

Reflections on the project *'45 actions to orient food systems towards environmental sustainability: co-benefits and trade-offs'*

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The project ran from September 2021 to February 2023, and was conducted at the Centre for Food Policy at City, University of London, with funding from the Swiss Agency for Development and Cooperation. Alessandra Roversi provided guidance and support on behalf of the SDC.

The main outcome of the project has been the publication of a Research Brief titled *'45 actions to orient food systems towards environmental sustainability: co-benefits and trade-offs'*. The Brief, and the accompanying list of references, can be found here, under the 'Centre for Food Policy publications' tab: <https://researchcentres.city.ac.uk/food-policy#unit=publications>.

This document has three main goals: (i) to place the core argument at the heart of the project in the context of a wider literature; (ii) to provide more insight into the choices we made in developing our approach; (iii) to offer ideas on how researchers could expand on our work.

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Why is this research important, and what context does it fit in?

Food systems generate intense pressures on the environment. To mitigate or eliminate these pressures, or even turn food systems into a driver of positive environmental change, massive change is needed. The scientific community has already identified how this change could broadly look like and what main goals it should pursue. These three statements are all true (see for example Searchinger et al., 2019; von Braun, Afsana, Fresco, & Hassan, 2021), and yet most of the

recommendations made by major international reports that call for transformative change in food systems are not transformative at all, or remain too vague and ambiguous (Slater, Baker, & Lawrence, 2022). Our own reading of several of these reports showed that calls for urgent action often lack clarity over (i) who would need to act, (ii) through what policy mechanisms, and (iii) how these interventions could be applied to different contexts. Policymakers around the globe are asked to intervene and steer food systems in a new direction, but they are not given accurate enough instructions to do so.

Compounding this deficiency, recommendations and calls to action in the literature are rarely accompanied by examples of what trade-offs could result from implementing them (Campbell et al., 2018). Where researchers do look at trade-offs, we noted that they mostly focus on analysing trade-offs across broad goals, not across specific actions or policies that can be implemented to pursue those goals (Brouwer, McDermott, & Ruben, 2020). More work has been done, on the other hand, on the potential co-benefits that may accompany a given intervention, but these analyses suffer from a lack of standardization in their approach (Mayrhofer & Gupta, 2016), or have not been able to impact policymaking at the needed scale yet (Karlsson, Alfredsson, & Westling, 2020). The lack of methodical, rigorous focus on the potential co-benefits and trade-offs of specific policies/actions leaves policymakers with an incomplete picture of what a sustainable transition will look like. This makes it harder to approach the process of policymaking from a systemic perspective and leads to a siloed approach to food systems change (Ericksen, 2008).

What was, and is, our core argument?

We argue that to make food systems more environmentally sustainable, researchers need to provide policymakers with concrete, detailed recommendations informed by scientific evidence, and analyses of their potential trade-offs and co-benefits. It is a self-obvious truth, but worth repeating, that change in food systems happens all the time: systems as complex as these do not wait patiently for policymakers and stakeholders to come up with a perfect response to every problem. This change can be to a certain extent managed, or steered in the desired direction, but we argue that doing so requires knowing what intermediate steps have the potential to lead to the goals that are being pursued and which co-benefits/trade-offs could manifest in the process.

What we did

We compiled a list of 45 actions, extracted from evidence-informed international reports¹, that have the potential to reduce the negative environmental impact of food systems, improve the positive

¹ (Bossio et al., 2021; Mbow et al., 2019; Pharo, Oppenheim, Laderchi, & Benson, 2019; Searchinger et al., 2019; Smith, Benson, Ewer, Lanel, & Petykowski, 2021; Steiner et al., 2020; TEEB, 2018; von Braun et al., 2021; Willett et al., 2019)

impact, or both, across five environmental dimensions: GHG emissions, chemical pollution, freshwater resources, biodiversity, and soil health (Caleffi, Hawkes, & Walton, 2023). For each action, we also assessed how they could potentially generate a co-benefit with diets/nutrition, and what potential trade-offs across any dimension could manifest, according to the literature. Those who study and do work in food systems will be familiar with many of the actions, co-benefits, and trade-offs presented. What is novel in our work is the combination of all three elements in a compact and accessible format, and the methodology we employed to identify them – which is detailed in the Research Brief we published in January 2023 (Caleffi et al., 2023). Our research provides an example of how assembling an accessible short guide for policymakers and stakeholders that translates existing evidence in detailed recommendations can provide the basis for more concrete discussions on what can be done to make food systems more environmentally sustainable.

