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The JUST GROW framework: conceptualizing how city regions can govern urban agriculture for equity and sustainability

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City regions hold much potential for advancing sustainable and just food system transformations. A mosaic of models for producing more food in and around cities is emerging that promises shorter supply chains, increased food access, plant-based solutions and robust community resilience. Models for urban agriculture range from backyard and community gardens to rooftop farms to plant factories, representing tremendous diversity in the cropping systems, technologies, skills, and organizational forms used to grow food. Amidst this flourishing, concerns over inequitable distributions of the benefits and risks of expanding urban agriculture underscore the need to center justice in determining the right mix of models. City regions need innovative governance approaches to strategically, sustainably, and equitably manage this emerging mosaic at the city region scale and considering its full social-ecological ramifications. The JUST GROW framework addresses this need by incorporating three interlinked principles of justice into a comprehensive governance process of collective knowing, inclusive deliberation, and intentional action. We offer strategies for building collaborative capacities among community, government, and research stakeholder groups to cocreate indicators and invest in the data infrastructure needed to measure outcomes that matter for sustainability and equity. Our framework also creates a pathway to proactively construct responsibility to act on this knowledge bank by aligning authority, capacity, and motivation within representative governance networks. The long term goal of the JUST GROW framework is to build a process for food producers, urban planners, municipal agencies, community groups, and civil society organizations to help city region food systems (CRFS) better provide key benefits from urban agriculture—including positive environmental impacts, supporting vibrant food cultures, land access, livelihoods, and food security—for all people now and into the future.

KEYWORDS

city region food systems, food justice, just sustainability, food system transformation, indicators & metrics, governance, urban agriculture

1 Introduction

City regions stand at the forefront for sustainably intensifying agricultural production to meet global food needs by 2050 (United Nations Environment Programme [UNEP], 2019; International Resource Panel [IRP], 2021). Growing more food in and near cities promises to shorten supply chains and reconnect producers with consumers, improving socio-ecological sustainability and resilience (Dubbeling and Carey, 2018; Weidner et al., 2019; Pulighe and Lupia, 2020; Caputo et al., 2021; Langemeyer et al., 2021). The United Nations recognizes urban agriculture (UA) as a primary strategy to localize food production and achieve sustainable urban development (International Resource Panel [IRP], 2021).

UA has become an increasingly attractive infrastructure feature of city regions across the globe, supported by a growing body of research that establishes its multi-layered benefits to society (Ackerman et al., 2014; Santo et al., 2016; Horst et al., 2017; Lopez-Muñoz et al., 2025). Scientific advancements in climate science, food system research, changing values and emerging technologies have enhanced the popularity of UA (Dobele and Zvirbule, 2020). Furthermore, the global Covid-19 pandemic sparked renewed interest in the sustainability and resilience of the food systems upon which large urban centers rely (Khan et al., 2020; Pulighe and Lupia, 2020). The development of city regions to sustainably meet the needs of a growing urban population will likely entail greater use of technologies that decouple food production from environmental constraints including seasonal climates and available land base (Specht et al., 2014), which may require more capital-intensive, highly controlled systems such as vertical farms (van Delden et al., 2021; Martin et al., 2022), or more knowledge-intensive systems such as urban agroecology (Altieri and Nicholls, 2018; Specht et al., 2022; Simón-Rojo, 2021). At the same time, small-scale, distributed production systems such as home and community gardens drawing on local and traditional agroecological knowledge may enhance community food sovereignty and resilience with attendant ecological and cultural benefits. The practical result is an emerging mosaic of UA models—ranging from home or community gardens to rooftop farms to plant factories (Lopez-Muñoz et al., 2025)—representing tremendous diversity in the cropping systems, technologies, skills, and organizational forms used to grow food.

Amidst this flourishing, there is a blind spot when it comes to transformative pathways toward justice and sustainability in urban agriculture at the city scale (Sonnino, 2023). Cities must contend with issues including affordability, malnutrition, unemployment, pollution, and well-being that are interdependent with food systems. At the societal level, systemic issues prevail that slow the movement towards just UA development, such as widespread political apathy towards changing the current food system (Tschersich and Kok, 2022) and the powerful sway of the food processing industry on the general public's dependence on cheap, processed foods (Vadiveloo et al., 2025). These issues affect different populations unequally, with inequities driven by factors including racialization, ethnicity, gender, age, socioeconomic status, and citizenship status, among others (Horst et al., 2017; Agyeman et al., 2022). Moreover, fragmented or siloed policies in addition to governance disconnects between the “grassroots” (UA practitioners, alternative food networks, community-led initiatives) and the “decision-makers” (city governments and administrators) have been widely documented, including in European (e.g., Manganelli, 2020; Vara-Sánchez et al., 2021), African (e.g., Puppim de Oliveira and

Ahmed, 2021; Vidal Merino et al., 2021), North American (McClintock et al., 2021; Cohen and Reynolds, 2015; Hammelman, 2019), and Southeast Asian (e.g., Limprapooiwattana et al., 2025) cities.

Faced with these challenges, city regions need innovative policy and governance approaches to manage these emerging mosaics at the city region scale and in light of the full social-ecological ramifications of UA (Hawkes and Halliday, 2017; Halvey et al., 2021). Researchers have begun to question the relative resource requirements, environmental footprints, and productivity of different UA systems in terms of energy and land-use intensity, life cycle impacts, and yield (Dorr et al., 2017; Goldstein et al., 2016; Nogueira-McRae et al., 2018; Rufi-Salís et al., 2020; Sanyé-Mengual et al., 2015; Stanghellini and Katzin, 2024). Yet, environmentally sustainable and technically efficient UA systems may still reproduce or increase power imbalances and inequities. Evaluating socio-cultural outcomes, such as cultural acceptability, equitable access, and nutritional adequacy, is equally critical to conducting holistic sustainability assessments for different food production systems (Carey and Dubbeling, 2017). Moreover, sustainability assessment for food systems cannot be the purview of scientists and technocrats alone but must involve inclusive collaboration among diverse members representing academic, government, and civil society that equitably distributes the power inherent in setting and implementing sustainability agendas (Conti et al., 2025; Whitfield et al., 2021). There is thus a pressing need to comparatively and collectively evaluate the equity and justice implications of different pathways toward sustainably increasing food production in and around cities.

In short, city regions must learn to adopt regional, holistic planning and policy processes for UA (Fox-Kämper et al., 2023; Steines et al., 2024). As food production becomes more integrated into a city's landscape and social fabric, policy making will need to strategically address UA's diversity and multifunctionality (Cohen and Reynolds, 2014). At a minimum, these processes should empower urban communities to produce food in ways that are “protective and respectful of biodiversity and ecosystems; culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” (IPES-Food, 2015). Building on this definition, we also recognize the need to balance open and regionally adaptable processes with standardized prescriptive approaches (Visseren-Hamakers et al., 2021; Petersen-Rockney et al., 2021).

To fill this research gap, we present the JUST GROW framework. The framework addresses the need for new governance approaches by incorporating three interlinked principles of justice into a comprehensive governance process of collective knowing, inclusive deliberation, and intentional action. Our overarching goal is to build a process for food producers, urban planners, municipal agencies, community groups, and civil society organizations to help city region food systems (CRFS) better provide key benefits—including but not limited to positive environmental impacts, supporting vibrant food cultures, land access, livelihoods, and food security—for all people now and into the future.

2 Foundational concepts: governance, transformation, and justice

We first lay a theoretical foundation for the JUST GROW framework by clarifying the core concepts of governance, transformation, and justice in the context of UA and CRFS.

2.1 Governance for city region food systems

Among other uses, governance refers to the dispersal of decision-making and administrative powers beyond the simplistic model of a sovereign government that ‘steers’ society in a top-down fashion (Kjaer, 2023). In general, the line between government and civil society is blurry in many areas of public policy: governments regularly devolve authority, oversight, and enforcement powers to non-governmental organizations (Black, 2001) and allow greater autonomy and freedom for civic actors to participate in setting, managing, and administering policy (Peters and Pierre, 2000; Klijn and Koppenjan, 2012). Moreover, when conventional, government-initiated policy mechanisms fail to solve public problems, such as lack of arable land access in cities, “new political spaces” (Hajer, 2003) open into which alternative policy networks can emerge (Cohen and Reynolds, 2014). In the best-case scenario, these policy networks are examples of truly collaborative governance, which “seeks to connect the input (greater citizen engagement) and output (improved services, policies and programs) sides of governing” (Ansell et al., 2021, p. 349). However, in less ideal circumstances, city regions may have to contend with disinterested or even antagonistic governments that can constrain local policymaking power or impose fiscal restraints that limit local capacity to act in decisive and consequential ways. In some cases, urban agriculture projects have been posited as a form of resistance to and resilience against apathetic, stagnant, or fiscally conservative governance structures (Noll, 2020; Sbicca, 2018). Even in politically challenging contexts, governance collaboration around urban agriculture and broader food systems may generate localized transformations and, under certain conditions, serve as an important mechanism for driving institutional and policy change (Huang, 2016; Xue et al., 2023; Zhang et al., 2022).

