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Mapping Food Systems: A Participatory Research Tool Tested in Kenya and Bolivia

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Food system research requires an understanding of system actors and activities. To this end, we codesigned and conducted a food system mapping process in 2 regions, one in Kenya and the other in Bolivia, that stretches from mountains to lowlands and involves sites of interconnected food system strategies related to these habitats. We adapted an existing method of mapping local food webs to an approach that subdivides food systems into 4 subsystems: operational, political, information and services, and natural resources. Through the mapping process, a group of local and external researchers and practitioners identified the most important food value chains in the study areas. They also identified the value chains' reach, as well as related actors; flows of knowledge, information, and finance; and the natural resources the food systems depend on. A power/interest matrix complemented the mapping results with information about different actors' roles in the food systems; this can help to identify the best target groups and entry points for efforts to improve the sustainability of food systems in the diverse habitats forming part of these food systems. Mapping and a brief analysis of actors and interests are first steps toward assessing the sustainability of a food system. The participatory nature of our approach enhanced coordination between projects of research and practice and helped to increase the relevance and applicability of the mapping results and related activities.

Keywords: *Food sustainability; food system mapping; power/interest matrix; transdisciplinary research; Kenya; Bolivia.*

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Introduction

Today's unsustainable and inequitable food systems demand attention. Top-down rural development, industrial agriculture, and oligopolistic food systems have been increasingly called into question (Altieri et al 2017; IPES-Food 2017). Furthermore, the production, distribution, and consumption of food and related activities are responsible for biodiversity loss, water depletion, and land degradation and cause up to 29% of anthropogenic greenhouse gas emissions (Vermeulen et al 2012; Allen and Prosperi 2016; IPES-Food 2016). Malnutrition is on the rise, with an estimated 821 million undernourished people (FAO et al 2018), as well as 1.9 billion overweight adults, of which 672 million are obese (HLPE 2017).

Solutions for these growing and intertwined challenges require new metrics and knowledge-based assessment tools (Prosperi et al 2016; Sukhdev et al 2016). Food system research has often been based on the analysis of agrifood value chains (Kaplinsky and Morris 2001). In the context of sustainable development, however, it must also assess food access (eg, incomes and food prices), food availability (eg, local production, distribution, and sale), and food utilization (eg, social and nutritional value and food safety), as well as environmental outcomes (Ericksen 2008; Ingram 2011). Food systems in this context can be understood as follows:

> *Interdependent networks of stakeholders (companies, financial institutions, public and private organizations, and individuals) in one or various geographical areas (region, state, multinational region) that participate, directly or indirectly, in the creation of flows of goods and services geared toward satisfying the food needs of one or more groups of consumers in the same geographical area or elsewhere.*
>
> *(Rastoin and Ghersi 2010:219; translated by the first author of the present paper)*

