

## MANIFESTO

### **Sustainable supply chains and strengthened local processing of bioresources in Central and Eastern Europe**

We, as representatives from both large and small companies, NGOs, biomass producers, regions, research institutes and academia across the Central and Eastern European (CEE) macro-region, encompassing several EU Member States, the Western Balkans, and Eastern Partnership Countries—in particular Ukraine and Moldova—gather under the auspices of the BIOEAST Initiative to present this Manifesto.

Together, we firmly believe that Europe's successful transition towards a sustainable and circular future hinges upon the better involvement of stakeholders from our macro-region into research and innovation, as well as the deployment of sustainable solutions, technologies, and manufacturing processes. Therefore, a concerted effort led by a European initiative must channel advancements in research, innovation, and knowledge towards our region.

We recognize that we stand at a pivotal moment in human history, facing the urgent challenge of striking a balance between global boundaries and growing societal needs. We are steadfast in our conviction that Europe must take a leading role in this transition to sustainability and stability by leveraging its own abundant natural resources and ecosystem services. By reducing our dependence on external inputs, we can stride towards greater strategic autonomy while reshaping global supply chains to pave the way for a sustainable future. Central and Eastern Europe possesses valuable assets, such as fertile soils, abundant freshwater resources, renewable biomass, and vibrant rural communities, which can significantly contribute to these efforts. Therefore, enhancing local knowledge on modern, environmentally benign technologies is essential for unlocking this immense potential. We advocate for increased and targeted public investment in joint research and innovation, and knowledge transfer, with a focus on the aforementioned areas, which hold high relevance for our macro-region.

The advancement of bioeconomy research and innovation is imperative for Central and Eastern Europe. It will enable us to better manage our natural resources and tap into new, competitive, and diversified markets within food systems and bio-based products. Specifically, we aim to enhance the production of renewable biological resources and convert these resources, residues, by-products, and side streams into value-added products, including food, feed, fiber, advanced bio-based products, services, and bioenergy in a sustainable way.

We call on decision-makers to prioritize the **soil – freshwater – food systems – biomanufacturing nexus** and recognize its pivotal role in shaping our sustainable future.

### *Soil*

Soil health is vital for ecosystem functioning, agricultural production and forestry thus for the safety and wellbeing of human society. We are aware that Central and Eastern Europe has precious land resources that can provide an invaluable contribution to the European food autonomy and self-sufficiency in material use. Still, there is no comprehensive and integrated information on soil health, soil productivity improvement options and their socio-economic aspects in this macro-region. Without this information the efficiency of agricultural, forestry, rural development and regional policies as well as land-related environmental programs cannot be enhanced considerably. Insufficient knowledge generation, exchange of information and use of innovation are among the key barriers to the adoption of sustainable soil use and management and the utilisation of untapped potentials of agricultural and forestry ecosystems in the CEE macro-region. To overcome this barrier, scientific knowledge needs to be developed in cooperation, and the transfer of existing knowledge from and to stakeholders must be facilitated.

Based on the overview of the most pressing challenges we wish to highlight five specific focus areas, which have utmost priority for the macro-region to be addressed:

1. Instruments for closing yield gaps and improving ecosystem service performance in land endangered by soil erosion and especially desertification.
2. Development of scientific understanding of soil health improvement options of fertile land under cultivation, in particular black soils, and of soils that are not under cultivation, but can be reutilized for food production (e.g., marginal land, urban soils).
3. Improvement of institutional support and the quality of advisory services for efficient and sustainable soil management adapted to the macro-region.
4. Improvement of knowledge uptake saturation level by deployment of state-of-art research results into practice.
5. Facilitation of synergies and cooperation between public and private actors considering both land users and investments.

### *Freshwater*

Freshwater is the source of drinking water, vital for agricultural production, and ecosystem functioning, thus ensuring the safety, well-being, and prosperity of human society.

We are aware that Central and Eastern Europe has abundant freshwater resources. However, there are numerous cases where these resources are endangered or

underutilized. With a well-structured focus on these topics in future programs, the CEE macro-region's water resources could still provide sustainable European ecosystem services. Despite the dramatic changes in freshwater bodies over the past year, attention is scattered between sectors and decision makers. Research and innovation advancements are not being brought closer to implementation, and research and innovation programs still function on a silo basis.

A sustainable transition will not occur unless examples of excellence-based science and innovation advancements are brought closer to users and the society. The development of future programs and cross-border cooperation in Central and Eastern Europe, which will benefit the whole of Europe, should commence immediately. To overcome this barrier, scientific knowledge and hands-on solutions need to be developed, and the transfer of available knowledge from and to stakeholders has to be enabled.

The CEE macro-region has a significant contribution to the stability of the global water cycle and climate, thus playing a major role in reducing climate risks and restoring the stability of the global water cycle, with many synergistic benefits not only for Central and Eastern European countries but for the whole of Europe. The existing two-dimensional water management concept needs to be expanded to address not only the entire water cycle but also the annual time balance in the region, as well as the role of soil in water retention and the climate of the basin. The 4D solution represents a new approach with global impacts.

