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Three reasons why food system transformations are contested, and why food system scientists and policymakers should care

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Over the last years, consortia of researchers with mandates from high-level international policy forums have published comprehensive assessments and indicator frameworks defining human welfare needs and planetary boundaries for food systems transformations. Despite the evidence presented, scientific assessments and guidelines on food production and diets remain hotly contested. In this *Perspective* we discuss three reasons why this is so: *goal conflicts*, *disciplinary framing*, and *power and influence*. Understanding and addressing the reasons for discord and polarization are important to build common ground and mobilize the necessary collective action for food system transformations.

KEYWORDS

food system transformation, indicator frameworks, goal conflicts, disciplinary framing, power and influence

> "An intense politics of food is unfolding across the world" (Leach et al., 2020)

Introduction

Current global food systems are unsustainable, both undermining their ecological foundation and failing to provide sufficiently nutritious food for all. High-level scientific assessments and policy frameworks call for transformative changes to improve food security and environmental sustainability (von Braun et al., 2021a; Rockström et al., 2020; Mbow et al., 2019; IPBES, 2019; Webb et al., 2020; Schneider et al., 2023). Food system frameworks linking production, processing, distribution, consumption, and regeneration - and related outcomes and feedbacks - have gained significant traction both in the scientific literature and food policy over the past decade (Fanzo et al., 2017; von Braun et al., 2021b) (Figure 1). At the same time, food policy frameworks and processes are highly contested. International processes such as those leading up to and emanating from the United Nations Food System Summit (UNFSS) and national processes to incorporate sustainability aspects into dietary guidelines, have

FIGURE 1
Food systems. Depiction of food system elements based on common understandings of the concept from the UN Committee on World Food Security (CFS) and its High-Level Panel of Experts (HLPE) and the UN Food System Summit (UNFSS) (Fanzo et al., 2017; von Braun et al., 2021b).

sparked widespread debates (Covic et al., 2021; Graham et al., 2020; Canfield et al., 2021). The EAT-Lancet study (Willett et al., 2019), for example, which defined boundaries for a "planetary health diet" led to hefty debates across academic and popular forums (Tulloch et al., 2023; Garcia et al., 2019; Hirvonen et al., 2020). Similarly, the recent Nordic Nutrition Recommendations 2023, subtitled "integrating environmental aspects" (Blomhoff et al., 2023), faced national pushback in political debates, with several governments opting *not* to incorporate environmental aspects in their national guidelines (Kullgren, 2023; Mellemstrand, 2023). Ripples of these debates and new ones emerge as new studies, monitoring frameworks, and guidelines for sustainable food systems and diets are published. This is arguably just as expected - food *matters* to people. Food is entangled with politics and financial interests at all levels and at the same time with intimate issues of bodily health, tradition, spirituality, and culture. Too much is at stake, however, to settle with the conclusion: "it is complicated."

In this *Perspective* we present three reasons why food systems transformation frameworks and processes are contested: (1) goal conflicts, (2) disciplinary framing, and (3) power and influence.[1] The motivation of this article is twofold: Understanding the reasons for discord is useful to further improve frameworks, metrics and resulting recommendations. Ultimately, it should aid policymakers and others in navigating these complex food debates and develop policies that can lead to the type of collective action needed to achieve healthier, more equitable and sustainable food systems.

Reason 1: goal conflicts

A sustainable food system transformation must deliver positive outcomes across all key dimensions of food systems: diets, environment, social equity, governance, and resilience (Schneider et al., 2023). However, there are often trade-offs between different short-and long-term outcomes and in most countries, there will be goal conflicts within and between relevant policies. Food systems strategies must weigh trade-offs across spatial and temporal scales, as what may appear sustainable globally may not be so locally, and short-term gains may not yield long-term sustainability. Two examples illustrate this complexity: (1) emission reduction from ruminants versus the multifunctional benefits of the agricultural systems they support, and (2) the true cost of sustainable food production versus affordability.

