

RESEARCH ARTICLE

# Participatory analysis and action to promote agroecological food systems – methodological insights from a three-country initiative: Nicaragua, Senegal and England

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## HIGHLIGHTS

- **Presents a novel and replicable participatory methodology for responding to the complexity and power imbalances of food systems, combining farmer-led participatory action research with complex systems analysis and deliberative processes**
- **Demonstrates how participatory and systemic action research can be applied to produce actionable knowledge and strategies across multiple levels of food systems to contribute to agroecological transitions in varying contexts.**

**KEYWORDS** food systems, participatory methods, action research, deliberative process

## Abstract

Understanding and seeking to change complex systems requires approaches which can adequately respond to complexity and which undermine rather than reinforce dominant power structures. This paper presents and reflects on a participatory methodology developed and applied to transition food systems in England, Nicaragua and Senegal to align better with agroecological principles. The methodology combines participatory research, complex systems mapping and deliberation to understand and respond to the complexities of food systems in an integrated and transdisciplinary way. Where this methodology distinguishes itself from other participatory research approaches is the explicit focus on the multiple dimensions of food systems in an integrative way, which was possible through a deliberative process and by involving various stakeholders, but continuing to privilege (yet also challenge) the voices of marginalised producers. Our experience indicates that the methodology could be used and adapted for various complex topics and contexts in which social change is sought.

## 1 Introduction

This paper presents a methodology for analysing and contributing to the transition of food systems, which are understood to be complex and dynamic (Leach et al., 2010; Ericksen et al., 2010) and which marginalise the voices and experiences of farmers (European Parliament, 2014), one of the most crucial set of actors. The methodology combines farmer-led participatory action research (PAR) with complex systems analysis and deliberative processes in order to adequately respond to the complexity of food systems and address their power imbalances. Its innovation stems from its ability to prioritise the voices of farmers beyond their direct interests. It proposes a strategy to address the sustainability of food systems while ensuring research is transdisciplinary and participatory (Lang et al., 2012; Wiek et al., 2012).

Our project evolved in response to a global food system that is undeniably in a state of crisis and is failing to achieve its principal goal of ensuring food and nutrition security for all people in socially just and ecologically sustainable ways (Ericksen, 2008; Foran et al., 2014). Although agricultural production is enough to feed the world 1.5 times over (Global

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Agriculture Report, 2016; Holt-Gimenez et al., 2012), an estimated 815 million people in the world are undernourished (FAO, 2017). Paradoxically, obesity is increasing in poor and rich countries (Global Nutrition Report, 2016; Ng et al., 2014) due to food systems failing to deliver high quality nutrition, leading to what is known as malconsumption and resulting in adverse dietary health effects (Sage, 2013; Lock et al., 2010). At the core of food production are farmers, who, all over the world are increasingly struggling to survive economically (van der Ploeg, 2008). Many farmers live in poverty, especially those producing on small or medium scale (World Bank, 2014). This is exacerbated by policies that favour agro-industrial production and marginalize small-scale farmers (European Parliament, 2014), excluding them from decision-making processes and leading to negative social outcomes. In addition, industrialised agriculture contributes to increasing environmental damage, loss of biodiversity and eco-system degradation, threatening the viability of the current food production model as a whole (Giraldo and Rosset, 2018; Altieri and Toledo, 2011; Tittonell, 2013). Against this backdrop there are increasing calls for a fundamental change to food systems (UNCTAD, 2013).

As a reaction to these challenges, the concept of agroecology has emerged and evolved as an approach that encompasses the social, ecological and economic dimensions of agri-food systems (Francis et al., 2003: 100; Gliessman, 2007; Wezel, 2009). Agroecology itself is a contested term with various definitions. It has been conceptualised not only as a science and practice at a farm or plot level but also as a social movement across entire food systems (Wezel et al., 2009; Rosset and Martinez-Torres, 2012; Francis et al., 2003). The project on which this paper is based chose to focus on the potential for agroecological food systems to be realised, thus interpreting agroecology in its most transdisciplinary and systems-wide definition rather than focusing only on production. This is based on an understanding of food systems as complex, in which treating issues in isolation (e.g. nutrition at the cost of ecology; livelihoods at the cost of nutrition, etc.) is unlikely to lead to positive changes for the system as a whole (Tendall et al., 2015).

With this food systems understanding of agroecology and the current challenges of complex, unsustainable and unequal food systems, the project Transitions to agroecological food systems: pathways to sustainability, took place in Nicaragua, Senegal and England from 2016 to 2018. The project was initiated and coordinated by a research institute in the UK, the Institute of Development Studies (IDS), and run in partnership with community and farmer-led organisations in each of the three countries. It centred on small-scale farmers who self-identified as practising agroecology, some of whom were involved in agroecological and/or food sovereignty social movements within their contexts. The project team deliberately selected localities in both the Global North and Global South to facilitate an exchange of knowledge and produce a greater understanding of the similar and different challenges faced in spreading agroecological food systems. Yet, of course, knowledge itself is unlikely to lead to change; rather, it needs to be applied, by actors which are relevant,

well positioned and empowered to act. Thus, the project also included a component of developing alliances and strategies, rather than simply producing more knowledge.

This article outlines the different phases of the research and demonstrates how a methodology that integrates participatory research and a systemic approach with a deliberative process is suitable for the analysis of complex food systems and their alignment with agroecological principles. The next section expounds the rationale underpinning this methodology and the methodological design. Using examples from the three-country initiative we then illustrate the different phases of the action research and briefly highlight research results and strategy outcomes of the project. The last section closes with a reflection on this methodological framework and how it can support future endeavours to improve participatory research in agroecology and thus the transition to more sustainable food systems.

The positionality of the authors is as follows. The lead author of this paper joined the project halfway through to support in the evaluation of the project process and outcomes. The other two authors were part of the core team of people implementing the project. One of the authors is an ecological food producer in addition to being a researcher. None of the authors are from the UK, though all were living in England at the time of the project.