Cities are nested within larger governments, must continuously negotiate matters of public interest with neighboring municipalities, and generally administer societal business at a much closer scale to where people live and work—the networked relations of power in urban governance are often readily apparent (Peters and Pierre, 2012). Likewise, food systems entangle many sectors across many scales, posing a complex governance challenge (Van Bers et al., 2019). The JUST GROW framework refers to the various government, academic, industry, community, and civil society stakeholders active in “steering” the development of UA as a governance network.

Governance networks work within, upon, and even outside of a kaleidoscopic landscape of policies that influence food systems, including but not limited to land tenure regulations, occupational health and safety regulations, nutritional standards, minimum wage laws, environmental regulations, natural resource policies (e.g., energy and water), food purchasing assistance or subsidies, food safety regulations, urban planning, and economic development plans and policies (IPES-Food, 2015, p. 4). Governance networks for local and regional food systems are increasingly formalized through food policy councils, which Schiff et al. (2022, p. 1) define as,

“collaborative, membership-driven organizations that bring together stakeholders across private (e.g., small businesses, industry associations), public (e.g., government, public health, postsecondary institutions), and community (e.g., non-profits and charitable organizations) sectors to examine opportunities to

implement integrated strategies for improving local and regional food systems.”

While many food policy councils prioritize public policy work (e.g., advocacy, design, implementation), their activities frequently include other work such as primary production (e.g., supporting community gardens), education and awareness, community organizing, or direct food assistance (Schiff et al., 2022; Gupta et al., 2018). Food policy councils and similar groups provide an organizational venue to strengthen existing and forge new social relationships, including cultivating “weak ties” (casual or loose acquaintances) that can complement stronger relationships (grounded in long histories, close collaboration, or common values) by introducing novel ideas and opportunities for collaboration (Granovetter, 1973; Levkoe et al., 2021). While there is a danger that food policy councils can cleave to a depoliticized or reformist approach (Corcoran, 2021; Packer, 2014; Schiff et al., 2022), these organically-organized networks at their best can play a key role in generating common visions and agendas for bottom-up food system transformation (Levkoe et al., 2021).

2.1.1 Representation and equity challenges in governance networks

Food policy networks are usually designed, in principle, to provide equitable representation among stakeholders within the target food system. The guiding logic often aims to maximize participation, as in this example: “A membership base that is as broad as possible is desirable because it enables food policy groups to draw knowledge and experience from across the food system, and to have as wide an influence as possible” (Halliday, 2015, p. 228). However, food policy councils, as with all governance networks, face many challenges with equitable representation. First, a formal food policy council may not exist for every city region or may operate at a scale that does not match that of the city region. Second, food policy councils frequently overrepresent certain sectors and groups, especially those with more resources and time, while underrepresenting others (Schiff et al., 2022). This may result in “a lack of ideological diversity, an inability to address issues of equity, and a limited understanding of community needs” (Levkoe et al., 2021, p. 51).

In the US, for instance, many food policy councils have been critiqued on equity grounds for failing to adequately include marginalized ethnic and racialized communities (Sands et al., 2016; Packer, 2014). Examining five different regional food policy groups in England, Halliday (2015, p. 236) found that the private sector (i.e., farming and food businesses) was frequently under- or unrepresented in food policy groups, which may partly explain inaction in “prompting major change in the over-all food system configuration.” Moragues Faus (2016, p. 26) further argues that people in more precarious socioeconomic positions are generally underrepresented: “in very few cases do the people who directly suffer the negative consequences of our food system participate in (food policy councils), such as, for example, people who use food banks or workers who have precarious employment in the food chain.”¹ The JUST GROW framework recognizes this perennial problem in representative democratic

1 Translated from Spanish. The original reads: “en muy pocos casos participan en ellos personas que sufren directamente las consecuencias negativas de

governance and centers reflection and response to issues of inclusion and exclusion as a matter of procedural justice (discussed below).

2.1.2 City region food system as scale of governance

The JUST GROW framework adopts the city region as an appropriate domain for governing urban agriculture and a promising scale at which to catalyze transformational action toward sustainable and resilient food systems (Verhoeven and Wiskerke, 2018; Nelles, 2013; Bohn and Tomkins, 2024; Proksch, 2016). A city region refers to a loosely defined geographic area centered on a dense urban population and including nearby suburban, exurban, and rural areas. City regions extend beyond traditional political or administrative boundaries, encompassing a wider variety of stakeholders and values in the urban planning and governance process (Sheikh et al., 2023). Critically, decisions that impact city-regions are driven by factors that may not always be within the purview of formal public planning strategies (Vinge, 2018). To bring the otherwise fuzzy boundaries of a city region into sharper focus, Forster et al. (2015) conceptualize city region food systems (CRFS) as “a regional landscape across which flows of people, goods and ecosystem services are managed.” This hybridization of geographic space with economic flows aligns well with a food systems lens (see also FAO, 2025), and the material emplacement and practice of urban agriculture within real space and real supply chains.

2.2 Sustainability transitions and food system transformation

The extensive sustainability transitions literature theorizes the ways established socio-technical systems shift to more sustainable modes of production and consumption (Köhler et al., 2019; Markard et al., 2012). While a full review of this theoretical space is beyond our scope, several key themes are foundational to our JUST GROW framework. First, sustainability transitions are multidimensional and multi-actor (Köhler et al., 2019), entangling various systems [e.g., food-energy-water nexus (Zhang et al., 2019) or socio-ecological systems (Angeon et al., 2024)] and various forms of agency—both formal (institutions) and informal (social movements) as well as public (governments) and private sector (industry)—that belie conventional siloed approaches to innovation and public policy. Second, sustainability transitions emerge through interactions among scales [e.g., the multi-level perspective (MLP), Geels, 2002; El Bilali, 2019; Geels and Schot, 2007]. Third, sustainability transitions are non-linear, open-ended, and uncertain, necessitating adaptive management approaches that incorporate continual and iterative learning (Loorbach, 2010). Lastly, early iterations of transitions scholarship were critiqued for lack of attention to the political dimension of complex systems (Köhler et al., 2019), risking adherence to a reformist agenda rather than a fundamental shift in power relations (see also Holt Giménez and Shattuck, 2011). From these critiques emerged the idea of just sustainability transitions, focusing on who has the power and position to imagine and enact transitions for the sake of whom (Avelino et al., 2024).

Food systems scholars have leveraged sustainability transitions to understand how to escape the structural lock-ins that have kept agriculture and food systems on a path toward global polycrisis for over a century (Hinrichs, 2014; Blesh et al., 2023; Baur et al., 2024; Anderson et al., 2019). Many see possibilities to harness innovations across the food system (e.g., Barrett et al., 2020; Klerkx and Begemann, 2020) and forge new alliances among otherwise siloed sectors (e.g., Moberg et al., 2021) to accelerate and direct the transition toward sustainability and justice. Yet food systems present additional layers of complexity for conceptualizing transition, including their deep entanglement with biodiversity, living ecosystems, and the sociocultural identities of individuals, groups, and nations. Therefore, to underscore the expansive degree of change needed, many food systems scholars advocate for transformation, referring to system-wide reinvention that addresses root causes across economic, political, environmental, and cultural domains (IPES-Food and ETC Group, 2021; Béné, 2022; Zoll et al., 2021).

The food systems transformation literature lends several further insights for the JUST GROW framework, focused on just processes through deeply committed community-engagement. As Juri et al. (2024, p. 12) specify, “transformative processes demand the collective and inclusive re-designing (from re-imagining to re-governing) of food system components through platforms where governance, practices, power, and value-change can be debated and enacted at multiple scales.” However, just as sustainability transitions scholars have begun to call for exnovation—phasing out unsustainable technologies that stand in the way of new innovations (Arne Heyen et al., 2017; Pel et al., 2022)—Avelino et al. (2024, 521) argue that transformative change also requires “challenging, altering, and replacing existing power structures and institutions that (re)produce patterns of injustice and unsustainability.” This may entail radically innovative methods for co-producing public participation (Chilvers and Longhurst, 2016). These reflections align with deliberations on reimagining our global food systems motivated by the COVID-19 pandemic. Kaiser et al. (2021, p. 1) argue that a postpandemic food system focused on “bottom-up, regional, cross-sectoral and non-partisan deliberation” could result in a more sustainable and ethical food future while Pereira et al. (2020) generally posits that any sustainability transformation requires understanding the workings of complex social-ecological systems and the important role that power and politics have within them. Building from these key themes in the sustainable transitions and food system transformation literatures, we see an opening within which our third foundational concept justice can provide a pathway forward.

