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Transformations towards food sustainability using the participatory Food Sustainability Assessment Framework (FoodSAF)

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Abstract

We are facing a global food crisis: the percentage of people with malnutrition are increasing, along with devastating results for the social-ecological environments, showing the unsustainability of the currently dominant food systems. The complex set of food-related problems requires multidimensional perspectives, using inter- and transdisciplinary methodologies, to address social-ecological aspects over a mere focus on productivity. This article introduces a hands-on Food Sustainability Assessment Framework (FoodSAF) that allows non-academic actors to identify pathways for making food systems more sustainable through collective transformations in a “spiral of change”. The emphasis is on making the concept of “food sustainability” operational and applicable, by exploring transdisciplinary methodologies, encourage genuine participation of actors at the local level, and elevate their solutions in the direction of decision-making spaces, where policy makers have a key role in supporting change. The results provide evidence-based scientific knowledge for the promotion of innovation strategies and policy options that improve the sustainability of food systems with the specific aim of strengthening local food systems in a long-term process to co-create transformations.

Keywords: food systems, transformations, sustainability, food crisis, food sustainability



Description: Workshop for the analysis of the food and productive memory, in Melancía community, Casa Nova Municipality, 2019.
Photo: Aymara Llanque

A social-ecological food system crisis

The currently widespread agribusiness-dominated food systems have failed (De Schutter, 2014), as an exclusive model, which produces unsustainable externalities (James et al., 2021). Agribusiness is causing environmental problems and is depleting the world's natural resources (Chowdhury et al., 2017, EAT-Lancet Commission, 2019). The proportion of the world population that suffers from hunger and malnourishment remains alarmingly high. The 2020 UN report on the state of food security and nutrition shows that the world is not on track to achieve Sustainable Development Goal 2 (Zero Hunger). On the contrary, hunger has been rising since 2014, as well as overnutrition. The report also finds that a healthy diet is 4-5 times more expensive – on a global average - than an unhealthy diet. These findings point to the complexity and multiple crises of the social-ecological food system (FAO, 2020).

Approaches in sustainability science recognize the interactions between natural and social sciences as necessary for supporting sustainability transformations (Kates, 2011; Mårtensson, et al., 2016; Hessels & Van Lente, 2008). Scientific disciplines use different concepts, which need to be combined to address complex social-ecological systems such as food systems (Ostrom, 2009).

Furthermore, there is a scientific community that questions the transformative capacity of science, when it is not directly connected to local problems. Possibilities of transformation depend on the knowledge exchange between science and societal actors (Clark et al., 2016). Furthermore, the heterogeneous needs of different societal actors require to contextualize sustainable practices (Navarrete & Gallopín, 2012). The outcome of these interactions can help to clarify responsibilities, design mediating compensations, reduce conflicts and anticipate future trends (Van Kerkhoff, 2014).

Participation of diverse actors through the transdisciplinary co-creation of knowledge opens new possibilities for transformation (Liu et al., 2015), if such processes are understood as complex and adaptive innovation that depends on capacities to mobilize usable knowledge through social learning (Clark et al., 2016:1). In the case of food systems, the question arises how science can use participatory approaches for transformations towards food sustainability. With this article we want first, to contribute to academic debates around food sustainability. Second, we introduce a “Food Sustainability Assessment Framework” (FoodSAF)¹ for food system transformations in specific local contexts.

Participatory food system transformation

Theoretical Framework: We see food systems as a circle of activities, institutions, resources, and related actors, which goes from production to processing, distribution and consumption to waste management and nutrient recycling (Colonna et al. 2013; Rist and Jacobi 2016). The transformation of food systems towards sustainability demands a process of reflection and co-creation of knowledge (Pohl, & Hadorn, 2007), it implies dealing with relevant and legitimate rationales in an inter-scientific knowledge dialogue (Delgado and Rist, 2016).

