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Balancing productivity and sustainability in driving agrifood systems transformation

Executive Summary

Agrifood systems in Europe and Central Asia face mounting pressures from climate change, environmental degradation, resource constraints and geopolitical instability. Unsustainable crop production practices – including monoculture, high external input dependency and inefficient land and water use – are degrading ecosystems, reducing biodiversity and increasing greenhouse gas emissions. These challenges are compounded by structural constraints such as small average farm size, limited access to resources and markets, and inadequate infrastructure, including information and communications technology connectivity.

Transforming these systems requires a balanced approach that reconciles productivity and sustainability. At the core of this transformation lies resilience, understood not only as the ability to withstand shocks but also as the capacity to adapt and thrive in the face of change. Building resilience requires policy alignment across interconnected sectors such as agriculture, water, energy, technology and socioeconomic aspects underpinned by strong monitoring systems and innovative governance. This document frames an integrated agenda centred on three interconnected enablers: strategic policies that provide coherent, systems-based frameworks aligning crop productivity with environmental and climate objectives; digitalization that leverages farmer-centred tools to enhance productivity, sustainability and adaptive decision-making; and sustainable and inclusive finance that mobilizes public and private resources, expands financial inclusion and facilitates access for smallholders, women and youth. These enablers are mutually reinforcing: Integrated policies and approaches create an enabling framework, digitalization enables agriculture to be more precise and brings benefits across the whole agrifood value chain, and finance ensures that solutions are accessible and scalable. Together, they offer a comprehensive pathway for the region to achieve agrifood systems that are productive, resilient, environmentally sound and socially inclusive.

I. Introduction: rationale

1. Agrifood systems in Europe and Central Asia are under unprecedented pressure from a convergence of environmental, technological and socioeconomic factors. Climate change is intensifying extreme events

such as droughts, floods and heatwaves,[1] while geopolitical instability and trade disruptions add further stress to food security and rural livelihoods and threaten crop productivity. At the same time, structural constraints – such as small farm sizes, limited access to finance, weak digital connectivity and inadequate infrastructure – reduce the ability of farmers and agrifood enterprises to adapt and invest in sustainable solutions for agrifood systems across the region.

2. The diversity of ecosystems and socioeconomic conditions across the region creates both opportunities and vulnerabilities. While some areas achieve high productivity, fragile ecosystems in Central Asia, the Caucasus and parts of Eastern Europe remain highly exposed to water scarcity, soil degradation and biodiversity loss. Addressing these risks requires balancing productivity and sustainability while ensuring social inclusion.

3. The transformation is central to the achievement of the Sustainable Development Goals (SDGs), especially SDGs 1, 2, 8, 9, 10, 12, 13, 15 and 17, including the Rio Conventions. It also is guided by the FAO Strategic Framework 2022–2031, supporting better production, better nutrition, a better environment and a better life, leaving no one behind.

4. Against this backdrop, the Forty-fourth Session of the European Commission on Agriculture and this background document highlight three mutually reinforcing enablers: "strategic policies and approaches towards more efficient, inclusive, sustainable and resilient agriculture to improve cropping system productivity and natural resource efficiency (ECA/44/25/4)", aligning productivity with climate and environmental goals; "harnessing digital technologies for balanced productivity and sustainability in agrifood systems (ECA/44/25/5)", equipping farmers and value chains with tools for efficiency, transparency and resilience; and "unlocking sustainable and inclusive finance and strengthening public–private partnerships for agrifood system transformations in Europe and Central Asia (ECA/44/25/6)", enabling investment and broad participation. Together, these enablers provide a comprehensive pathway for building agrifood systems that are productive, resilient, inclusive and environmentally sustainable.

5. This background document outlines in section two the challenges of the region, connects the three enablers with challenges in section three and provides a short conclusion in section four.