2.3 Distributive, procedural, and knowledge justice in food systems

Both the sustainability transitions and food system transformation literature emphasize the need for sustainability and equity. As a starting point, sustainability means ensuring that city region food systems enable urban communities both today and in the future to have healthy environments, economies, and cultures, while equity means providing the most benefit to the least well-off and empowering the most disenfranchised or marginalized. Both ethical precepts can be understood as statements of *distributive justice*, which focuses on the ways in which the benefits and risks of how food is produced,

nuestro sistema alimentario, como, por ejemplo, personas usuarias de bancos de alimentos o trabajadoras precarias de la cadena alimentaria.”

distributed, and consumed are distributed differently among different populations (Gottlieb and Joshi, 2010).

While the disposition of tangible goods, services, and harms is critically important, distributional justice in many ways responds to surface-level symptoms of inequities in deeper layers of city region food systems. Community participation and agency in food justice decision-making has a critical relationship with food system transformation (Murray et al., 2023). However, the people who are in a position to share their knowledge and who have the authority to make decisions regarding food policy frequently do not adequately represent those communities who have the most direct stake in the outcomes those policies affect (Halvey et al., 2021). Drawing on these insights, our framework seeks to ensure that the process of seeking distributional justice is itself equitable by operationalizing procedural and knowledge justice (Gibb and Wittman, 2013; Valley et al., 2020; Conti et al., 2025). *Procedural justice* refers to intentional power-sharing processes to flatten hierarchies in who may participate in decisions about the food system, particularly in policy-making, governance, and administration. *Knowledge justice* refers to open and inclusive research, collaboration, and communication processes to dismantle power asymmetries in who has access to what kinds of information, whose facts and truth count, and who may claim expert authority.

We also acknowledge Cadieux and Slocum's (2015, p. 12) warning against "policing the term and limiting whose knowledge becomes part of its definition" and recommendation to allow justice to emerge organically "from groups seen as having the authenticity, by dint of their situated knowledge, to speak on the subject of justice." Rather than approaching equity and justice from a standpoint focused on envisioning what *should* be in an imagined just transformation, we can consider the grounded, historical, and empirical origins of social movements and initiatives that self-identify as promoting food justice and equity. In this grounded view, "we need to look at justice in terms of recognition, process, procedure, and outcome and how these mutually constitute one another" (Sbicca, 2018, p. 16).

The JUST GROW framework seeks to embed these recommendations by adopting an iterative, interactive approach to working with stakeholders and communities in city region food systems such that government officials, researchers, and communities share in the activities of problem-definition, planning, analysis and communication. This process is closely related to community-engaged research (Key et al., 2019) and collaborative management. *Co-management*, as the latter is commonly known, means "the sharing of power and responsibility between the government and local resource users" (Carlsson and Berkes, 2005, p. 70), which in practice applies to "governance systems that combine state control with local, decentralized decision making and accountability and which, ideally, combine the strengths and mitigate the weaknesses of each" (Singleton, 1999, p. 7). For our purposes, we take from this paradigm the idea that effective governance entails sharing power and responsibility among researchers, community members, and decision-makers (e.g., government agencies).

3 The JUST GROW framework

From the foundational concepts of governance, transformation, and justice, we now present the JUST GROW framework for helping city regions govern urban agriculture and progress toward sustainable and just food system transformations. The framework is visualized in

Figure 1, and each element of the framework is explained in the following sections and summarized in Box 1.

3.1 Designing for knowledge justice through indicators

We begin in the center of Figure 1 with the "deepest" layer: knowledge justice. Internalizing justice within knowledge-production processes means accepting that we cannot presume a universal definition of food justice: it is essentially contested, contingent upon geographic, cultural, and temporal contexts. For this reason, Boling and Cervini (2024, p. 429) frame food justice as a product of food democracy, "something arrived at when people with fundamentally different interests learn to work together to pursue change through political processes." However, for food democracy to function, there must be some public mechanism for producing basic facts about the state of city region food systems to inform deliberation and action. Food democracy therefore also entails data democracy, which includes equitable access to and a degree of sovereignty over data in a world in which powerful interests increasingly seek to privatize and commodify agricultural and food data, exacerbating inequities (Hackfort, 2021; Wittman and Mehrabi, 2020; Ezirigwe et al., 2024). Like any public good, democratic governance for equity can benefit from indicators to help city regions and their publics gauge progress. But how should city regions choose and define appropriate equity indicators? Who shall be responsible for collecting the data to inform those indicators and ensuring that it is accurate and up-to-date? On what basis should urban publics accept those indicators as credible and legitimate sources of 'truth' about the state of their food system?

3.1.1 Indicators link the situation on the ground to justice-centric governance of UA

In order for city planners, policymakers, and communities to make informed decisions, they need access to timely, trustworthy, and accurate evidence on the state of their city region's UA mosaic and how it is changing over time. As Corburn and Cohen (2012, p. 1) advise, "Ongoing measurement and evaluation is one critical aspect of moving toward more healthy and equitable cities because what we measure often matters for whether and how we act." For this reason, there is a robust literature and many established communities of practice devoted to defining *indicators* for the health, equity, and sustainability of CRFS (Cirone et al., 2023; Lowe et al., 2022; Pineo et al., 2018; Petralli et al., 2014; Corburn and Cohen, 2012; Holden, 2006; Specht et al., 2025). An indicator can be defined as "a variable with characteristics of quality, quantity, and time used to measure, directly or indirectly, changes" in a situation of interest (Corburn and Cohen, 2012), e.g., a city region food system. Indicators are generally conceptualized as the primary tool for program evaluation and monitoring progress toward explicit goals. Health indicators feature heavily in the UN "New Urban Agenda," designed to help cities reach the UN Sustainable Development Goals (United Nations Conference on Housing and Sustainable Urban Development, 2017). However, indicators are not neutral—they are socially constructed tools that reflect particular values, priorities, and power dynamics. As such, the choice of what to measure and how to measure it can either reinforce existing inequities or help redress them.

The UN FAO has also published an indicator framework for city region food systems comprising 210 individual indicators aligned with

