Human and societal transformations are critical for food system responses to the climate crisis

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Abstract

Faced with the growing climate crisis, there are calls for transformative adaptation, a climate response that address the root causes of vulnerability and requires radical change in food systems. Transformation of food systems is, hence, essential to deal with the ongoing climate crisis and to fulfil wider sustainability and development challenges from local to global scales. Transformed food systems must minimise vulnerability to shocks while delivering environmental, social, and economic benefits. This need can only be met by embracing food systems transformation as a process of social and individual change that contributes to transformative adaptation. The scale of this societal and environmental challenge demands an equally grand vision – one that integrates climate, sustainability and systems thinking with human psychology, beliefs and values, and shared understandings. Such a vision, with community and individual transformation at its core, has the potential to deliver multiple benefits to society through transformative food systems change, livelihood resilience and climate change adaptation and mitigation. Fostering conditions that support both individual transformation and the development of collective understandings, therefore, needs to be a core part of any strategies to transform food systems. In this opinion piece we provide a framework to guide this transformative drive towards societal climate resilience.

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Introduction

Climate change threatens food security with dire warnings of increased poverty and malnutrition. The agricultural sector is not only a significant source of greenhouse gas emissions but it is also adversely impacted by climate change, especially droughts, floods and increasing temperatures. Climate risk management is part of the response to the threat of climate change. In particular, there is an urgent need for food system transformation that minimises vulnerability to climate shocks while delivering environmental, social, political and economic benefits (Zurek et al. 2022, Whitfield et al. 2021). Further, risks to food availability and access, conflict, migration, public health, and security can interact and cascade across communities, sectors, and borders, effectively acting as a risk multiplier (Challinor & Benton 2021), especially for the most vulnerable.

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6), in recognition of the severity of the climate crisis, calls for a paradigm shift in the climate response from an incremental to transformative one (IPCC 2022). The report also identifies the danger of the climate response inadvertently increasingly the vulnerability of more marginalized groups. There have subsequently been calls for transformative adaptation, a climate response that address the root causes of vulnerability and requires radical change in food systems including power dynamics between different value chain actors (Hellin *et al.* 2022).

The COVID-19 pandemic and the food systems reverberations of the invasion of Ukraine revealed the low levels of resilience of global food systems to unexpected shocks, with the poorest and most vulnerable most negatively affected (Carducci et al 2021, Alexander et al 2022, Lin et al. 2023). COVID-19 brought transformational societal shifts to the forefront of global discourse and rapidly unlocked unprecedented financial supports for social systems transformation (Barrett et al. 2021) for a limited duration. Food systems transformation, as part of the climate response, must be longer-lasting (including inter-generational dimensions), while enshrining environmental sustainability and ensuring that nobody is "left behind". A radical new agenda is required, one that embraces a rights-based approach to planetary boundaries (Ensor & Hoddy 2021) under the umbrella of climate justice (Newell 2022).

Agricultural research plays a major role in this transformation but it requires researchers to work in different ways with much greater emphasis on inter- and transdisciplinary research and by embracing food systems transformation as a process of change at societal and individual levels (Pender 2023). However, transformative change for individuals, communities and societies is inherently risky. Social equity issues arise in terms of who bears the burden of transformative changes and how transformation towards more environmentally and socially-sustainable food systems can be charted in ways that minimize maladaptation (Eriksen et al. 2021; Tribaldos & Kortetmäki 2022, Blythe et al. 2018).

Transformative food systems change is driven by multiple agents, who operate at different levels and dimensions of societal and economic systems. Critically, transformation is a socio-political choice (Pender 2023). While technological innovations are fundamental to the process (Barrett et al. 2020), the social and institutional environments ultimately enable and

drive transformation (Hellin *et al.* 2022). There is a need to couple technologies and innovations with broader societal, institutional and governance change (International Science Council 2023). Government and governance are responsible for profound economic, political and social changes but as O'Brien (2018) notes, these structural changes are themselves underpinned by shifts in the mental models (i.e. the values and assumptions) of the individuals that comprise those structures. Hence, social transformation consists of practical, political and personal transformation.

A transformative response to the climate crisis is, hence, both a huge challenge and opportunity for agricultural researchers. There is no denying that the challenge can at times be overwhelming. Schipper *et al.* (2024) in a Comment titled "*Scientists have emotional responses to climate change too*" recognized that "*trying to resolve problems with serious consequences over which you have inadequate control is the literal definition of distress — and not surprisingly, many climate scientists are reporting feelings of distress and anxiety*". We very much relate to this reality.