II. Challenges

Regional challenges

6. Balancing productivity[2] and sustainability[3] in agriculture is among the greatest challenges facing agrifood systems in Europe and Central Asia. While the region holds significant potential, it continues to

[1] **Bednar-Friedl, B., R. Biesbroek, D.N. Schmidt, P. Alexander, K.Y. Børsheim, J. Carnicer, E. Georgopoulou, M. Haasnoot, G. Le Cozannet, P. Lionello, O. Lipka, C. Möllmann, V. Muccione, T. Mustonen, D. Piepenburg, and L. Whitmarsh.** 2022: Europe. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1817–1927, doi:10.1017/9781009325844.015.

[2] Productivity is more comprehensively captured by the concept of total factor productivity, which measures output relative to the combined use of all inputs and production factors (land, water, labour, tractors, fertilizers, seeds, etc.). This contrasts with partial productivity metrics, such as yield, which consider output relative to a single input. For more information, please visit: https://agris.fao.org/search/en/providers/122566/records/669fae424295623862502e2f.

[3] Sustainability refers to the ability of socioecological processes and activities to produce long-term environmental, social, technical, financial and cultural benefits. FAO's vision for sustainable food and agriculture is of a world in which food is nutritious and accessible for everyone and natural resources are managed in a way that maintains ecosystem functions to support current and future human needs. For more information, please see the FAO Glossary

rely heavily on input-intensive farming systems that undermine natural resources and long-term resilience. The two goals of productivity and sustainability are not mutually exclusive; they go hand in hand[4].

7. Agrifood systems across Europe and Central Asia are confronted by multiple interlinked challenges that threaten their productivity, resilience and long-term sustainability. At the heart of these challenges lies a persistent reliance on conventional, input-intensive farming systems. Monoculture cropping, heavy use of chemical fertilizers and pesticides, and inefficient land and water management continue to degrade ecosystems and reduce the natural capital upon which agriculture depends.[5]

8. Unsustainable practices undermine productivity and worsen climate vulnerability, creating a damaging cycle of ecological stress and socioeconomic hardship and business risk. Central Asia, the Western Balkans and parts of Eastern Europe are particularly at risk, facing severe droughts, land degradation, floods, energy supply shocks and inflationary pressures. These challenges are often amplified by limited infrastructure, weak governance and fragmented agricultural and rural development policies. In Central Asia, for instance, the reliance on extensive irrigation for high-demand crops such as cotton has left soils fragile and vulnerable to climate variability.

9. Smallholders and agricultural small and medium enterprises – which provide a significant contribution to agricultural output – face significant constraints in accessing technologies, finance, advisory services and market and employment opportunities. These limitations reduce their capacity to invest in sustainable business models, adopt and scale innovative and sustainable solutions, and improve productivity.[6]

10. Demographic shifts further complicate the regional picture. Youth are increasingly disengaged from agriculture due to limited incentives, lack of access to quality services, and insufficient economic opportunity in rural areas. This trend threatens the generational renewal of farming communities and limits the adoption of new technologies and practices. Similarly, rural women remain underrepresented in access to resources, credit, training and decision-making platforms, which constrains household- and community-level resilience and reduces overall system efficiency.

11. Fragmented policies and weak institutional coordination remain significant obstacles to achieving integrated agrifood system transformation. Financially inclusive strategies and agricultural, environmental, water, climate and digital agriculture policies and are often developed in isolation, resulting in conflicting incentives and missed opportunities for synergies. For example, subsidies and support mechanisms may prioritize short-term yield increases without accounting for long-term soil health, water conservation or biodiversity protection. The lack of coherent frameworks impedes the integration of climate, biodiversity, water and productivity objectives into national and regional strategies.

12. While several countries in the region have embarked on the development of sustainable finance frameworks that can contribute to better steering, tracking and reporting on financing flows towards sustainability-related objectives, further effort is needed to expand and harmonize these frameworks.