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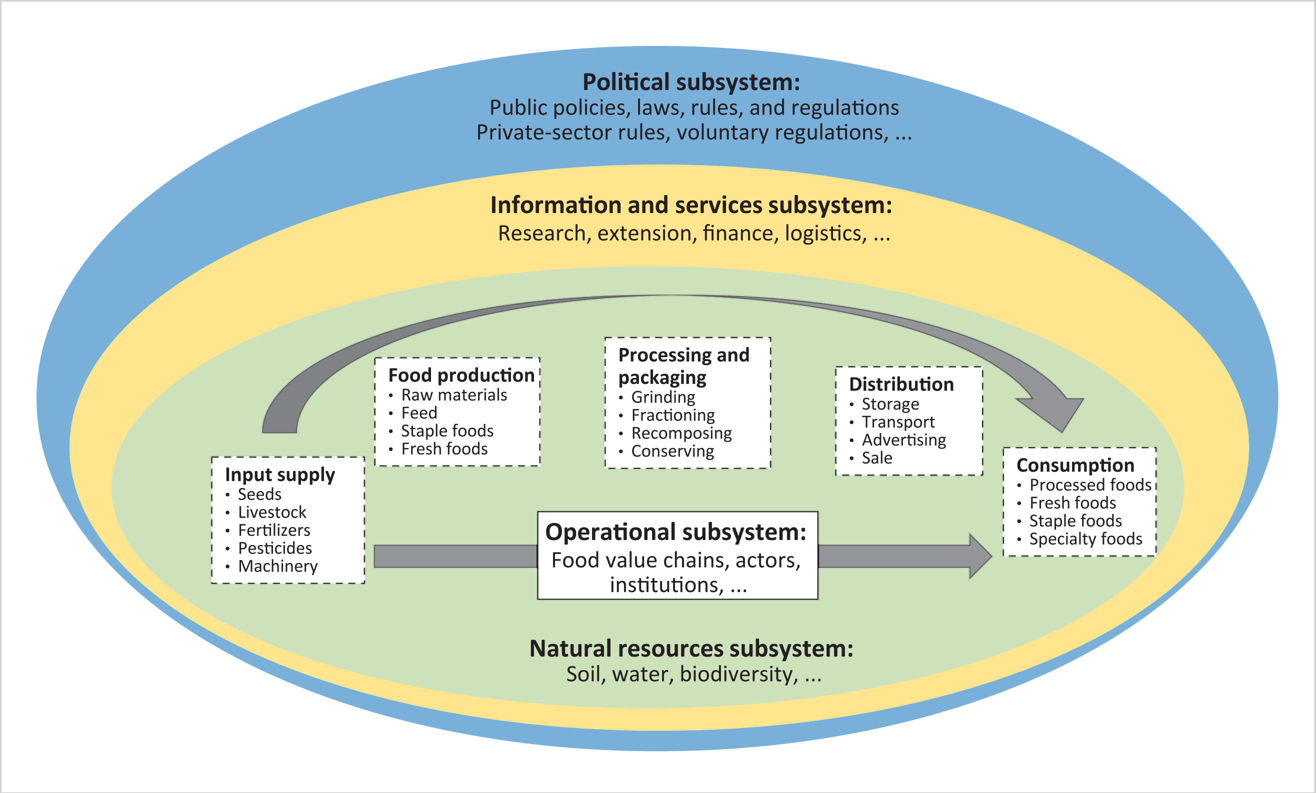
FIGURE 1 Conceptualization of a food system. (Adapted from Rist and Jacobi 2016, based on Rastoin and Ghersi 2010)



Food systems, thus broadly defined, can be divided into several subsystems—for example, following Rastoin and Ghersi (2010), into information and services (eg, research and finance), political, and natural resources subsystems that are used for the operational subsystem (food production, processing, storage, distribution, and consumption; Figure 1). The operational subsystem is the most visible part of a food system; it reveals how and where the food system is functioning or dysfunctioning, which is why it is usually at the center of food system analyses. However, addressing research questions about specific food system aspects requires an overview of their main elements. For a better understanding of the subsystems, the knowledge of the people involved in these matters is indispensable. However, external professionals have long tended to ignore such knowledge and the capabilities of their research subjects with top-down, extractive research methods and related interventions (Chambers 1994). Transdisciplinary research bringing together different knowledge systems with participatory methods has therefore become increasingly important and recognized as a means to achieve credibility and applicability of research results (Hirsch Hadorn et al 2006).

This article presents and discusses a method of mapping food systems, with the participation of different food system actors, to cocreate an overview of the systems. The method was developed and applied in 2 highly diverse tropical mountainous contexts, one in Kenya and the other in Bolivia. Both countries have an advanced constitutional framework to support the sustainability of food and agriculture. Both also have substantial food insecurity. The aim of this research was to develop an inclusive, participatory tool that creates a knowledge base for subsequent in-depth studies. A related aim that emerged during the research was to link the food system mapping tool with a method of identifying actor roles, influential actors, and power asymmetries (Reed et al 2009).

In addition to providing a deeper understanding of food systems for researchers and practitioners, the mapping method tested during this study and presented here is a tool for operationalizing the concept of food systems. It aims to enable researchers to systematically link their disciplinary knowledge with other disciplinary insights and with the knowledge of food system actors and to compare food systems. Field visits help to clarify the boundaries of the food system under study and to decide whom to interview and where to collect data. The resulting food system maps—and additional information on main actors, value chains, natural resources, flows of information and services, and policy influences—can be used to identify bottlenecks and leverage points that

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interventions or policies should address to make a food system more sustainable.