Reduced production and consumption of red meat is one of the clearest recommendations emanating from sustainable food system frameworks, but it is also among the most contested. With the current global meat production and consumption trajectory, even the most effective methane mitigation strategies will not suffice to meet the 1.5°C target by 2050 (Clark et al., 2020; Arndt et al., 2022). Thus, global climate targets alone require a reduction in red meat consumption in most countries. This would also have positive impacts on other indicators like deforestation and diet-related diseases, but there will also be trade-offs with other sustainability indicators and policy goals. Using Norway as an example, agricultural policy has four overarching goals: (1) food security and preparedness, (2) maintain agricultural production across the country, (3) increased value creation, and (4) sustainable agriculture with reduced GHG emissions (MoFA, 2024). In the debates following the publication of assessments addressing the fourth goal, the first three goals have been evoked by actors opposed to such recommendations (Larsson and Vik, 2023). Reduced meat production and consumption will, according to some analysts, lead to negative impacts on cultural landscape maintenance and associated biodiversity, and also have negative social and economic impacts on rural societies and ultimately on national food security and preparedness (Bakken et al., 2024; Korsæth, 2019). This is an example of how the global climate target by many is seen as having trade-offs with local socio-political sustainability targets.

Another example of a common goal conflict is that between regulations to make food production more environmentally sustainable versus the goals of affordable food and food security and government budgetary costs. Food system scholars generally agree that we are not paying the true social cost of food (Hendriks et al., 2023). If environmental and other externalities are fully included, the consumer price would increase substantially. Moreover, the introduction of sustainable food production practices has a cost. However, this raises a dilemma. One third of the global population cannot afford a healthy diet (FAO, 2024b). If the externalities associated with current unsustainable practices were incorporated in the market price of food and/or costly sustainable food production

1 We identified these entry points to understand the contestations during a multi-and trans-disciplinary food system symposium explicitly engaging with the Nature Food publication The state of food systems worldwide in the countdown to 2030 (Schneider et al., 2023): Food and society, Oslo, Norway, April 2024, https://www.nmbu.no/forskning/arrangementer/food-society.

policies are implemented, we can expect food insecurity and poor diet quality to rise unless deliberate and substantial action is taken to support disadvantaged social groups in accessing sustainable and healthy food. As such, this is one of the clearest examples of the importance of addressing distributive justice in food system transformations.

Global food system frameworks typically prioritize global indicators and long-term goals over local and short-term ones and trade-offs between these scales is one reason why these frameworks are contested when they enter national debates. However, some trade-off arguments are red herrings, often presented by defenders of *status quo*. We explore this phenomenon more in the following sections.

Reason 2: disciplinary framing

Which disciplines and perspectives have come to frame the description of the food system crisis and its solutions? Recognizing that this matters to many engaged in the debate – especially those who see themselves as left out of the room when the problems and solutions are being defined – is important to move food system debates out of the trenches.

Early conceptualization of food systems as complex systems (beyond agriculture and value chains) was done by ecologists and social-ecological systems scholars (Foley et al., 2011; Godfray et al., 2010; Pretty, 2002). Since then, the scope has broadened, and nutritionists and economists have been particularly influential in further shaping the agenda (Willett et al., 2019; Springmann et al., 2018). Several seminal papers have emerged from high-level policy forums and networks of leading scholars on global food systems that largely (though not exclusively) represent those disciplines. These studies have been published in top-tier interdisciplinary academic journals, quickly getting widely cited and receiving attention in the public debate, and thus with considerable power to define the problem space at the global level. Some have argued that other disciplines have had less opportunity to contribute (Leach et al., 2020). We highlight three perspectives that, in our view, could make a stronger contribution to shaping food system frameworks and informing the ongoing debate.