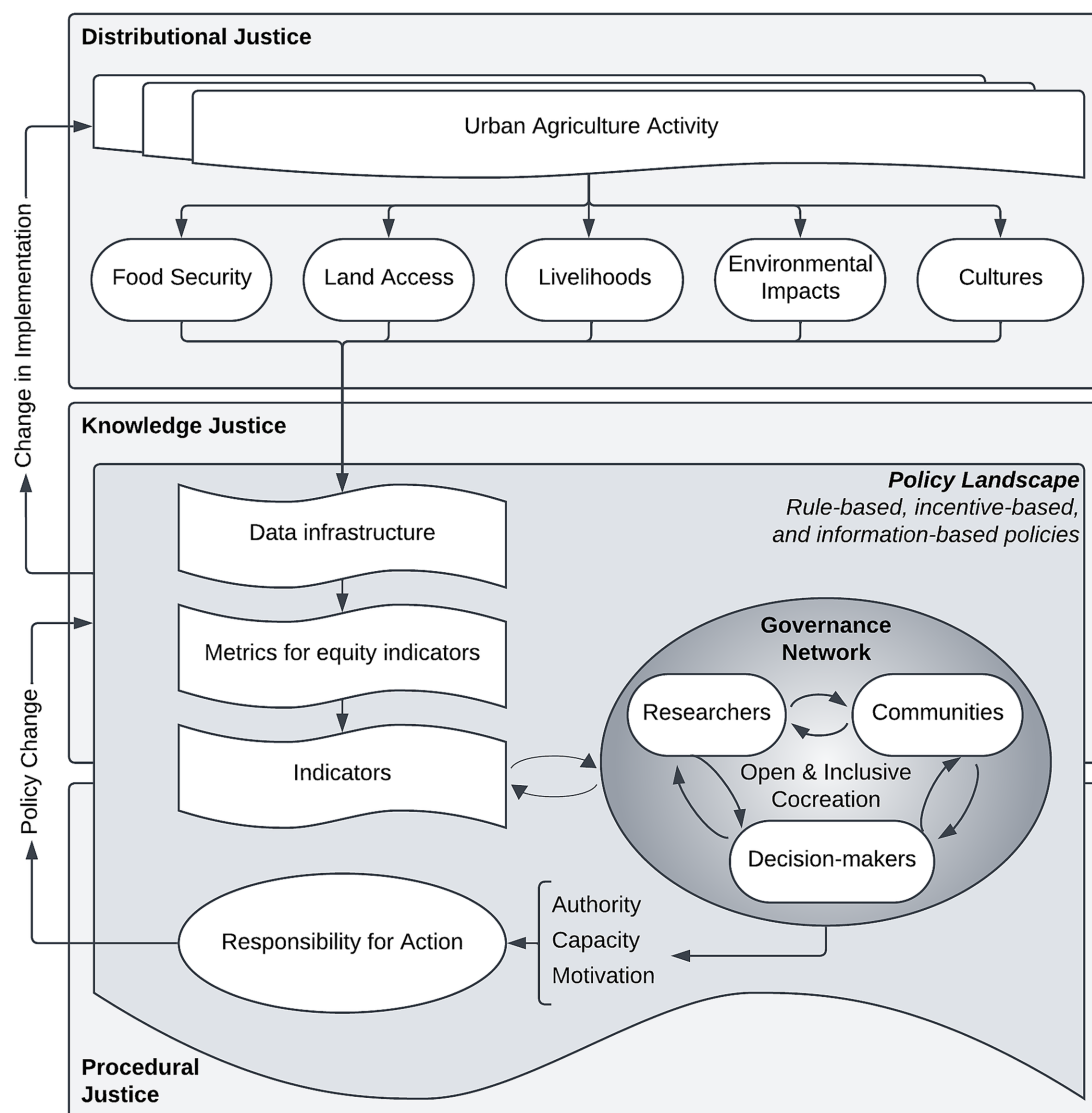


FIGURE 1

The JUST GROW Framework. Urban agriculture (UA) activities determine the distribution of key services including food security, land access, livelihoods, environmental impacts, and cultures. Just transformations in city region food systems should achieve more equitable distributions of these services, suggesting the need for an indicator-based system to measure and evaluate UA performance. That indicator-based system should itself embody knowledge justice: data infrastructure, metrics, and indicators should be co-created through an open and inclusive governance process comprising networks of researchers, community stakeholders, and decision-makers. That governance network itself should further embody procedural justice, working within and upon the policy landscape to align authority, motivation and capacity and thereby construct positive responsibility for action. In this way, collective action can change policy and in turn lead to a change in UA implementation, feeding back into the distributive justice of key UA services. The arrows indicate how each element may determine, inform, or enable another element. See [Box 1](#) for a glossary of key terms.

21 “desired directions of travel... that characterise a more sustainable and resilient city region food system” (Carey and Dubbeling, 2017, 11). These indicators should “Establish baselines and monitor changes resulting from (future) policy and programme implementation” (Carey and Dubbeling, 2017, 4). Importantly, in order to arrive at this list, the report authors describe an iterative narrowing and refining process beginning with identifying overarching objectives (i.e., policy priorities), moving to defining specific positive outcomes that would achieve those objectives (i.e., “desired direction of travel”), then to deciding upon “key issues to be measured,” and finally to constructing specific indicators that can represent the status of progress on those key issues (Carey and Dubbeling, 2017). None of these steps are

simple, and none can be taken unilaterally—this is a deliberative process that requires substantive dialogue and representation from diverse stakeholders. Pineo et al. (2018) formulated a set of good practice guidelines, recommending that designers prioritize indicators that are: succinct, co-designed with end users, credible, compelling, relate directly to policy priorities, presentable in an accessible and preferably visual format, commensurable with a systems approach, and that can be transparently verified and validated. The WHO further describes a “good indicator” as “measureable, feasible, valid, timely, replicable, sustainable, relevant, and comprehensive” (PAHO and WHO, 2018). Some of these priorities conflict—e.g., the need to be both succinct and to give a comprehensive account—reinforcing

BOX 1 Glossary of the JUST GROW Framework. Summarizes key terms used in the framework. See the main text for full explanation and citations.

Urban agricultural activities: Localizing food production for urban populations by expanding, developing, or enhancing urban agriculture in city regions via traditional urban farms, community gardens, and alternative agricultural systems such as rooftop gardens and vertical farms.

Distributional justice: Ensuring that the multiple and diverse benefits and risks of where, what, and how food is grown and produced, transported and distributed, and accessed and eaten are shared fairly.

Procedural justice: Intentional power-sharing processes to flatten hierarchies in who may participate in decisions about the food system, particularly in policy-making, governance, and administration.

Knowledge justice: Inclusive research, collaboration, and communication processes to dismantle power asymmetries in who has access to what kinds of information, whose facts and truth count, and who may claim expert authority.

Food security: Whether, to what extent, and for whom urban agriculture improves availability of, access to, and local control over healthy and culturally appropriate food.

Land access: Whether, to what extent, and for whom urban agriculture allows city region residents to benefit from land by claiming and realizing the capacity to produce food.

Livelihoods: Whether, to what extent, and for whom urban agriculture provides fairly-compensated, safe, secure, and dignified opportunities across the full spectrum of foodwork.

Environmental impacts: Whether, to what extent, and for whom urban agriculture enhances positive environmental quality and ecosystem services and minimizes negative environmental impacts in city regions.

Cultures: Whether, to what extent, and for whom urban agriculture supports diverse, valued, and vibrant foodways and cultural landscapes.

Data infrastructure: The technologies, personnel, and processes required to collect, verify, clean, format, curate, and share information about the state of city region food systems.

Indicator: A constructed variable that provides key information about a given situation or the state of a system that is needed to guide decision-making.

Metric: Metrics directly represent the underlying qualitative or quantitative data used to inform indicators.

Policy landscape: The set of written laws, rules, regulations, plans, and other public documents that establish rights, authorities, mandates, entitlements, incentives, sanctions, and due processes over all aspects of a city region's food system.

Governance network: The collective human agency that sets and implements policies and acts within and upon policy landscapes, comprising the various government, business, community, and civil society stakeholders active in 'steering' city region food systems and cocreating solutions.

Open and inclusive cocreation: Process in which affected and relevant members of a city region are empowered to proactively convene, deliberate, and take joint action in response to pressing public problems.

Responsibility for action: The extent to which authority to act, capacity to act, and motivation to act in response to a particular indicator all align within the governance network of a given city region's food system.

Authority: The legally defined role of a particular actor, i.e., an individual, organization, or institution.

Capacity: The resources—financial, human, infrastructural, sociocultural, information—that a given actor can mobilize.

Motivation: The incentives that drive a particular actor to action, which could be legal, political, economic, or normative.

the need to apply principles of knowledge and procedural justice. Indicators must not only be “good,” they must also be just, i.e., arrived at through open, inclusive, democratic deliberation to determine an appropriate balance across these desired characteristics.

Clearly, choosing and crafting a concise set of indicators that still provide a whole-system perspective on progress toward city region food system equity and sustainability is a substantial undertaking. However, this is only half of the battle. As Holden (2006) argued, while indicators abound, ensuring that they are actually used to guide city decision-making remains an elusive goal due to three challenges:

- 1 Insufficient quality, up-to-date, and appropriate data from which to construct indicators.
- 2 Conceptual confusion and conflict over defining the “desired direction of travel,” as Dubbeling and Carey (2018) put it.
- 3 Disconnect between indicators and responsibility to take action based on those indicators (Holden, 2006).

The first challenge may be addressed by highlighting the importance of *data infrastructure*. For our purposes, the concept of data infrastructure refers to the technologies (real capital), personnel (human capital), and processes (institutional capital) that are required in order to collect, verify, clean, format, curate, and share information about the

state of city region food systems. A hypothetical example specific to CRFS might be a municipal registry of active urban farms. This is the font of data from which metrics, and hence indicators, are built.

Data infrastructures incur upfront and ongoing costs plus significant time to establish, so most discussions of city region indicators emphasize using existing data (Pineo et al., 2018). However, this is a problematic assumption. Assuming that the available data is a fixed, exogenous variable in CRFS governance both disempowers city regions and unnecessarily limits the range of what could be known, and therefore what can be managed. For this reason, the JUST GROW framework underscores how city regions should consider what actions they might take to mitigate or correct the “deplorable state” of data (Holden, 2006). Clarifying the relationship between data infrastructure and indicators helps city regions recognize the need to strategically invest in technologies, personnel, and processes if they want access to quality, up-to-date, appropriate data. City regions will generally need to weigh tradeoffs in where and how to invest in data infrastructure.

The second challenge, conceptual confusion, may be partially resolved by distinguishing indicators from metrics. While both concepts connote measurement, they differ in complexity and purpose. An indicator is a constructed variable that provides key information about a given situation or the state of a system that is

needed to guide decision-making (PAHO and WHO, 2018; Walz, 2000). As Walz (2000, 1) explains, “In order to derive clear statements, a great deal of observations, data, and knowledge have to be systematically ordered and condensed” in order to produce an indicator. In contrast, metrics are simpler, directly represent the underlying data, and are subordinate to indicators, i.e., “the actual quantitative or qualitative data that is used to populate the indicator” (Corburn and Cohen, 2012, 2). For example, in the context of food security, the INDDEx Project cites an indicator, “national fruit and vegetable availability,” as “an indirect measure of the nutritional quality of the food supply” that can be expressed via a metric using the units grams per capita per year (Data4Diets, 2023). Another way to conceptualize the distinction is that metrics derive from what is feasible to measure, while indicators derive from what is desirable to measure: both are crucial links in the process of systematically tracking a situation. Figure 2 visualizes the role of data infrastructure, metrics, and indicators in linking those responsible for action to the actual state of UA in the CRFS.