13. Digital agricultural solutions present both opportunities and challenges. While digital tools can enhance productivity, efficiency and resilience, adoption remains uneven. Barriers include poor connectivity in rural areas, high costs of digital agriculture devices and platforms, low digital literacy, and

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at https://openknowledge.fao.org/server/api/core/bitstreams/317db554-c763-4654-a0d3-24a8488bbc3a/content/status-women-agrifood-systems-2023/glossary.html.

[4] Future of Agriculture: Balancing Sustainability

[5] **FAO.** 2022. *The State of the World's Land and Water Resources for Food and Agriculture – Systems at breaking point.* Main report. Rome. https://doi.org/10.4060/cb9910en

[6] **OECD/FAO.** 2023. *OECD-FAO Agricultural Outlook 2023-2032.* Paris, OECD Publishing. https://doi.org/10.1787/08801ab7-en.

a lack of farmer-centred solutions tailored to local contexts. Marginalized groups – particularly smallholders, women and youth – face the greatest exclusion, limiting the potential of digital technologies to catalyse inclusive and sustainable transformation.

14. Many agrifood system actors lack adequate access to affordable and appropriate finance for operational, investment and risk management needs, including credit, savings, insurance and transaction services. This limits their ability to invest in productivity-enhancing technologies to support growth. When combined with weak incentives to adopt sustainable practices, the result is low productivity and limited uptake of sustainable technologies and production models. Many small-scale producers, rural women and youth, and agricultural small and medium enterprises are effectively excluded from formal sources of finance. Without targeted interventions, these systemic barriers threaten to perpetuate inequalities, slow the adoption of sustainable practices, and hinder progress towards resilient, productive and inclusive agrifood systems across the region.

Response to challenges

15. Addressing the multifaceted pressures on agrifood systems in Europe and Central Asia requires a coordinated response across three interlinked enablers: strategic policies, digitalization, and sustainable and inclusive finance.

Strategic policies: Setting the framework for balanced transformation

16. Policies form the backbone of agrifood system transformation. A systems-based approach to policy integration ensures that agricultural productivity goals are aligned with environmental, climate and social objectives, creating coherence across sectors and scales – from local farm and community initiatives to national strategies and up to regional and global frameworks.

17. Mainstreaming transformational integrated farming practices stands out as innovative. Climate-smart agriculture,[7] regenerative agriculture,[8] integrated soil fertility management,[9] integrated pest management,[10] and conservation agriculture[11] – alongside synergistic crop–livestock systems and

[7] Climate-smart agriculture provides an approach to boost productivity, enhance resilience and cut farm-sector emissions. See: **Raihan, A., Ridwan, M. & Rahman, M.S.** 2024. An exploration of the latest developments, obstacles, and potential future pathways for climate-smart agriculture. *Climate Smart Agriculture*, 1(2): 100020. https://doi.org/10.1016/j.csag.2024.100020. Integrating climate-smart agriculture into national budgets and mandates means replacing blanket subsidies with targeted grants, soft loans and payments for ecosystem services. Practices such as crop rotations, integrated pest and nutrient management, conservation tillage, agroforestry and landscape planning, deliver productivity, resilience and mitigation. See: **FAO.** 2025. Climate-Smart Agriculture. In: *Food and Agriculture Organization of the United Nations.* [Cited 4 September 2025]. https://www.fao.org/climate-smart-agriculture/en/

[8] Regenerative agriculture redesigns farming systems to restore carbon, biodiversity and water functions while maintaining yields. See: **Hoorn, H. van den, Jellema, A., Dam, D. van, Pesser, R., Geerling-Eiff, F. & Manshanden, M.** 2024. Regenerative agriculture in the EU: exploring the transition. https://doi.org/10.18174/680029. Its principles align with the EU Green Deal and Farm to Fork Strategy.