Material and methods

Study sites

The food system mapping was carried out as part of a larger research project on food sustainability in Kenya and Bolivia (Rist and Jacobi 2016). The study areas, located in the Mount Kenya region and the Andes–Amazon continuum, contain both highlands and lowlands and host high biocultural diversity (Mathez-Stiefel et al 2007; McCord et al 2015). The larger study compared food systems with diverse habitats and livelihoods connected to different ways of production and consumption to identify patterns of interactions and innovative solutions.

In Kenya, we focused on the region northwest of Mount Kenya (in Laikipia and Meru Counties), whose central town, Nanyuki, is located around 0°01′N and 37°02′E; in Bolivia, we focused on Santa Cruz Department, whose capital city, Santa Cruz de la Sierra, is located at 17°48′S and 63°11′W.

The region northwest of Mount Kenya is characterized by diverse socioeconomic and agroecological conditions, which enabled the evolution of diverse food systems. The region is dominated by Mount Kenya (5199 m above sea level), which supplies the food systems with resources such as water and volcanic soils. Rainfall decreases drastically with increasing distance from the mountain (McCord et al 2015), and with it, population density decreases from 320 inhabitants per km^2 in the fertile areas of Meru County to 42 inhabitants per km^2 in semiarid Laikipia. The fertile land and the available water on and around Mount Kenya are used for food production for both domestic consumption and export. The diverse habitats and socioeconomic contexts host livelihoods that include smallholder farming, pastoralism, large-scale wheat farming, and intensive horticulture and flower production (Lanari 2014; Zaehringer et al 2018).

The study area in Bolivia is located where the Amazon basin connects with the Andes. The 2 landscapes strongly influence each other, for example, in terms of water cycles and biodiversity (Herzog et al 2011). Migration from the Andean highlands to the fertile inter-Andean valleys and the tropical lowlands, as well as between rural and urban areas, has a long history in Bolivia. While migration is often a response to a lack of rural employment and insufficient income from production, it is also an accumulation strategy that uses the different biotopes and seasonal opportunities (Castañon Ballivián 2014). People's high mobility, combined with an extraordinary biocultural diversity adapted to the different landscapes and climates, has led to a complex mixture of food traditions and to food systems in which production, processing, distribution, and consumption are strongly characterized by highland–lowland interrelations.

Selection of food systems

In each country, in a workshop before project design and food system mapping, we identified types of food systems for investigation, together with interested stakeholders and possible project partners, following the classification of Colonna et al (2013). We selected food systems that were (1) essential to national food security, (2) essential to exports, (3) a cultural heritage, (4) a local mainstay of family subsistence, and/or (5) an emerging alternative to dominant food systems.

In the larger research project, we investigated 3 food systems in each country. In Kenya, these were an agroindustrial, export-oriented food system focusing on vegetable production for European markets; a regional food system bringing cereals, milk, and meat from rural to urban areas; and a local food system composed of small, primarily subsistence-oriented family farms. In Bolivia, they were an agroindustrial, export-oriented system based on soybeans; a domestic system managed by the indigenous Guaraní people; and a network of organic producers and consumers in and around the city of Santa Cruz, known as the Agroecological Platform for the Tropics, Subtropics, and Chaco. As examples of food system mapping, this article focuses on the agroindustrial vegetable export system in Kenya and the Agroecological Platform in Bolivia. For information about the other food systems, see Rist et al (2016).

Food system mapping

To develop a joint understanding of the key features of the food systems under study, interdisciplinary teams of student researchers, senior researchers, and other stakeholders in Bolivia and Kenya developed a method of participatory food system mapping inspired by the *Mapping Local Food Webs Toolkit* of the Campaign to Protect Rural England (CPRE 2012). The method consists of an iterative process of reflection and discussion between the research team and the key stakeholders of a given food system, in which they jointly identify the system's main features—such as its most important actors, activities, benefits and externalities, and geographical spaces.

Our mapping starts at the food system's production stage. Starting the journey at the production stage provides an understanding of how a food system is embedded in geographical spaces and ecosystems—that is, it sheds light on the food system's operational subsystem and its natural resource base. It also provides an idea of how these are linked with the political subsystem, which comprises the most relevant public and private policies affecting the food system, and with the information and services subsystem, which influences modes of production; knowledge about agriculture, food, and nutrition; marketing; and other factors.

