What is a food system? Exploring enactments of the food system multiple

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Abstract

Recent years have seen widespread calls to transform food systems to address complex demands such as feeding a growing global population while reducing environmental impacts. But what is a food system and how can we most effectively work to change it? "Food System" can be found describing more limited dietary regimens as well as sector-specific supply chains going back to the 1930s, but its use to describe very large, dynamic, coupled socio-ecological systems gained traction in academic and civil society publications in the 1990s and this use of the term has increased dramatically in recent years. When the influential food system actors from non-governmental organizations, foundations, consultancies, and the UN that this research focuses on talk about food systems, they seem to be talking about the same thing. Yet the interpretive flexibility of the concept obfuscates that people may have very different framings that may be deeply incompatible. Drawing from interviews, participant observation, and document analysis, this paper examines what food systems thinking does in terms of setting the stage for how we enact the food system and efforts to intervene in it. It reveals that rather than leading to more expansive understanding, the unexamined use of the concept food system might actually serve to sharpen divides.

Keywords Food systems · Systems thinking · Transformation

Introduction

> The challenges seem ominous: a global population approaching 10 billion, greenhouse gasses changing our climate, pollution poisoning our soil, air, and water. Yet, there are opportunities to address them if we act together to transform our food system.
> —From the introduction to the Rockefeller Foundation Food System Vision Prize (2021).

Our species' future survival is often framed as being dependent on how well we will be able to manage systems—be these ecosystems, the climate system or, as in the quote above from the Rockefeller Foundation, the food system. But what is a system, and how can we most effectively work to change it? This paper explores this question by focusing on divergences in framing the concept that emerge from those working to transform the food system. "Food system"

as a concept is having a moment. 2021 saw the first ever United Nations Food Systems Summit (UNFSS). Increasing understanding of the key role that food and agriculture play in anthropogenic climate change led to the first ever food-systems pavilion at the Conference of the Parties (COP27) of the United Nations Framework Convention on Climate Change (UNFCCC) in November 2022. Drawing from field-work with organizations who are attempting to transform the future of the food system, this paper analyzes the way the concept of system is leveraged by influential actors. At the surface, when the actors this research focuses on—including food system professionals from non-governmental organizations, foundations, consultants, UN officials, and academics—talk about food systems, they seem to be talking about the same thing. The idea of a food system can be seen as a boundary object (Star and Griesemer 1989) that brings people together without requiring full consensus. Yet the interpretive flexibility of the concept obfuscates that people may have very different framings that may be deeply incompatible, posing serious challenges to drawing them together in common purpose.

Academic interest in food systems has increased in recent years. While many articles refer to food system or

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food systems without analyzing what they are, others have worked to define them (Ericksen 2008; HLPE 2017; Béné et al. 2019a, b; Marshall et al. 2021; von Braun, Afsana, Fresco, Hassan, et al. 2021a, 2021b). Attempts to define food systems usually outline various components that are linked in these systems, such as production, health, distribution, consumption, or waste, among others. As a growing number of definitions of food systems have been proposed, some have worked to develop frameworks for what should and should not be included in food systems (HLPE 2017; Fanzo et al. 2021; von Braun, Afsana, Fresco, and Hassan 2021a, 2021b). But the literature is far from reaching any consensus on a definition. In their literature review of food system governance, for instance, Hospes and Brons (2016) found that 69 of the 79 journal articles relevant to the topic did not include explicit definitions of what a food system is. The other eleven papers defined food systems independently, with none using the same definition or even adhering to a common framework within their definition.

In light of this lack of consensus many scholars have written about the contested nature of food systems, outlining what they see as different values frameworks that give rise to different actors' diverging conceptualizations of food systems. Some have proposed values typologies (Buttel 2001; Paarlberg 2013; Garnett 2014; Holt Giménez and Shattuck 2011; Belasco 2006) that describe food systems concepts emerging from deeper debates, such as normative claims about the role of markets and the state, or nature and culture, for example. This paper complements these values-centered approaches, while offering a different conceptual and analytic focus. Rather than asking how values influence how different actors understand and describe food systems in terms of their structure, operation, or goals, this paper focuses on how actors conceptualize the idea of "system," that is, how they frame what kind of thing a system is and ultimately enact efforts aimed at system transformation. This is not a focus on debates about what should be in or out of particular systems, but more fundamentally about what the nature of a system itself is and what this means for how we could or should work to transform a system.

This analysis engages with Annemarie Mol's concept of ontological politics to gain insight into the concept of food systems. In her *Body Multiple*, Mol's argument is not that different understandings give rise to different framings of the body singular, but rather that different practices enact different bodies. Mol is not focused on epistemological questions of "whether representations of reality are accurate" (Mol 2002, 2), but an ontological question of how multiple realities come into being. For Mol, "ontologies are brought into being, sustained, or allowed to wither away in common, day-to-day, sociomaterial practices" (2002, 6). My analysis, thus, draws from in-depth ethnographic engagement with ongoing efforts to transform the food

system. Drawing on Mol's framing of the "body multiple" and applying it to the enactments of a food system this paper focuses on two questions: First, how is "food system"[1] being leveraged by different actors and what are the consequences of this? Or, put differently, what work does the increasingly popular "food system" do? And secondly, what approaches to knowledge, deliberation, and transformation does "food system" give rise to? Through an analysis of how different actors engage with food systems, I argue that different enactments of systems have real consequence. They matter for how powerful actors shape their efforts to transform global food systems and, ultimately, what food systems come to be as a result. Importantly, this research suggests that rather than leading to more expansive understanding, the unexamined use of the concept "food system" might actually serve to sharpen divides.