Based on the overview of the most pressing challenges, we wish to highlight five specific focus areas, which have utmost priority for the macro-region to be addressed:

1. A new water paradigm is needed that describes the importance of integrated land and watershed management by adopting and implementing effective local, regional, and national rainwater harvesting measures to restore the small water cycles (evapotranspiration - precipitation feedback loop) on continents by watershed restoration, land rehydration, and afforestation.
2. Application and adoption of nature-based solutions, rainwater harvesting, water treatment methods for decentralized aquifer recharge and storage, and natural sequence farming practices to sustainably produce food, fiber, and biomass while stewarding natural assets.
3. Development and application of sustainable agriculture practices that support freshwater management in the macro-region such as regenerative agriculture, rewilding practices, permaculture, agroforestry, agroecology, irrigation and reclamation, floodplain and riparian restoration, sustainable water management methods.
4. Development and improvement of blue and green infrastructure, digitization in water technologies (e.g., Water 4.0, 5G-based solutions), low-impact urban development, urban rainwater management, and redesigning cities to reduce heat island effects.

5. Focus on nature conservation and integrated freshwater-based bioeconomy development: utilization of water-based biomass, biowaste for food, feed, fiber, material use, industry, and energy purposes, with special attention to aquaculture and services like tourism.

### *Food Systems*

The challenge of understanding and addressing the complexity of food systems persists in our macro-region. Developing sustainable and resilient food systems requires cross-sectoral planning and investment in innovative solutions. Currently, the primary production and food processing sectors remain disjointed, hindering effective investment, which impedes competitiveness. Strengthening research in food systems would contribute to improving cross-sectorial relations between agriculture, waste management, supply, and interaction with external systems such as energy, trade, and healthcare. However, the current policy environment in CEE countries does not prioritize research, innovation, and risky applications.

Our manifesto aims to direct attention towards the processing of locally produced biomass while maintaining competitiveness and fostering a sustainable future. This necessitates additional investment, targeted research, and innovation-oriented funding. Such funding should empower private and public actors to invest in new value chains, business models, cutting-edge technologies, and to invest in the development and implementation of social innovations, including those related to changes in consumer attitudes.

External shocks and challenges, such as COVID-19, wars and climate issues highlight the urgency of rethinking European food systems. Solutions must consider climatic regions, societal acceptance, trade policies, and integrated approaches to primary production, processing, and waste management.

Based on the overview of the most pressing challenges we wish to highlight five specific focus areas, which have utmost priority for the macro-region to be addressed:

1. Developing a sustainable food systems for the macro-region building on agroecology, including food waste and resource efficiency, nutrition and diets linked to the health system, and monitoring.
2. Addressing food justice along the food chain where people's vulnerabilities are exploited and where injustice and inequity turn up: farm level, processing, distribution, especially retail level and other industrial pollution at rural areas, and finally about access to enough, safe and nutritious food.
3. Demonstrating the true cost of food and enhancing the environmental performance of food production.
4. Scoping the trade-offs, contradictions, conflicts, and knowledge gaps that emerge when policies address societal challenges related to food systems.

5. Scoping the diversification of new proteins sources to develop sustainable food systems in the macro-region.

### *Local valorisation of biomass*

Circular bio-based industries produce a wide range of sustainable goods, ingredients, chemicals, building blocks, and bio-based materials from renewable resources, such as agriculture, forestry, and food industry side streams, water-based biomass, and municipal waste. Their development is essential for a sustainable future and a key element in addressing the world's current environmental challenges.

Despite the fact that Central and Eastern Europe has abundant biomass resources and a vast potential for the expansion of bio-based industries, the related value chains are not yet well developed. Lacking economic policy priorities directed towards these industries the investments are not forthcoming to the extent required. Furthermore, the playing field is tilted against bioeconomy stakeholders, particularly the biotechnology and bioprocessing sectors, with the fossil-based economy still retaining at a strong pace.

The lack of detailed information on the characteristics and volume of primary and secondary biomass streams, insufficient biorefinery capacities and technological challenges all hinder the transition of the chemical industry from fossil-based resources to renewable ones. The various steps involved in the conversion of biomass must be further developed to valorise currently untapped biomass fractions and side streams. Furthermore, it is imperative to promote cascading resource utilisation and effective carbon use towards high-value products, such as polymers, pharmaceuticals, as well as food and feed ingredients.

The CEE macro-region is currently missing the opportunity to build a competitive future without modern biorefineries and local biomass valorisation. The below specific focus areas have been identified with the highest priority to be addressed:

1. Facilitate the development of expertise in the bio-based sectors through promoting higher education and skills development with an interdisciplinary approach.
2. Stimulate research activities in countries and regions with underdeveloped R&I capacities towards improving the environmental performance of bio-based processes and the development of high-value bio-based products.
3. Increase the awareness and acceptance of bio-based solutions among biomass owners, industry actors, policy makers, and research support agencies.
4. Protect and enhance biodiversity and ecosystem services while ensuring the sustainable supply of high-quality bio-based feedstocks.
5. Develop local infrastructure for biomass collection, post-harvest management, and processing, with a particular focus on small- and intermediate-scale biorefineries.

With the signing of this Manifesto, we express our willingness to dedicate our future capacities to take an active part in the implementation of such research and innovation projects. We ask the BIOEAST Initiative to propose and coordinate further discussions on the above priorities. We call on national and EU level decision makers to consider how to provide targeted financial support for the realization of these aspirations.

Signed by:

<b>Institution or Person name</b>	<b>Country</b>	<b>E-mail (not visible on the website)</b>
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