Food system mapping composed the following 4 steps:

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TABLE 1 Food system actors that actively participated in or were visited during food system mapping.

	Kenya: Agroindustrial, horticulture-based food system	Bolivia: Producer–consumer network (Agroecological Platform)
Agricultural inputs and production	Syngenta Foundation for Sustainable Agriculture	Biopesticide producer Probiotec, local agroecological organization Probioma, Heifer International, Simón I. Patiño Foundation
	Agrovet store shopkeeper, Nanyuki	
	Horticultural farm, Nanyuki	
	Flower farm, Nanyuki	
Processing and storage	Agricultural Sector Development Support Programme, Laikipia County	Agroecological farm and school Colonia Piraí, two local farming families
Distribution and trade	Nakumat supermarket	Farmers market, agroecological fair, small shops Tiendita Natural and Naturalia, supermarket Hipermaxi
	Roadside market	
Consumption and recycling	Two small-scale subsistence farming families, Nanyuki	Consumer representative of the network, restaurant La Casona

1. We began by preparing large printouts (DIN A0, 841 × 1189 mm) of topographical maps or Google Earth images of the study area and smaller copies (DIN A4, 210 × 297 mm) to be taken to the field.
2. Bringing along the topographical maps or Google Earth images, we visited food system actors (listed in Table 1), identified by means of snowball sampling, and sought to identify their role in the system and the value chains they participated in by asking them about the main actors, activities, and places involved in the purchase and sale of products and inputs. We also visited the key locations of food system activities (eg, farms, mills, shops, restaurants, and homes) to better understand the geographical scope of the food systems; the related flows of goods, information, and services and the political context influencing these activities; and the type and scope of the system's natural resource base. To ensure traceability for subsequent documentation, we marked the locations visited and the routes that the food traveled on the small maps. We took 3 days for each field visit to a study area.
3. After the field visits, we organized a systematization workshop of 1 to 2 days in each study area with interested stakeholders, during which we created a large map of each food system. In 3 groups—1 for each food system—researchers and stakeholders jointly systematized the information gathered during the field visits. By placing markers, images, and drawings on the larger map or image generated in step 1, each group created a visualization of its respective food system. Each group also drafted a text explaining the map features and providing background information. The maps were then presented and discussed in a plenary session.
4. After the mapping experience in Kenya, we decided to add a new element in Bolivia: power/interest matrices, which characterize the main actors in each food system based on their level of power (eg, access to resources, knowledge, and influence) and their interest in increasing the food system's sustainability (Reed et al 2009). We collected actors' names on small cards, which we then positioned on a large sheet of paper, with a y-axis showing power and an x-axis showing interest in increasing the food system's sustainability. Each actor's placement was discussed in the group, which produced an explanatory text to accompany the matrix.

The boundaries of a food system vary from topic to topic. Research on the political subsystem analyzes national policies and looks for global links. For example, Kenyan policies influencing the country's food systems are shaped by norms set in the European Union's Common Agricultural Policy. National and international policies in turn shape policies at the subnational level, such as the county level in Kenya. Subnational policies often focus on improving small- to medium-scale farmers' access to the information and services subsystem, in terms of capital and retail markets and productive infrastructure, which is either self-financed or financed via alliances with nongovernmental organizations or private businesses.

Results and discussion

Overall mapping results

Mapping enabled us to visualize how different habitats within a larger region are connected to different strategies and different food systems. In Kenya, it showed how the flower and horticultural farms around Mount Kenya compete with other actors in national and local food systems (eg, large-scale cereal farms and cattle ranches and smallholder farmers) for the fertile land and

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FIGURE 2 Map of an agroindustrial food system: input-intensive horticulture in the Mount Kenya region, drawn in October 2015. Mount Kenya (lower right) is shown as the center of the natural resource base. (Map created by the researchers and stakeholders)

water that the mountain provides. In Bolivia, it showed the close interconnection between the highlands and the lowlands. The diverse habitats and an elevation range of about 1200 m enable production of various foods, which are traded and consumed along the highland–lowland continuum. The area has high agrobiodiversity—from Andean root crops to tropical fruits—and a diversity of traditional dishes and nutritional knowledge, which are linked to the habitats and cultures influenced by the migration history.