## 2 Motivation

### Integrating ‘participation’, ‘complex systems thinking’ and ‘deliberative processes’

Food systems are characterized by their dynamism and complexity as processes interlink on various levels (individual, farm, local, national, global) and are affected by multiple forces (economic, social, cultural, technological and ecological) (Guzmán et al., 2013). Systemic and participatory action research approaches lend themselves to effectively engage with these characteristics and inform the novel methodological design this article describes. Undergirded by a strong deliberative component, the methodological design allows for a discursive and critical analysis and meaning-making process by farmers over time. Illustrated with examples from the three-country initiative this section elaborates on the rationale of the methodology and the anticipated impact, before taking the reader through the methodology and the different phases of the project in section 3.

The methodological framework of this research initiative was developed to a) contribute towards a rebalancing of power relations through approaches that centre on farmers as co-researchers, b) respond to and capture the complexity of food systems, and c) apply an integrated view on the social, economic, ecological and nutritional dimensions relevant for agroecological food systems.

To rebalance power through participation, we purposefully chose an action research approach as it allows to draw on the knowledge and experience that farmers have about their lived realities and local conditions. A participatory research approach, according to Chambers (1995) refers to

an “empowering process, which enables local people to do their own analysis, to take command, to gain confidence, and to make their own decisions.” Action research (Reason and Bradbury, 2001, 2008) is a participatory, democratic process of iterative cycles of action and reflection that brings together theory and practice, and centres on the development of knowledge (Reason and Bradbury, 2001) that responds to the needs and challenges of people in their everyday lives. Knowledge that is derived under a participatory paradigm has the potential to challenge deeply entrenched power inequalities, as well as the monopoly of conventional research and knowledge production (Gaventa and Cornwall, 2006; Pimbert, 2006). This research has taken a decision to particularly privilege – though also critically challenge – the perspectives of small-scale farmers in the food system who identify as practicing agroecology. This is because small-scale farmers have typically been excluded from decision making about food systems (Pimbert and Wakeford, 2002), yet they have unique understandings of what it is like to produce food and the challenge of working within the existing food systems while maintaining agroecological principles. As agroecological approaches emphasise farmers as protagonists in the research process, as opposed to top-down measures in conventional research, PAR approaches harmonise well with the more political interpretations of agroecology (Guzmán, 2013; Pimbert, 2006). The incorporation of agroecological farmers along with other actors in the food system (as witnesses and as change agents), had the additional benefit of responding to complexity. A growing body of literature acknowledges that because of their multi-dimensional, multi-levelled, dynamic and uncertain nature, research about complex issues require a wide range of knowledge to be incorporated from across different disciplines and actors, but with facilitation of ‘scaffolding’ to support constructive dialogue and the emergence of new perspectives (Burns 2014, Burns and Worsley, 2015, Lang et al., 2012, Jordan et al., 2013).

To further respond to complexity, we chose to use an approach based on participatory systemic inquiry (Burns, 2012, Harvey et al., 2012). Participatory systemic inquiry is an approach which can be incorporated into action research, and which emphasises “developing processes and learning architectures that can effectively engage with complex systems dynamics” to support systemic change (Burns, 2014: 3). Specifically, the complex nature of food systems means that conventional research approaches which look at single issues (production, distribution, marketing, consumption) in isolation are inadequate (Thompson and Scoones, 2009; Jordan et al., 2013). Instead, our process included a focus on the ecological, economic, social and nutritional aspects of food systems throughout. This focus brought the inquiry out beyond the direct interests of food producers and into wider societal and ecological considerations.

Two complexity-congruent methods which we used in this research were complex systems mapping and deliberative processes. Systems mapping helped to visually account for the non-linear interactions of diverse actors and issues across scales and levels in food systems. Rather than an end

in itself, systems mapping in this project was used as a tool to facilitate discussion and analysis, as described in the next section. It was also used for setting research questions, which were deliberately not formulated at the outset by the research team, in order to both challenge conventional research power dynamics and respond to the uncertainty and disagreement about the problem which characterises complex issues.

Deliberation as a form of discursive participation (Carpini et al., 2004) was incorporated to support the action-reflection cycle of PAR, and because the nature of this research requires a process that facilitates critical and dialogic analysis of the issues in question and the provided evidence. A deliberative process can bring in different perspectives of various stakeholders of the food system to provide a better understanding of its complexity; it enables participants to make sense of the research findings as well as challenge them; it enables participants to contextualise and appropriate research findings within their realities; it provides an arena to discuss different strategies for change; it can build solidarity between participants and underpin decisions they have reached collaboratively with legitimacy (Kemmis and McTaggart, 2006). A deliberative process in which different stakeholders come together to debate, reflect on and challenge each other’s experiences and perspectives without having to find consensus is a way to address complexity and avoid potential groupthink, thus addressing a common downfall of participatory research (Cooke, 2001; Wakeford et al., 2008). Considering the values of participation and agroecology in terms of constituting bottom-up approaches and being context specific (Guzmán, 2013; Pimbert, 2006), and also considering the wide range of interpretations of agroecology (Bellwood-Howard and Ripoll, 2020), it was deemed important to ground the project in what the farmers themselves understood to be agroecological food systems. We chose to present four different dimensions for participants to reflect on: social, ecological, economic and nutritional, with a view to ensuring that the participants went beyond their own interests and concerns as food producers to consider the wider aspects of food systems beyond production.

In sum, incorporating these conceptual considerations our methodological design led to an approach which included different phases of participatory systems mapping, research, deliberation, alliance and strategy building and learning across countries. These phases are described in a practical way in the following sections, with a view to them being adapted and replicated in future participatory research on agroecology.

### 3 Methodology

The research process was designed by the UK research team and co-led by farmers who created the content, allowing them to inquire themselves into their situation as agroecological growers and the manifold factors that affect them. While the farmers did not initiate the project, they were at

the centre of the inquiry, with power to make decisions about the content and direction and the ability to shape the process itself. The participatory research design enabled farmers to set the research agenda, analyse the findings and negotiate their meanings and implications. Involving farmers actively in the research and basing it on their lived experiences ensured the relevance of the project to them personally and led to a sense of ownership over the process and continued momentum after the process ended.

The methodological design was structured in the below mentioned phases (Figure 1) for all three countries, whereby the implementation of individual phases could vary slightly across locations.



