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Advancing agrifood system resilience under polycrises: pathways for adaptation and transformation

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Special Issue: Building Resilient Agrifood Systems

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1 Introduction

Global agrifood systems face increasingly persistent and interconnected risks. Climate change and extreme weather reduce production; pandemics and geopolitical conflicts distort trade and logistics; and price volatility and public-health shocks transmit volatilities across markets, supply chains, and diets. They form a polycrisis environment in which agrifood systems will be fundamentally disrupted.

All there broadens the meaning of resilience. Productivity, sustainability, and efficiency remain essential, but performance under normal conditions does not ensure performance under disruption. Agrifood systems need three related capacities: to absorb shocks and maintain essential functions; to adapt production, behavior, and resource allocation as conditions change; and to transform by upgrading technologies, market arrangements, and institutions so that the systems can respond more effectively to future risks[1–4]. Transformation is a process of moving the system toward a higher capacity to manage uncertainty. Adaptation and transformation are especially important when risks are persistent and complex rather than temporary and singular[5].

Transformation also needs a clear direction. Resilient production is necessary, but the broader goal is nutrition and health resilience: ensuring that all people, at all times and across changing conditions, can maintain access to safe, sufficient, affordable, and nutritious diets. The nine contributions in this Special Issue examine resilience through production, technology, markets, value chains, and nutrition. Together, they point to four complementary pathways: to Diversify & Buffer, to Anticipate & Adapt, to Connect & Coordinate, and to Protect & Nourish.

2 Key contributions and findings

The contributions in this Special Issue illustrate how these four pathways operate in different agrifood-systems contexts. Taken together, they form a complementary and integrated approach to building agrifood systems resilience.

- **Anticipation and adaption.** Yang et al. (https://doi.org/10.15302/J-FASE-2026701) analyze AI-based climate-risk early warning and find that its effect on farmers' adaptive behavior depends on perceived value and information credibility. The study distinguishes information availability from adaptive

capacity: forecasts contribute to resilience only when they are trusted, understood, and translated into decisions. Effective risk management therefore requires not only better prediction, but also communication, extension, and decision support.

● **Diversification and buffering**. Kebede et al. (https://doi.org/10.15302/J-FASE-2026702) show that African indigenous vegetables in Kenya can support smallholder adaptation under production shocks while helping maintain dietary diversity. Yang et al. (https://doi.org/10.15302/J-FASE-2026699) examine maize-soybean strip intercropping in China and show that diversification must also be economically viable: intercropping raises farm operating and transfer income but reduces wage income, and the total-income effect weakens when transfer income is excluded. Together, these studies show that diversity and sufficient redundancy create alternatives, but those alternatives must remain productive and remunerative.

● **Connection and coordination**. Li et al. (https://doi.org/10.15302/J-FASE-2026700) show that product certification and e-commerce can jointly improve market recognition, widen sales channels, and strengthen links with cooperatives, certification bodies, agribusiness firms, and digital platforms. Deng et al. (https://doi.org/10.15302/J-FASE-2026698), using Guangdong's lychee sector, show that productivity gains can intensify market gluts and income volatility when processing, storage, cold-chain capacity, and market diversification lag behind production. These studies underline that resilient value chains require not only access, but coordination across production, processing, logistics, markets, and institutions.

● **Protection and nourishment.** Wang et al. (https://doi.org/10.15302/J-FASE-2026705) compare food assistance programs in China and Brazil and show how program effectiveness depends on institutional design, including beneficiary identification, supply-side integration, and multisectoral governance. Schwenke et al. (https://doi.org/10.15302/J-FASE-2026703) broaden resilience assessment beyond yield and income to include security, capacity, community, women's inclusion, and health. Aytekin and Birol (https://doi.org/10.15302/J-FASE-2026704) extend the argument to dietary resilience, emphasizing the capacity to maintain healthy diets under shocks and stresses through coordinated action across production, supply chains, food environments, nutrition education, and social protection.

These studies highlight three points. First, resilience goes beyond absorbing shocks to include adaptation and transformation. Second, it depends on complementary capacities, including diversified production, credible information, connected markets, coordinated value chains, and effective protection measures. Third, resilience should ultimately be judged by its ability to sustain healthy diets, nutrition, and human well-being under changing conditions.

3 Conclusions

This Special Issue shows that agrifood resilience requires more than surviving shocks. It depends on the capacity to anticipate, adapt, coordinate, and transform while maintaining essential functions. Diversification, anticipation, coordination, and protection provide complementary pathways for strengthening resilience across agrifood systems.

Future resilience-building should center on income, employment, and nutrition and health of disadvantaged population and groups, respond to changing risks, strengthen system integration, maintain sufficient diversity and redundancy, and balance short-term protection with long-term transformation. The goal is to build agrifood systems that can learn, adjust, and improve while sustaining access to income and employment and safe, sufficient, affordable, and nutritious diets for all under changing conditions.

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