

We need a food system transformation – in the face of the Ukraine war, now more than ever

The Ukraine crisis exposes the fact that our current ways of producing and consuming food are unsustainable and unjust. In response, we should reinforce – and not abandon – the transformation towards a healthy, just, and environmentally-friendly food system. We need comprehensive solutions that bring relief in the short term and at the same time avert the existential threat our food system poses to the health of people and the planet.

Russia's invasion of Ukraine has created a humanitarian catastrophe, while simultaneously disrupting global energy systems and the world's agricultural markets. Ukraine and Russia are major global producers of wheat, maize, and oilseeds as well as fertilizer and fuel. Exports are likely to be severely disrupted due to the war. The Middle East and Africa are highly dependent on imported grain from the area and will be most affected. Soaring grain prices could push millions of people in these regions into poverty and hunger. As an immediate reaction, policy-makers should ensure open agricultural trade flows and adequate financial support for international food aid programmes.

The anticipated shocks to agricultural markets have also prompted short-sighted suggestions like abandoning sustainable agricultural practices that form part of the EU's Farm2Fork strategy, and increasing Europe's grain production capacities, partly to secure animal feed supply. These measures would not move us towards but further away from a reliable food system that is resilient to future shocks, and delivers healthy and sustainable diets.

Transforming today's food systems to ensure food security

Global food insecurity has its origin not in a shortage of supply, but in high economic inequalities and maldistribution. Today's global food production is more than sufficient to feed an even higher world population. However, grains are fed to animals, used as biofuels, or wasted rather than supplied to those with limited financial means¹.

Contrary to what ongoing discussions might imply, European food security is not under threat from the Ukraine crisis. Rather, Europe is threatened by a long-standing crisis of unhealthy diets with consumption of refined grains and animal products markedly above the recommendations of national dietary guidelines and those for healthy and sustainable diets².

Here we propose three levers for coping with the short-term shocks to the food system while also ensuring human health and long-term sustainable development.

1. Accelerate the shift towards healthier diets with less animal products in Europe (and other high-income countries). A shift towards higher human consumption of legumes, vegetables and fruits, and less animal products in Europe could substantially alleviate pressure on global grain supplies. One-third of global calories are currently used to feed animals³ and more than three-quarters of agricultural land are used to produce

¹Berners-Lee et al. (2018). Current global food production is sufficient to meet human nutritional needs in 2050 provided there is radical societal adaptation. *Elementa: Science of the Anthropocene*, 6, 52. <https://doi.org/10.1525/elementa.310>; Cassidy et al. (2013). Redefining agricultural yields: from tonnes to people nourished per hectare. *Environmental Research Letters*, 8(3), 034015. <https://doi.org/10.1088/1748-9326/8/3/034015>

²Willett et al. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447–492. [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4); Springmann et al. (2020). The healthiness and sustainability of national and global food based dietary guidelines: modelling study. *BMJ*, 370, m2322. <https://doi.org/10.1136/bmj.m2322>

³Cassidy et al. (2013).

animal-source foods⁴. Based on FAO data, we estimate that reducing the EU's use of grains to feed livestock by about one-third could compensate for the collapse of Ukrainian exports of grains and oilseeds⁵.

Concurrent reductions in the consumption and production of animal-source foods would lead to a more balanced food and agricultural system in line with health and environmental targets⁶. Drastically reducing consumption of animal-source foods is a prerequisite for limiting global warming to well below 2°C⁷, halting the continuous destruction and pollution of natural habitats, and thus stopping agriculture's transgression of planetary boundaries⁸. Furthermore, a shift towards predominantly plant-based diets could prevent 11 million premature deaths each year and substantially lower the global burden of disease⁹.

Conversely, political efforts to allocate further land to feed production with the aim of stabilizing livestock capacities within the current crisis are counterproductive to global food security. These efforts increase the feed-food competition and delay the transformation towards more sustainable food production.

2. Increase production of legumes and strengthen Farm2Fork. European agriculture heavily depends on energy-intensive nitrogen fertilizers. Supplies are currently interrupted as Russia is one of the world's largest producers of fertilizers and natural gas. The Farm2Fork strategy, which aims at halving nitrogen surplus and expanding organic agriculture on 25% of the land, would largely reduce this import dependency. Increasing diversity in crop rotations by including nitrogen-fixing legumes could replace synthetic fertilizer by biological fixation¹⁰. Improving nitrogen use efficiency by better dosing and timing of synthetic and organic fertilizers would further reduce imports, and would also result in enormous benefits to climate, air quality, and water quality. In addition, implementing the Farm2Fork strategy rapidly would improve soil quality and strengthen biodiversity in agricultural landscapes, thereby ensuring long-term food security through preserving ecosystem services.

Political efforts to abandon the sustainability targets of the Farm2Fork strategy (including greenhouse gas emission reduction, reduction of nitrogen fertilizer and pesticide use, and protection of fallow land for biodiversity) do not shield us from the current crisis, they rather worsen it and make the crisis permanent. Global warming and ecosystem decline are already affecting crop yields and livelihoods worldwide, a situation that will substantially deteriorate in the absence of ambitious mitigation strategies¹¹.

