the fishery sector survey, which covers the sample of 75 commercial fishing companies and the results of which are representative on the national level.

[5] FAO. 2022. Ukraine: Impact of the war on agriculture and rural livelihoods in Ukraine – Findings of a nation-wide rural household survey, December 2022. Rome. https://doi.org/10.4060/cc3311en

Table 2. Sources of information used for the damages estimates (baseline and unit prices)

Indicator	Source for the baseline	Source for the unit price
Agricultural machinery	SSSU, 2019	SSSU, 2020 - average price of the machinery purchased by agricultural companies
Households' agricultural machinery	SSSU, 2019	For tractors - the average price of imported tractor from Belarus in 2021, for combine harvesters - the average price of imported from China combine harvester in 2021.
Storage facilities	SSSU, 2021	Interview with industry experts
Livestock	SSSU, 2021	Own estimations using the b2b listings, May 2022
Livestock - bees	Registry of beekeepers, 2021	NGO "Brotherhood of Ukrainian Beekeepers", the cost of beekeeping equipment, 2021
Fisheries and Aquaculture	SSSU, 2021, State Agency of Fisheries	
Perennial crops	SSSU, 2021	Interview with industry experts
Inputs - fertilizers	Average fertilizers consumptions (SSSU, 2018-2020), Ministry's survey on the purchased inputs (Feb. 2022 - Mar. 2022).	Customs data for 2021 + estimated price increase via the Fertilizers Price Index (World Bank)
Inputs - fuel	Fuel consumption, SSSU, 2020, Ministry's survey on the purchased inputs (Feb. 2022 - Mar. 2022).	SSSU, May 2022
Inputs - CPMs	Crop protection measures consumption, SSSU, 2020, Ministry's survey on the purchased inputs (Feb. 2022 - Mar. 2022).	SSSU, 2020
Outputs	SSSU, Jan 2022, discounted on the volumes of exports in January & February 2022	Ukragroconsult, world prices, May 2022

Source: own compilation

Losses

We included the following categories of losses in our estimates:

- Losses of the farmland due to the damage to the soil layer
- Decrease in annual crop production
- Decrease in perennial crop production

- Decrease in livestock, fisheries & aquaculture production
- Decrease in producers' revenues due to logistics disruptions and lower prices for export-oriented commodities
- Decrease in producers' revenues due to higher production costs.

To estimate the losses due to the damage to the soil layer, we rely on the estimations from the Department of mathematical modeling and data analysis of Igor Sikorsky Kyiv Polytechnic Institute, Space Research Institute NASU-SSAU, and The World Bank[6]. The team used the satellite data to classify fields as damaged and provided the RDNA team with the estimates of damaged farmlands as of January 1, 2023. To estimate the unit price for the recultivation – we relied on the Government's decree that regulates the formula for recultivating the damaged farmlands[7].

To estimate the decrease in annual crop production, we selected the sowing areas from 2021 as the baseline (source – State Statistics Service of Ukraine, SSSU). We then estimated the yields for each of the major crop cultures by averaging the yield data from the Ministry of Agrarian Policy and Food of Ukraine (MAPF) for the years 2020 and 2021. We then used the MAPF data to estimate the decrease in the sowing area for each major crop. We also estimated the yields for the 2022 harvest as the percentage change in 2022 yields to the average yields in 2021 and 2020 using the MAPF data. For the "other crops" category, we approximated the change in the sowing area and the change in yields by the change in the sowing area and yields for major crops. In estimating the production losses for winter crops sown in the Fall of 2022 – we assumed the same reduction in sowing area and productivity as for the winter crops harvested in the summer-fall of 2022. To estimate the losses from lower annual crop production, we assume that all decreases in the harvesting areas are attributed to losses. We also attribute 70% of the decrease in productivity of annual crops to war-induced losses.

For the losses due to the perennial crop production, we are using the coefficients from the damages estimates to estimate the decrease in the perennial plantation areas. We also assume that the productivity of perennial production in 2022 remains unchanged compared to the 2021 productivity, which serves as the baseline for perennial production. We estimated the losses due to lower perennial crop production for five years of lower production for pome fruits and stone fruits and for three years of lower production for berries production.