FIGURE 1  
The research design

## 4 Process description and exemplary results

### Phase 0: Selecting participants and creating a safe space

**Selecting participants:** Who to invite as participants is a first crucial step (Bergold and Thomas, 2012; Wakeford et al., 2008). The consideration of who to engage depends on the nature of the project and who can contribute the knowledge required for what wants is to be achieved. The participant selection did not aim to get a sample representative of the population or even of agroecological farmers. Rather, the primary consideration was to create a panel with a combination of people which could generate insights about the challenges of producing agroecologically within existing food systems but more specifically about how to identify leverage points that are suitable to induce systems change.

Burns (2012, 2014) pointed out that there are trade-offs between Participatory Action Research (PAR) and Systemic Action Research (SAR) in terms of the homogeneity of the participant panel and the diversity of worldviews that they yield. In order to achieve a multiple-perspectives view of systems, SAR involves a variety of people in the research process that can have completely different interests, and that join and leave as necessary (Burns, 2014: 9). PAR however, is centred on a community or fixed group of participants that carry the entire research process, part of which is to identify and counteract unequal power relations. In a pure SAR approach for example farmers might lose their weight and centrality in the project if stakeholders with different interests were part of the process. While a multi-stakeholder panel ensures a diversity of worldviews, it has the disadvantage of risking co-option by more powerful actors and yielding knowledge that is not specifically relevant or action-oriented. On the contrary, in PAR the emphasis is clearly on amplifying the voice of a specific marginalized group, which means that less emphasis is given to the concerns of other stakeholders and that other perspectives would be less represented in the research. A group of people with similar goals, problems and strategic interests leading action research will ensure that the knowledge generated is relevant for their lives and generates practical action to pursue. The disadvantage will be that other worldviews from other stakeholders will not be present in the panel. There is no 'right' make-up of the panel, but rather a need to acknowledge and redress the drawbacks (e.g. bringing other voices into the analysis). In our case, we tended towards the interest group-based approach, using the deliberation process to bring in the perspectives from other actors in the food system (consumers, traders, retailers and so on). The methodology featured in this paper seeks to create a systemic PAR approach, that offers the potential to use elements of both approaches and adjust the weight that is given to either one according to the scope and context of the research.

The idea was that farmers, who are at the centre of food production, come together, bring to the fore and consolidate their first-hand experiences and knowledge. The farmers

were selected purposefully for their previous engagement – or interest – in agroecological or sustainable agriculture, with many (but not all) belonging to organisations that were linked to agroecological or food sovereignty social movements. It was anticipated that this particular positioning could yield the tensions and contradictions between farmers' immediate economic survival (which entails working within the existing system) and their other goals and aspirations such as regenerating their land, building communities and equitably nourishing populations, which may require significant changes to the systems on which they currently depend. Further, involving those who are already active in the agroecological movement and demonstrating an interest in the matter had the benefit of high engagement throughout the project and beyond.

Variety and balance are important criteria to ensure versatility and inclusion of less represented or marginalized groups as well as a variety of perspectives. In our examples the farmers' panels, also called 'juries', consisted of 10 – 13 members of a mix of genders and age groups, representing different types of production and different levels of involvement with farmers' or civil society organisations. Calling the farmers' panels a 'jury' in Nicaragua and Senegal was a symbolic way of declaring the farmers' knowledge as priority and was met with affirmative positive feedback from the farmers. In the English context, the term 'panel' resonated well with the farmers and for some, gave a sense of prestige to their participation. The geographical scope varied depend on the country. In the UK, discussions were mostly relevant to England, in Nicaragua, to the Central and Pacific regions, and in Senegal, to the region of Casamance.

In practice, many of the eligible and interested participants for this project held a representative or leadership position within their community or organisation. This presented both strengths and risks. One of the strengths of including such individuals with leadership roles is that they brought a wealth of issue-specific knowledge about the promotion of agroecology, having engaged in it for some time. They also had strong networks through which knowledge from the project could be disseminated and acted upon.

The risk was that of re-enforcing existing power relations through privileging some voices at the expense of others during the process (Cooke and Kothari 2001). Thus, there is a trade-off that emerges when constituting the panel. There is no 'right' combination of leaders (who in our project were themselves farmers) and 'lay' people, rather the structure of the participatory process needs to reinforce and give space to those voices that are at risk of being diminished. Further, a number of facilitation measures were put into place in order to avoid and/or counteract power imbalances in real time during workshops and through reflection and feedback throughout the project. The following section describes ways in which this was undertaken.

**Facilitation, power and creating a safe space:** "Reflexivity is a hallmark of excellent qualitative research and it entails the ability and willingness of researchers to acknowledge and take account of the many ways they themselves influence

research findings and thus what comes to be accepted as knowledge." (Sandelowski and Barosso 2002: 222)

Facilitation is not neutral (Kemmis and McTaggart, 2005: 285 f.; Burns, 2015). Like any other person, the facilitator is subject to her or his ontological and epistemological position and therefore not free of values, beliefs and vested interests. These can influence the direction in which she or he guides the process, analyses data and draws conclusions. Whether intended or not, a facilitator exercises power: facilitators have the power to include or exclude perspectives, open up communicative and safe spaces or shut them down, influence relationship dynamics and even manipulate the process (Burns, 2015: 157; Chambers, 1997: 155).

In this project, workshops were facilitated by an IDS researcher and co-facilitated by a local researcher embedded in the partner organisation. The biases and positionalities of the research team were mitigated by the use of participatory exercises which entailed metaphorically 'handing over the stick' to participants (Chambers, 1997: 157). The project drew on exercises espoused by Chambers (2012) and Kaner et al. (2014) which encouraged inclusivity and empowerment of participants.

Facilitators also endeavoured to be reflexive about their own positionality and the power they themselves exercise, intentionally or not (Muhammad et al., 2015; Burns, 2015: 157 f). Reflexivity of positionality was supported by co-facilitation and by cross-country facilitator debriefings after each major workshop.