3.2 Designing for procedural justice through responsibility to act on indicators

In order to address Holden’s (2006) third challenge, the disconnect between indicators and action listed in the previous section, a key tenet of the JUST GROW framework is that indicators are only useful if someone will actually use them to enact a change in policy, implementation, and practice. To operationalize this tenet, the JUST GROW framework conceptualizes the construction of *responsibility for action* within governance networks. Responsibility for action describes the extent to which authority to act, capacity to act, and motivation to act in response to a particular indicator all align within a policy landscape and emerge from the governance network.

3.2.1 The role of policy and policy landscapes

Within the JUST GROW framework, a *policy* is a written plan to implement a collective decision (by an authoritative entity such as a governmental body or a powerful organization) about the CRFS. These decisions impact the allocation of authority and resources (including to support data infrastructure), but also serve to legitimize or render invisible certain priorities and aims for UA. A policy comprises both a purpose and a mechanism of implementation to achieve that

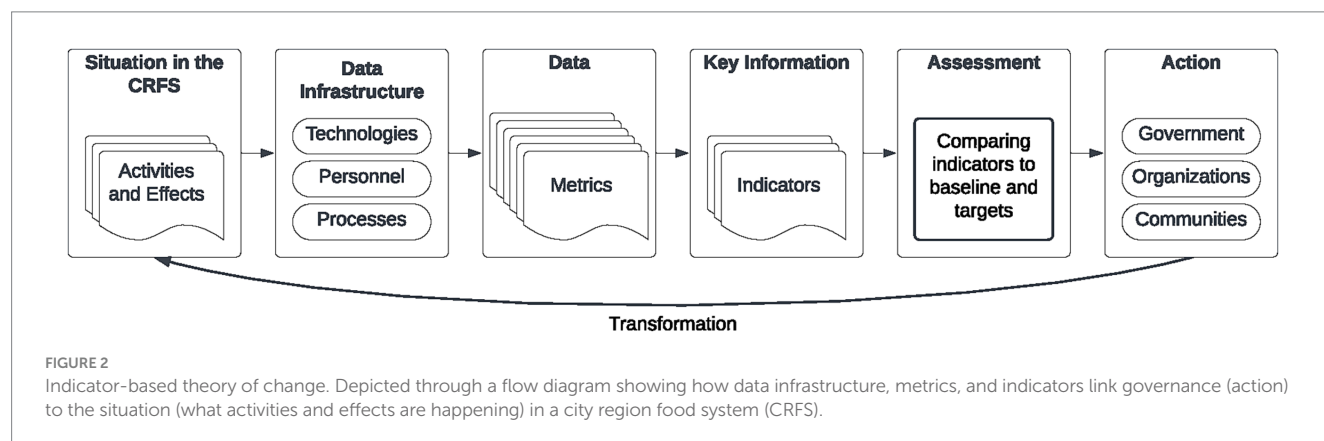
purpose. There are many kinds of policy instruments, including setting and enforcing rules or standards (rule-based policies), providing economic incentives such as tax breaks or fees (incentive-based policies), or disseminating information and knowledge (information-based policies) (Vedung, 1998). These types of policy have a source (i.e., the decision-maker) and a target (i.e., those who must follow that decision) and operate over a given domain and at a given level defined by their purpose. Some scholars also distinguish a fourth type of policy, direct action, in which a powerful organization directly provides goods, services, or infrastructure (Pal et al., 2020).

A *policy landscape* refers to the many interwoven policies that together shape a given CRFS. Most city regions govern the many dimensions of UA relevant to distributive equity in an independent or siloed fashion. Few city regions have a comprehensive UA plan, especially one that is equity-focused. Hence, utilizing the framework necessitates a process of mapping, or piecing together, policy landscapes (see Wissmann et al., 2022). The mapped policy landscape can be compared against distributive equity indicators to determine where and under what authority each indicator is covered by or absent from policy.

Policies can establish rights, authorities, mandates, entitlements, incentives, and sanctions to act, but cannot act in and of themselves. Policy requires human agency to implement. Likewise, human agency must form and set policy in the first place. To conceptualize the human agency that sets and implements policies and acts within and upon policy landscapes, the JUST GROW framework centers governance networks (see above). To recap, governance networks comprise the various interrelated stakeholders active in “steering” CRFS.

3.2.2 Governance networks face accountability and legitimacy challenges

Governance networks have been critiqued for being too diffuse, opaque, and mutable to be held accountable for the outcomes of their members’ actions (Harlow and Rawlings, 2007; Papadopoulos, 2005). Complex governance networks can blur the distinction between the public and private sectors, potentially decreasing transparency and raising the risk of conflicts of interest, sparking deeper concerns over their democratic legitimacy (Sørensen and Torfing, 2003; Sørensen and Torfing, 2005; Klijn and Skelcher, 2007). These concerns parallel those about the representativeness of food policy councils discussed above. As Hajer and Versteeg (2005, p. 341) argue, while public sector



institutions in classic liberal democracies derive legitimacy from professionalism, science-based rationality, and democratic representation (e.g., through elected officials), “governance networks break with that logic.” Without clear roles, boundaries and accountability, entrenched powerful interests might simply ‘colonize’ and subvert networks, for example by manipulating funding to ‘starve’ oversight bodies or by manipulating the criteria for including or excluding members (Steen et al., 2018). An equally worrisome pitfall is that governance networks will fail to act by allowing their members to avoid responsibility, i.e., if everyone in the network is responsible, then in effect no one is (Willmes and van Wessel, 2021). This raises a critical question: how does a governance network function—or in the case of JUST GROW, proactively act on indicators to advance just transformations in CRFS—without a fixed constitution and a transparent organizational structure?

3.2.3 Constructing responsibility for action through open and inclusive cocreation

Despite the aforementioned pitfalls and criticisms of governance networks, The JUST GROW framework posits that governance networks in CRFS can be effective in constructing positive responsibility for action. Our framework hypothesizes that an inclusive and regionally adaptive citizen engagement model can catalyze high-quality co-creation.

There are a variety of ways in which a governance network can engage citizens, and this should be arrived at according to a region’s capacities and needs. In a review of citizen participation practices in the governance of local food systems, Affre et al. (2024) found five major types of local food system citizen participation programs that have emerged across regional, municipal and neighborhood levels. Citizen working groups, for their ability to focus on a specialized topic (i.e., urban agriculture), position an inclusive set of participants as experts, and bring forth appropriate recommendations to decision-making bodies (Huttunen et al., 2022; OCED, 2021). “These groups often lead to transformative and empowering experiences, allowing participants to articulate personal experiences, identify mechanisms of oppression, and foster deep ties of support and solidarity” (Affre et al., 2024, p. 7). In like manner, participatory workshops can foster inclusive, safe and welcoming spaces, enabling participation among more vulnerable communities (Leclerc et al., 2011; Levkoe and Sheedy, 2019; Lourival and Rose, 2022). Workshops have been successful in facilitating practical experiences, which can lead to more open conversation, project ownership and strategy development.

Sørensen and Torfing (2005) argue that governance networks function through continual negotiation of the public purpose amongst interdependent actors in horizontal relationships. Hajer and Versteeg (2005) affirmed that actors in network governance must perform governance, first building up mutually intelligible identities and systems of meaning to reach a shared understanding of purpose, roles, and obligations. This does not mean that the formation of legitimate and effective governance networks must be spontaneous: governance theorists have explored the potential for deliberative design of collaborative governance platforms through which diverse stakeholders can proactively co-create solutions to pressing public problems (Ansell and Gash, 2018; Lee, 2023). Critically, such platforms should at a minimum provide a transparent public arena in which to convene, allow an open process in which anyone may step forward to identify problems in need of resolution, include those who are most

affected and those who are most relevant for addressing the problem, follow a deliberative process of engagement across difference, and finally enable joint action in response to the problem (Ansell et al., 2021). Ideally, focusing on positive co-creation can lead governance networks to not only empower “weak and vulnerable individuals or groups to participate” but help foster their democratic capacity and influence (Ansell et al., 2021, p. 356).