Methodology

This analysis draws from a larger research project encompassing 24 months of fieldwork with foundations, NGOs, corporations, and policymakers engaged in transforming the future of the food system. Participants were chosen for the range of approaches they took to food systems change with specific attention to representing approaches that contrasted with one another, or even stood in opposition to one another. Data used in this analysis were drawn from (1) Multi-sited participant-observation at convenings, consultations, and events, including major conferences such as the Committee on World Food Security, the IPCC COP26 in Glasgow and COP27 in Egypt, and the UN Food Systems Summit (UNFSS), the latter of which I draw more significantly from for this the purposes of this paper; (2) Semi-structured interviews using purposive and snowball sampling techniques; and (3) Digital archive assembly, including recordings of public online convenings, reports, websites, and social media feeds, analyzed and coded using mixed-methods qualitative data analysis. The approach to data collection draws on the work of others who have examined the functioning of international communities of expertise (Mosse 2005; Lahsen 2002; Callison 2014; Messeri 2016; Helmreich 1998). This paper is a focused analysis which looks at how actors are talking about, writing about and enacting "food system," rather than an ethnographic investigation into a particular field site. It relies on a sample which is not meant to be comprehensive or statistically representative of everyone who works on food system transformation or who participated in the UNFSS. Rather, this is a purposive sample that draws from those I

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[1] As people use both food system and food systems (often interchangeably) this paper focuses on both these terms.
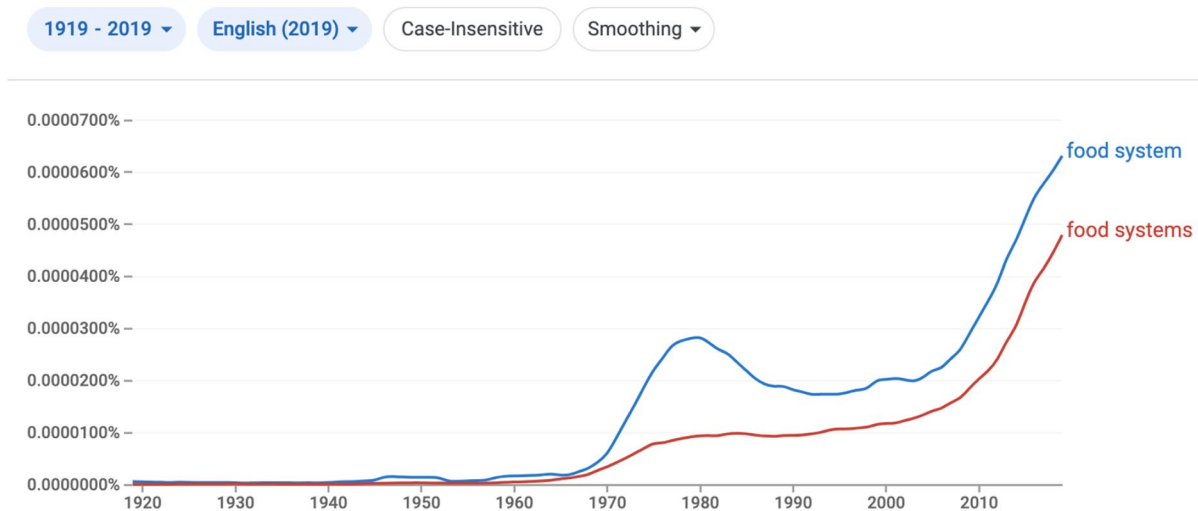
Fig. 1 Google N-Gram trends for "food system" and "food systems" in English language texts, 1919–2019

interviewed who explicitly addressed "food system" as an organizing principle. The quotes used in this paper come from interviews with people who focus on food systems transformation and many people who were involved in UNFSS. In terms of the UNFSS, it draws from people who were engaged with carrying out the dialogues for the summit, the Champions Network,[2] the Scientific Group, and those who critiqued the summit (both academics and members of social movements) who, in my interviews with them, reflected on the use of "food system." In line with Mol's idea of multiples, an analysis in different spaces with different actors would most definitely lead to different "food system" enactments.

In terms of my own positionality, I come to this research project after more than fifteen years' professional work on sustainable food issues in NGOs, foundations, and government. This professional experience gave shape to a key question underlying this research, namely, why do those working to transform food systems come to such different conclusions about what needs to be done? This background enabled me to take an active participant-observer approach and gain access to various food system actors that I might not have had otherwise, as I was able to leverage my experience in food systems work to volunteer substantial time writing, facilitating, organizing, summarizing, and making other contributions to the organizations that agreed to participate in this research, in exchange for my taking part in non-public meetings. This access enabled me to make

connections outside of public-facing meetings and develop more direct connections with those I interviewed and worked with for this research, which was especially advantageous given that a large portion of this research was carried out virtually during the pandemic. As Mosse outlines in his work inside and outside development institutions, in what he calls "a multi-positioned ethnography" (2005, 11) the kind of access that this role affords enables a more robust exploration of implementation where policy and practice meet, thus enabling deeper engagement with the enactments of food systems which are the focus of this analysis.

Food system origins

The "food system" is a relatively new English-language term. In Google's N-grams search tool for digitized English-language texts, "food system" can be found describing more limited dietary regimens as well as sector-specific supply chains going back to the 1930s, but its use to describe very large, dynamic, coupled socio-ecological systems first appears in the 1970s, becoming widespread in the 1990s. Its use has skyrocketed in recent years (see Fig. 1). By far, the most common name mentioned by the practitioners I interviewed for this research as a key influence on their thinking about food systems was Donella Meadows. Meadows, along with co-authors, wrote about the agri-food system as a sub-system of their world systems model in the influential *Limits to Growth* report. Released by the Club of Rome in 1972, the report used a computer model (World3) to analyze variables such as pollution, food production, and industrialization and concluded that present population and economic growth trends would result in the "limits to growth" being met in the next century. It has been a highly influential report

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[2] The Food Systems Champions was a network made up of 106 participants from public sector, civil society, private sector, research communities, indigenous groups, and farmer organizations (a list of names can be found here: https://www.un.org/sites/un2.un.org/files/unfss_champions_as_of_12_february.pdf).

that continues to impact the thinking of those who support the idea of limits to growth ("planetary boundaries" being the most recent iteration of this concept) as well as those who question these limits (e.g. Pethokoukis 2022).

During her lifetime, Meadows went on to write extensively about sustainability, systems change, and food and agriculture. She has become so important to food systems thinking that her ideas were used by the editors of *Nature* in their launch of the new journal *Nature Food*. Their article introducing the new journal was titled "Solve hunger with systems thinking" and drew extensively from Meadow's writing (Nature Editorial Board 2020). Meadows' thinking has also been a key inspiration for many of the food system experts I engaged with through this research. The director of the Global Alliance for the Future of Food (an international alliance of foundations), for example, has written about how Meadows' framing of systems highlights the importance of narratives, mindsets, and paradigms as key leverage points with which to transform systems (Richardson 2020). Another philanthropist from of an influential foundation commented that she drew inspiration.