These perspectives come from disciplines that have long played a central, though often under recognized, role in food systems. Fields such as agronomy, along with soil, crop, livestock, and agricultural technology sciences have been and will remain essential to any meaningful transformation of food systems. Since 1960, the year when the UN Food and Agriculture Organization (FAO) started collecting statistics on primary food production, the global population has increased from three to more than 8 billion, yet there are more calories available per capita in the world today than six decades ago (FAO, 2024a). The dramatic increase in output happened mostly through agricultural intensification on existing arable land, but nevertheless had dire ecological consequences such as nutrient runoff and pesticide pollution (Evenson and Gollin, 2003; Godfray et al., 2010). Perhaps because the productivity increases are now taken for granted (at least in the Global North) or perhaps because the negative consequences of the productivity increase have become so apparent, the last 60 years´ achievements are often under recognized in the discourse defining the current food system problem space. However, recognition of the need for constant research and innovation in production systems remains essential as metrics and policies for food systems continue to evolve (Barrett, 2021).

Social sciences, across the spectrum from economics to anthropology, also contribute important perspectives and methods to understand food system transformations. But prominent food systems framing papers are often criticized for insufficiently addressing questions of power (Clapp, 2023; Resnick and Swinnen, 2023; Slater et al., 2022; Leach et al., 2020). Perspectives from political science, sociology, economics, human geography, and other fields with an explicit focus on power and politics are needed to address structural inequalities in food system development when going forward (Clapp, 2021; Leach et al., 2020). These factors are harder to incorporate into quantitative metric frameworks but influence the enabling environment within which change will (or will not) take place (Resnick and Swinnen, 2023). Recently, there has been growing emphasis from influential organizations on governance and the political economy of food systems transformation (Ruggeri Laderchi et al., 2024; Resnick and Swinnen, 2023). Still largely missing are perspectives from peace and conflict studies. More than half of the food insecure people in the world live in countries affected by war and violent conflicts (WFP, 2024; IFPRI, 2024). Conflict resolution and peace are therefore intrinsically linked with food systems transformation and must be better integrated to make the frameworks more relevant to the people most affected by food insecurity.

Consumer science has much to add to food system studies, with its focus on how and why people choose their foods, and how those choices may or may not change within complex food systems (Varela et al., 2023). The importance of food preferences is reflected in the established definition of food security: "when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs *and food preferences* [sic] for an active and healthy life" (FAO, 2003). Yet, the ways in which preferences influence food choices remain largely under recognized in current food system framings. Cuisines and food culture shape people's identity and psychology in profound ways (Rozin, 2005; Pollan, 2009). Understanding the identity politics connected to food is key to understand the current polarized food system debates (Judge et al., 2023). Prominent "hot button" issues intersect with the food systems transformation debates – in particular those concerning the role of GMOs, meat, veganism, (ultra)processed food, etc. – which are connected to larger current "culture wars" (Haidt, 2012). Including a broader range of disciplines and perspectives and taking a longer view of the historical and cultural context that shapes our present, is important to find solutions that move past current areas of polarization and deadlock.

Reason 3: power and influence

All elements of food systems are infused with power and politics (Leach et al., 2020). There is a general trend toward increased corporate concentration in food value chains, both among national and multinational actors (Clapp, 2021). These actors exercise power in different ways, most visibly through their market power, and related control over material resources, technologies and jobs, but also by influencing policy and governance frameworks (Clapp, 2023).

The social and environmental effects of corporate concentration often lead to resistance from counter-movements of different sorts (McMichael, 2023), but due to the entanglement of most national and local food system actors in the same market structures, there is also much resistance to transformative change (Conti et al., 2021). For example, indebted owners of machinery and farm buildings constructed to produce one food type (e.g., dairy products) are likely to resist efforts to transform diets toward lower consumption of that food type. Similarly, if processing equipment is specifically designed for one type of input (e.g., gluten content in grain), it limits the flexibility of the entire chain for that product. Structural lock-ins are therefore driven not only by the profit maximization goals of powerful actors (or shareholder accountability) but also by the material realities and necessities that smaller food system actors are entangled in (Guthman, 2019). A case in point is the farmer protests that erupted across Europe in the spring of 2024, which were motivated by multiple factors, including the market effects of increased import from Ukraine and inflation, but also by perceived and experienced negative effects of environmental regulations (Henley, 2024). This type of resistance to food system change is partly due to material goal conflicts, but also to the politics of framing.