What we found

While compiling the list of actions, with co-benefits and trade-offs, we found that:

- (i) There is significant potential to transition to more environmentally sustainable food systems.
- (ii) Positive environmental change could generate significant trade-offs in certain contexts.
- (iii) Co-benefits between environmental outcomes and diets/nutrition are possible, but they will often require systematic and intentional efforts from the outset.
- (iv) Major global reports that offer recommendations on how to make food systems more environmentally sustainable often use vague and ambiguous language.
- (v) Many recommendations found in major global reports on food systems are mostly or only relevant to high income countries.
- (vi) Major global reports on food systems rarely explicitly discuss trade-offs or potential negative consequences that could arise from implementing many of their recommendations.

Our approach to identifying actions: strengths and weaknesses

We used a consistent methodology to identify, extract and phrase the actions presented in our Research Brief (Caleffi et al., 2023). The actions derive from explicit recommendations made in major evidence-informed international reports, and all exhibit a viable pathway to positively impact the environment across at least one of the five environmental dimensions we assessed². While remaining as faithful as possible to the intent and phrasing of the original source, we wrote each recommendation following a coherent structure, ensuring they are action-oriented and that they

² GHG emissions, chemical pollution, freshwater use/resources, biodiversity, soil health.

draw an explicit link between the strategy of the recommendation and the impact it could have on the environment – while providing examples of tactics for implementation if possible. Focusing only on recommendations that meet our stringent criteria allowed us to produce an action-oriented list that can spark concrete discussions on the options currently at the disposal of policymakers around the world. At the same time, this approach also led to some limitations.

Firstly, not all our actions are accompanied by a specific policy mechanism. We included one only when the original source made explicit reference to it, using generic verbs such as ‘adopt’ otherwise. This lack of specificity reflects the vagueness of the language used by some of our sources when making recommendations and reinforces our argument that we need to provide policymakers with better information (Béné et al., 2019; Deconinck, Giner, Jackson, & Toyama, 2022). What are the best tools at their disposal to achieve environmental targets? We recognise that this lack of specificity could simply be reflecting the desire of researchers to offer guidance that is applicable at a global level. Given the different forms of government and resources that are represented across the world, attaching a specific policy to all recommendations might make them immediately less relevant to contexts where that specific policy is inapplicable or not relevant. But we argue that it is important to at least offer examples or options to policymakers, and we see scope for expanding on our work by picking a small sample from the 45 actions and then identifying the most suitable policies they could be linked to in specific regions or countries.

Secondly, our actions have a ‘technical’ profile and do not explicitly address structural issues or underlying power dynamics. Our goal was to offer policymakers a menu of options to make food systems more environmentally sustainable, but our call to action is not framed within a defined political approach to changing food systems – such as Agroecology, for example. The actions can and should be combined in different permutations depending on the context, to achieve maximum efficacy, but as separate potential interventions, they do not fit into a single overarching narrative of what their aims should be beyond improving the environmental impact of food systems. We believe that they should be implemented through participatory processes that empower all stakeholders, and without disregarding local contexts and livelihoods. While our focus on purely technical actions can be seen as limited, we recognise that policymakers around the world work in very different conditions, political frameworks, social hierarchies, and may often have limited scope for addressing existing power structures in their daily work. This is why our objective was to propose a menu of options that offer all policymakers – regardless of the system they operate in, information on what strategies and tactics they could implement to make their food systems more environmentally sustainable.

The need for systemic thinking, or why it is important to assess co-benefits and trade-offs

One of our aims has been to produce an example of food systems thinking ‘in practice’. While there is now agreement among many stakeholders that we need to apply systems thinking to food systems, there are still too few examples of how this is done in practice (Brouwer et al., 2020; Ericksen, 2008). We argue that assessing potential co-benefits and trade-offs when making recommendations to policymakers is a step in this direction. Mapping out all the potential dynamic interactions within a complex system is impossible, but providing at least some examples – based on the literature, or on expert opinion/interviews, or on modelling, etc. – can help stakeholders think from the start about the potential implications of any policy or action beyond its main intended purpose (Brouwer et al., 2020). The co-benefits and trade-offs in our work are presented alongside each action in our list precisely to prompt policymakers to think systemically about environmental sustainability.