Another crucial element for mitigating power inequalities was the creation of a safe space (Bergold and Thomas, 2012; Gayá-Wicks and Reason, 2009). In the panels, farmers of different types of production, most of whom did not know each other, came together, not being sure what to expect or what exactly was expected from them. Participants from all three countries emphasised the importance of establishing ground rules at the beginning, to create a space where people's interpersonal needs of inclusion and intimacy were met, so that they could feel free to speak their minds. Creating and maintaining a safe communication space is crucial for achieving a high level of participation, and a way to address power relations, as spaces "are infused with power relations, affecting who enters them, who speaks with what knowledge and voice, and who benefits. This is particularly apparent, for example, when both professional knowledge and peoples' experiential knowledge are brought together in the same space and discussed." (Pimbert, 2006: 19)

A safe communicative space was created by establishing 'ways of working' together in the first workshops by discussing ground rules such as the types of confidentiality to be had, active listening, empathy, giving people space to voice their opinions and, crucially for the deliberative aspect of the project, not needing to agree on everything.

In England, the 'ways of working' were revisited at the beginning of each workshop, even though they had been discussed a number of times. Participants themselves would present to the group different principles for working together that felt important for them. The group would then be able to add to or discuss any additional details.

The exercise was less repetitive than the researchers had anticipated, and as workshops progressed, exemplified the ownership that participants felt of the process. New principles were added, and existing ones were adjusted or clarified with nearly every iteration. At the beginning of the final workshop, for example, one participant had new reflections and disagreed about the importance of one of the ways of working which had previously governed the group dynamic. He questioned whether it was necessary to be stipulating 'safe expression', given that there was no threat of physical violence within the group. Rather than the facilitators jumping in to explain what 'safety' meant in this context, a number of participants expressed their own previous life experiences of not feeling able to speak up in group settings because of gender and age dynamics, with other participants adding details for clarification. The resolution of this issue by the group – rather than by the facilitator – is one small example of the ways in which the process enabled participants to set boundaries and respond to their needs for expression.

**Phase 1: Participatory food systems mapping and definition of research questions**

"I loved the alchemy of the chaos - in the beginning it seemed chaotic, but then things started to emerge." (Farmer, England)

Complex systems are very difficult to grasp due to their non-linear interactions and dynamism (Leach et al., 2010;

Ericksen et al., 2010; Burns, 2015; Foran et al., 2014). Visualising a system through participatory mapping can enable participants to see the 'bigger picture' and identify correlations, patterns, causalities and leverage points (Burns, 2012; Burns, 2015; Burns and Worsley, 2015) that will serve as a foundation for building strategies for systemic change. In this methodological design the mapping process served five purposes:

- Facilitating reflection
- Generating new insights and perspectives
- Creating systems (or 'messy') map(s) of the food system
- Deriving distilled maps of specific issues within the food system
- Determining researchable questions

The systems maps, to which we also refer as messy maps (Burns, 2015) due to their initial chaotic appearance, served as starting points of this inquiry as they formed the basis for discussion, reflection and the generation of new insights into food systems. The mapping process was preceded by a session in which participants reflected on their own lived experiences of trying to work agroecologically, and what they understood agroecology to be when considered considering its relevance to the food system as a whole, exploring the four dimensions of food systems (social, ecological, nutritional, economic) as guiding points. During this process, they identified the factors which had impacted their reality. It was important that people focused on their own lives, so that the mapping was grounded in the participants' actual

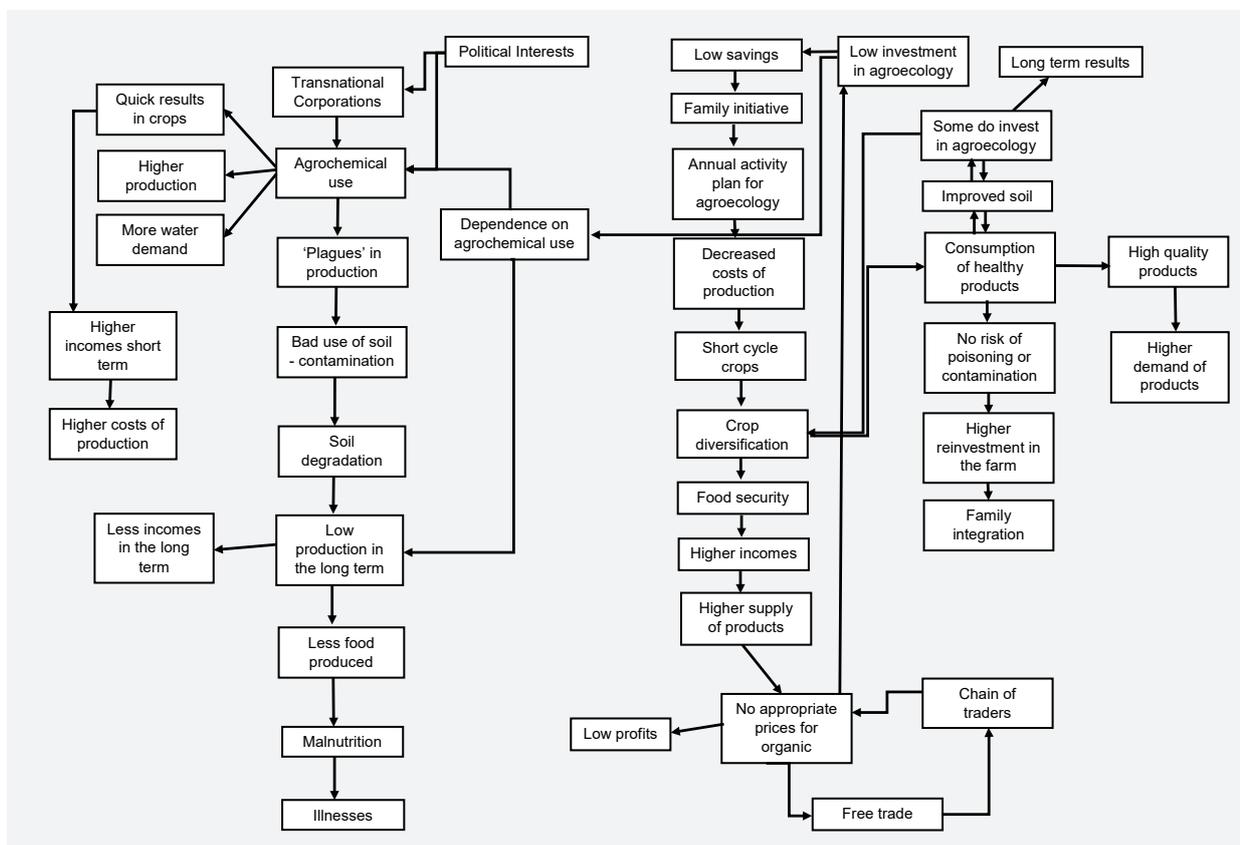


FIGURE 2 Distilled map 'Economic profitability and environmental impact in the medium and long term' by Nicaraguan farmers

experiences, rather than perceptions of others, which can be biased or limited.

