Circular Agroecology for a Resilient Europe

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Europe faces a critical moment. While trade wars and geopolitical tensions dominate headlines, they threaten to overshadow urgent ecological and social crises unfolding across the continent. At the heart of these intertwined crises lies our current industrial food system—a system that pushes our societies beyond planetary boundaries through impacts on wellbeing, water, biodiversity, climate, and ecosystems. As a direct result of this resource-intensive system, Europe suffers a staggering €3 trillion annual cost in healthcare expenses, environmental damage, and climate impacts across the EU—a sum which equals the entire GDP of France. At the same time, nearly one in ten Europeans cannot afford a quality meal every other day.

In this context, the European Commission has published its new Vision for Agriculture and Food. The Vision emphasises competitiveness, simplification, and digitalisation for 'strategic autonomy'. Still, it fails to address the fundamental drivers of the system's massive negative footprint: the heavy dependence on, and intensive use of, synthetic fertilisers, pesticides, and imported animal feed, for the production of highly processed but low-nutrition food. Meanwhile, food producers (including farmers, fisherpeople, and many more) struggle with volatile prices, climate impacts, and high input costs, often becoming the first victims of health crises caused by industrial farming.

While current policies lack a clear path for the sustainable transformation of our food system, the EU's emphasis on strategic autonomy presents an opportunity. To achieve genuine strategic autonomy, the EU must build a resilient, sustainable, and equitable food system that can face the multiple challenges of the 21st century. In this article, we propose the idea of 'Circular Agroecology' as the guiding concept for this transformation.

If the EU intends to maintain current production and consumption patterns while pursuing strategic autonomy, we risk entrenching an unsustainable food system. The linear 'take-make-waste' approach to industrial agriculture will continue to exceed environmental limits, leading to systemic risks like pollution of ground and surface waters, degradation of agricultural land, and the loss of local biodiversity.

Instead, we must fundamentally rethink how we produce and consume food. Our solution is a combination of two unexpected allies: the circular economy and agroecology. Both concepts are well known on their own, but when combined, they open a wealth of potential. Circular agroecology could help us shape sustainable nutrient and resource use, fair prices for farmers and consumers, and diets that improve socio-ecological wellbeing, while decreasing EU dependence on imports.

In our current polycrisis—so deeply connected to our diets and economies—the combination of circularity and agroecology provides an attractive starting point. Each concept brings distinct strengths and limitations. The circular economy primarily focuses on resource efficiency, but lacks a food system lens. Its emphasis on material flows doesn't fully capture socio-economic and ecological impacts at the farm level. Conversely, agroecology concerns environmental and social transitions targeted at smallholder farmers. However, it could benefit from scalability and integration with other sectors and industries, such as biomaterials, textiles, furniture, and electricity.

Despite the differences, both approaches share common practices and technologies for cycling nutrients and energy, utilising by-products and waste streams, and shortening value chains. By leveraging the complementary strengths of each concept, we base the concept of Circular Agroecology on three core principles:

1. Enhance the ecological value of farming and promote circular resource use: Halt and reverse the harmful impacts of industrial agriculture by fostering symbiotic relationships between farming and nature, advancing regenerative practices, and supporting resilient food systems. Reduce reliance on external inputs, especially non-renewable and toxic materials, and make better use of biological and ecological processes (such as soil regeneration, polyculture, and crop rotation), and apply circular principles (such as waste minimisation, nutrient recovery, and reuse of by-products).
2. Empower food producers and communities: Ensure decent incomes for food producers and leverage their knowledge and skills to increase self-reliance. Encourage collective action across sectors to address shared challenges like access to land, inequalities, pest management, water use, and renewable energy. Create networks to inspire and educate people on the sustainable production of their food. Implement political structures that empower people to determine the nature and future of their food systems democratically.
3. Foster local food sovereignty and urban-rural symbiosis: Relocalise food systems by encouraging sustainable collaboration between cities and rural areas and facilitating circular flows of resources, waste, labour, trade, and wealth. Ensure equitable access to seeds, land, tools, and resources needed for nutritious food production. Create policy instruments to incentivise initiatives such as Community Supported Agriculture, farmers markets, urban food production, composting from urban wastes, new forms of farmland ownership and leasing, and local food procurement by public institutions like schools and hospitals.

All in all, Circular Agroecology seeks to create a healthy, resilient, regenerative food system that closes resource loops, respects planetary boundaries, and is founded on equity, democracy, and justice. Applying Circular Agroecology to our food system offers a path to healthier diets and environments. Examples include turning organic waste from cities into high-quality compost, which can be used to replace synthetic fertilisers on farms supplying the city, as shown by the Life Biobest project in Spain. Another example is using plant or tree clippings to cover the soil, retaining moisture and preventing weeds from growing, a well-known technique which market gardeners and farmers in the EU and UK have already applied. Or even turning agricultural waste into biofertilisers and biobased chemicals, as demonstrated by the ReLEAF project. Circular Agroecology also involves a shift towards healthy, seasonal plant-based diets that nurture both people and ecosystems as opposed to the current focus on highly processed industrial meals.