In this Opinion we propose a framework (Figure 1) that highlights the importance of internal and external dimensions of both individual and collective change for food systems transformation. We do not provide a blueprint on how the framework could be operationalized (that would be well beyond the scope of this Opinion piece and our expertise). Rather we provide the framework to illustrate the type of human and societal transformations that underpin urgently needed food systems responses to the climate crisis. We see the framework as a contribution (however small) to the fusion of science and humanism which is so urgently needed to "*provide not only solace and inspiration, but also maps and narratives toward a better future for nature and people*" (Jackson 2019). A framework that can in the words of (Wilson *et al.* 2020) help "*our understanding of human behavior that can lead to societal climate resilience in the long-term*".

The role of human and societal transformation in responding to the climate crisis

Most analyses to date have focused primarily on external aspects of transformation, whether the systems themselves (e.g. Hall & Dijkman. 2019), regulatory instruments (government policies, laws), or the behaviour patterns of individuals (e.g. Karanja et al. 2022). Our focus here is instead on the internal aspects of transformation – both the personal psychology and the cultures that can result in agency as a transformative force. The organisations and institutions that comprise and drive food systems all arise from collective culture which are themselves affected by individual agency. We use the term 'internally driven transformation' to emphasise this ever-present role of individuals and society in fostering change (Clare *et al.* 2017).

Those who exercise their agency may act, at different times, as consumers, or as actors within value chains, as well as members of research, regulators and advisory entities, governments and multilateral organisations. The importance of individual agency applies therefore to all such groups. Organisations and institutions interact in multiple ways to produce food systems outcomes (figure 1, RHS) through presenting options, choice-editing, enabling actions, rewarding progress or penalising unwilling actors, where outcomes can cascade across other systems, sectors, geographies and communities.