> …from the Donella Meadows and the Otto Scharmers, to human-centered design philosophies, and the art of change making. It's abundant, and it's a growing space and I think that was one of the takeaways from the summit (UNFSS), that there are more people out there in the space than we know. More people who wear the badge "systems," and they weren't just the kind of ever-so-academic vernacular of card-carrying system-ites. So I think the community's bigger and more tacit, even than we might have thought (I6, 2022).

Meadows herself cites her influences in her posthumously published book *Thinking in Systems* as drawing from Jay Forester and other members of the MIT systems dynamics group as well as a list of "natural system thinkers" that included people like Gregory Bateson and E.F. Schumacher. Interestingly, her writing and lectures touched both on the kind of computational system modeling that was the basis of the *Limits to Growth* report and the work of Forester's MIT group as well as the need to look beyond numbers to the human values and worldviews that underlie systems framing. For example, the executive director of the Global Alliance for the Future of Food (GA) pulled from Meadows to urge food system thinkers to "Pay Attention to What is Important, Not Just What is Quantifiable," citing Meadows' passage in *Dancing with Systems*:

> Don't be stopped by the "if you can't define it and measure it, I don't have to pay attention to it" ploy. No one can precisely define or measure justice, democracy, security, freedom, truth, or love. No one can precisely define or measure any value. But if no

one speaks up for them, if systems aren't designed to produce them, if we don't speak about them and point toward their presence or absence, they will cease to exist (Meadows, Dancing with Systems) (Richardson 2020, 3).

In both these approaches, Meadows was employing different schools of thought that emerged from the influential concept of cybernetics which arose in the 1950s and 1960s and went on to shape diverse fields from computer science to ecology to anthropology. Her own definition of system very much fits with cybernetics focus on autopoietic (self-organizing) systems shaped by flows of information through feedback:

> …a system is a set of things—people, cells, molecules, or whatever—interconnected in such a way that they produce their own pattern of behavior over time. The system may be buffeted, constricted, triggered, or driven by outside forces. But the system's response to these forces is characteristic of itself (Meadows 2008, 2).

Meadows contrasts systems thinking to a linear and reductionist way of thinking and characterizes understanding interconnections between things (rather than the things themselves) as key to understanding how a system functions (ibid., 7). Importantly, the way she wrote about and analyzed systems embraced both the hard and soft approaches that I will describe at greater length in the following section. She saw systems as both being about relational meaning-making (a more soft-systems approach) as well as something in the world that we could attempt to map and measure (a more hard-systems approach).

Since Meadows' time, the continuing development of the concept of food systems has been linked to a number of sources such as civil society groups and researchers wanting to develop a "more holistic approach to food production and provisioning" (Canfield et al. 2021), a number of "high-profile reports on nutrition and food security (e.g. Global Panel, 2016; HLPE 2017; IPES 2016)" (Béné et al. 2019a, b, 117), as well as efforts to understand the "true cost" of food from a systems perspective through initiatives like TEEB Agri-food (I34, 2020). As outlined above, the rise in the use of the term has not led to any kind of consensus around what the term means. Leach et al. observe that the term food system has become "itself something of a development 'fuzzword' (Cornwall 2007): a shared language amongst diverse actors obscuring sometimes opposing viewpoints on meaning and implications" (Leach et al. 2020, 2). They note that "while for some this means drawing on systems science, to others it has come to justify a political agenda which advocates greater appreciation of the private sector's role in delivering industrialized food, and to yet still others,

thinking 'systemically' means focusing critically on the root, political and structural causes of food injustices" (Leach et al. 2020). What is clear is that the term has been increasingly taken up in a variety of settings by diverse actors often working towards different ends, a critical point that will be discussed later in this paper. First, I will briefly outline some of the opposing framings of systems that have been linked with the concept since its inception to give greater context to the ongoing debates we find in contemporary food systems discourse.

Systems framing: holistic versus managerial

System framing in contemporary fields such as political ecology, geography, and science and technology studies tend to portray the idea of a system as either creating a more holistic, "humble" understanding that sees a complex system as not entirely knowable, or on the other hand a more managerial approach to systems as something that must be "measured to be managed." Influenced by the uptake of cybernetic thinking in a variety of fields, large-scale interconnected assemblages have become increasingly understood as systems (Murphy 2006). As Valerie Olson outlines in her analysis of the solar system, "the system concept has a long history of conditionally connecting heterogeneous things" (Olson 2018, 12). It is not just what these systems are composed of that has important consequences, but how these systems are understood to be bounded in space and time. Looking at a system at too small a scale, for example, can lead to a limited understanding or misdiagnosis of what is going on. Using a larger systems framing can tell a very different story, as Raj Patel has argued in his framing of the Long Green Revolution, where what initially appears to be gains in agricultural production become losses when system boundaries are expanded in space and time (Patel 2013). For example, increased yields over time can lead to soil deficiency and greater dependence on external inputs which themselves have downstream effects such as eutrophication. An important point that scholars using systems framing outline is that constrained system boundaries become naturalized. We don't question them, and they come to determine how we see outcomes. For example, we remain fixated on yields while ignoring impacts outside the farm gate.

Others have argued that the idea of a system does not enable us to see more clearly, but rather, can both obscure and generate knowledge claims and "power over." In *Globes and Spheres: The Topology of Environmentalism*, Tim Ingold (1993) argues that through conceiving of the world as a global system it becomes an object of appropriation for a collective humanity. We do not belong to the world, with its cycles and rhythms perceived through intimate and immediate experience (a view which Ingold calls the "spherical perspective"). Rather, the world becomes property or resources to be optimized and managed by experts. Timothy Luke (2009) outlines a similar theme in *Developing Planetarian Accountancy: Fabricating Nature as Stock, Service, and System for Green Governmentality*. For Luke, it is seeing nature as complex systems (through disciplinary lenses such as Earth System Science) under threat that invites expert managerial control by an "expertarchy." Working from models that are often incomplete, this expertarchy can claim certitude not only about what is, but what ought to be. Murphy, in *Sick Building Syndrome* (2006), makes similar arguments about the links between systems, uncertainty, and expert management. They outline that framing buildings as systems facilitated a managerial approach towards them, undertaken by "apolitical" experts who could side-step labor and well-being issues by focusing their analysis at the system scale (Murphy 2006, 144). Valerie Olson similarly outlines in her framing of the solar system that the system idea has the epistemic power to gloss over real-world contradictions. She states, "systematicity became a hallmark of good thought, authorizing what historians describe as a philosophical demonstration of 'completeness' and 'order'" (Olson 2018, 14).