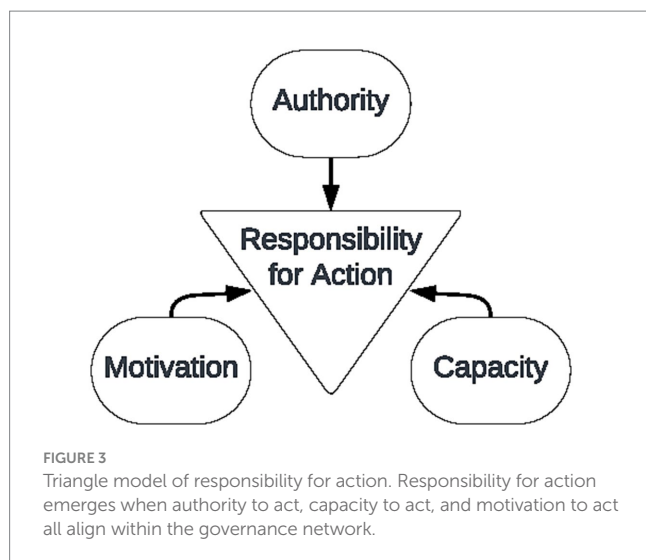
We note that academic researchers can help foster co-creation, as well. The Community Engagement Continuum (Key et al., 2019) outlines pathways for academic researchers to progressively activate engagement in citizen governance groups. The continuum also embeds mechanisms for knowledge and procedural justice, including evaluating the progress of collaboration, decision-making authority, communication, reciprocity and mutual benefit (Ellison and Eatman, 2008). The creators of the CE Continuum predict that by following these principles, more inclusive knowledge generation and decision making will occur, leading to community-ownership of research questions, data analysis and interpretation and knowledge co-creation over time (Barnes-Najor et al., 2024).

While participation, inclusion, and deliberation are thus critical, those aspects of governance networks must also be balanced against networks’ functionality to effectively address real problems facing CRFS. Specifically, for co-creation to work, we need to understand how responsibility emerges (or fails to emerge) from network relationships.

Uzzell et al. (2012) argued that responsibility is discursively constructed in governance networks through overlapping causal, moral, and role mechanisms. Causal responsibility is tacitly assigned to those who are expected to have the power, or capacity, to cause change. Moral responsibility refers to when an actor is perceived to have a choice between right and wrong actions and is assigned to actor groups based on their intentions, or motivations, for taking action. Lastly, role responsibility is assigned to actor groups based on their authority to act, as defined in law, policy, or professional affiliation. Whether responsible action happens depends on the discursive confluence of these three tacit forms of assigning responsibility (Uzzell et al., 2012).

The interaction of causal, moral, and role responsibility echoes the “triangle of responsibility” concept from the fields of psychology and law, in which responsibility arises from alignment among identity, events, and prescriptions: “When an actor is linked by his or her or its identity to certain prescriptions, and those prescriptions are applicable to a specific event, then responsibility can be assigned to that actor in relation to that event.” (Willmes and van Wessel, 2021, p. 4). When extrapolated from the individual level and flipped from past culpability to “responsible future conduct,” Willmes and van Wessel (2021) demonstrate how to adapt the “triangle” model for governance networks. The relevant identities become stakeholder roles or positions, events become contributions to reforms (of the social domain being governed), and prescriptions become the institutions that incentivize or motivate behaviors (such as rules or norms).

For the JUST GROW project, we reconceptualize the triangle around the three ways of assigning responsibility—moral, causal, and role—identified earlier. Specifically, the framework allows analysis of where within the governance network we can observe actor groups with *motivation*, *capacity*, or *authority*, respectively, for each dimension of distributive justice and indicators thereof (Figure 3).



Responsibility for action arises when authority, capacity, and motivation to act all align within the governance network. Importantly, the theory of network governance suggests that authority, capacity, and motivation do not need to be unified in a single group—responsibility for action may be achieved by a tightly linked cluster of actors within the network that possess complementary attributes and can form a like-minded coalition (Hajer and Versteeg, 2005). This may look like, for example, a scenario in which one passionate actor group motivates an authoritative actor group to delegate to a third actor group with the capacity to make a real change on the ground. Recall, however, the role of dynamic “weak ties” to draw in diverse perspectives beyond those in the like-minded coalition, which can help correct for potential blind spots (Levkoe et al., 2021).

Our framework views responsibility for action as a characteristic of governance networks that can be evaluated collaboratively. By identifying the relationships among individuals and groups in the network, city regions can open up a conversation about who is positioned where and with what influence within the network. This process can be diagnostic as well as prescriptive, for example revealing opportunities for a community-based organization to motivate a city council to use its authority to direct a municipal transportation department to add new bus lines connecting residences with community garden sites.

3.3 Designing for distributional justice in the goods, services, and risks of UA

As discussed above, the most tangible aspects of food system equity fall under the rubric of distributive justice (Gibb and Wittman, 2013; Valley et al., 2020). Yet we come to a discussion of how to operationalize distributional justice for UA last in order to underscore the critical importance of first designing knowledge justice and procedural justice into data collection, research, policy, and governance processes. This is necessary, though still insufficient, to advance city region food systems toward distributional food justice.

As we established above, defining distributional food justice must be an intentional process of inclusive democratic deliberation. To help organize that deliberative process, we suggest starting with tangible

ways in which urban agriculture impacts the everyday lives of people residing and working in city region food systems. Toward that end, we developed an initial typology of five distinct pathways through which urban agriculture affects communities: food security, land access, livelihoods, environmental impacts, and cultures. We offer these categories as a starting point to intuitively invite conversation on multiple functions of urban agriculture, while leaving ample room in the cocreation process to specify how and by whom each category should be assessed, or even to redefine categories.

3.3.1 Food security

The extent to which food systems provide nutritious food and ultimately good health is commonly conceptualized as *food security*, defined by the UN Food and Agriculture Organization (FAO) as, “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 for an active and healthy life” (ESA, 2006). These conditions are often summarized as the “four pillars”—availability (how much nutritious food there is), access (can people get the nutritious food), utilization (do people have the means to safely consume the food, e.g., clean water), and stability (continuous, uninterrupted access). Recent scholarship drawing on food justice and food sovereignty movements adds agency to this list,² which refers to the capacity of individuals and groups to exercise control over their own circumstances (e.g., self-determination or autonomy) and to provide meaningful input into governance processes. Agency means, in other words, the power to choose one’s own version of food security free of unreasonable restrictions (Clapp et al., 2022; Chappell, 2018). In the context of the JUST GROW framework, indicators for the food security domain should help city regions assess whether, to what extent, and for whom urban agriculture improves availability of, access to, and local control over healthy and culturally appropriate food, particularly for residents of the city region who experience the highest levels of food insecurity.

3.3.2 Land access

Land access is a prerequisite for all urban agriculture and therefore shapes all other distributions, including food security, livelihoods, environmental impacts, and cultures. Exclusion from land is among the most commonly cited sources of injustice in UA (Santo et al., 2024; Black Yield Institute and Farm Alliance of Baltimore, 2021, p. 11). Land access is more than just property rights, land ownership, or land tenure. Rather, land access is a socio-legal construct comprising the rules, customs, and practices by which individuals, organizations, and communities claim and realize the capacity to cultivate and harvest food (Ribot and Peluso, 2003). Understanding this construction therefore demands a study of the legal instruments that guide access, transfer, rights, and obligations relating to land as well as the social practices that structure access, exclusion, distribution and use. Formal

² Some definitions of food security now also call for incorporating sustainability (Clapp et al., 2022), as exemplified in consumption-centric efforts to encourage sustainable diets such as that advocated by the EAT-Lancet Commission (Willett et al., 2019). We have chosen not to include this aspect into our overview of food security as production-level sustainability is addressed through our other domains of distributional equity.

dimensions of land tenure can be observed by examining lease arrangements, relevant property law (rules of resource allocation and/or distribution, rights and obligations related to land) (Calo et al., 2023), planning obligations, debt relations, and land titling registrars. Informal dimensions of land tenure can be studied by analyzing access mechanisms, landlord tenant relations (Calo and De Master, 2016), land quality assessments, speculative interests in land, perceptions of security, or observed distribution. Indicators for the land access domain should help city regions assess whether, to what extent, and for whom urban agriculture allows city region residents to benefit from land by claiming and realizing the capacity to produce food.