The integration of different types of knowledge implies a mutual openness (Gargallo, 2019), an academic commitment to engage with diverse actors, to accept the interdependence of problems, and the need to address them together (Liu et al., 2015). Transdisciplinary research is a co-production process (Binder, 2015; Mauser et al., 2013; Schuck-Zöllner et al., 2017) based on the dialogue among key actors, who develop knowledge and practice science at different levels (Pohl and Hadorn, 2007). Transdisciplinary methodologies can encourage researchers to engage with other actors, and to bring their solutions to decision-making spaces. Accordingly, the FoodSAF-tool is embedded into the transdisciplinary co-creation of knowledge and transformation in a “spiral of change” (Rist and Herweg, 2016). The spiral of change starts with (a) a participatory problem definition, followed by (b) the integration of natural and social sciences, (c) the integration of non-academic actors and their knowledge, (d) a social learning process that reflects on the meaning of “development” and (e) collective action. According to this concept, the application of the co-created knowledge happens from the moment when integration starts (Jahn et al., 2012; Jacobi et al., 2020).

The Food Sustainability Assessment Framework

The composition of food systems, and their sustainability outcomes (in each of the dimensions that are described below) can be optimized with a knowledge co-creation process involving multiple perspectives, such as the voices of women who are responsible for feeding their families. For defining food sustainability, we consider five dimensions and 15 indicators that can be applied in different cultural, ecological and political contexts, and to different types of food systems:

- 1) *The Right to food* refers to fulfillment and protection of the access to all the necessary conditions to feed ourselves. Countries and their regulations must guarantee at least the following indicators: 1) non-discrimination, 2) access to information, and 3) access to spaces of effective participation in decision-making.
- 2) *Food security* is the access to safe, nutritious and permanent food supply. It implies at least: 1) food security at the household level, 2) the capacity to store and process food for times of scarcity and to assure diversity, and 3) transparent and equal power relations.
- 3) *Poverty reduction and inequality* are economic conditions of food systems that can produce changes in poverty and inequality from production to consumption, granted: 1) a livable income that exceeds expenditures, 2) access to adequate infrastructure and technologies, and 3) access to functioning and fair agri-food value chains.
- 4) *Environmental Performance* is the ability of the food system to preserve or enhance the natural environment, when 1) landscapes that are influenced by the food system are diverse and managed in a sustainable way, 2) a low amount of carbon and other harmful greenhouse gases are emitted, and 3) where there are positive effects of the food system on human, animal and plant health.
- 5) *Social-ecological resilience* refers to the capacity of a food system to withstand shocks and trends, to reorganize, to learn and to adapt with: 1) bio-cultural diversity, 2) social self-organization, and 3) learning and adaptation through a rich knowledge legacy and identity.



**Figure 1: Pentagon of food sustainability, five dimensions of evaluation.
Photo: Probioma, 2016.**

From Participatory Assessments to Transformative Action

FoodSAF is a multidimensional tool for sustainability assessments of food systems, based on the experiences of eight application examples in Africa and South America in the frame of a transdisciplinary action-research project (Rist et al. 2016). The assessment allows us to know the current state of the food system from the perspective of the actors involved. It is also a tool for planning transformation processes, monitoring the process and analyzing the scope of the plans.

Workshops for participatory assessments of food sustainability take place in groups with strategic characteristics (e.g. gender and/or institution, places in value chain e.g. farmers' and consumer groups). Also the food systems are defined geographically and can connect different scales, depending on the scope of the food system. Boundaries are fuzzy, there are connections between scales e.g. agro-industrial food systems generally reach different scales, or agro ecological food systems scale up, but by the sum of many small initiatives.

The assessment starts with a participatory mapping of the food system. This gives an idea of the actors' participation in value chains. We then assess collectively conceptualized indicators and assign them values on a scale of five values. We use a scale from 0 to 4, where 0 means ("undesirable", "0%", "very bad" or "very low") to 4 ("ideal", "100%", "very good" or "very high"). A description and discussion, and possible contextualization of each indicator is important to assure their relevance.