Circular Agroecology creates opportunities for new revenue streams through ecosystem services, carbon offsetting, biogas production, and nutrient recovery, which benefits other sectors by creating value from their wastes. Diversified nature-based systems built on circular agroecology principles could increase food security thanks to farming systems that leverage nature's power, reducing dependence on imported chemical inputs such as fertilisers, pesticides, and feed. This, in turn, can create many new employment opportunities in rural and urban areas. Moreover, Circular Agroecology techniques are generally more labour-intensive, which could create more jobs. Farming subsidies like the EU Common Agricultural Policy (CAP)—the EU's largest budget item—can be reoriented to help pay for impactful and meaningful work on farms and support industries' transition to sustainable practices. In addition, by increasing agricultural biodiversity, diversifying revenue streams, and creating direct links between food producers and consumers, Circular Agroecology can increase the food producers' incomes and safeguard them against market shocks and fluctuating weather conditions.

Circular Agroecology can greatly improve resilience against value chain disruptions while delivering real economic, ecological, and social benefits. Indeed, it can create a sustainable food system that guarantees the production of healthy, nutritious food, lead to the creation of meaningful jobs, and safeguard the ecosystems and biodiversity on which we all depend.

Agroecology, and by extension, Circular Agroecology, requires a deep understanding of local socio-ecological conditions to be effective. Local and regional governments should thus be supported in developing locally adapted approaches that help food producers transition to more sustainable practices while improving their economic standing. For that, the government itself needs to become more transformative. This requires empowering local and regional authorities to create conditions for change by addressing social barriers and respecting local social and cultural norms; considering soil type, landscape and water in zoning; and being more deliberate in defining what type

of food production can and should take place in a specific region. These approaches might include:

- Creating financial mechanisms and incentives for transitioning to circular agroecological models.
- Developing infrastructure to transform food, farming and fishing wastes into high-quality organic fertiliser and other high-value products like oils and animal feed.
- Supporting local food markets and community-supported agriculture, including the digital and physical infrastructure to connect producers and consumers.
- Encouraging healthy and sustainable plant-based diets with local seasonal produce.
- Establishing a minimum percentage of local agroecological produce on supermarket shelves.
- Ensuring a basic right to healthy and sustainable local food for people and liveable incomes for agroecological food producers through the creation of a 'social security of food'.
- Using public procurement to purchase food from local food producers for schools, hospitals, and other public institutions.

These examples represent just a fraction of the diverse actions local and regional governments can take. Member States should redirect investment toward locally adapted solutions that follow circular agroecological principles, while the EU can accelerate the transition by reducing administrative burden, creating more flexible implementation of policy, and fostering good communication between civil servants and food producers with a focus on creating a sustainable and resilient food system. Embracing the principles of circular agroecology requires a transformation that will implicate our entire societies. We urge the following stakeholders to take part in the creation of a more circular, inclusive, sustainable and fair food system in the following manners:

First, governments might empower citizens to co-design and co-create the transformation of the food system. Participatory mechanisms such as citizen assemblies should be given the power to define the new policies and solutions for our food system. Research and empirical evidence have shown that, when participating in a deliberative, democratic and informed setting, citizens often choose more socio-ecologically sustainable solutions than politicians and can even forgo present gains for the benefit of future generations.

Second, food producers can form coalitions that advocate for policy changes supporting circular agroecology. Share knowledge on regenerative practices and develop collaborative models for equipment sharing, land stewardship, biodiversity regeneration, and community engagement.

Third, food businesses and retailers can commit to procurement policies that favour products from circular agroecological systems as your purchasing power can drive transformation throughout the value chain. Develop transparent value chains that fairly reward sustainable food production practices and help communicate their value to consumers.

Fourth, research institutions could redirect research priorities toward circular agroecological approaches, emphasising transdisciplinary methodologies that value the knowledge and experience of food producers. Develop metrics and assessment methods that capture the multifaceted socio-ecological benefits of these systems (beyond just yield and economic efficiency).

Fifth, civil society organisations can build public awareness and support for circular agroecology through education campaigns highlighting connections between food choices, health, food producer livelihoods, and social and planetary wellbeing. Build local food systems through initiatives like urban agriculture, community gardening, community composting, tool libraries and many more. Form strategic alliances across environmental, social justice, labour, indigenous, and peasant movements.

Sixth, financial institutions can develop innovative financing mechanisms suited to the transition period, recognising that circular agroecological systems may have different investment profiles than conventional agriculture. Create metrics that capture their reduced risk exposure to climate change and input price volatility.

Seventh, and finally, citizens and consumer groups can demonstrate demand for products from circular

agroecological systems through purchasing decisions and participation in alternative food networks like community-supported agriculture. Engage in food policy councils and other democratic food governance structures. Voting for and supporting politicians who foster sustainable food system transformations.

By embracing circular agroecology at all levels, Europe can create a food system that delivers true strategic autonomy while being resilient in the face of geopolitical uncertainty. A system that can be equitable for food producers and consumers alike, and sustainable within our planetary boundaries—fit for the challenges of our ever-changing world.

About the author:

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