Making such interrelations visible is important for supporting different groups of actors with differing bargaining power in developing strategies to access and sustainably use limited and often dwindling natural resources while using the diversity of socioecological systems that the pronounced topographical and climatic differences offer.

Map of an agroindustrial food system in Kenya

The agroindustrial food system selected for study in Kenya (Figure 2) is built around a global value chain that links production sites in Laikipia and Meru Counties with distant consumer markets in Europe. Its operational subsystem contains the following elements: most vegetables and herbs for European markets are produced on horticultural farms like the one we visited in Nanyuki (Figure 3), which have about 10% permanent and 90% casual employees. Up to 80% of the casual workers are women; they are employed on short-term contracts and earn a minimum daily wage of 240 Kenyan shillings (US$ 2.35). Contract farmers, also known as outgrowers, likewise produce vegetables for export. Contracts are usually made with farmer groups or individual farmers who have at least 10 ha of land, but some companies also work with farming families that have less than 2.5 ha.

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FIGURE 3 Horticultural farm in Nanyuki, Kenya. Left: application of pesticides; right: grading of bok choy. (Photos: left by H. Augstburger, right by J. Jacobi)

The produce—runner beans, garden peas, snow peas, green and yellow fine beans, bok choy, basil, chives, green onions, and others—is grown exclusively for export and graded according to a strict process in line with international standards such as GlobalG.A.P., Tesco Nature's Choice, and Marks & Spencer Field to Fork. Produce that fails to meet the grading standards is rejected and disposed of at the horticulture farms or returned to the outgrowers. Vegetables and herbs that are highly perishable are transported in a cold chain and within the shortest possible time after harvest and packing to maintain quality and extend shelf life in the destination markets. Insulated refrigerated trucks are used to transport the products from the farm gate in Laikipia or Meru County to the capital, Nairobi, for holding and forwarding by airfreight to Europe.

The political subsystem influences the conditions of production—for example, through restrictions on river water extraction and rules requiring water users to maintain community pipes passing through their property. The Laikipia County Agricultural Sector Development Support Programme, the Kenya Plant Health Inspectorate Service, the Kenya Bureau of Standards, the Horticultural Crops Directorate, and the Water Resources Management Authority are key actors that regulate safety and quality standards, as well as access to and use of water for horticulture production.

An important actor in the subsystem of information and services is the Syngenta Foundation for Sustainable Agriculture, which advises outgrowers on the use of agrochemicals, links farmers to markets, certifies seeds, helps farmers meet certification standards, and established the Savanna Fresh Horticulture Society, which sells exclusively to a single company, Mara Farming Limited, which buys, packs, transports, and organizes the export of produce.

Participants in the mapping pointed to international political and economic influences that we were unable to address with the mapping tool. To explore these influences, we drew on a study of the influence of international trade regimes on Kenya's food systems. That study concluded that since Kenya's adoption of structural adjustment programs in the 1980s, cash crops for export have been prioritized over food production, making Kenya a net food importer. At the same time, the multiple trade agreements that Kenya has signed have not substantially increased market access for Kenyan products in the partner countries (mainly because of nontariff trade barriers that these countries have maintained), but they have opened up Kenya's food market for cheap imports of subsidized food and other agricultural products (Kiriti Nganga and Mugo 2018).

The natural resource base of this food system consists primarily of land and water. For example, the horticultural farm in Nanyuki that we visited has 47 ha of farmland on soils that, according to study participants, are among the best in the region and access to river and borehole water, although rainwater harvesting is also practiced to a limited extent. Land and water are arguably the most heavily contested natural resources in the region northwest of Mount Kenya (Dell'Angelo et al 2016).