After jointly assigning values to each indicator, the participants develop possible solutions for solving the problems identified – or also to strengthen indicators with high values as a potential for further advancement – and agree upon specific actions. The experiences presented here took place over a period of six to nine months and include assigning specific responsibilities to local actors and researchers. Establishing a management and monitoring process is crucial to identify moments of follow-up actions and achievements during the process, as well as possibilities for re-orientation. The actions can be a combination of economic support for local initiatives and a social learning process, and can also be linked to regional and global socio-political movements.

Results

Description of case studies: So far, the FoodSAF methodology has been applied in eight food systems in total in Bolivia, Colombia, Brazil, Kenya and Zambia (Table 1).

Table 1. Eight food systems where a FoodSAF assessment was conducted and a collective action process has been taking place.

	Geographic location	Local food System	Actors involved	Main problem FoodSAF	Collective action
1	Samaipata municipality, Bolivia.	Local conventional and organic production of vegetables and fruits, for self-consumption and sale to the regional market.	Rural communities, local, vice ministry of irrigation, and NGOs.	Capacity of the system to store and process food.	Water management for sustainable food production.
2	Sucre municipality, Bolivia.	Diversified production, with mostly organic vegetable tents, for self-consumption and commercialization in local market and intermediaries.	1400 urban families, social organization, local government and Ministry of education.	Access to information.	Capacity building for sustainable food production.
3	Velez Municipality, Santander Colombia	Diversified production, focused in local and traditional self-consumption, and sale in local markets.	Part of the initiative: 10.000 farm defend themselves against mining, NGOS, University.	Effective participation, power and access to infrastructure	Recovery, exchange, adaptation and innovation of traditional knowledge of farmers.
4	Casa Nova Municipality Brazil.	Traditional diverse productive system based on the management of soil and water, for breeding goats and sheep.	Cooperative COOAF, local government and NGOS.	Source of income and expenditure.	Capacity building and brand, for participating in markets.
5	Seara municipality, Brazil	Management of a small area of land for full use, including animals	Local farmers, University, NGOs, Crediseara	Power relationships.	Promote the debate for the legalization of cheese made

		and plants, for own consumption and raw milk cheese, by informal paid in cut local circuits.	cooperative and government.		from raw milk from their farms.
6	Magobbo Community – Zambia	Traditional local food system combined with the sugarcane agro industrial system from the Zambian company Sugar Cane.	Local community, University.	Low food quality – right to food.	Infrastructure for water access and seeds distribution.
7	Umande cooperative, in Nanyuki – Kenya.	Mixed farming keeping livestock, poultry and growing a vegetables variety to local markets.	Cooperative Umande, local and regional government, NGOS.	Performance of the value chain.	Organize to improve its participation in the value chain, with new infrastructure.
8	Makueni municipality, in Kenya.	Semi-subsistence farming of vegetables, with market high demand, integrating crop production with livestock.	Local communities, NGOS.	Levels of income and expenditures.	Capacity building and infrastructure for local production.

Food sustainability analysis

We conducted a comparative analysis of the eight food systems evaluated with FoodSAF, and obtained a median value for each indicator. Overall stronger indicators include effective participation for the right to food, especially in production and consumption at the local level and food security at the household level, because the systems produce food for the households' own consumption. Environmental performance indicators such as health impacts and social-ecological resilience in terms of self-organization, diversity and local knowledge also tend to have high values, because local actors perceive their food systems to make positive contributions to the larger ecosystems.

In contrast, indicators associated with food collection, transformation and commercialization, such as the capacity to store food, tend to be low. Access to infrastructure, income levels and participation in value chains associated with poverty and inequality are also low (Figure 2), demonstrating that socio-economic factors are determining the continuity of initiatives with a high potential to increase food sustainability.