This kind of dialectical juxtaposition of different systems views is not new. Daniel Belgrad, in his history of ecological thinking in the 1970s, outlines that some cybernetics-influenced earth system thinkers used the concept of "Gaia" to imagine geoengineering and terraforming other planets. In contrast, he argues:

> Such notions were diametrically opposed to the strategy of minimal intervention in the systemic control of natural processes that had been embraced by such thinkers as Rachel Carson and Gregory Bateson. Gary Snyder told an interviewer in 1977: There are two kinds of earth consciousness: one is called global, the other we call planetary. The two are 180 degrees apart from each other, although on the surface they appear similar. "Global consciousness" is world-engineering-technocratic-utopian-centralization men in business suits who play world games in systems theory… "Planetary thinking" is decentralist, seeks biological rather than technological solutions, and finds its teachers for its alternative possibilities as much in the transmitted skills of natural peoples of Papua and the headwaters of the Amazon as in the libraries (Belgrad 2019, 56–57).

Belgrad asserts that in recent years we have come to associate cybernetics as "leading inevitably to the more totalizing exercise of what Foucault called 'biopower': a world of intensive surveillance, dwindling options, and compulsory interfaces with cyborg technology." (Belgrad 2019, 209).

Indeed, those social scientists who critique the managerial power of systems often use Foucauldian framing to do so. Belgrad, however, is trying to reframe how we come to think of cybernetics and systems to recover a "usable past" inviting "hope not despair" (Belgrad 2019, 210). He argues that the 1970s culture of feedback that arose from cybernetics:

> …offers a post-humanism that emphasizes…the common ground of subjectivity among humans, animals, and plants. Its critique of the notions of objectivity and progress enshrined in modern science does not point toward either relativism or ignorance, but to an epistemology and ethics of intersubjectivity, which issues in the caring attentiveness of empathy and the "performative" engagement of walking a mile in another person's shoes (Belgrad 2019, 210).

A binary that has some overlap with these kind of holistic and managerial framings is that of "soft" and "hard" systems. There is not room in this paper to go into all the different schools of systems thought,[3] but this hard and soft framing was brought up by a number of those I interviewed, and is important for framing the ideas of systems I found at work. At its most basic, the distinction is that hard systems thinkers view systems as real things that exist in the world, whereas soft systems thinkers see all systems as constructs. One food systems expert described his own transition in understanding systems:

> I was very fond of modelling quantitative stuff because I was trained as an engineer. When the models I was doing were consistently failing I came to terms with the other systems traditions like the soft system tradition and critical systems [a related approach]… It's not about boxes and arrows that you just pull out of your head…This was a complete shift (I31, 2021).

Soft systems thinking was developed by Peter Checkland in the late 1960s at the University of Lancaster. It arose out of a dissatisfaction with the ability of hard systems thinking to adequately capture the world and to address the critical insight that people have different views on what a system is and what a system does. This led Checkland and others "to create a new set of methodologies that explicitly considered issues such as multiple perspectives, power and intractable problems with no simple solutions" (Ramage and Shipp 2009, 13). A related approach, that of critical systems, urges us to see that all understandings of systems create boundaries and that we must be attentive to who and what is favored or marginalized by this selectivity (Reynolds and Holwell 2010, 257). What these approaches bring is an

understanding that we cannot possibly comprehend a system in its entirety. The creation of boundaries that delineate what is in or outside the system is unavoidable. But system still brings a powerful heuristic for getting to the root of the differences among how we each see the world. While this is by no means an exhaustive review of how systems are conceptualized, it gives a sense that the concept of system is mobilized in very different, and often opposing, ways. How, then, do those working to transform the future of the global food system leverage the concept of system?

The food system multiple: how food systems are enacted

I start this section with a description of a tense meeting, one that a number of the people I interviewed for this research talked to me about when I asked them if they have ever tried to draw or map a food system. It is from the perspective of an experienced facilitator who was brought in to carry out an exercise with philanthropic funders to define a food system:

> It was a total, utter failure—and it was because I didn't realize how differently people think when they say 'map the food system.' One person was mapping biological cycles, and other people were mapping actors and issues, and other people were thinking about it at a global scale and some people thought that you can't talk about a food *system*, that's food *systems* and they're nested or overlapping (I27, 2021).

This exercise became so fraught that it was called off and the group decided that instead of mapping a food system together, they would focus on principles for carrying out work that they could agree on. In order to do productive work together, they had to *not* define a system. I will revisit this disagreement at the end of this paper. First, I want to highlight some of the key framings of food system that emerged through this research in order to outline how various food system actors are currently enacting the food system. This section draws from interviews, fieldwork at key food system events, and food system reports that were produced by or referenced by my interlocutors.

All of the food systems practitioners[4] I interviewed and worked with agreed that food systems framing was

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[3] A further discussion of some of the myriad different systems framings and the way they are taken up in food systems discourse can be found in Leeuwis et. al. (2021).

[4] Those I interviewed or worked with through this research will be called food systems experts or practitioners in an effort to maintain their anonymity. This is not a term that most of them would use to refer to themselves, however, as the idea that something as complex as a food system could have an expert that would have all the necessary knowledge to understand it is something that would be rejected by most of them. For a chart of those interviewed and the kinds of organizations (which for reasons of anonymity I cannot name) they belonged to see Appendix 1.

important and that food systems themselves need radical transformation.

Despite agreeing on these fundamentals, how food system transformation should be undertaken (and by whom) is the root of much debate. This was starkly seen in the conflict that erupted over the UNFSS, where many felt that corporate involvement in the summit tainted it. Civil society actors, academics and others critical of the summit said this involvement would yield solutions that were more "business-as-usual," that is, focused on large-scale agriculture and international trade rather than what were seen as more transformative solutions focused on the right to food, agroecology, and food sovereignty.[5]

The conflicts that arose at the UNFSS were very typical of the kinds that unfold in food systems convenings on a regular basis. One conference I attended at a Rothschild château on the outskirts of Paris with over 250 delegates from 40 countries tried to nip the regular conflict in the bud by beginning with a plea. A speaker from a large US-based foundation asked the audience to "leave their agenda at the door" and to not "fall too much in love with their own theory of change." The audience of invited experts was urged to be humble learners and to accept the elephants in the room "as beautiful elephants." It became clear soon into the 3-day event that this plea was going to be a hard one to fulfill. By the end of the event, a CEO from a large multi-national food organization concluded by saying he felt barely welcome at the event. The next speaker, a food system academic, asserted that the corporate leadership in the food system was a model we should reject outright. Like the majority of such events I have attended on food system issues, this one ended with disagreements aired and not much else. Despite this usual kind of disagreement, there were key areas where these practitioners agreed about food systems, and ones which they did not which I will outline in turn.