The mapping fieldwork drew our attention to the ways that people have adapted to ecological conditions over time: seminomadic pastoralists from different ethnic groups have traditionally moved, depending on the availability of water and pasture, toward and from Mount Kenya within communally governed territories. Participants explained how different forms of land use—such as large, private landholdings emerging since the start of the colonial era; small-scale farming plots after independence; and protected areas—have caused conflict over natural resources. However, innovative strategies, for example, in water governance, have also been developed (Kiteme and Wiesmann 2008; Dell'Angelo et al 2016; Kaeser 2018). The mapping also sensitized the whole group to how strongly the different food systems are intertwined in terms of natural resources that depend on Mount Kenya (especially regarding water, but also soils,

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FIGURE 4 Map of an agroecological food system: the Agroecological Platform, a producer–consumer network in Santa Cruz Department, Bolivia, drawn in November 2015. (Map created by the researchers and stakeholders)

habitat diversity, and other resources), besides many links in the operational, political, and information and services subsystems (Kaeser 2018).

Map of an agroecological foood system in Bolivia

The Agroecological Platform in Bolivia (Figure 4) is a network of producers and consumers in and around the city of Santa Cruz de la Sierra. They are united by what they call an "identity label," which is granted through low-cost mutual certification, based on criteria that are redefined in frequent meetings of the platform's around 30 institutional and individual members. Through this certification label, which declares a product agroecological, the food system differentiates itself from others, especially the industrial food system, by not using pesticides or chemical fertilizers or practicing deforestation or monoculture.

The operational subsystem consists of producers (family farms, as well as other models such as foundations) that use the diversity of habitats along the main road connecting the lowlands around Santa Cruz de la Sierra to the near highlands around Samaipata to produce fruits, vegetables, coffee, cocoa, bread, juices, and other processed products. They are connected to small shops (eg, La Tiendita Natural and Naturalia) and one major supermarket (Hipermaxi) in Santa Cruz de la Sierra, a range of restaurants and bakeries, and consumers who support the network by participating in the meetings and helping to organize a weekly farmers market. The restaurants and markets offer a colorful mix of food traditions that reflects the diversity of habitats in the study area: agroecologically produced coffee from the mountain regions is sold alongside juices and frozen pulp made from tropical fruits such as *copoaçu,* a fruit from the cocoa family that grows in the lowlands. This mix of products also reflects the merging food traditions of migrants from the mountains and people of the lowlands—for example, when freeze-dried potatoes, known as *chuño,* are served with dishes made from cassava.

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FIGURE 5 Agroecological Platform initiatives in Bolivia. Participants in a farmers market; inset top left: the platform's certification label. (Photo and label by Probioma)

Maintaining and enhancing the diversity of crops and dishes from Bolivia's tropical (lowlands), subtropical (mountains), and Chaco (lowlands and hills) regions is a declared goal of the Agroecological Platform.

In the subsystem of information and services, the platform has a range of important actors. The educational center Colonia Piraí trains producers in agroecological farming methods, particularly crop rotation, cover crops, mixed cropping, inclusion of small animals, management of pests and diseases without chemical pesticides, and agroforestry. The agroecological input provider Probiotec sells biopesticides (eg, based on *Trichoderma* or *Bauveria*) and organic fertilizers to farmers who are practicing or transitioning to agroecological production. Development organizations like Heifer International support the network with capacity building, and others, like the Simón I. Patiño Foundation, provide financial resources. The nongovernmental organization Probioma has a leading role in organizing regular meetings, farmers markets, and the certification process (Figure 5).

The platform's natural resource base consists of comparatively small production areas (around 3 ha on average) and, in most cases, water for irrigation. Irrigation distinguishes the platform's production systems from many others in Bolivia, such as corn or wheat, which are rainfed.

Power/interest matrix of the Agroecological Platform

During the mapping fieldwork and workshops in both countries, the issue of power relations was raised repeatedly. Therefore, we complemented the mapping workshop in Bolivia with an assessment of the most important actors in the food system, their decision-making power, and their level of interest in the sustainability of the system. The results were portrayed in a power/interest matrix (Figure 6). Among the actors influencing the Agroecological Platform, the educational center Colonia Piraí and the agroecological input provider Probiotec had strong interest but low to medium decision-making power because of limited funds and limited areas of influence. By contrast, political actors that have major decision-making power at local to national levels (eg, municipal governments and the National Agriculture and Forestry Innovation Institute) have hitherto shown little interest in the Agroecological Platform. This means that the political subsystem provides little support for agroecological production and