Rather than an analytical tool, these categories of sustainability were a heuristic device to reflect on what agroecology meant to participants, to remind facilitators and participants of the multidimensional nature of food systems i.e. they span beyond production into distribution and consumption and beyond agriculture to other domains such as social welfare, economic policy, and so on. It also served to highlight how factors that may be positive in one dimension may undermine sustainability in others. For instance, organic edible flower production (i.e. a niche product) may enable farmers to achieve economic and ecological sustainability but is unlikely to contribute to nutritional sustainability. These categories can be expanded or modified according to the needs of the panel, for example including categories like health more broadly, animal welfare, biodiversity, etc.

Upon completion of and reflection on the messy maps, participants identified common themes, or core issues that seemed to be integral to the issue of transitioning food systems. In each country, the participants identified 3–6 salient topics. These were explored further through, so-called distilled maps (Burns, 2015: 77 f) (Figure 2). Distilled maps allowed the deliberative panels to zoom in on particular issues and articulate and perceive more clearly how factors relate to each other and what dynamics they cause. From reflecting on the distilled maps, the groups identified issues that needed to be explored further. These then became the research questions for the group.

**What else do we need to know? Determining the research questions:** The distilled maps served as the basis for deriving the research questions. Through the process of mapping and deliberating farmers identified and collectively agreed four to six areas of research that had the potential to yield relevant insights and understanding of how to move towards more sustainable food systems. Collaboratively participants and the researcher-facilitators turned the various lines of research

into researchable questions and sub-questions which led to what we called ‘micro-research’ projects, small research projects that could be solved through a few days of inquiry.

By participants setting the research agenda the project sought to overcome a significant and often overlooked source of bias in research: the research questions that are asked and those not asked (Ioannidis, 2005; Greenhalgh and Russell, 2009). This bias is strongest when research questions are formulated by ‘outsiders’ and not the people actually involved with and directly affected by the issue. Table 1 provides an overview of the research themes and questions developed through the project.

### Phase 2: Conducting collaborative research

The type of research that was employed for this second phase of the project was farmer-led collaborative research. The farmer panels posed the research questions above and commissioned the micro-research projects to their respective farmer organisations. These farmer organisations then carried out the research as a result of the interaction of in-house technical officers, and research consultants linked to the agroecology movement in the case of England and Nicaragua. In the case of Senegal, the collaboration occurred with agrarian researchers from the Senegalese Institute for Agricultural Research (ISRA). The role of the Institute of Development Studies was to support the research processes and give guidance to collaborating partners in terms of approaches, methodologies and analysis. This approach aimed to enable grassroots organisations to develop their capabilities to engage in research processes. There are, however, trade-offs between choosing farmer-led collaborative research and strictly defined action-research, in which farmers conduct the research themselves. The further removed from the farmers the research is, the less likely it will yield knowledge relevant to them. On the other hand, areas of interest may fall outside the usual area of experience of farmers e.g. trade agreements and policies around subsidies, and thus research conducted by a trained researcher can be a

TABLE 1  
Research themes or questions

Country	Research themes
Nicaragua	<ul style="list-style-type: none"> <li>• Markets and their politics</li> <li>• Management of water and forest resources</li> <li>• Comparison of agroecological and conventional approaches</li> <li>• Land access and land tenure</li> <li>• Youth in agriculture</li> <li>• Public awareness about agroecological products, health and nutrition</li> </ul>
Senegal	<ul style="list-style-type: none"> <li>• What is the existing knowledge of agroecology within our communities?</li> <li>• How can existing diversification be best utilised to support improved nutrition?</li> <li>• How can we increase access to agroecological production inputs?</li> <li>• What are the capacities of existing agroecology organisations to promote agroecology?</li> </ul>
England	<ul style="list-style-type: none"> <li>• What can promote increased access to land for agroecological farmers?</li> <li>• How can we ensure the contribution of agroecological farmers is valued appropriately?</li> <li>• How do and to what extent do subsidies affect the cost of food?</li> <li>• What has led to the development of sustainable local food strategies, and what have these entailed?</li> </ul>

useful contribution to the process. There is potential to combine both approaches, research conducted by farmers and collaborative research with relevant researchers, aiming to maintain the balance between action-relevance or results and adequate scope of expertise.

Most of the research conducted was a result of secondary data analysis and key stakeholder interviews and focus groups. Only in the case of Senegal was primary research conducted. For the purpose of food system analysis for action, a significant amount of information was available (academic and grey literature, key informants interviews, etc.): the role of the researchers was to 'ground' and translate that research for the requirements of the farmer panels, rather than conducting new research.

### Phase 3: Deliberation

Following the completion of research projects, a series of deliberations were held in each of the respective localities. First, panel or jury members reminded themselves of the research questions and were presented with the research findings. This was through a combination of written summaries and oral presentations. Then, up to four witnesses presented their views about the research topic to the farmers to spark a discussion. Witnesses were key informants (researchers, activists or practitioners) whose expertise and insights would spark productive debate. Presenters were urged to use a range of techniques for sharing their opinions, in order to ensure their content was accessible to all participants. After presenting, they left the room, and the farmers reflected individually and discussed in pairs. They then individually identified what questions they had for the witness. The witness was then brought back into the room for questioning and comments by the farmer panels. Having participants reflect and identify their questions individually and in pairs helped to prevent quicker thinkers or more confident participants from dominating the group deliberations. The talking playing field was also levelled through some use of 'stacking,' a facilitation tool used to establish turns and enable everyone to speak, along with flexibility to allow for dynamic interactions (Kaner et al., 2014). After questions and comments were fielded, the floor was open to general discussion and deliberation, with witnesses and farmers interacting as equals in the discussions.