3. Reduce the amount of food waste. According to our calculations, the amount of wheat wasted in the EU is approximately half the amount of Ukraine's wheat exports and a quarter of other grain exports¹². Efforts to reduce food waste along the value chains from retailers to

⁴Poore et al. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987–992. <https://doi.org/10.1126/science.aag0216>

⁵According to FAOSTAT, Ukrainian exports of grains amounted to 57 Mt in 2019, whilst 160 Mt were used as feed in the EU (for the EU, EFTA and UK, the combined value was 175 Mt).

⁶Willett et al. (2019); Springmann et al. (2020)

⁷Clark et al. (2020). Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets. *Science*, 370(6517), 705–708.

<https://doi.org/10.1126/science.aba7357>

⁸Springmann et al. (2018a). Options for keeping the food system within environmental limits. *Nature*, 562(7728), 519–525. <https://doi.org/10.1038/s41586-018-0594-0>;

Soergel et al. (2021). A sustainable development pathway for climate action within the UN 2030 Agenda. *Nature Climate Change*, 11(8), 656–664.

<https://doi.org/10.1038/s41558-021-01098-3>

⁹Willett et al. (2019); Afshin et al. (2019). Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 393(10184), 1958–1972. [https://doi.org/10.1016/S0140-6736\(19\)30041-8](https://doi.org/10.1016/S0140-6736(19)30041-8);

Springmann et al. (2018b). Health and nutritional aspects of sustainable diet strategies and their association with environmental impacts: A global modelling analysis with country-level detail. *The Lancet Planetary Health*, 2(10), e451–e461.

[https://doi.org/10.1016/S2542-5196\(18\)30206-7](https://doi.org/10.1016/S2542-5196(18)30206-7)

¹⁰Drinkwater et al. 1998). Legume-based cropping systems have reduced carbon and nitrogen losses. *Nature*, 396(6708), 262–265. <https://doi.org/10.1038/24376>

¹¹IPCC, 2022: *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Pörtner et al. (eds.)]. Cambridge University Press. In Press.

¹²According to the FAO, 25% of grains in the EU are wasted in households. We combined this with estimates of EU's demand for wheat, which according to FAOSTAT was 47 Mt in 2019, and compared it to Ukrainian wheat exports, which according to FAOSTAT was 21 Mt in 2019.

private homes could thus reduce short-term pressures on global markets. Food waste does not only contribute to the maldistribution of food supplies, it is also responsible for a large share of our food system's environmental footprint, as 30% of food produced is wasted at different stages of production and consumption¹³. Halving the amount of food waste worldwide by 2030 is therefore also an integral part to align the food system with the Sustainable Development Goals and stay within planetary boundaries¹⁴. Policy-measures have so far failed to adequately address this issue.

It's time to act – to ensure global food security today and a livable future

We have presented three levers to address the current food crisis while keeping long-term sustainability goals in mind. In addition to these overarching strategies, further short-term actions by European governments should be taken to ensure that vulnerable people in poor, food-importing countries do not fall into food insecurity. These actions include providing funds to the World Food Programme to purchase grains and keeping trade open, including food trade to and from Russia. Furthermore, social-security systems and food banks need to be strengthened across the EU to avoid detrimental effects of rising food prices for poor households. Effective long-term action however needs to tackle the inequalities of the current food system, in which hunger, waste, and resource-intensive consumption patterns coexist.

Russia's invasion of Ukraine and the ongoing war have sent shock waves through the food system. How the current crisis is handled politically has far-reaching implications for each one of us. The recently published IPCC report states that there is only a short window of opportunity left for effective action in the face of accelerating climate change and other environmental crises¹⁵. Focusing on short-term solutions now without considering the longer-term consequences or integrating the wider picture exacerbates future risks including the threat of surpassing critical tipping points of our planet's natural systems. Investing in a transition towards healthy and sustainable food systems now is essential to increase our resilience against future crises and ensure a safe and livable planet for generations to come.

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¹³Shafiee-Jood et al. (2016). Reducing food loss and waste to enhance food security and environmental sustainability. *Environmental Science & Technology*, 50(16), 8432–8443. <https://doi.org/10.1021/acs.est.6b01993>

¹⁴Willett et al. (2019)

¹⁵IPCC, 2022.

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225. Dr. Alberto Sanz-Cobena, Associate Professor at the Research Center for the Management of Agricultural and Environmental Risks (CEIGRAM) of the Universidad Politécnica de Madrid (UPM, Spain).

226. Jun.Prof. Dr. Antje Risius, Professur Ernährung Gesundheit und Nachhaltigkeit, Pädagogische Hochschule Schwäbisch Gmünd/Universität Göttingen (Germany)
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228. Dr Thomas Pugh, Senior Lecturer, Lund University, Sweden.
229. Dr Jan Ellenberger, Researcher at the Institute of Crop Science and Resource Conservation, University of Bonn, Germany.
230. Carmen Klinger, PhD Candidate, Ludwigs-Maximilians-Universität (LMU) München
231. Pierre-Alain Jayet, DR INRAE (National research institute for agriculture, food and environment)
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258. Dr. Julia Baudry, researcher, INRAE, France
259. Bea Bardusch, researcher at Thünen Institute of Market Analysis.
260. Dr. Marco Heinrich, researcher at Thünen Institute of Market Analysis
261. Prof. Dr. Martin Banse, Director, Thünen Institute of Market Analysis
262. Dr. Felicitas Schneider, researcher at Thünen Institute of Market Analysis, Germany
263. Dr. Josef Efken, researcher at Thünen Institute of Market Analysis, Germany
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