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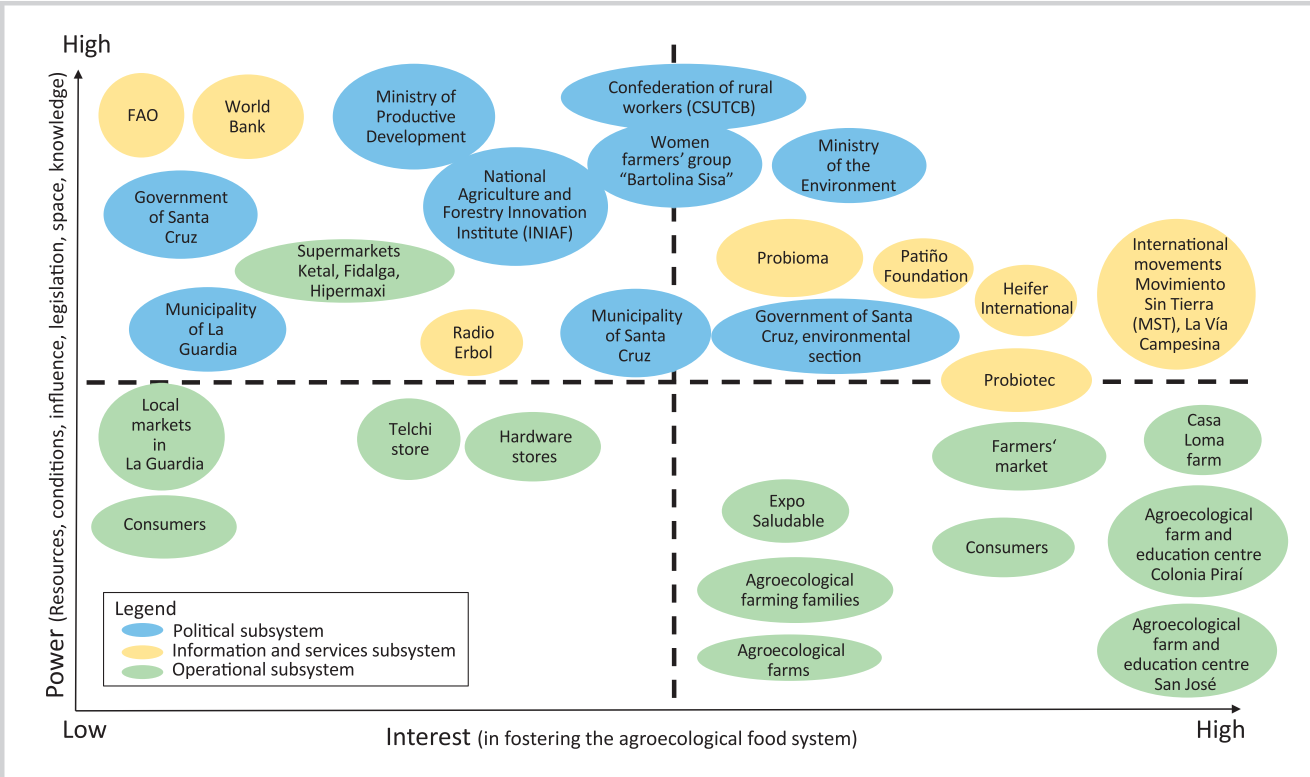
FIGURE 6 Power/interest matrix of actors related to the Agroecological Platform, comparing their relative interest in fostering the agroecological food system with their relative power to do so. The consumers category appears twice because discussion participants indicated that consumer interest varied. (Matrix by the researchers and stakeholders)



consumption. Another important actor is the agroecology social movement, which is led by the landless people's organization Movimiento Sin Tierra and the peasant movement La Vía Campesina and includes a growing number of individuals and organizations opposed to genetically modified crops.

Food system mapping as an entry point for transdisciplinary research

For the larger research project, the food system mapping was useful, if not crucial, because it provided a space for international researchers, as well as local actors, research partners, and activists, to participate in the project from its outset in the place where the main activities happen. Some mapping participants had already helped to design the research project, for example, by participating in the selection of food systems to be studied and by proposing small, related development projects. In this way, diverse actors brought up issues that were important to them, and the case studies and objects of research were selected with the participants during the mapping workshops.