The deliberations did not necessarily need to lead to conclusions or to consensus. While consensus was reached on many occasions, at times what was most important was the surfacing of disagreements and tensions that were otherwise unrecognised. Given the plurality of the agroecological movement, explicitly recognising these differences was arguably as valuable as finding agreements and clarity. In the spirit of action research, it is hoped that these areas of ambiguity might be further explored through future iterations of questioning, inquiring and reflecting, individually or collectively.

Following these discussions, the witnesses left the room and farmers revisited the distilled maps, reflecting on what was missing or what needed editing in their maps, as well as what was needed as a next step to change or overcome a

particular challenge. Another round of reflection and deliberation ensued to identify potential strategies and next steps. This process focused on what might lead to 'tipping points' or changes in key dynamics or path dependencies of the system (Burns and Worsley, 2015). Strategies were then ranked in terms of feasibility, impact and passion for action, and a short-list of strategies was collectively decided. For each strategy, change agents were identified for outreach and invited to a 'change agent' workshop (see Phase 4). Some highlights of the research results- including insights from the deliberative process

It is outside the scope of this article to describe in full the research results of 12 micro-research projects conducted by local researchers and the added insights provided by the deliberative workshops, as our main goal here is to showcase the methodology. That said, it is useful to offer some highlights in terms of content to understand the relevance of the activities described.

In Nicaragua, the research highlighted the lack of price differentiation for agroecological or even organic products, an exposure to fluctuating and low-return global markets through free-trade agreements and a policy bias toward large-scale plantation farmers. Positive experiences were collected of farmers' market promotion and the benefits of producer and buyer cooperatives. A similar bias in favour of plantation farming occurred in terms of the uneven implementation of an otherwise progressive environmental legislation. In terms of agroecological production, the economic environment pushed small-scale farmers to short-term risk mitigation for survival that side-lined other priorities, such as the long-term soil health and fertility. This lack of profitability, coupled with patriarchal decision-making dynamics in the household, makes agriculture unappealing to young people. Land is progressively being concentrated in the hands of wealthy producers, shifting towards cattle and monoculture production of cane, palm and other cash crops, whilst landlessness increases. Consumers play a role in the lack of price differentiation of agroecological production, as they are less aware of the different benefits of food produced agroecologically.

In Senegal, the primary research showed diverse understandings and practices of agroecology in Casamance, and the coexistence of conventional and agroecological techniques. It also identified preferred methods of communication of agroecological techniques, not only through engaging with farmers (radio, traditional oral communication, demonstration plots, etc.), but also encouraging system-wide alliances beyond production, such as engaging with leadership of farmer groups, and owners of canteens and restaurants, so as to encourage them to source agroecological produce. Another micro-project established the linkages between agroecological produce, dietary diversity and improved nutritional outcomes. Lastly, an analysis on the availability and affordability of inputs showed the impact of subsidies on farmers' preference for agrochemical use, the unavailability of native seeds and the potential of community organisation for agroecological input provision, e.g. seed banks.

In England, the research focused on the market and subsidy systems that have enabled extreme land concentration, leaving agroecological new entrants struggling to access land. Important drivers identified included financial investments in land, and planning policies. Potential avenues to enhance access were identified, from promoting tenancy opportunities, to the implementation of a statutory land registry and reforming planning policy. In relation to markets, the research evaluated critically and comparatively the different schemes to incorporate other forms of value into the cost of food such as triple cost accounting (environmental, social and economic costs), or true cost accounting and how they could be helpful in the promotion of agroecology. The literature review on subsidies highlighted the contradictions in the subsidy regime and the bias towards grains and food manufacturing and showed the myriad of factors that drive prices and the difficulty of attribution. Lastly, the research identified the factors that contributed to the development of local sustainable food strategies: mobilisation and commitment of different public (local councils, NHS bodies, educational institutions and housing associations), private (local farmers, traders, retailers and caterers) and coordinating local associations, NGOs or community interest companies.

#### Phase 4: Strategy and Alliance building

A defining characteristic of Action Research is its orientation towards transformational action, not only to understand social phenomena, but, unlike conventional social science, to generate knowledge in order to effect a desired change (Bradbury, 2010). Through deliberation and several cycles of action and reflection, the previous phases of the project facilitated the formation of a body of new and refined knowledge that the farmers put into action as they identified key stakeholders ('change agents') in the food system who could be potential 'allies' in pursuing strategies for moving towards more sustainable food systems. Change agents, which are indispensable actors in any process where change is pursued, can be individuals or organisations (Rothwell and Sullivan, 2005) which have the capacity and position to induce change and to effectively interact with the gatekeepers responsible for maintaining the actual structures (Wielinga et al., 2008; Argyris and Schön, 1996). These change agents were invited as participants to the 'change agents' workshop'. The 'change agents workshop' was a significant step in the project in which participants, based on their new understandings and self-assurance (Bergold and Thomas, 2012: 13), assumed agency and carried action beyond their group to involve stakeholders on multiple levels. Linking the research to the broader debate serves as a catalyst for inducing desired change.

**The 'change agents' workshop':** Between 10 to 20 change agents or 'allies' per country were invited to partake in 2-day 'change agent' workshops. As opposed to conventional stakeholder engagement, the identification and selection of change agents was undertaken by the farmer panels following on from the preceding phases of collaborate analysis and deliberation. They ranged from representatives of

agricultural ministries, ethical bankers, nutritionists, planning commissioners, radio stations (in Nicaragua) and traditional oral narrators (in Senegal), only to name a few. The objective was to forge alliances and build actionable strategies with key actors who were in a position to influence driving factors in the favour of more sustainable food systems.

In the sessions of these workshops, the farmers presented to the enlarged group of farmers and change agents on the various topics which had emerged as priorities in the deliberative workshop, explaining the problems as well as the findings from the research and the conclusions from the deliberations. Following this, a facilitated deliberation was opened for the entire farmers' panels and the invited change agents, to include everybody's contributions. At the end of each day farmers and change agents agreed on concrete action points, the responsible person or organisation to carry it out and a realistic time frame to complete them.