3.3.3 Livelihoods

Urban agriculture also has the potential to provide economic opportunity, which we refer to as livelihoods to emphasize a fuller meaning of dignified and fulfilling work beyond simply employment or wage. Often, the foodwork of UA appears undervalued, with common positions ranging from unpaid volunteer work to highly routine wage labor. As in other sectors of modern economies, neoliberal policies and institutional structures prioritize market-driven approaches and individual responsibility, leading to precarious working conditions and limited social protections in UA (McClintock, 2013). There is limited research on labor conditions and policies for UA workers, even on basic labor statistics such as working hours, wages, safety and health provisions, and security. In part, this lacuna results from lack of a coherent vision of what a dignified livelihood means both among researchers and within the alternative food movements that champion urban agriculture (Klassen et al., 2023). For some, work in the food system should be hard yet rewarding. For others, the ideal of the yeoman farmer obscures racialized, gendered, and classed agricultural work while propping up the managerial work of the proprietor farmer (Calo, 2024). Toward this end, Klassen et al. (2023) shared a set of values that, if realized, may lead to what they called “good work”; these included tangible facets of dignified livelihoods such as fair pay, occupational safety, and career advancement opportunities, but also less tangible facets such as being recognized as a valued and skilled member of the community. Klassen et al. (2023) also called for ensuring equal opportunity employment, freedom of association and right to organize, and agency in determining the conditions of work. These principles are a strong starting point towards the broader meaning of “good” agricultural work yet may still be limited to making exploitative work less pernicious rather than actively promoting dignified livelihoods.

Social reproduction theory offers insight into another dimension of labor that is missing from the “good work” discourse, namely the generally uncompensated daily labors of care such as of healthcare, child care, and food preparation needed to sustain an agricultural workforce (Bhattacharya, 2017; Becot et al., 2024), labors that are also typically heavily gendered, racialized, and classed (Swan and Perrier, 2019). The extent to which this social sphere of care is subordinated to or exploited by the productive sphere is a key indicator of justice. Food work is directly related to care work—it nourishes human bodies, is produced by farmers caring for soils, plants, and animals—and relates to human value of livelihoods (Swan and Perrier, 2019). Indicators for livelihoods should help city regions assess whether, to what extent, and for whom urban agriculture provides fairly compensated, safe, secure, and dignified employment and livelihood opportunities across the full spectrum of foodwork.

3.3.4 Environmental impacts

The concept of environmental impact captures not only the consequences, positive or negative, of human activities on the natural world and its ecosystems, but also the ways in which those consequences in turn affect human health and well-being (Finnveden and Potting, 2014). As Rebitzer et al. (2004) suggest, “All activities, or processes, in a product or service’s life result in environmental impacts due to consumption of resources, emissions of substances into the natural environment, and other environmental exchanges (e.g., radiation).” This observation also holds true for the production of food in UA. The field of environmental justice has extensively documented the ways in which the human toll of that consumption and those emissions is distributed inequitably along racialized, classed, and gendered, as well as disproportionately on residents of the Global South (Agyeman et al., 2016). For example, numerous case studies show that some UA models enhance green space in cities, although the attractiveness of that very environmental amenity may catalyze gentrification that pushes out low-income residents who most need the benefits of UA, i.e., ecogentrification (McClintock, 2018). In contrast, some controlled environment agriculture models may require significant inputs of energy and water, which could strain a city’s overall supply of these resources and reduce access among lower-income communities (Engler and Krarti, 2021).

Although the science of indicators on environmental impacts from agriculture is robust, it is important to understand what environmental risks and benefits of UA are most meaningful to city region stakeholders. For example, midpoint indicators that measure emissions (e.g., greenhouse gases) are attractive for scientists, because they provide a basis for quantitative modeling that allows for controlling biases and quantifying uncertainties. However, context-dependent environmental impacts (e.g., light pollution or urban heat island mitigation) may be more meaningful for other stakeholders (Orsini et al., 2024). In the context of the JUST GROW framework, indicators for environmental impacts should help city regions assess whether, to what extent, and for whom urban agriculture enhances positive environmental quality and ecosystem services and minimizes negative environmental impacts (e.g., pollution) in city regions.

3.3.5 Cultures

UA as “green infrastructure” can provide critical socio-cultural benefits and cultural ecosystem services for cities (Ilieva et al., 2022; Giacchè et al., 2021; Evans et al., 2022). UA is also embedded within, and can help sustain, broader food cultures. The burgeoning field of food studies has shown how social identities—for individuals, families, communities, ethnicities, even nations—along with place-making and sense of belonging, are formed in part through how people interact with food and the social relationships that revolve around food (Albala, 2013; Ashley et al., 2004). Taken together, patterns of behavior, belief, tradition, spiritualism, art, and value expressed in or supported by UA produce—and reproduce from day to day and generation to generation—food cultures. Urban farms and gardens can serve as sites for the genesis (e.g., Dobernig and Stagl, 2015; Maurer, 2020; Lyson, 2014) and revitalization of cultural identity and expression, growing and sharing knowledge about the preparation of a greater diversity of species of plants in general and varieties of the same plant. For example, urban home gardening plays a key role in the preservation, adaptation, and transmission of cultural foodways and traditional ecological knowledge—particularly for immigrant

households—and must not be overlooked (Taylor and Lovell, 2015; Taylor et al., 2017). Such urban foodscapes express the interwoven eco-cultural narratives of nature-human interactions.

The food cultures that UA reproduces are also entangled with the natural and built environment: land use, geography and topology, form, function, and infrastructure. Agriculture can also therefore be central to the formation and reproduction of cultural landscapes. The value of cultural heritage in landscapes varies significantly by context. For example, in Germany, cultural landscapes or “Kulturlandschaft” are described in the 1976 Federal “Nature” Conservation Act, in Norway the 2009 Nature Diversity Act, while in Japan in the 2004 Cultural Properties Protection Act. In addition, since 2012 Japan has established the Japan Important Agricultural Heritage Systems, which recognize and support traditional agricultural systems as living heritage, thereby complementing the legal framework of the Cultural Properties Protection Act (Nath et al., 2024). Custom and convention are central to organically evolved cultural landscapes, which according to UNESCO have formed through long-term use and occupancy to become part of communities’ collective identity and play “an active social role in contemporary society closely associated with the traditional way of life” (UNESCO World Heritage Centre, 2008). These include heritage agricultural landscapes (Luengo, 2013). Specifically, preserving traditional agricultural land uses is often instrumental in producing and maintaining biocultural diversity in such landscapes (Houfková et al., 2015; Arnaiz-Schmitz et al., 2018; Agnoletti and Rotherham, 2015). While heritage agricultural landscapes may frequently be associated with more rural forms of food production, this idea can apply to urban agricultural landscapes, including those still in formation. According to Engelhardt (2017), heritages should not be isolated, but neither should they be relativized to the wider environment, society, and history. Dynamic authenticity captures the idea of multi-layered value systems in the same area. Many layers including but not limited to geology, a variety of land-management styles, transformation and innovation can all be valued (Kanki et al., 2015).

The cultural services provided by food systems becomes an issue of justice when differences arise in whose foodways are valued and supported, and whose are ignored, devalued, or undermined. Indicators for environmental impacts should help city regions assess whether, to what extent, and for whom urban agriculture supports diverse, valued, and vibrant cultural services, foodways, and landscapes.

4 Discussion

The JUST GROW framework adds to a rich existing ecosystem of frameworks for food system transformation in three unique ways: (1) a focus on the city region scale of transformation and urban agriculture as a prime vehicle for transformation; (2) the integration of justice from a holistic viewpoint, including knowledge and procedural justice as necessary preconditions for achieving distributional justice; and (3) a comprehensive approach for just sustainability transformations that calls on city regions to measure what matters (via indicators and associated metrics) and then act on what they measure (via aligning motivation, capacity, and authority for action). Below we briefly consider how our framework compares to a representative, but not comprehensive, sample of existing frameworks to illustrate our contribution.

One of the few frameworks targeting a comparable scale of transformation is the City Region Food System Framework,

developed by FAO, RUAF Foundation, and Wilfrid Laurier University (Carey and Dubbeling, 2017). This framework, refined by expert stakeholders, offers a roadmap to a more resilient and sustainable food system for municipalities alongside an array of indicators, yet it primarily seeks to optimize economic outputs and environmental impact. The entry point for stakeholders utilizing this framework to share knowledge occurs towards the end of the process, in the assessment and planning phases. On a slightly different scale, the Community & Agriculture Resilience Audit Tool (CARAT)³ offers another point of comparison. While not focused specifically on city regions, CARAT is designed for use by community stakeholders to produce a baseline assessment of existing food system assets that can contribute to community resilience. The tool comprises 101 qualitative indicators across seven thematic areas spanning the social-ecological spectrum, with five indicators devoted to addressing food system inequities and injustices. In terms of process, CARAT encourages a collaborative and holistic approach to evaluate each indicator. While the tool includes consideration of the sources of information and calls for users to focus on specific goals and next steps, CARAT does not appear oriented toward the explicit goal of developing long-term local or regional governance capacity for CRFS.