Both study areas encompassed highlands and lowlands with competing claims on natural resources, as well as a rich diversity of food traditions and strategies. The Kenyan study area stretched from lower-lying semiarid to arid pastoralist lands up to the densely inhabited and cultivated slopes of Mount Kenya, and the Bolivian one reached from soybean-covered lowlands to Samaipata mountain areas characterized by family farms and more diversified production and consumption. From the research team's point of view, the mapping helped the various research groups cocreate a common understanding of the food system concept (Wilsey and Dover 2014). Furthermore, it opened up a space for local-level fieldwork while ensuring that researchers did not lose sight that the activities studied belonged to a larger food system.

The fieldwork and workshop participants appreciated the overview of value chains and the contacts and exchanges with other food system actors. The mapping process, which took place during the systematization workshops, also provided a sound knowledge base for subsequent research projects—for example, on perceptions of "good food" in Kenya (Hertkorn 2017) and on agrobiodiversity linked to dietary diversity in Bolivia (Catacora Vargas 2016).

Although not all actors participated in the whole mapping process, they provided helpful insights into crucial steps in the value chains. The participation, even if sometimes brief, of different actors—from producers to retailers, from the public and private sectors, and including interested individuals—is crucial in inter- and transdisciplinary food system research. In this sense, the

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mapping represented one important step in the transdisciplinary process by codeveloping an understanding of the food systems, their actors and activities, and their main bottlenecks. Addressing complex sustainability problems requires such an integration of existing knowledge and coproduction of new knowledge from different epistemic communities (Hirsch Hadorn et al 2006; Pohl et al 2010).

Further development of the method

To effectively inform further food system research, the information in each map should be updated regularly, for example, every 3 months, as researchers generate new insights on key features of the respective food systems. This can be achieved by creating an internal document that researchers then continuously update with results, insights, and reflections emerging from fieldwork. This growing interdisciplinary resource can play a fundamental role in supporting interaction and coordination within and between disciplinary research studies. It also offers a near–real-time overview of existing and emerging information that researchers may use and expand while preparing publications and engaging in transdisciplinary communication or collaboration with stakeholders directly or indirectly linked to the relevant food system.

Keeping in mind that food system mapping provides an empirical entry point to further food system research, the question arises of how changes in food systems over time (eg, the impacts of actions to improve sustainability) can be captured, visualized, and communicated. The larger research project has developed a comprehensive framework for assessing food systems' sustainability. The framework was developed and applied in the same research project as the food system mapping, and it evaluates 5 dimensions of sustainability that can be regarded as food system outcomes: food security, the human right to food, environmental performance (positive and negative impacts of food system activities on the natural environment), reduction of poverty and inequality, and social–ecological resilience (Tribaldos et al 2018).

Conclusion

This article described a participatory food system mapping method that can be a useful starting point in food system research. This method, developed in 2 tropical highland–lowland contexts, expands basic value chain mapping to include other important elements of food systems: the political context, the natural resource base, and flows of information and services.

The food system mapping was carried out as part of a larger research project on food system sustainability. It provided an overview and a basis for in-depth disciplinary research. Participatory tools are applied in transdisciplinary food sustainability research to coproduce knowledge with people from different backgrounds and circumstances and to support joint efforts to improve food sustainability in all its dimensions. Our food system mapping provided an overview grounded in the reality of the participating food system actors, a basis for in-depth disciplinary research, and a way to enter discussions with decision-makers to identify policies that influence a food system in positive and negative ways.

There are many ways in which this tool could be broadened or adapted to specific needs, for example, for studying food value chains that are embedded in more complex global systems. Such an endeavor would require considerably more time and resources. Following soybeans, for example, from their production site to their final destination (eg, where they are fed to animals and then to the consumers of the related animal products), as well as engaging with the related actors, would be important further steps.

To investigate agrifood value chains in more depth, a mapping approach is an interesting start. However, broadening the mapping to include the food system elements that this article presented as subsystems (political context, natural resources, and information and services) provides a richer range of perspectives as a basis for further research and decision-making for improving the sustainability of agrifood value chains.

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