The examples in the list are not exhaustive and do not represent a fixed outcome that would manifest under any circumstance. Specific co-benefits and trade-offs for each action will depend at the very least on the context, the chosen policy mechanism, and the tactics used for implementation (Bustamante et al., 2014). Furthermore, a co-benefit or a trade-off could manifest across different points in space and time; an action may generate an immediate trade-off that then dissipates with time, while a co-benefit could emerge years or decades later, and vice versa (Ericksen, 2008; Jagustović et al., 2021). Even more importantly, stakeholders should always ask the question ‘co-benefit/trade-off *for whom*’? The same action could impact different groups and communities in radically different ways – to the point that a person’s trade-off may be someone else’s co-benefit. We argue that for this reason policymakers should take responsibility for, and *own* co-benefits and trade-offs. That is, they should make explicit choices about them when designing policy interventions, based on the specific context they find themselves in, rather than taking co-benefits, and especially trade-offs, as given and unavoidable outcomes that can be discounted or ignored.

Finally, researchers seem to focus much less on trade-offs than they do on co-benefits, or ‘win-win’ solutions, or synergies, etc. Only two of the reports from which we extracted actions explicitly referred to potential trade-offs when discussing how to implement some of its recommendations, but none of them had an explicit framing of or discussion on trade-offs. In most cases, the reports presented their calls to action as incorporating several objectives at once by design (e.g., promoting ‘healthy and sustainable diets’), and highlighted their positive impacts only. It is understandable that when making recommendations to policymakers and stakeholders, researchers want to focus on the potential rewards, to show the benefits that would result from implementing them. However, this

risk obscuring the costs that we might need to pay to deliver a sustainable transition in food systems (Campbell et al., 2018). We argue that ignoring the trade-offs doesn't make them disappear, and that policymakers should be given some examples of what additional undesirable outcomes might manifest, so that they can be taken into account during the policymaking process.

Our approach to identifying co-benefits: strengths and weaknesses

Early in the project, we assessed through a quick scoping review of the literature how the concept of co-benefit is used, and what methods to identify them were available. We found that there is no single agreed upon definition of co-benefits (Mayrhofer & Gupta, 2016), and in fact that the term (and its synonyms or related concepts, such as 'win-win') has a wide range of uses and is employed in several disciplines (Floater et al., 2016). The term co-benefits is now most often related to climate policy, and most empirical studies on co-benefits involve some form of modelling or quantification relevant to this space (Karlsson, Alfredsson, & Westling, 2020). Building on this work, large international institutions have tried to incorporate the concept of co-benefits into their work and to provide standard definitions. Following the recommendation made by Karlsson and colleagues (2020), to define co-benefits within the context of our project we built on the definition provided by the IPCC in their 2018 report (Intergovernmental Panel on Climate Change, 2018). We defined co-benefits as *'The positive effect(s) that a policy, action, or measure aimed at transitioning food systems towards greater environmental sustainability could have on nutrition and/or vice versa, thereby increasing the total benefits for society and/or the environment'*.

There is no single methodology that can be applied to identify co-benefits related to the implementation of specific policies. Overall, we found that researchers mostly relied on methodologies that can be grouped into six main categories, with differences relating to what resources were available and on if the analysis was being done ex-ante (potential co-benefits) or ex-post (co-benefits that have already manifested): expert analysis/deliberation; academic literature review; policy documents review; stakeholder/policymaker interviews; modelling; multi-criteria decision analysis. Our objective was to assess potential co-benefits between environmental sustainability and nutrition by comparing two specific sets of actions/recommendations: the 42 actions for improving nutrition identified by the Centre for Food Policy in 2020 (Hawkes, Walton, Haddad, & Fanzo, 2020), and the 45 actions for improving environmental sustainability that we identified during this project (Caleffi et al., 2023). This allowed us to consider potential co-benefits between diets and the environment in the context of a set number of specific actions, which all have clear pathways to impact, and which are all targeting explicit dimensions³. Given our resources and