Where there was agreement on the conceptualization of food systems

The fundamental point that those I interviewed and interacted with throughout this research agreed on was that "food system" offered a useful way of understanding food and agricultural issues. In terms of framing the issue as a system issue, many articulated that food naturally gave rise to a systems perspective. An international consultant working on food systems stated, for example:

…given that we don't exist without food, it seems to me the most powerful lever to get at everything else including our relationships to the environment, to each other, to disease, the pandemic, all of that stuff. You have a place to enter systems…Food is a way to then connect with the other parts of whatever a culture or community is about (I2, 2022).

A food system philanthropist articulated a similar perspective: "when we look at food you realize it's not just one thing, it's about all of these factors and it can only be explained in a systems manner" (I29, 2021). For many of my interlocutors a system view enabled a way to understand food beyond agricultural production. Many felt that system framing enabled seeing complexity and moving beyond simplistic or silver bullet solutions. As one consultant working on modeling food systems stated:

…more high-net-worth individuals are getting excited about food systems transformation, but when they think about food systems transformation, they're thinking like, "we have to end all meat production, and create the perfect burger. That's gonna solve all our problems." I am so tired of this. So, we are working on developing a training program for ultra-high net worth individuals who want to get into food system space. We're trying to create an app that makes them overwhelmed by the complexity of the food system. Like, okay, you push here, and then watch all this other stuff happen…The real purpose is to show these funders that you may think you have a silver bullet solution, but you really don't (I27, 2021).

Many described how the mistakes they saw as emerging from the Green Revolution would not be repeated if they used systems view. They outlined that a more holistic accounting would have rejected the productionist focus of the Green Revolution and would have been better equipped to see the negative externalities associated with it. One organizer of the UNFSS stated that the term "system" was used to frame the summit as it showed that the issues at the center of the UN's 2030 agenda (a set of strategies aimed at eliminating extreme poverty, reducing inequality, and protecting the planet) were all interconnected (I8, 2022).

A number of those working on food systems transformation felt that seeing things as systems enabled a more accurate view of reality. One system mapping consultant talked about the ability of this kind of visualization to enable people to see beyond themselves. Seeing the world as systems is what she felt enabled us to change it beyond our own small sphere of influence. At the same time, she cautioned against a mechanistic understanding of a system we can break down and "replace the cogs" to fix (I32, 2021). Many also agreed that seeing

[5] More detail on critiques of the UNFSS can be found in a number of recent articles including Canfield et al. (2021), Montenegro de Wit et al. (2021) and McMichael (2021). They argue that the UNFSS represents a shift in global governance away from democratic engagement with civil society and nation states towards less accountable initiatives led by corporate actors and other special interests.

through the lens of systems enabled us to see complexity. One practitioner who is so passionate about systems thinking that he has a whole YouTube channel devoted to lectures on the subject, debunked a popular story to highlight his view on the importance of systems thinking:

> the story of the nine blind men and the elephant, which is used as a classic systems story is not a systems story at all. It's a reductionist story. If you want to understand the elephant from a systems point of view, you have to understand it as a herd that operates in a particular ecology, the forest of the savanna and the relationships with other flora and fauna. So it's the interrelationship piece of mutuality, of causality, that I think is more meaningful to understand how the world operates than the sort of arrogant human agency perspective on everything (I2, 2022).

Where there was disagreement on the conceptualization of food systems

While some food system experts view a food system as something knowable, others see framing a food system in this way as problematic. This framing corresponds significantly to the categories of hard and soft systems outlined above. A hard systems framing was clear in the introduction to systems thinking that was used in the launch of the journal *Nature Food*. The editorial board characterized systems as something to be mapped and measured:

> According to systems thinking, changing the food system—or any other network—requires three things to happen. First, researchers need to identify all the players in that system; second, they must work out how they relate to each other; and third, they need to understand and quantify the impact of those relationships on each other and on those outside the system (Nature Editorial Board 2020).

Interestingly, the diverse sets of actors carrying out the UN Food Systems Summit had differing views of systems. The Scientific Group for UNFSS's analysis largely aligned with the more "measure and manage" hard-systems approach clearly stated in the *Nature Food* editorial. On the other hand, those involved in carrying out the dialogues and evaluating the dialogues (two separate groups of practitioners) approached their respective tasks from a more soft-systems approach. The framing used by the UNFSS Scientific Group, which was a group of scientists chaired by economist Joaquim von Braun who wrote reports to inform the summit, viewed systems as interlinked component parts which could be understood through linking scientific disciplines (von Braun, Afsana,

Fresco, and Hassan 2021a, 2021b, 10). The Scientific Group's report on defining the food system concept acknowledges that food systems are "embedded in values and cultures that need to be considered when 'systems transformations' are proposed" (2021, 2). However, it elaborates that this does not mean that systems should "escape the yardsticks of scientific evidence," (2021, 7). Thus, scientific analysis of a definable system serves as a something of a final arbiter, ensuring that normative aspirations do not "steer into a dead end of unrealistic wishful thinking." (2021, 7). This framing reinforces the hard-systems view that a system remains an objective thing out there in the world, with underlying values capable of shifting a perspective, illuminating a particular facet, or filtering with a certain bias. For those who articulate this kind of hard-systems view, which sees food systems as something real that exists in the world, statistical analysis and quantitative modeling are seen as the most effective way to understand and communicate about systems. In this view a full mapping of what is in the system, including its components and connections, is what is needed.