To estimate the decrease in livestock production, we are relying on the decrease in herd sizes from the damages estimates and on the results of the nation-wide rural households survey and the "Impact of the war on agriculture producers" survey that present the nation-wide decrease in livestock productivity for each category of livestock production. We assume that the decrease in livestock productivity is universal across all regions of Ukraine for each category of livestock production.

We use the information from the State Statistics Service of Ukraine to establish the baseline in fishery and aquaculture sectors. The estimated decline in production is then estimated using the results of the fishery sector survey, which covers the sample of 75 commercial fishing companies and the results of which are representative on the national level.

[6] Deininger, K., Ali, D. A., Kussul, N., Shelestov, A., Lemoine, G., & Yailimova, H. (2023). Quantifying war-induced crop losses in Ukraine in near real time to strengthen local and global food security. Food Policy, 115, 102418.

[7] https://zakon.rada.gov.ua/laws/show/z0406-22#Text

Since the RF invasion – Ukrainian producers have experienced a decrease in domestic prices for export-oriented commodities. In our estimations, we assume that a decrease in these prices will affect the entirety of the wheat, corn, sunflower, and barley harvest of 2022 as well as the stocks of these products available in Ukraine as of February 24, 2022, which has not been damaged or stolen. We estimated the decrease in prices of these commodities using the monthly domestic prices weighted by the export volumes from March 1 to December 31, 2022.

To estimate the increase in producers' costs, we estimated the change in prices for two primary inputs of crop production – fuel and fertilizers. We then estimated the need for fuel and fertilizers in the 2022 farming season by using the MAPF data on the decrease in the cultivating areas and estimated the corresponding losses by multiplying the increase in input prices by the estimated need for these factors of production.

Annex 2. Data and estimations

Table 3. Regional breakdown of agricultural damages and losses

Region	Damages, million USD	Losses, million USD	Total	% of National
Vinnytsya	-	2,034	2,034	5.1%
Volyn	-	353	353	0.9%
Dnipropetrovsk	1	1,827	1,828	4.5%
Donetsk	960	1,447	2,406	6.0%
Zhytomyr	0	795	795	2.0%
Zakarpattya	-	45	45	0.1%
Zaporizhya	1,447	2,445	3,892	9.7%
Ivano-Frankivsk	-	72	72	0.2%
Kyiv	457	1,778	2,235	5.6%
Kirovohrad	1	1,553	1,554	3.9%
Luhansk	2,500	1,167	3,667	9.1%
Lviv	-	384	384	1.0%
Mykolayiv	386	1,686	2,072	5.2%
Odesa	1	1,335	1,336	3.3%
Poltava	0	1,985	1,985	4.9%
Rivne	-	484	484	1.2%
Sumy	116	1,509	1,625	4.0%
Ternopil	-	771	771	1.9%
Kharkiv	1,207	2,985	4,192	10.4%
Kherson	1,411	2,137	3,547	8.8%
Khmelnytskiy	-	1,044	1,044	2.6%
Cherkasy	1	1,581	1,582	3.9%
Chernivtsi	0	181	181	0.4%
Chernihiv	231	1,889	2,120	5.3%
Ukraine	**8,718**	**31,488**	**40,205**	**100.0%**