³ The 45 environmental actions all aim to improve the net environmental impact of food systems across at least one of these five dimensions: GHG emissions, Biodiversity, Chemical pollution, Freshwater use/resources,

time constraints, and that we were focusing on two specific sets of actions, we decided to engage in a theoretical exercise to assess *how could* actions that aim to make food systems more environmentally sustainable generate a co-benefit with nutrition. The methodology is described in the research brief we just published (Caleffi et al., 2023), and it essentially relied on comparing the pathways to impact of all actions across the two sets, trying to establish how could implementing one environmental action make it easier for one of the nutrition actions to achieve its targets – or how it could reinforce it. These co-benefit assessments are based on our deliberations – which were in turn informed by our reading of the sources and of the wider literature. However, they should not be taken as an assessment of what would surely happen, or of what has concretely happened in every case where any of the actions have been implemented.

To our knowledge, our effort to identify co-benefits by explicitly comparing pathways to impact across two specific sets of policies/actions is a first in the wider literature. In our reading of the literature, empirical co-benefit assessments mostly focused on very narrow – and important – climate related issues (see for example Chae, 2010; Kim et al., 2018; Ma, Y., Wang, Wang, Liu, & Zhang, 2019; Ma, Z. et al., 2013; Zhang, Wang, Bai, & Han, 2013), while studies that take a broader approach or do not focus on easily measurable quantities, such as GHG emissions, tend to assess interactions at the goal level, and not at the level of specific policies and measures. For example, the excellent guide to SDG interactions published by the International Council for Science (2017) introduced a scoring mechanism that can be used to evaluate the interactions among SDGs, using a combination of expert deliberation and published literature.

While the co-benefits we identified are not based on expert deliberation or peer-reviewed research in all instances, and while they do not always relate to easily quantifiable measures of impact, we have tried to show how researchers can take a more methodical approach to evaluating co-benefits. We argue that at a minimum, researchers should explicitly address the framework they use to reflect on interactions across policies/actions, and if they engage with the concept of co-benefits/trade-offs they should clearly define them within the context of their study and describe in detail the methodology used to identify them.

Researchers could expand on our work by identifying which co-benefits would be more likely to manifest based on the policy mechanism that is used to implement each action, and by quantifying

Soil health. The 42 nutrition actions all aim to improve nutrition by increasing/decreasing the Availability, Affordability, Accessibility, Appeal of more nutritious foods/less nutritious foods, with the four A-s representing the dimensions that the nutrition actions are targeting.

the ‘strength’ of each potential co-benefit – building for example on the scoring mechanism introduced for SDGs interactions (International Council for Science, 2017).

Our approach to identifying trade-offs: strengths and weaknesses

From early on, Members of our Advisory Board highlighted that some of the actions had the potential to cause substantial harm to communities and individuals if implemented without care in certain contexts. Further conversations with more external experts confirmed this and prompted us to include an assessment of these risks in our project. For our analysis of potential co-benefits, we were exclusively interested in the interactions between environmental sustainability and nutrition, leading us to develop a methodology that focused on comparing two specific sets of actions/policies across these two domains. With regards to trade-offs however, we were interested in assessing their potential to manifest across any dimension – not just along the environment-nutrition axis, to account for those risks that go beyond the nutrition sphere. For this reason, we decided to conduct a rapid literature review to identify potential trade-offs, casting a wide net and using both peer-reviewed and grey literature, and adopted a looser definition of what a trade-off is in the context of our project – building on the one we developed for co-benefits. We defined trade-offs as *‘The negative effect(s) that a policy, action, or measure aimed at transitioning food systems towards greater environmental sustainability could generate across any dimension, thereby decreasing the total benefits for society and/or the environment’*. This approach allowed us to identify trade-offs across a wide spectrum, ranging from the usual yield/price fluctuations to gender imbalances (see for example Beuchelt & Badstue, 2013), increases in inequality (see for example Chomba, Kariuki, Lund, & Sinclair, 2016), increases in health risks (see for example Wekesah, Mutua, & Izugbara, 2019), etc.