As discussed in the disciplinary framing section, the power to frame the problem space also gives power to define solutions and there is often a fine line between legitimate "interest politics" and "conflict of interest" when powerful actors engage in the formulation of policy and governance agendas. There is much "knowledge politics" (Sumberg et al., 2013) in food system governance agenda-setting and reactions. Two prominent examples of this from the international scene are the political debates that surrounded the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAAKSTD) published in 2008 and the UNFSS organized in 2021. Both forums were portrayed as being inclusive and participatory, opening up to other voices and representation than nation-states and scientists, but both forums also faced criticism in civil society and scholarly circles for what some saw as undue influence by corporate interests in shaping processes and outcomes (Scoones, 2009; Montenegro de Wit et al., 2021; Clapp et al., 2021; Stokstad, 2008). Questions of accountability and legitimacy are therefore important at all levels from agenda setting to indicator selection (Iversen et al., 2023; Duncan et al., 2022; Covic et al., 2021). Acknowledging that seemingly "technical" indicators also have political dimensions does not mean we should abandon their use, but more awareness and open discussion are needed among both scientists and policymakers on this point.

While many food system actors have vested interests in maintaining the *status quo* or even in pushing the system onto trajectories that further serve their interests, others are vested in a specific transformation outcome or means of getting there (e.g., organic or regenerative agriculture, plant-based diets). For example, social media influencers have direct or indirect economic interests in promoting certain diets and trends. Thus, food system agendas are shaped by the political influence of a range of food system stakeholders from the global to the local level. It is therefore essential that frameworks and processes aimed at food system transformation include attention to power (im)balances and related democratic and distributional effects. Going forward, food system frameworks will probably benefit from recent strides to incorporate procedural and distributive justice perspectives and metrics into earth system sustainability frameworks (Gupta et al., 2024; Rockström et al., 2023). Ensuring broad participation, not only in policy formulation processes but also in knowledge generation and assessments of impact, is essential for their legitimacy.

Why food system scientists and policymakers should care

While some food system topics can be framed as global and technical issues where meaningful universal indicators can be formulated (e.g., GHG emissions), many topics are more local and socio-political in nature and universal indicators can be hard to formulate (e.g., the value of local and national self-sufficiency). Furthermore, assessments of sustainability greatly depend on what spatial and temporal scale is applied. We can situate different contested issues in three-dimensional space that incorporates temporal and spatial scales as well as where the issue is situated on a spectrum from technical to socio-political (Figure 2). Understanding these dimensions of the issue space can help illuminate entry points to move the debates beyond stalemate.

Many current food system frameworks and policies arguably emphasize global and technical problem/solution framings, and these are often contested when they embed trade-offs with national and local policy agendas and interests. Rather than justifying inaction, dealing with trade-offs requires careful consideration of all these dimensions. For example, policies with local short-term costs (e.g., job losses) but long-term benefits (e.g., ecosystem preservation) can only be sustainable if short-term impacts are managed equitably. Food system transformations must happen within the "safe and just corridor" (Gupta et al., 2024) that ensures environmental sustainability while at the same time distribute the burdens and benefits of the transformations in just and socially sustainable ways.