[9] **IFDC.** 2025. Integrated Soil Fertility Management (ISFM). In: IFDC. [Cited 4 September 2025]. https://ifdc.org/integrated-soil-fertility-management-isfm/

[10] Integrated pest management shows that pesticide use can decline without yield loss, supported by cross-border cooperation. See: **FAO.** 2025. Standing the test: Five countries see proof of IPM success at FAO workshop. In: *FAO Regional Office for Europe and Central Asia.* [Cited 2 July 2025]. https://www.fao.org/europe/news/detail/standing-the-test--five-countries-see-proof-of-ipm-success-at-fao-workshop/en

[11] Conservation agriculture, grounded in minimal soil disturbance, permanent cover and crop rotation, mimics natural ecosystems to restore and maintain soil productivity See: **Derpsch, R., Kassam, A., Reicosky, D.,**

aquaculture[12] and the principles of agroecology[13] – provide scalable pathways for enhancing resilience. These approaches, combined with supportive policies and risk-sharing mechanisms, are a necessary condition to addressing the pressing challenges of environmental degradation. They empower smallholders, who often face daunting obstacles due to limited access to financial resources, advanced technology and knowledge.

18. Consequently, it is crucial to prioritize the harmonization and coordination of policies and approaches to reduce conflicting incentives and repurpose agricultural subsidies in ways that actively support sustainability and resilience. Furthermore, inclusive policy design embeds gender equality, youth empowerment and smallholder inclusion as core objectives, ensuring that all actors in the agrifood system can participate and benefit.

19. Moreover, evidence-based decision-making, supported by robust data collection and monitoring, strengthens the effectiveness of interventions and allows for adaptive governance in the face of changing climatic, economic and social conditions.

20. The subtopic "strategic policies and approaches towards more efficient, inclusive, sustainable, and resilient agriculture to improve cropping systems' productivity and natural resource efficiency (ECA/44/25/4)", presented under agenda item 4, explores in detail the relevance of this enabler.

Harnessing digitalization

21. Digital technologies are a transformative enabler for balancing productivity, sustainability and inclusion in agrifood systems. Precision agriculture, artificial intelligence-driven advisory tools, digital traceability systems and fintech solutions already are delivering tangible benefits across parts of Europe and Central Asia. Yet adoption remains uneven, with a persistent digital divide between and within countries. Unlocking its potential requires embedding digitalization in agricultural and rural development strategies, supported by stronger agrifood innovation systems that connect research, extension and farmers and promote skills development and innovation. Expanding rural broadband, digital financial services and robust policies on data governance and responsible artificial intelligence – complemented by behavioural, user-centred and gender-sensitive approaches – is essential to strengthening trust and uptake. Equally important is investing in digital skills so that farmers, extension agents and local authorities can use technologies effectively.

22. The subtopic "harnessing digital solutions for agrifood system transformation (ECA/44/25/5)" is presented under agenda item 5.

Sustainable and inclusive finance

23. Transforming agrifood systems in the region requires both scaling up finance and directing it towards sustainable business models, technologies and practices. Current public and private financing are

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Friedrich, T., Calegari, A., Basch, G., Gonzalez-Sanchez, E. & Dos Santos, D.R. 2024. Nature's laws of declining soil productivity and Conservation Agriculture. *Soil Security*, 14: 100127. https://doi.org/10.1016/j.soisec.2024.100127. The wider adoption of conservation agriculture could be encouraged through targeted grants, soft loans and tailored extension services aligned with sustainability goals.

[12] **Pullin, R.** 2001. Integrated agriculture-aquaculture and the environment. In: *Integrated agriculture-aquaculture: A primer.* [Cited 4 September 2025]. https://www.fao.org/4/y1187e/y1187e07.htm

[13] Agroecology is a holistic approach to food system transformation that blends scientific and traditional knowledge to create context-specific solutions guided by its ten elements, addressing environmental, social and economic challenges in alignment with the SDGs. See: **FAO.** 2018. The 10 Elements of Agroecology. In: *Agroecology Knowledge Hub.* [Cited 4 September 2025]. http://www.fao.org/agroecology/overview/overview10elements/en/.

insufficient, with public resources constrained and often inefficiently allocated and national financial systems frequently lacking the policy, infrastructure and capacity to mobilize private investment. Small-scale producers, rural women and youth, and small and medium enterprises are particularly excluded from formal finance due to high costs and perceived risks.