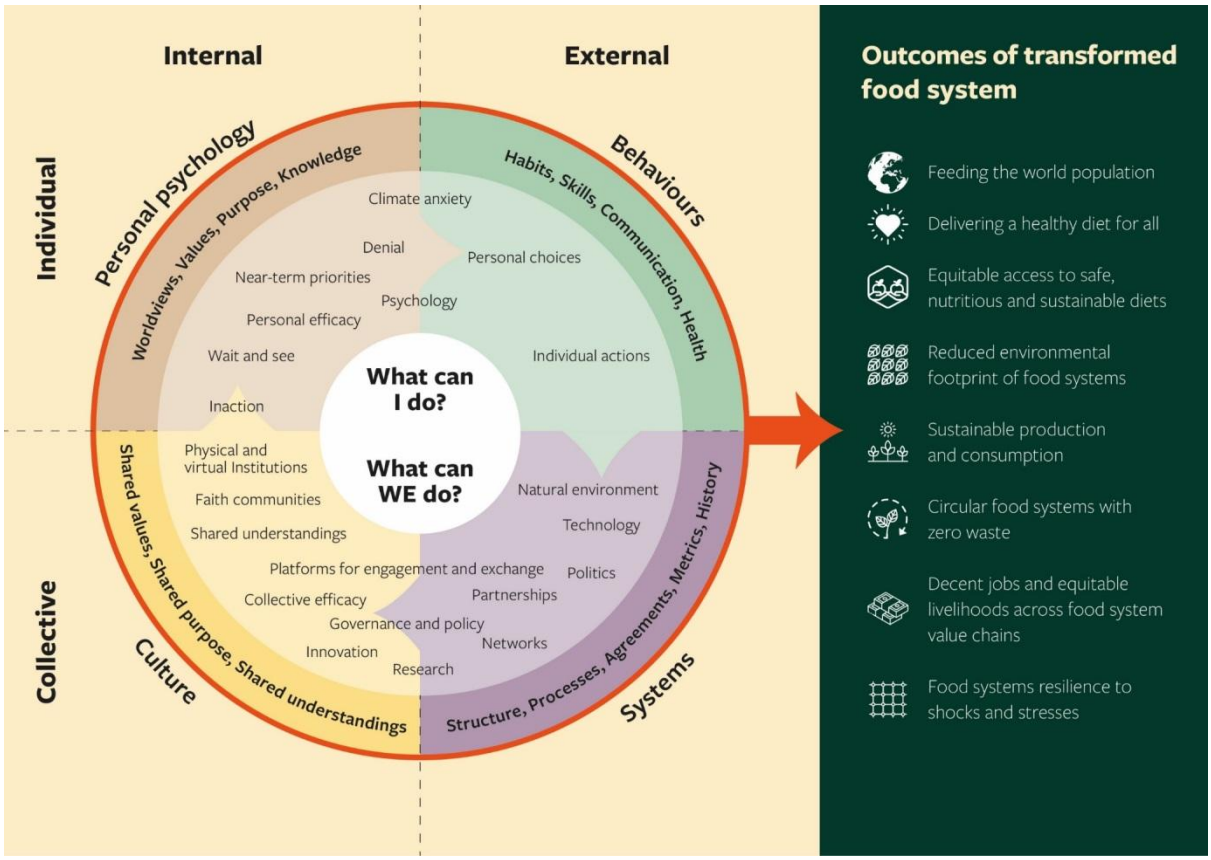

Figure 1. Food systems transformation framework that highlights the importance of internal and external dimensions of both individual and collective change. Figure adapted from Wilber (2001). Outcomes of transformed food systems are derived from the 2021 World Food Systems Summit Action Tracks (https://www.un.org/en/food-systems-summit/action-tracks) and from Béné et al. (2019).

Human transformation: individuals and behaviour change

The behaviour of individuals is shaped by their personal and collective values and worldviews (Pender 2023). Human behaviour is also shaped and influenced by innovations and policies, and is aggregated through a range of different institutions in society, including households, communities, workplaces and civil society (Granderson 2014). Transformative change in food systems can occur when sufficient numbers of individuals feel empowered or are required to take actions that collectively drive structural and systemic shifts. If such changes at the collective level in turn generate further individual transformation, positive feedback loops of transformational change can arise.

Understanding pathways of systems change requires disaggregation of the various overlapping roles that individuals play within systems, structures and society, e.g. as consumers, farmers, processors, retailers, regulators as well as family and other social roles, as well as their roles in advocacy or civil society groups.Being an effective agent of change may have many dimensions, including internal psychology (Fig.1, upper left) from which the desire to express agency and drive behaviour change (upper right) may emerge. The key question here, as shown in Fig.1, is “what can I do, either individually and/or as part of wider networks and organisations?”

Individual and group transformation is a highly effective, and usually entirely overlooked, way of increasing the agency of individuals in effecting change (Pender 2023). Research on individuals who undergo positive personal transformation following periods of intense psychological turmoil highlights a shift towards greater and more cooperative agency. Such individuals tend to transcend notions of group identity (such as attachment to a particular religious, political or ethnic affiliation) in favour of wider-ranging and more open perspectives. There is an expansion of conceptual awareness, with a transcendence of a self-centred perspective and a greater concern for other people's problems and for social and global issues (Taylor 2012, 2021).

Individual transformation does not need to await the occurrence of intense turmoil. Ken Wilber (whose 'Four quadrants' model provides a basis for Fig. 1) has viewed personal development partly as a progression from an "egocentric" to a "sociocentric" and then a "worldcentric" worldview (Wilber, 1995). At the egocentric level, the individual is entirely preoccupied with self-needs, whereas at the sociocentric level, they prioritise the needs of their group or community beyond self-needs. At the worldcentric level, the individual identifies with humanity as a whole, beyond any notions of nationality, ethnicity, religion or gender. Similarly, Maslow (1970) saw this wide-ranging identification as one of the characteristics of the highly developed individuals he termed "self-actualisers."

Viewed in this way, individual transformation becomes an essential element of sustained social change such as transformative climate change adaptation, particularly any shifts towards a more global perspective, involving global citizenship with greater consideration of justice and fairness. While not discounting the possible value of 'enlightened self-interest' in certain circumstances, social and political change cannot be sustainable without a corresponding psychological shift in individuals. Although such a shift often occurs accidentally, it can be consciously cultivated. Various practices and lifestyles are traditionally strongly associated with spiritual growth, such as meditation, altruism, empathy, voluntary simplicity, and contact with nature. A person may also follow a more systematic path of self-development such as the Buddhist eightfold path, the eight-limbed path of Yoga, or the practices of contemplative or mystical Christianity.

In Figure 1, the internal quadrant of personal psychology can be seen as a key driver of external change. In particular, the aspects of worldview and values are highly significant. Critical global issues such as equitable sustainable food systems and just climate change transitions (the change advocated by IPCC 2022) can only be adequately dealt with from this wider conceptual perspective: any attempt to deal with them from a social systems perspective alone will emphasise and exacerbate conflicting competitive agendas, which run the risk of exacerbating the very problems they intend to address.

In terms of values, personal development or transformation involves a movement towards increased empathy and altruism, hence shifting towards a more *connective* orientation in which an individual is no longer enclosed within their own psychological space, with a sense of duality between them and the world (including other beings). The "transformed" individual feels a more empathic connection with other people, and with other living beings and the natural world itself (Taylor 2012, 2021). Individuals are more likely to act if they believe that their action will bring about positive change (Wilson *et al.* 2020).