On the other hand, those using a more soft-system approach such as those carrying out the food system dialogues felt that this kind of representational mapping exercise would not be a useful in terms of building collective understanding of systems. The dialogues were a primary way in which various actors were engaged in giving input into the summit. There were three kinds of dialogues that were facilitated for the UNFSS: global dialogues (done in partnership with UN institutions like UNEP), national dialogues (led by UN member states), and independent dialogues, which anyone could carry out independently and submit a report about to the UNFSS site. Over 1500 dialogues with over 100,000 participants were carried out according to the dialogue portal. A "deep dive" into data produced by the independent dialogues for the UNFSS titled "Systemic approaches to food systems" asserted that: "It is deeply unsystemic to say that there is something called a 'whole system' that is self-evident and comprehensible by all" (Williams and Blue Marble Evaluation Team 2021, 36). The report outlined that, "your food system will always be different from my food system, even if we are observing the same situation using the same data and working towards the same goals" (ibid., 35). The author of the report talked about the need for systems, and in particular boundaries of systems, to be discussed and deliberated. He went on to define an approach to holism that was not about including everything, but realizing that some things always get left out:

> A systemic approach to 'holism' is not about including everything, but being careful, thoughtful, and critical of the choices we make when deciding who or what to leave out (ibid., 18).

This report was critical of the feedback received through the independent dialogues[6] that suggested "that 'systems thinking' was about including more; more interactions and more perspectives" rather than reflecting on boundary issues (ibid., 14). A leader of systems dialogues felt strongly that we should not even work to define a system, as it would "cease to be a system" (I3, 2022). A consultant working on the food systems dialogues similarly asserted:

…my view was we should steer absolutely clear of defining what a food system is, because you can't, you'll then be wrong…In living systems terms, there is only one system, which is the Universe. That's fundamentally unhelpful, frankly—so what's a food system, "Ah, it's a subset of the Universe" (I11, 2021).

In terms of the nature of a system itself, there were thus different and contrasting ways of conceptualizing systems among the food system practitioners I interviewed. Importantly, these different conceptualizations led to very different approaches to how to transform food systems, which I examine in the next section.

How systems are transformed

Through my engagement with those striving to transform the future of the food system, it became evident that variations in their understanding of what a food system is led to distinct perspectives on how it should be transformed. Those who conceptualize food systems as things that are real and exist in the world propose that it is through mapping, enumerating, and modeling that we can come to understand, forecast, and then transform systems. While obtaining and analyzing such complete knowledge may be a hard task for humans to do unaided, many I observed and spoke to feel that tools like artificial intelligence (AI), blockchain, and machine learning would enable us to do so. As one panelist said at the 2021 Changing the Game for Food Systems Innovation Symposium:

I'm actually very confident that machine learning and computing capacity will be able to solve these incredibly complex systems problems and transform the food system. Interestingly, machine learning is ideally suited for this problem processing huge amounts of data and discovering patterns, predicting

behaviors and recommending actions that would be, frankly, impossible for humans to do alone. So, I'm actually very optimistic that machine learning and artificial intelligence is a great fit for the challenge we're facing (Grant and Chicago Council on Global Affairs 2021 28:00).

On the other hand, those who saw systems as social constructs relied more on transformation strategies focused on dialogue, shifting relationships, and understanding. One person who worked on systems dialogues asserted:

The only way you can really understand the system is by getting everybody in it to sit down together… Dialogue is a core part of the philosophy around how to deal with complexity. Complexity by definition involves these multiple messy feedback loops, which means every action you have has other actions that affect other people and you can't unravel it back to a root cause. You have to have a way of surfacing, what are the various positions, what are the various interests, what's the various anxieties, what's the various hopes, all of that stuff. That doesn't happen by writing a plan or a strategy, it happens through a dialogic process where people engage with each other in some form or another (I11, 2021).

Controversies were seen as a welcome part of this kind of dialogic process as they enabled a view into key frictions that underlined disagreement. Dialogues were understood to open up imagination, which was a strategy to move beyond strongly held positions. As one dialogue leader noted, "you start with a dialogue because that loosens stuff up" (I3, 2022). The dialogues process was seen to have the effect of shifting positions and in creating connections that had not existed beforehand. As dialogues were seen as being about building human relationships, emotions and feelings were seen as having an important role. I remember being urged multiple times during the food system dialogues training for the UNFSS to make sure to report back on the emotions that had come up in the group, as they were seen to offer important insights. This dialogue leader went on to assert:

…this kind of work is about relationships. It's about feelings. I mean, we were at our best when we use our emotions, because our emotions are part of our relationships and if we can use our emotions as a real asset in relationship forming and relationship maturing and relationship changing…When we do systems leadership…[We] teach people to use emotions to sense systems. If you do it just using rational stuff from your frontal lobes, I think it's not good enough (I3, 2022).

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[6] The report was initially much more critical. As part of my work with the dialogues, I was tasked with reviewing this report and offered the following feedback: "There are different perspectives on what a system is. My hope for this report would be that we can understand where those who did the dialogues are coming from (their own emic understanding of what a system is) without saying it is *wrong.*".

Emotions were understood to be central to building connections and were, therefore, seen as a fundamental way to create systems shifts (I10, 2021). Systems leaders were seen to have an important role to play in creating these connections and shifts through adept facilitation:

> …these kinds of systems exercises can be influenced by people like us, the way in which they think and work together can be influenced by people like us… We have these three words, narrative to describe the stories, networks that describe the people, and nurturing to describe the process of bringing people together and helping them to connect. And it is my belief that those who are involved in systems change, if they're clever at narratives, networks, and nurturing connection actually create the circumstances under which big shifts can happen. But of course, some of those shifts can be really bad things, such as telling people that vaccination is dangerous or it's going to turn us all into foster children of Bill Gates. The truth is that the techniques of narrative, network, and nurturing can be applied to system shift for just about any kind of purpose (I3, 2022).

A number of food systems experts also said that inner work, like "mindfulness, embodied leadership, inner transformation" (I6, 2022) were essential to systems transformation. For example, in 2021 the "Conscious Food System Alliance" emerged via the United Nations Development Program with a focus on building "…a movement of individuals and organizations dedicated to leveraging the power of inner development for systemic change in food systems"(CoFSA 2021, 1). The purpose of the group is to "offer food and agriculture practitioners, as well as systems change and consciousness experts, a safe space where they can experiment new ways of being and doing, and explore the role of consciousness in food systems transformation" (CoFSA 2021, 1). Belgrad documented a similar focus on consciousness through avenues such as meditation, music, and psychedelics among cybernetics-inspired systems thinkers of the 1960s and '70 s (Belgrad 2019).