Global-level framing of food system issues often clashes with socio-political experiences of food system actors and consumers who do not see their reality represented in the global narrative. When global frameworks recommend reduced production and consumption of one food type and this translates to less reliance on local resources and threatens livelihoods based on the production of that food type, the recommendation is also likely to be at odds with local food culture and social identities. This can lead to resistance and polarization. Issues of culture and identity often trigger the type of reactions and polarized positions seen in other culture wars. The debate on plant-based diets is a prominent example of a debate infused with social identity and moral psychology (Judge et al., 2023) driven to polarization by the type of selective exposure implemented in the algorithms of social media (Lueders et al., 2022). Thus, adapting global models to local realities is not only necessary for making goals actionable but also for enabling a political climate conducive to actions.

Polarized debates can stifle and derail processes for change. However, research in political science and psychology shows that perceived opinion differences are typically larger than actual opinion differences. For example, people often underestimate the level of public support for climate policies across the political spectrum (Judge et al., 2023). Since many food system issues, especially the environmental issues, are collective action problems there is much to gain from engaging people in deliberative

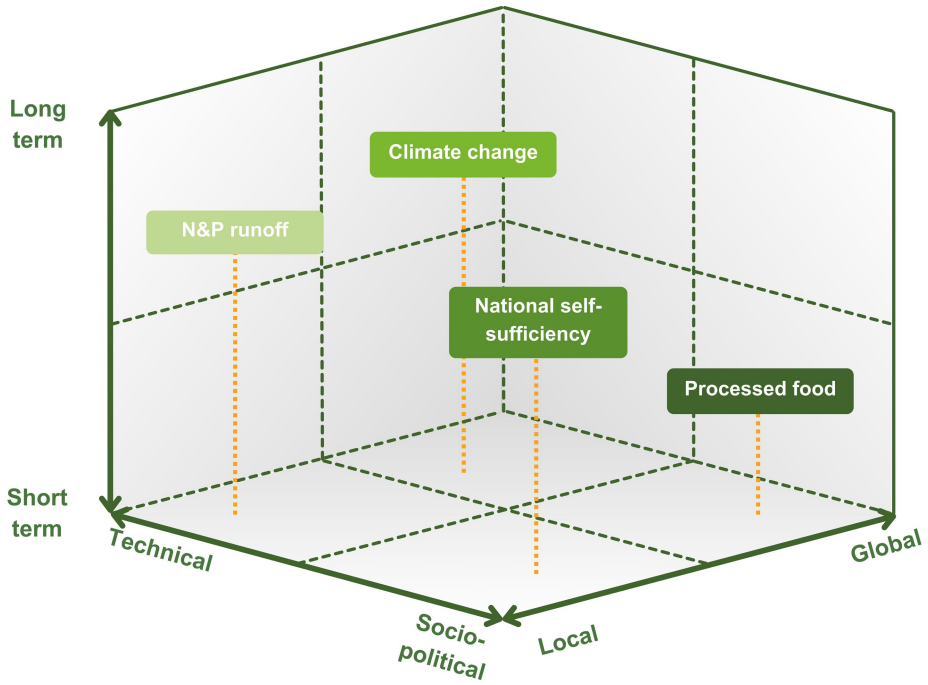

FIGURE 2
Selected food system issues framed by the space between three scales of sustainability.

processes to learn about other perspectives, understand the reasons for disagreements, seek common ground, and create ownership of the solutions. Food system frameworks can, because of their holistic perspective, provide a good basis for such deliberative processes. Our argument here is that it is necessary to keep improving food system frameworks and be attentive to perspectives that deliberately or inadvertently have been left out. That said, there will always be heterogeneity in opinions, contestations and struggles around larger changes in food systems. In fact, civil debates in such processes are in themselves a sign of a healthy system capable of movement and change.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

OW: Writing – original draft, Writing – review & editing. KS: Writing – original draft, Writing – review & editing. AA: Writing – review & editing. MA: Writing – review & editing. NB: Writing – review & editing. SE: Writing – review & editing. RH: Writing – review & editing. CK: Visualization, Writing – review & editing. HO: Writing – review & editing. OR: Writing – review & editing. AS: Writing – review & editing. CS: Writing – review & editing. PV: Writing – review & editing.

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