In all three countries, the change agents' events denoted a constructive phase in which farmers harnessed their newly gained understandings and self-confidence to step out of their circle and engage key actors of the wider food system. The positionality of the farmers in the centre of the project – presenting their research and deliberation findings and their draft strategies – possibly gave them additional credibility with the invited change agents. Local researchers and participants involved, more used to conventional research, were surprised on the shifts of power-relations away from top-down, 'expert' led processes. For example, a researcher and community organiser in Nicaragua reported: "Until now I have not seen in my work in this country a process in which campesinos (peasants or farmers) themselves do the discussions and analysis of their food systems."

This direct collaboration with change agents has laid the ground for expanding and intensifying the farmers' networks and building actionable strategies to transition to more sustainable food systems.

#### Phase 5 Global summit

The action research was not designed to be comparable across countries, but rather to adapt to the context-specific needs of each locality. However, a global summit was organised to gather some lessons that could be learned across countries and to promote exchange of experiences and ideas between the deliberative panels. Through the 3-day participatory workshop, farmers from each country presented key insights from the participatory analysis of their country's food systems and their strategies and alliances for action. Participants then compared between the different country experiences. The key issues which were common to all three countries -although unfolding in different ways due to different ecologies and political economies- were access to land, markets and trade, communication and awareness-raising, and forming alliances. An insight of significant impact for farmers across the three countries was the difficulty of access to land in England, particularly the inability for many farmers to live on their farms. The struggles faced by farmers in England appeared to turn on its head the typical narrative of 'developed' and 'developing' countries.

## Outcomes

Whilst this project could not possibly redress the lack of sustainability and of food systems in Nicaragua, Senegal and England, it did generate some localised impact, both in terms of kick-starting initiatives that promoted agroecology and highlighting the avenues for change, as well as countering top-down power relations in food system research and the position of farmers in the production of knowledge. Highlights of strategies are presented here, though these have not yet been evaluated for their ability to effect systemic change, in part due to the timescale of the initiatives. Perhaps most importantly has been the sense of empowerment reported by the farmer participants. One farmer in Senegal, for example, stated, "It was the first time I experienced a project like this, [a project] that changed the community."

One of several examples of actions from Senegal is the cooperation with a nutritionist, a cookery school and designated local restaurants. With them the farmers worked out a plan where the nutritionist would teach farmers, restaurant owners and youth that attend a cookery school the nutritional and taste value of agroecological food. In the cookery school students would learn to prepare nutritious meals from agroecological produce and cater to designated restaurants. This has the potential to reach a large number of people and the entire process is embedded in awareness-raising as a method to promote agroecology effectively. A new network of agroecological farmers across the Casamance region of Senegal was created, to share experiences in agroecological production.

In England, farmers were able to form and strengthen alliances with key stakeholders for policy changes. Among them two ethical investment banks that provide funding for sustainable agriculture and representatives of planning bodies that are instrumental in the interpretation of planning policy and its revision. Farmers were also well-positioned to feed into agricultural policy making opportunities which arose from Brexit, and fed into government consultations, met with parliamentary members and developed and strengthened policy and advocacy materials.

In Nicaragua, farmers participated in the First National Agroecological Forum that was hosted by UNAG, the Nicaraguan National Union of Farmers, to promote agroecology in Nicaragua. In this forum, which also included a strategy-building-section, the farmers shared their experiences and research findings with key stakeholders in agroecology and government. Artists contributed to help spread the message, and farmers had the opportunity to share their experiences on radio and TV. The research pointed to a high potential for systemic change when initiated at the local and municipal level, and members from the farmers jury have been speaking to community radios to communicate the key messages emerging from the action research.

## 4 Conclusion

The project 'Transitions to agroecological food systems' applied a methodological approach that combines systemic and PAR supported by a strong deliberative component. Especially tailored to analyse food systems and contribute to systemic change, this methodology additionally draws on values of agroecology and food sovereignty: enabling participatory processes that emphasise context-specificity and actively involve those in the research who are directly concerned by an issue, and not leaving it to outside experts. This methodology draws from the commitment of both participatory and agroecological approaches to realising just futures and reshaping asymmetric power relations (Méndez et al., 2013) to enable systemic change. Where this methodology distinguishes itself from other participatory research approaches is the explicit focus on the multiple dimensions of food systems in an integrative way. This was achieved through a deliberative process and by involving various stakeholders across multiple levels of the food system for each of the three countries..

The expectation of deploying this methodological approach was that it would facilitate the emergence of new knowledge, enabling farmers to adjust their views, develop new perspectives and, it follows, new strategies for change (Gaventa and Cornwall, 2006). Farmers gave account of how being involved in the research process, being able to build on their own knowledge and creating the content themselves based on their lived realities was not only satisfying but increased the relevance of the research outcomes for their own lives. They also gained a sense of ownership over the process. Farmers' knowledge was recognised and valued, yet their perspectives were also challenged through engagements with other farmers, witnesses, change agents and research findings. This facilitated a process in which participants could develop new ideas and new ways of framings both problems and solutions. In Senegal, for example, farmers realised that agroecological knowledge and practices are part of their cultural heritage – even though some farmers did not know the term agroecology before – and determined that agroecology represents a strategy to oppose neo-colonialism.

The participatory methodology facilitated an empowering process that enabled farmers to feel more confident to assume agency beyond their immediate circle and participate in new spaces: for example, when they identified and involved key stakeholders for the 'change agents workshop,' or when Nicaraguan farmers presented their cause on national radio and in the First National Forum of Agroecology. This resulted in the expansion of their networks within the agroecological movement, and with other stakeholders in the food system. The use of participatory and inclusive methods played a valuable role in the capacity building of farmers and local research partners. Farmers gave account of how through the participatory workshops they had appropriated the way of organising and structuring their thoughts and how to express them; skills they started to use in other areas of their lives as well. Through engaging and building the

skills and capacities of local facilitators and researchers it is hoped that capabilities will remain with the communities and benefit them beyond the project duration.