Source: own estimates based on Table 2 data

Table 4. Agricultural war damages by asset type

Asset Type	Totally damaged	Partially damaged	Total ($)
Agricultural machinery			**4,655,741,819**
Tractors	18,203	10,068	1,665,829,011
Tractors (Households)	18,203	10,068	334,057,787
Trucks and lorries	8,236	3,233	424,429,424
Combine harvesters	1,565	825	338,977,138
Combine harvesters (Households)	1,565	825	72,538,046
Machine harvester for vegetables and melons	34	14	2,869,692
Agricultural trailers. semitrailers	6,319	2,520	138,315,592
Ploughs	6,363	2,410	140,610,084
Cultivators	9,036	3,365	221,514,803
Harrows	21,563	7,813	442,140,531
Seeders (excluding fertilizer seeders)	7,956	2,957	646,941,681
Mowing-machines	910	366	5,510,995
Ripper-binders	1,894	730	55,795,741
Press-packers (including pickup presses)	873	336	33,443,111
Spreaders of manure and fertilizers (including fertilizer seeders)	2,391	966	46,804,912
Grain cleaners	2,425	936	51,287,406
Milking and dairy machines	303	128	5,303,254
Milk cleaners. milk coolers	152	2,410	9,844,694
Machinery for fodder's cooking	311	143	5,417,992
Feed distributors	382	263	11,346,015
Manure conveyers	916	375	2,763,911
Storage facilities (thousand tons)	**8,198**	**3,249**	**1,327,117,997**
Livestock			**265,613,169**
Livestock. Cattle (thsd. heads)	90	125	133,881,559
Livestock. pigs (thsd. heads)	170	590	74,134,422
Livestock. sheeps&goats (thsd. heads)	60	109	9,523,964
Livestock. poultry (thsd. heads)	1,910	13,247	16,213,756
Livestock. Bees (bee colony)	86,902	192,526	31,859,468
Fisheries and aquaculture			**12,002,180**
Aquaculture facilities	174		4,404,224
Aquaculture facilities - broadstock	29		569,286
Fisheries - number of producers	23		7,028,670
Key Perennial Crops			**489,840,000**
Berries, hectares	2,552		51,040,000
Stone fruits, hectares	9,284		232,100,000
Pome Fruits, hectares	8,268		206,700,000
Stolen/Lost Inputs			**95,387,732**
Inputs stolen/lost - Fertilizers (tons)	123,825		67,425,328
Inputs stolen/lost - Crop protection measures (tons)	587		6,729,159
Inputs stolen/lost - Fuel (thsd. liters)	11,582		21,233,246
Stolen/Lost Outputs			**1,872,044,202**
Outputs stolen/lost - Grain (tons)	2,810,525		983,683,899
Outputs stolen/lost - Sunflower seeds (tons)	1,227,017		888,360,303
Total ($)			**8,717,747,100**

Source: own estimates based on Table 2 data

Table 5. Agricultural war losses

Category	Value, $
Wheat	2,853,026,229
Sunflower	2,467,028,472
Corn	1,700,806,246
Barley	822,948,228
Stone fruits	250,071,250
Berries	120,409,668
Pome fruits	79,478,984
Winter wheat	2,681,336,610
Winter barley	313,232,024
Winter rapeseed	287,481,988
Winter rye	11,756,421
Other crops	2,667,284,232
Production losses, crops	**14,254,860,352**
Milk	800,082,027
Eggs	346,216,097
Pigs	147,543,242
Cattle	64,673,359
Poultry	285,597,571
Other	35,254,293
Production losses, livestock	**1,679,366,589**
Fisheries	37,114,870
Aquaculture	16,666,848
Fisheries, aquaculture losses	**53,781,719**
Higher production costs	**1,028,412,862**
Losses due to lower prices for export-oriented commodities	**14,480,217,827**
TOTAL	**31,496,639,349**

Source: own estimates based on Table 2 data

Table 6. Agricultural reconstruction and recovery needs

Category	Component	Immediate (2023)	Medium to Long-term (2024-2033)	Total
	(a) Support to reconstruction:	**50**	**9,270**	**9,320**
	Storage facilities		1,593	1,593
	Farm equipment and machinery		4,656	4,656
	Recultivation of damaged farmlands	50	133	183
	Perennial crops		588	588
Reconstruction	Livestock, fisheries, and aquaculture		333	333
Needs	Outputs and inputs		1,967	1,967
	(b) Support to an immediate agriculture production recovery:	**490**	**1,380**	**1,870**
	Interest rate compensation (BDF, credit program 5-7-9)	300	600	900
	Partial credit guarantee fund for agriculture	20	80	100
	Grants and inputs for ag production by small farms (per hectare and per livestock unit)	120	500	620
	Full and matching grants for alternative energy generation of farms, elevators and other agribusinesses	50	200	250
	(c) Support to a longer-term recovery of the agriculture:	**50**	**14,450**	**14,500**
	Investment grants for promoting climate-smart technologies for arable crops		4,000	4,000
	Investment grants for investing in horticulture (orchards and greenhouses)	50	3,950	4,000
	Investment grants for livestock development		4,000	4,000
	Investment grants for integrated food-energy systems, inc. biogas development		1,800	1,800
	Investment grants for fisheries and aquaculture		700	700
Recovery Needs	**(d) Support to agricultural public institutions, including to accelerate the EU accession**	**10**	**4,000**	**4,010**
TOTAL		**600**	**29,100**	**29,700**

Source: own estimates based on Table 2 data.

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