With this heightened sense of socio-ecological connection, comes a sense of responsibility. The individual feels an impulse to respect and support others, and the natural world itself, because they feel that their identity is shared, that they are part of a wider network of being. Indeed, it could be argued that it is a lack of empathic connection that has led to our present environmental crises, with a lack of responsibility to the natural world. Whilst this attitude is far from universal, it is prevalent enough to be the underlying major driver of anthropogenic environmental change.

Personal transformation ("what can I do?") is complemented by an additional perspective in Fig. 1: "what can we do?". Here, it is communities that are the engine of change, since it is within communities that the necessary deep reorientation of systems and practices, now clearly identified as *our* systems and practices, can begin (Pisor *et al.* 2022). It is here that questions can be asked, and meaning found, about the goal and direction of food systems. The notions of individual and personal transformation necessarily imply, 'Transformation towards what?' just as the notion of sustainability immediately raises the question: 'what do we want to sustain, and how?'

Large-scale societal change, which is driven by a positive collective vision, is more likely to be effective in the long term, because change is motivated and underpinned by a shift to a transformed mode of thinking and feeling about one's place in the world as a whole. Collective understanding is therefore a key part of the human transformation that is needed for transformative adaptation. Transformative change is underpinned by both individual and shared understandings and assumptions about the world, which in turn influence perceptions and interpretations of food systems.

Collective understandings also define what is individually and collectively imaginable, desirable, and viable, based on different understandings of causality, perceptions of agency, and assumptions about leadership. Thus, when considering the role of individuals and communities as subjects of change, the related issues of equity and justice emerge starkly, particularly regarding concepts of climate justice and just transition pathways (Whitfield et al.. 2021, Rockström et al. 2021, Newell 2022). Individual transformation towards pro-environmental values and behaviours is likely to occur most reliably when practised and habituated in community. Communities and collective action is therefore a key instrument in creating large-scale social change.

Societal transformation through collective understandings

There are multiple pathways and feedbacks between collective understandings and the individuals that together form the collective (i.e. between the top and bottom halves of fig. 1). Social and societal norms play a key role in generating the behaviours and beliefs of individuals (Gifford & Nilsson 2014). Motivation for personal change is, to a significant degree, socially generated. We consistently underestimate how much others influence our choices and behaviours (Wilson & Dunn 2004). Social affiliation has a demonstrated effect on environmental behaviours (Hoffarth & Hodson 2016).

Collective understandings can be facilitated through dialogues that respect communities' rights and autonomy, and forge common interests regarding transformation, rather than dialogues that simply communicate or entrench the positions of different (often opposing) groups (Pender 2023). Indeed, enabling multiple perspectives may prove more useful to accelerate food systems transformation, than operating within silos or traditional dividing lines. This calls for inter- and transdisciplinary responses as part of the climate response (Cundill *et al.* 2019), including polycentric governance processes (Ostrom 2017). For example, delineating left versus right politics can tend to produce opposing drivers that hinder rather than serve transformation. The transformative visions with the greatest potential may be those where there are a broad range of views that allow for the identification of common interests and alterations to structures that stymie collective agency – from the multinational corporations that are driving change in food systems through to food sovereignty movements and broader animal welfare perspectives. This kind of pluralism and diversity of values and perspectives can be argued to be central to the progress of knowledge about the world (Longino, 1990).

Collective understandings can also be embodied by faith communities. Around 84% of the world's population belong to a faith community, and this number is growing (Sherwood 2018). These communities are often heirs to traditions of practice that foster personal transformation towards a wider sense of solidarity with others and with the natural world. Altruism is an explicit value of every world faith. Indeed, extending a sense of kinship beyond biological relation, generating empathy and fellow-feeling with those more distant from oneself, is thought to be a significant evolutionary role of religion (MacIntyre 2004). Faith communities thus represent an under-utilised resource in fostering the transformation of individuals at a large scale, and so creating transformative social and environmental change (Muller 2021).

Despite the key role for collective understandings and agency, they remain a necessary but not sufficient element of internally driven food system transformation. For change to occur at a societal level, actors need to form new and potentially unconventional partnerships to allow for the scaling of new knowledge and innovations. Truly transformative processes therefore require reform of both governance and power-relations, by forging new coalitions and partnerships that espouse both sustainability and equity and which work towards societal change. Public investments and policies are an important stimulus for many necessary changes. These include de-risking transformative climate adaptation pathways via incentives, infrastructure and support. Governments are innovation partners, along with investors (donors, private sector, and philanthropy) and both public and private agricultural research organisations (Hall & Dijkman 2019).