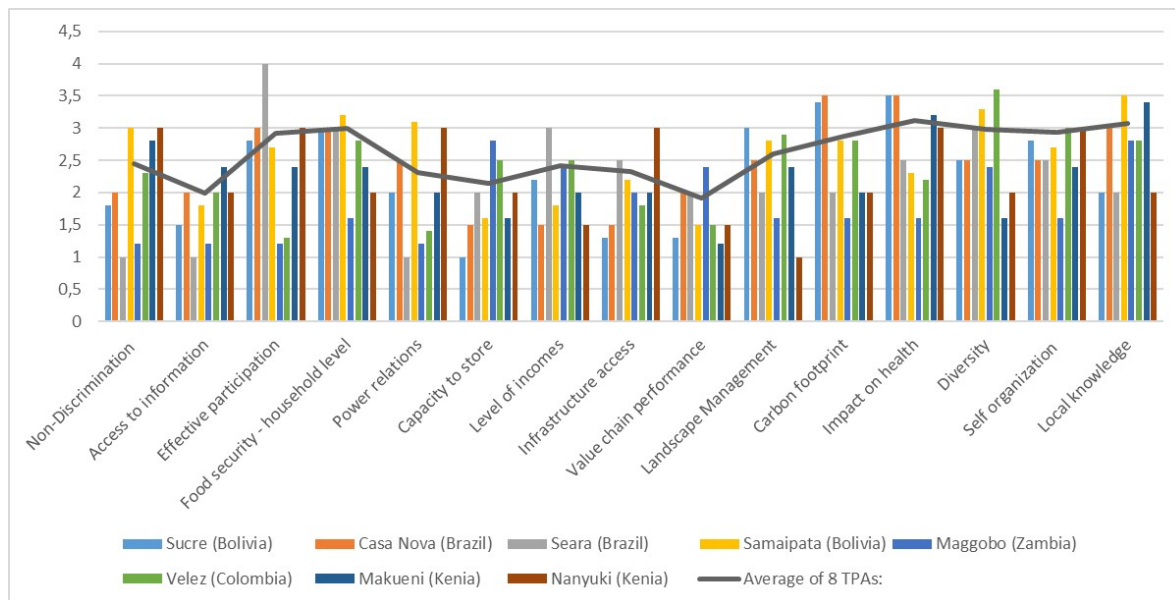


Figure 2: Ratings of eight food system case studies per indicator during FoodSAF-assessments.

Similarities between the case studies concern the importance of food production for self-consumption, while surplus can be sold or bartered. The amount of food produced is not the central problem but instead, the concentration of profits: The majority of families do not receive sufficient income and mention challenges in participating in value chains. Both of these factors combined cause severe weaknesses in the evaluated food systems, e.g. in self-organization to participate in markets.

The dimension of poverty and inequality has particularities to be analyzed in more detail. For example, income levels are comparatively high in the case of Seara, Brazil, but in most other cases, they are low. The Umande cooperative in Kenya increased their rating regarding access to infrastructure, after the transformative action had taken place and a considerable infrastructure for milk collection was constructed after the group had gained the attention of policy-makers. The example shows that organizing and investing in infrastructure can strengthen the overall food system.

All cases show that there is no justice in market access, neither for producers nor consumers. FoodSAF-assessments are often conducted by and with local producers, who are often the consumers of their own food systems, but also the providers of raw material for agribusiness value chains. While in the case study in Zambia, people depend almost entirely on food from outside of their production system, in other cases such as Sucre, Bolivia, Velez, Colombia and Casa Nova, Brazil, the locally produced diversity of food is insufficient in terms of grains and cereals, which are then consumed from agro-industrial food systems.

Innovative communities

Indicators on power relations in food security and social-ecological resilience suggest that actors from science, policy and practice in transformation processes towards sustainable food systems have an important role in strengthening the participation of marginal actors. The innovation related to FoodSAF consisted of opening spaces for negotiation on a specific transformative, local collective action for one or more indicators in the food system. Rural communities, farmers' and women's groups played a leading role in assessing sustainability and co-creating collective action. The outcomes relate to a vision of more sustainable food systems, setting up action plans for more equitable access to productive resources and better ecological practices.