In stark contrast to those who advocated for a more hard-systems approach, measurement was not seen as key to those who used a more soft-systems approach. For example, the system practitioner who wrote the "System approaches to food systems" deep dive report wrote:

> …the most common suggested solution [in the independent dialogues] was for more information and more data. The assumption is that information will lead to greater knowledge and understanding that will enable solutions to be generated that often required no trade-offs. In the systems field, this would be

considered an unsystemic response…[C]ollecting and distributing more information, more data about reality will have little impact on a collective understanding of a situation unless at the same time it addresses and acknowledges these more deeply held values and world views that people bring to systemic inquiry and design (Williams and Blue Marble Evaluation Team 2021, 36).

The aim instead should be about building the capacity to see from other perspectives:

> …a systemic analysis will rarely seek to change people's existing perspectives but seek to find ways of enabling acceptance of new perspectives. But it doesn't achieve this just by acquiring more data and information alone, but allowing people to understand the data through different sets of spectacles (ibid., 35).

For many I interviewed, the ultimate goal of dialogue, relationship building, and consciousness was a kind of complex balance. A dialogue leader commented that the aim of dialogues he carried out was to reduce extreme views on food systems:

> …extreme life is actually weak life. Middle life, where you've got equilibria where you're negotiating, that is the strong life. Multiple divisions are being navigated and some kind of equilibrium will be reached, but it's not a static equilibrium. It's a dynamic equilibrium. And that's life. So I'm constantly in this state of things. Moving around. I often describe my work in food systems, like three dimensional Quidditch, that game played in Harry Potter books (I3, 2022).

This balance is understood to be constantly in negotiation. It necessitates constant monitoring and course correction. As the executive director of the GA put it, drawing extensively on Donella Meadows in an article:

> Meadows says, "In a world of complex systems it is not appropriate to charge forward with rigid, undeviating directives. 'Stay the course' is only a good idea if you're sure you're on course. Pretending you're in control even when you aren't is a recipe not only for mistakes, but for not learning from mistakes. What's appropriate when you're learning is small steps, constant monitoring, and a willingness to change course as you find out more about where it's leading." This is hard in a world where we want solid answers and firm metrics especially when confronting today's crises (Richardson 2020, 2).

Overall, in interviews and participant-observation, those who spoke of system in "softer" terms, emphasizing the dynamic, holistic, active, relational, and processional, tended

to look towards dialogue and engaging multiple perspectives in deliberative processes as key to transformation. By contrast, those who referred to system in "harder" terms, emphasizing the potential for systematic measurement and management, look to data collection and analysis such as through computational models as key to understanding and transforming systems. This gives rise to different system enactments. Some groups, leaning towards "hard" systems approaches, value the practice of systematicity, pursuing exercises like true cost accounting that builds the system that can be measured as much as it measures the system—they are laying down the track that the true-cost-accounting train drives upon even as it's in motion, so to speak. Others, leaning on "soft" approaches turn towards, for example, shifting their own consciousness to engage more expansively with an embodied practice that is more process-oriented, inter-subjective, and relational.

The contestations of the UNFSS, in particular, offered a microcosm of very different systems definitions taking place amongst those planning, carrying out, evaluating, and criticizing the Summit. One international food system consultant commented that "what the summit accomplished was getting everybody to use the term systems. But everybody's using the term systems at a very shallow level and actually have no idea what they're talking about or what the implications of it is" (I2, 2022). I would argue that it is not the shallowness that is the issue, but the fact there was never a discussion about what was meant by system. This ultimately led not to the kind of coming together around food issues that the UNFSS articulated a wish for, but rather, a deepening of divides. One paper critical of the summit asserted that:

> …the adoption of food systems language by UNFSS has intensified frictions in a territory of conflict in which multiple parties are seeking to define food systems and thereby their governance. For example, the UNFSS adopted its scientific advisory group's mechanistic model of food systems; this 'integrated approach' expanded the sectoral scope of UNFSS interventions and widened their spheres of influence without recognizing power relations inherent to the dominant food system—inequities entangling race, class, gender, and more (Montenegro de Wit et al. 2021, 154).

A food system academic and civil society organizer who was a very strong critic of the summit process critiqued the control over the term they felt the UNFSS imposed:

> …so the discourse of the summit is, "we must transform the food system." Everyone else is like, "Fuck you…who's in control?" The fight is over the control…It's like the new kid discovers this thing that everyone's been working on forever. "Hey guys, I discovered neoliberalism as a thing." It's like, dude, just because you thought it doesn't make it like no one else has ever thought this thought. Because this thing called food systems. We've been doing it for 30 years (I28, 2021).

While there was a feeling from many that the summit got everyone talking about food systems, there was not agreement on whether it had been useful at all in achieving any transformation. But as one participant observed in an interview, "just because the UNFSS was not effective, doesn't mean it didn't accomplish something" (I27, 2021). Indeed, one outcome that seems to have emerged from the summit is further polarization in an already polarized arena. In meetings post-Summit, I have heard blanket dismissals of the UNFSS and everyone involved in it. Civil society members who did participate have been told they will have to recover their reputation (I32, 2022). On the other hand, I have also heard those who opposed the summit referred to as the "my way or the highway" people (I26, 2022). Dismissals of this sort raise the possibility that putting "systems" to work at the UNFSS, using its vocabularies and framings in an attempt to see more holistically and inclusively, has resulted in the opposite of its intended effect, mostly deepening pre-existing divisions.

Conclusion: What does "system" do?

> Guys, we need to talk to people in a way that they understand us, because if all we are doing is saying people are using systems wrong…do we expect people to do a PhD in order to properly do the work (I31, 2021)?

This research has uncovered a number of key effects of using food systems framing. Firstly, by labeling something as a system, it becomes knowable as a thing, which makes us think we can understand (or even see) how the world works. Even those who use more of a soft-systems framing believe that the idea of "systems" gives insight into how the world functions, even if they do not see the system as a real entity "out there" in the world. Talking about the food system can also make us all think we are talking about the same thing, and sometimes even that we are talking about just one thing. Using the concept of systems also makes us think that heterogenous things are connected and that we can understand how they are connected, such as through the cybernetic concept of feedback. This enables us to think that systems operate as a whole. Putting systems to use may have different implications for different people. For some, it may imply that they are stuck in the system and unable to change it. For others, it may imply that they have some degree of

influence over the system. This influence may come in the form of influential pressure points made visible that can bring about predictable transformation, or it may involve the potential for interventions enabled by systems thinking to have unintended consequences.