Several frameworks proposed in the academic literature have explicitly called for a justice-oriented approach to food system transformation, yet their scope is broader than the city region. Heffron and McCauley (2018), for instance, argued that sustainable transitions at the societal level (e.g., nation) should include distributional, procedural, restorative, recognition, and cosmopolitan justice. Specifically, they emphasize justice as necessary for securing “public acceptance and understanding” of any sustainability transitions framework, which “are crucial to ensure (that publics) act towards and support such a transition” (Heffron and McCauley, 2018, p. 7). Also recognizing the need for an “ethical and justice lens” in sustainable food systems transformation, Papargyropoulou et al. (2025) underline the importance of stakeholder engagement, quantifying both social and environmental outcomes, and highlighting the role of governance and policy. The proposed multi-stakeholder, multi-level process to affect food system transformation applies a systems-thinking approach, yet one focused primarily on food security outcomes. The JUST GROW framework adds to these approaches an explicit engagement with theories of governance, specifically marrying the literature on community engaged research with that on inclusive cocreation to suggest why and how community stakeholders, government decision-makers, and researchers should work together.

The JUST GROW framework resonates with the principles exemplified in the Citizen’s Assemblies model, which was synthesized into a framework by Schmid et al. (2024). The guiding premise is that decision-making processes brought about through citizen groups can inspire justice-driven food system transformation. They considered very similar dimensions of

³ The CARAT tool is maintained by the North American Food Systems Network and is available online at: <https://www.foodsystemsnetwork.org/carat.php>. Campbell et al. (2022) describe the tool’s initial development.

justice: procedural, recognition and distributive justice. Unlike our framework, this model only involves policy-makers at the end, in delivering the recommendations; not surprisingly, they found there was a resulting lack of follow-through in implementing the recommendations. Other frameworks also grapple with the dilemma of who shall bear responsibility for enacting new recommendations for justice-driven policy measures (e.g., Papargyropoulou et al., 2025; Tribaldos and Kortetmäki, 2022; Whitfield et al., 2021).

A prominent example that aligns strongly with our focus on embedding principles of justice throughout the process is the JUSTRA matrix, designed on the premise that “without careful consideration of justice, processes aimed at supporting transformations might fail to address inequities, thus perpetuating the very problems they aim to solve” (Conti et al., 2025, p. 1). The JUSTRA matrix dives deeply into the pitfalls of power imbalances, resource inequities, and blind spots to injustice itself, emphasizing the importance of retroactive, contemporary, and forward-looking assessments of justice within the many facets of food system complexity. However, while the matrix is a promising tool to elicit deep questioning of the multi-layered injustices within our food systems, this framework does not incorporate an internal theory of change for putting the insights generated by these questions into practice: as the authors note, JUSTRA’s “practical application can only become truly meaningful if it is employed by people who have the agency to make change happen” (Conti et al., 2025, p. 9). Thus, the JUST GROW framework makes a valuable contribution to these existing frameworks by conceptualizing a proactive theory of governance aimed at constructing positive responsibility for action.

4.1 Limitations

The JUST GROW framework presents an idealized or best-case scenario. While we believe that articulating this ideal can spark more ambitious aspirations for just city region food systems, we also recognize that seeking to realize this vision in practice will encounter numerous barriers. Potential pitfalls could include political apathy or food illiteracy among the general populace, intransigent or antagonistic governments, ineffective or siloed food policy councils and other civil society groups (e.g., Corcoran, 2021), or simply the numerous well-known collective action challenges—e.g., free-riding, transaction costs, lack of trust, divergent interests—that plague any effort to get people to work together toward a common good. At this stage, the JUST GROW framework is largely conceptual, and has yet to be ground-truthed. Further work is needed to map out these potential pitfalls and identify preventive measures and actionable solutions that can minimize the impact of these barriers and aid in implementing the multi-layered framework of justice we have laid out here. The theoretical lens of collective action theory, in particular, offers a promising opportunity to identify pathways for governance networks to form, overcome barriers to action, and become effective mechanisms for transformation in local and regional agrifood systems (e.g., Wezel et al., 2018; De Rosa et al., 2024; Crespo et al., 2014).

Immediate practical challenges need to be addressed, such as the likely universal paucity of existing data infrastructure and

resources to further invest in and develop that infrastructure. Yet deeper unanswered questions are also apparent. In formulating this model for embedding principles of justice into measuring what matters and acting on what is measured, we as authors have necessarily made a few executive decisions that may face questions, challenges, and complications in the field. For example, although we call for knowledge justice in the cocreation of indicator-based governance mechanisms, we also presented our ideas of five different distributional domains that we think are important, with the intention of offering a starting direction without controlling how the process unfolds. This reveals an unresolved, and perhaps unresolvable, tension that will have to be carefully balanced when employing our framework in real CRFS, between functional effectiveness (getting something done) and inclusive deliberation (ensuring everyone can participate) (see also Ansell et al., 2021). Further work remains to be done to assess how this tension manifests, and whether specific principles or best practices may be developed to seek a just and effective balance.

A second limitation, and one common to all frameworks for food system transformation that we reviewed, is the inherent ‘fuzziness’ of the boundaries drawn around the focal system. Our framework attempts to clarify system boundaries by anchoring the theory of change to the city region scale and the mechanism of urban agriculture, i.e., the production stage of a food system. However, whether and in what ways to recognize the interdependence of city region food systems and urban agriculture with broader scales, other stages of the food system, or other systems (e.g., water, energy, housing, transportation) remains unresolved.

Third, our introduction to the JUST GROW framework applies to singular city region food systems and their governance networks. Yet initiatives such as the Milan Urban Food Policy Pact⁴ and the Food Policy Networks⁵ project of the Johns Hopkins Center for a Livable Future are emerging to help connect city region food systems and food policy councils around the world and forge a global network for sharing experiences and strategies to mutual benefit. How can the JUST GROW framework therefore help compare and facilitate cities working together in solidarity or mutual support? What mechanisms or opportunities exist to enable inter-city collaboration on UA governance? Significant potential exists to comparatively pilot this framework on the ground in different city regions, a step which will be necessary for further refinement.

4.2 Insights

The JUST GROW framework raises several insights into what a justice-centered orientation and transformation of CRFS might entail. Any transformative initiative should incorporate principles of justice into both knowledge production and circulation processes as well as procedural (i.e., deliberative and decision-making) processes. Incorporating justice principles throughout food system governance

⁴ Available online at: <https://www.milanurbanfoodpolicypact.org/>.

⁵ Available online at: <https://foodpolicynetworks.org/>.

networks would likely benefit from participatory equity mapping exercises consider where, for whom, and in what ways justice occurs or does not. Our framework also suggests that focusing transformation of CRFS on specific types of activities such as urban agriculture—could effectively catalyze action. Food systems are complex and expansive in scope and making progress toward just sustainable transformations may mean breaking it down into more manageable pieces (although not along the lines of conventional policy silos). A final insight is that an accessible and dynamic database of indicators for all three types of justice, along with associated metrics, would likely help key CRFS decision-makers and administrators grasp the scope and necessity of governing for equity in UA. Such a database could also help clarify the complex interrelationships, and potential tradeoffs, in UA systems; for example, scaling up land access versus scaling up caloric availability. It may also facilitate inter-city networking and solidarity by directing attention to the local value of thinking about indicators globally.

5 Conclusion

We have presented a new framework for establishing justice-oriented pathways to govern and catalyze the sustainable transformation of city region food systems. The JUST GROW framework calls for processes of open and inclusive co-creation with community stakeholders (e.g., UA practitioners), decision-makers (e.g., municipal government agencies), and researchers (across various disciplines). This framework can facilitate transformational practice in the short-term by catalyzing immediate shifts towards knowledge justice. This might look like, for example, collaboration between a community of actors invested in a transformation vision of UA in their city region and researchers who can help develop an appropriate data infrastructure to inform progress toward more equitable and sustainable outcomes. At the same time, the framework encourages stakeholders to invest in long-term strategies for just sustainability transformation by incorporating procedural justice principles. This can include a more diverse and equitable representation of who shares knowledge, capacity building in order to put that knowledge into practice, and finally a more equitable urban agriculture landscape, that benefits all people at all stages of the food system.

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

PB: Conceptualization, Funding acquisition, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing. RJ: Conceptualization, Project administration, Writing – original draft, Writing – review & editing. SA: Conceptualization, Writing – original draft, Writing – review & editing. AC: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. MF: Conceptualization, Funding acquisition, Writing – original draft, Writing – review &

editing. KK: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. YK: Conceptualization, Writing – review & editing. MM: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. BSa: Conceptualization, Writing – review & editing. BSc: Conceptualization, Writing – review & editing. KS: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. A-KK: Conceptualization, Writing – original draft, Writing – review & editing. JT: Conceptualization, Writing – review & editing. MT: Conceptualization, Writing – review & editing. HV: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. VV: Conceptualization, Writing – review & editing. YH: Investigation, Writing – review & editing.

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