24. Addressing these challenges requires intersectoral, coherent policies and stronger coordination among stakeholders, alongside investments in financial, agrifood and data infrastructure. Strengthened regulatory frameworks and sustainable finance mechanisms can steer, track and verify investment toward climate-smart, resource-efficient and environmentally sound practices. Mainstreaming principles such as CFS-RAI[14] into legal and policy frameworks – combined with innovative instruments such as blended finance, digital financial services, risk-sharing tools and public-private partnerships – can overcome systemic constraints. Financial inclusion strategies can further improve access, utilization and the quality of financial services for underserved groups. By tackling bottlenecks across multiple levels, countries can create the incentives and conditions for both **more and better finance** to support agrifood system transformation.

25. The subtopic "unlocking sustainable and inclusive finance and strengthening public–private partnerships for agrifood system transformations in Europe and Central Asia (ECA/44/25/6)", presented under agenda item 6, further examines the enabler of sustainable and inclusive finance.

Interlinkages: Strategic policies, digitalization and finance as a transformation approach

26. Strategic policies, digitalization and finance are not stand-alone enablers but interdependent drivers of transformation. Integrated policies create the framework to align productivity, environmental sustainability and social inclusion objectives. Digitalization provides the tools to farmers and agrifood actors to enhance efficiency, resilience, market transparency and risk management, but its uptake depends on enabling policies and financing. Financing, in turn, determines whether smallholders, women and youth can access these technologies and practices and whether public subsidies and private capital are directed towards sustainable outcomes. Coordinated implementation actions across these enablers ensure that gains in productivity do not come at the expense of environmental sustainability or social inclusion. Tailored to the diverse context across the relevant subregions, such linkages ensure that productivity gains strengthen rather than undermine sustainability and social inclusion.

III. Conclusion

27. A systems-based approach, as promoted by FAO, must guide the transformation of agrifood systems in Europe and Central Asia. This means addressing interconnected challenges across agriculture, environment, water, energy and rural development in an integrated manner, ensuring that interventions reinforce rather than contradict each other.

28. Transforming agrifood systems in Europe and Central Asia requires moving beyond short-term productivity gains towards approaches that recognize sustainability as intrinsic to long-term resilience. Policies must align agriculture, environment and trade to eliminate contradictory incentives, while finance must be scaled up and directed to facilitate private investment for sustainable practices. Digital agriculture can accelerate this transition, but only if it is inclusive and supported by appropriate governance.

[14] The Committee on World Food Security Principles for Responsible Investment in Agriculture and Food Systems (CFS-RAI) were endorsed in 2014 and provide a global framework to guide investment in agriculture and food systems towards outcomes that support food security, nutrition and sustainable development.

29. Gender equality and youth engagement are critical drivers of innovation and resilience. Mainstreaming these dimensions through targeted capacity building, behavioural change initiatives and tailored support mechanisms ensures that traditionally marginalized groups gain access to resources, technologies, knowledge, finance and decision-making platforms, thereby contributing to more resilient and socially inclusive agrifood systems.

30. Collaboration and investment at the regional level are vital for the sustainable management of land, water and ecosystems, alongside digital solutions and inclusive financing. By sharing best practices and pooling resources, countries can strengthen their resilience to climate, economic and geopolitical challenges.

31. By connecting local realities with regional collaboration, countries can effectively balance productivity and sustainability. This will foster sustainable, locally driven solutions that enhance long-term economic and environmental resilience.

32. Finally, leveraging partnerships, frugal innovation and context-specific adaptation can turn the region's inherent diversity into a strength. By strengthening collaboration between public, private and civil society actors and promoting locally led solutions tailored to specific ecological and socioeconomic contexts, Europe and Central Asia can emerge as a successful model for agrifood system transformation – one that is productive, sustainable, resilient and inclusive.