Some I interviewed felt that systems framing would naturally lead to deep democratic engagement as it gave rise to the idea that, as we are all connected, we all have stakes in the system that need to be considered. Others felt that systems framing conversely gave rise to the need for an expert body (such as the Scientific Group of the UNFSS) to produce and analyze complex systems data. Importantly, the use of system can hide these underlying differences, bringing a poorly-founded sense of common agreement to an effort that appears, in fact, to be deeply divided. System, no matter how it is framed, has become central to our ordering and understanding of the world. It is something to rally for or against, or even something to see as "broken" and in need of repair. Clifford Siskin makes a similar argument in his analysis of the systems framing that emerged through eighteenth century astronomic and economic "systems." As system is never a fully adequate heuristic for understanding something in its entirety, he argues, we will always see the system as failing in some way:

> In blaming The System, we configure "things as they are" in a very particular way: as needing change, as capable of being changed, as providing the means of effecting that change, and, crucially, as always failing enough to maintain an ongoing need for change (Siskin 2016, 166).

This analysis has aimed to illuminate that the ways in which we conceptualize "food system" leads to very different ideas about how systems ought to be transformed in terms of by whom, through what actions, and using what knowledge. It is not adequate to see food systems as a kind of boundary object which can draw actors together despite their different understandings. As the food system world is rife with divisions, as seen so starkly through the UNFSS, not paying attention to how different actors enact food systems may ultimately create further divides.

Instead of avoiding having a conversation about what we are really talking about when we talk about a food system, as the facilitator mentioned earlier in this paper ended up doing, what would happen if we purposely had this conversation knowing that divisions would be illuminated? All systems definitions are partial. It is easy for anyone to look at another's definition of a food systems and see what is missing or how their different values or epistemologies drive their view of systems. But this is not where we should end our thinking. Rather, what comes after the realization that we may be talking about different things when we are talking about systems matters for how we should pursue knowledge

production about, efforts to transform, and evaluations of complex systems. As articulated in the analysis of holistic and managerial framing of systems, these kinds of polarized views about systems have precedent. They are something that have arisen since systems took hold in various fields following the emergence of cybernetics, and may even go back to the early enlightenment period (Siskin 2016). The divisions that arise when enacting systems change may, thus, be inherent to the competing understandings of "system" embedded in the historical-intellectual development of the concept itself. Understanding these different tendencies of systems should, thus, be central to how we use the concept in the world.

Donella Meadows held both soft- and hard-systems views together in tension throughout her work.[7] Perhaps this offers a model for how we can work effectively with the concept of systems. There is a danger that if we subscribe too firmly to the idea of a system as something that must be "measured to be managed" we can end up with top-down, expert-driven approaches to system transformation like those critiqued in the managerial framing above. On the other hand, if we go too far down a view of systems that focuses on the relational and conceptual, we risk getting lost in a morass of relationships that is too expansive and theoretical to understand. It may, thus, be better to understand systems as something that must be constantly negotiated and held in tension. This is an argument in favor paying heed to the insight from soft-systems thinking that a system is not entirely knowable and that we are always making explicit or implicit boundary decisions about what is in and what is out. Maintaining the idea of unknowability at the root of our understanding of systems has practical applications. It means we should frame longer time and space horizons for our deliberations about systems and realize that our interventions must be continually assessed and recalibrated to changing understandings. It also means that we should approach with suspicion "impatient optimism" and quick-paced, narrowly defined expert-driven approaches to systems change. Further, instead of hoping a systems framing will automatically lead to democracy—as some holistic framings of system can assume—we need to talk directly to democracy and power.

As discussed above, a number of scholars have described and elaborated upon how different understandings of food systems are heavily inflected by underlying values and epistemologies. This paper aims to complement this body of work by departing from it, following Annemarie Mol's use of "ontological politics." For this reason, I have emphasized what system "does," as practice and enactment, rather than what system "is" as object and objective. This paper has attempted, therefore, to answer the title question *What is*

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[7] Though she did not necessarily use these terms.

a Food System? with an ontological spirit, by asking what kind of thing a food system is, rather than what components and relations constitute a food system. Drawing from Mol's example, this paper focused on a number of specific examples of how certain actors enact food systems. Though there is not room within this paper to go into great depth about each of these examples, touching on them has aimed to demonstrate the various and contrasting approaches at work. Looking at other cases could reveal how different systems framings are taken up in other contexts and to what ends. This presents an avenue for further research, as does an investigation of how other non-systems framings of food and agriculture may be enacted differently.[8]

For last year's UNFSS the discussion about what a system is, which includes both conceptual framings about the nature of a system as well as issues such as system boundaries—who and what should be in or out—took place largely outside the summit. Ian Scoones noticed a similar trend in his analysis of the process that led to the production of the *International Assessment of Agricultural Knowledge, Science and Technology for Development* report more than a decade earlier. Through this process, he observed, key tensions were "relegated to off the record debates" rather than being central to the expert group's deliberations about the current and future state of food and agriculture (Scoones 2009, 568).[9] Keeping these deep divides on the sidelines of efforts to transform food systems is not an effective way to have a systems conversation. With the UNFSS, almost a whole year was spent discussing food systems without ever purposely delving into what food system meant to those involved and, specifically, how different actors came to the discussions with different understandings of systems. How could this have been otherwise? If we are going to use the term food system, let's use it well. Following the quote from the practitioner at the beginning of this conclusion, by well, I don't mean "right." I mean let's use it in a way that enables us to see what the term may obscure, and what it could enable.

Appendix 1: Interviewee Organization Type.

Interviewee number	Organization type
I2, 2022	International consultancy

Interviewee number	Organization type
I3, 2022	International non-profit organization
I6, 2022	Large foundation
I8, 2022	UN agency
I10, 2021	International non-profit organization
I11, 2021	International non-profit organization
I26, 2022	US-Based food and agriculture consultancy
I27, 2021	US-Based food and agriculture consultancy
I28, 2021	Academic and civil society advocate
I29, 2021	Small foundation
I31, 2021	International consultancy
I32, 2021	International non-profit organization
I35, 2022	International non-profit organization

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[8] Non-systems framings that have been applied towards food and agriculture include, for example, food regimes (e.g. McMichael 2009), food networks (e.g. Goodman, DuPuis, and Goodman 2013), and food chains (e.g. Gereffi and Korzeniewicz 1994).

[9] In my own research, there continues to be a divide between those who saw the outcomes of the IAASTD report as legitimate or "ideological.".

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