Transformations resulted from strategic networks of the diversity of actors involved in the FoodSAF processes. Through their networks, they reached consumer groups, local government and administration representatives, the media, the church, credit cooperatives, national research companies, and other key actors. The participation of politicians in these processes is relevant, because public funding sources can contribute substantially to innovations. Local governments for example are sometimes participating in technical courses (Samaipata, Bolivia case study), co-financing infrastructure projects (Umande, Kenya case study), or offering spaces for marketing agricultural products (Sucre, Bolivia case study). However, there are different perspectives about the value of local food systems within local governments, which is why collective action is often linked to a demand of being heard.

The FoodSAF evaluation in eight case studies shows that the co-creation of transformation as a negotiation process with non-academic actors can enable collective actions based on a consensus. The actors involved in our case studies are often cooperatives, consumer groups, representatives of NGOs and local governments, and in some cases governmental entities. Furthermore, injustice in food systems is a serious problem and relates to topics such as discrimination, lack of diversity, dependence on an export market, contamination of the environment, labor exploitation, or unfair regulatory frameworks.

Challenges in shaping participatory processes mainly relate to enabling marginalized food system actors in a supportive and coordinated way to take part in decision-making. Negotiation processes among stakeholders that challenge established configurations, e.g. when a greater diversity of stakeholders can decide on budgets, also poses challenges.

Another determining factor for the advancement of transformation is funding. We had allocated funding of between USD 12,000 and 18,000 available for each case study as part of the overall project budget. These budgets were managed by local communities and cooperatives for the implementation of the jointly identified collective actions. The experiences showed that changes are possible in a period of up to one year even with a small budget, if this can be integrated into local resources such as work force, local inputs or finding additional funding. However, the opposite can also happen, for instance when food system activities depend on external funding that governments are not or no longer willing to provide. We based all activities in our case

studies on previous experiences or local initiatives, arguing that innovations linked to broader societal change are more likely to be successful.

Finally, the initiative also involved the creation of a global food sustainability network, composed of various academic and social actors, called the GLOCAL network², as a strategy to scale up meaningful case study messages in different contexts. It is an organizing process that influence decision-making spaces.

Conclusion

The experience of applying the FoodSAF tool both in assessment and in the creation of transformative collective action are opportunities to identify the current state of a food system and its proximity to sustainability. It is useful when it enables participatory dialogue with non-academic actors to support sustainable development. The FoodSAF approach addresses the need to optimize the outcomes of the complex interactions between food production, environmental impacts and social justice. Applying an inclusive concept of food sustainability can guide the identification of comprehensive innovations.

Another determining factor has to do with institutional agreements to generate changes at the local level and alliances of actor groups with an interest in transforming a food system. The FoodSAF-tool opens space for discussing often overlooked components of a food system, but it is insufficient if there are no sustained processes of social and political movements for food sustainability and food justice, and related multi-stakeholder negotiation processes addressing power asymmetries. The eight case studies underline the need for co-creating transformation and that the problems often relate to socio-economic aspects more than to productivity. In this sense, the transformation processes based on a FoodSAF-assessment focus on the participation of local food system actors in decision-making, especially those on the margins of food systems. This enables adaptability in the planning and use of available resources, and demonstrates that negotiation and consensus where actors participate, take over the process, and legitimize its results.

End Notes

¹ The tool called FoodSAF guide, was developed in the six year research project "Towards food sustainability: rebuilding the coexistence of different food systems in South America and Africa" financed by the SNF, in a larger consortium (UNIBE, Switzerland, The Graduate Institute of Geneva, Switzerland, COMPAS Bolivia, CETRAD Kenya, UFRRJ, Brazil, UN, Colombia, Millar Institute for Transdisciplinary and Development Studies, Ghana, and UZ, Zambia). Based on the experience gained, the project in its second phase (2017-2020) implemented a series of pilot transformation actions (TPAs), engaging directly with local communities, in order to improve the sustainability of their food systems.

² GLOCAL network: <https://redglocal.org/>

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