While we were able to identify at least one potential trade-off for all but three of the 45 actions, we found it hard to find published evidence of trade-offs related to single, specific actions to make food systems more environmentally sustainable (even at a general level, see Campbell et al., 2018, who complain about the lack of focus on trade-offs in discourse around the SDGs). In most cases, as these actions or policies are presented as a way to improve the current situation and deliver a benefit, our experience is that researchers present them by focusing on the environmental gains, and very little on the potential trade-offs. This prompted us to search for trade-offs in a very diverse range of sources, from advocacy documents written by NGOs to very technical peer-reviewed papers. In the few examples we found in which researchers compiled more extensive groupings of trade-offs, the analysis was either limited to a specific set of practices (FAO, 2021), or a geographical context (Balié, 2020), so we had to build our own dataset of trade-offs by combining evidence from multiple sources.

The heterogeneous nature of the sources we used to assess potential trade-offs makes comparing their likelihood and relevance difficult. Some trade-offs could affect entire populations on a large scale, while others would only have effect on small groups. We also have not measured how likely it is that a given trade-off will manifest, so our list presents each trade-off as equally likely and relevant. But this is, to a certain extent, the point: trade-offs will always feel relevant and likely to happen to those who are set to suffer them, and by arbitrarily making some trade-offs more relevant than others in our analysis we would have offered policymakers another skewed assessment of the impacts that a sustainability transition can have. By compiling a list of as diverse as trade-offs as possible, we aimed to help policymakers to think outside of the box and engage in systems thinking (Mausch, Hall, & Hambloch, 2020). Researchers could go further by expanding the literature review to include more recent or more specialized sources that were not included in our project, and classify/label the trade-offs according to their domain (such as Economic, Health-related, Environmental, Social, Political, etc.) in order to show which potential interactions should be studied more carefully and where the evidence gaps are (Deconinck et al., 2022).

[What did we achieve, why does it matter, and what next?](#)

We created a list of 45 explicit, science-informed recommendations to make food systems more environmentally sustainable, framing them in the larger context of their potential trade-offs and co-benefits. We combined actions, trade-offs, and co-benefits in a single, accessible, and easily readable table, available in the Research Brief published in early 2023 (Caleffi et al.) By doing this, we provided policymakers with an action-oriented and evidence-informed resource that they can draw from in their daily work, and we offered researchers an example of food systems thinking in practice. Taken individually, none of the elements in our table are brand new, or previously unreported in the literature. What is novel in our approach is the combination of individual actions, co-benefits and trade-offs that span across so many food systems domains in one resource. We argued that this integrated and systemic approach is needed now more than ever: as researchers, we need to use the available evidence to equip policymakers and stakeholders with the knowledge they need to make food systems more environmentally sustainable, and we need to challenge them to think holistically about the implications of delivering this change to the scale that is needed.

Food systems are always in flux and evolving. They are complex systems in which an astoundingly large number of variables interact each day to shape what food we grow, what food we eat, and what impacts this has (Béné et al., 2019). Constant change is in the nature of a complex system. The best option at our disposal to drive this change and guide it towards the results we want to obtain is to design and implement effective policies (Deconinck et al., 2022). But to do so, we need to provide policymakers with (i) better data (ibid) and (ii) more detailed analyses of what needs to be done, by

whom, and what would happen if we actually did it. Our work provides a blueprint for how to combine a systemic approach to food system change with a synthesis of the available evidence, and then deliver this knowledge to policymakers using action-oriented language.

Researchers who work on food systems, practitioners, citizens and all stakeholders who care about the impact our daily eating has on the planet can engage with the list of 45 actions. We made recommendations based on what the sources that met our criteria proposed, but we have been by no means exhaustive: much more could be done, and other actions could join the list. We have dedicated a whole section of the Research Brief to exploring five potential avenues for future research (Caleffi et al., 2023), and will not repeat the exact same points here in detail. In simple terms, we see a rigorous evaluation of how a subset of the actions could perform in specific contexts as the natural next step. Researchers could focus on a country or region, and use locally-collected data and input from local stakeholders to assess which of the 45 actions would hold the greatest potential for positive change. They could then assess which policy mechanisms would be more suitable given the local context, and map the potential co-benefits and trade-offs that could result. Armed with this context-specific knowledge, researchers could then make explicit recommendations to the relevant policymakers, making direct calls to action. We know that food systems must change and become more sustainable. We know that many, from individual citizens all the way to policymakers at the global level, are keen to play their role and steer food systems in the right direction. It is our responsibility to give them the information and tools they need to do so. We hope that our work will play a role, however small, to help in this crucially important endeavour.

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