Achieving food systems transformation and transformative adaptation

We have proposed the need to incorporate individual agency and self-actualisation into food systems transformation, as a counterpoint to the more common focus on institutional and policy change. What evidence is there that such an approach can work? Certainly, the process of developing collective understandings, as outlined above, has the potential to generate bottom-up change (Mehta et al. 2021). For example, new conversations and partnerships at the local level can affect change in food systems (e.g. Freedman et al. 2011);

local-level food system change can occur in response to geopolitical events and global food regime changes (e.g. Mukahhal et al. 2022); and collectively envisaged food system scenarios can lead to effective policy formation in the context of a climate response (Veeger et al. 2019, Chaudhury et al. 2013, Palazzo et al. 2017, Vermeulen et al. 2013, Vervoort et al. 2014, Rutting et al. 2021, Wiebe et al. 2018).

Do the pathways we outline here have the potential to scale sufficiently to engender system-wide transformation of food systems as a response the climate crisis? There aredefinite examples at the national level from outside of food systems. In the Netherlands, where people working for various government agencies and universities got organized to pressure their pension fund — the biggest in the country — to divest from fossil fuels, which they recently did (Rutting et al. 2022). Another example of internally driven change comes from Honduras, in the wake of the destruction caused by Hurricane Mitch in 1998 (McSweeny and Coomes 2011). Household-level innovations in land management spurred by the natural disaster spread from household to household, eventually resulted in a shift to system built on more just land distribution and protected forest areas that proved much more resilient when a similar flooding occurred a decade later (McSweeny & Coomes 2011, Westley et al. 2011)

There are also a number of examples of specific food systems transformations that resulted from internally-driven change, as documented in Pereira et al. (2023). In Costa Rica, more ambitious mitigation goals were included in the Intended Nationally Determined Contribution (INDC) due an inclusive process where transformation was envisioned. The INDC team engaged with researchers, asking them to set up a participatory process for exploring futures that ultimately helped them demonstrate public aspiration towards an ambitious goal. A somewhat similar example is presented in the same reference for Ghana, where national science-policy dialogues resulted in policy, strategy and programme advancement. Pereira et al. (2023) also provides an analysis of both barriers to change and means of overcoming those barriers.

Despite the examples provided here, the ability of internally driven change to foster national-to-global food systems transformations is far from guaranteed. Fostering and maintaining local-level initiatives that can scale up to the national level has significant challenges. For example, whilst food hubs have seen growth in recent years, and can contribute to food system resilience, support beyond current levels is needed to ensure longevity (Neuman and Sharp 2023). However, there is at least some cause for optimism. First, there is evidence that societal tipping points can, during peak mobilisation events at least, occur when just 3.5% of a national population is actively engaged in protest to effect change (Christensen et al. 2013, Chenoweth 2020). Platforms for engagement and exchange could be used to scale up individual and community action. Indeed, the internet and social media systems are increasingly used as a resource for the forming of shared understandings and actions (Foodtank 2022, Earl & Kimport 2013). If the associated challenges of misinformation, echo-chambers and filter bubbles that arise from power and agenda processes can be addressed (Rhodes 2022), then these platforms offer significant potential for a transformative approach to the climate crisis.

A second cause for optimism is that the cultural shifts can result from positive feedbacks across scales (and thus across the quadrants of Fig. 1). For example, modelling results suggest that dietary shifts away from meat result from interactions between social norms and self-efficacy, findings which "stress the importance of value-driven actions motivated either by intrinsic identity or by group dynamics" (Eker et al 2019). A similar result can be seen in the field of environmental psychology, with collective efficacy shown to increase pro-environmental intentions through increasing self-efficacy (Jugert et al. 2016). Self-efficacy can also be increased by addressing underlying anxieties, as has been argued for the case of climate by Mortreux et al. (2023).

The framework presented here offers a lens through which to consider the complexity and challenge of transformation to sustainability; transforming food systems as part of a radical response to the climate crisis. It does so by looking at who can, who will, and who should act as an agent of change, and how change can be fostered. The adoption of this framework would allow us to better perceive and understand the roles played by different agents of change across system nodes, grasp the systemic consequences, and identify the blockages or enablers that can emerge in pathways of transformation to sustainable and equitable climate futures. There are many pathways for change –internally driven change can not only occur through the routes we have focussed on here, but also through engendering large-scale structural change. We believe that the framework contributes to the emerging literature on how to foster societal transformation in different contexts (Fisher *et al.* 2022) and especially the growing number of bottom-up examples of transformative climate change adaptation. Mehta *et al.* (2021) refer to these examples as "*socio-ecological bright spots*" or '*patches of transformation*" that can inspire "*transformative societal changes that can be scaled up and out*".

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