The methodological framework and description of the process presented in this paper demonstrates how different members of the action research family – participatory and systemic action research – can be creatively integrated to meet context-specific requirements and produce relevant and actionable knowledge and strategies. While rigorous evaluation of the efficacy of strategies actioned has not taken place, evidence about the empowerment and capacity development effects of the project suggest that the methodology is relevant and effective for research efforts endeavouring to contribute to transitions to agroecological food systems. It also appears to be adaptable for a multitude of topics that are complex and require systemic change through the involvement of various stakeholders across the system, including those whose voices are typically marginalised.

#### REFERENCES

- Altieri MA (1995) *Agroecology: The Science of Sustainable Agriculture*, Boulder CO: Westview Press
- Argyris C, Schön D (1996) *Organizational Learning II: Theory, Method, and Practice*, Reading, MA: Addison-Wesley
- Bellwood-Howard I, Ripoll S (2020) Divergent understandings of agroecology in the era of the African Green Revolution. *Outlook Agr* 2020; 49(2):103–110, doi:10.1177%2F0030727020930353
- Bergold J, Thomas S (2012) Participatory Research Methods: A Methodological Approach in Motion. *Forum: Qual Soc Res* 13(1), Art. 30, doi:10.17169/fas-13.1.1801
- Bradbury Huang H (2010) What is good Action Research? *Action Res* 8(1):93–109, doi:10.1177/1476750310362435
- Burns D (2012) Participatory Systemic Inquiry. *IDS Bulletin Special Issue 'Action Research for Development and Social Change'*, 43(3):88–100, doi:10.1111/j.1759-5436.2012.00325.x
- Harvey B, Burns D, Oswald K (2012) Linking Community, Radio, and Action Research on Climate Change: Reflections on a Systemic Approach. *IDS Bulletin Special Issue 'Action Research for Development and Social Change'*, 43(3):101–117, doi:10.1111/j.1759-5436.2012.00326.x
- Burns D (2014) Systemic action research: Changing system dynamics to support sustainable change. *Action Res* 12(1):3–18, doi:10.1177/1476750313513910
- Burns D, Worsley S (2015) *Navigating complexity in international development: Facilitating sustainable change at scale*. Rugby, UK: Practical Action Publishing
- Carpini M, Cook F, Jacobs L (2004) Public Deliberation, Discursive Participation, and Citizen Engagement: A Review of the Empirical Literature. *Annu Rev Polit Sci* 7:315–344
- Chambers R (1995) Paradigm shifts and the practice of participatory research and development. In: Nelson N, Wright S (eds) *Power and Participatory Development: Theory and Practice*, London: Intermediate Technology Publications, 30–42
- Chambers R (1997) *Whose Reality Counts? Putting the First Last*. Rugby, UK: Practical Action Publishing.
- Chambers R (2012) *Participatory workshops: a sourcebook of 21 sets of ideas and activities*. Routledge
- Cooke B, Kothari U (2001) *Participation: The New Tyranny?*, London: Zed Books
- Cooke B (2001) The Social Psychological Limits of Participation? In: Cooke B, Kothari U (eds) *Participation: The New Tyranny?* London: Zed Books, 102–121
- Erickson PJ (2008) Conceptualizing food systems for global environmental change research. *Global Environ Chang* 18(1):234–245, doi:10.1016/j.gloenvcha.2007.09.002
- Erickson P, Stewart B, Dixon J, Barling D, Loring P, Andreson M (2010) The value of a food system approach. In: Ingram J, Erickson P, Liverman D (eds) *Food Security and Global Environmental Change*. London: Earthscan
- European Parliament (2014) *Family Farming in Europe: Challenges and Prospects* [online] Directorate General for Internal policies. European Parliament: Brussels. IP/B/AGRI/CEI/2011-097/E027SC2, retrieved from <http://www.europarl.europa.eu/RegData/etudes/note/JOIN/2014/529047/IPOL-AGRI\_NT(2014)529047\_EN.pdf> [at 16 Mar 2020].
- FAO (2017) *FAO, IFAD, UNICEF, WFP and WHO: The State of Food Security and Nutrition in the World 2017, Building resilience for peace and food security*. Rome: FAO.
- Foran T, Butler JR, Williams LJ, Wanjura WJ, Hall A, Carter L, Carberry PS (2014) Taking complexity in food systems seriously: an interdisciplinary analysis. *World Dev* 61:85–101, doi:10.1016/j.worlddev.2014.03.023
- Francis C, Lieblein G, Gliessman S, Breland TA, Creamer N, Harwood R, Salomonsson L, Helenius J, Rickerl D, Salvador R et al. (2003) *Agroecology: The Ecology of Food Systems*. *J Sustain Agr* 22:99–118, doi:10.1300/J064v22n03\_10
- Gaventa J, Cornwall A (2006) Challenging the Boundaries of the Possible: Participation, Knowledge and Power. *IDS Bulletin*, 37(6):122–128, doi:10.1111/j.1759-5436.2006.tb00329.x
- Gayá-Wicks P, Reason P (2009) Initiating Action Research: Challenges and paradoxes of opening communicative space. *Action Res*, 7(3):243–262, doi:10.1177/1476750309336715
- Giraldo OF, Rosset PM (2018). Agroecology as a territory in dispute: between institutionality and social movements. *The Journal of Peasant Studies*, 45, 545–564.
- Gliessman SR (2007) *Agroecology: the ecology of sustainable food systems*, Boca Raton: CRC press.
- Global Agriculture Report (2016) [online] retrieved from <http://www.globalagriculture.org/report-topics/hunger-in-times-of-plenty.html> [at 14 Mar 2018]
- Global Nutrition Report (2016) [online] retrieved from <http://ebrary.ifpri.org/utills/getfile/collection/p15738coll2/id/130354/filename/130565.pdf> [at 14 Mar 2018]
- Greenhalgh T, Russel J (2009) Evidence-based policy making: a critique. *Perspect Biol Med* 52(2):304–18, doi:10.1353/pbm.0.0085
- Guzmán GI, López D, Román L, Alonso AM (2013) Participatory Action Research in Agroecology: Building Local Organic Food Networks in Spain. *Agroecol Sustain Food Syst* 37 (1):127–46, doi:10.1080/10440046.2012.718997
- Holt-Giménez E, Shattuck A, Altieri M, Herren H, Gliessman S (2012) We Already Grow Enough Food for 10 Billion People ... and Still Can't End Hunger. *J Sustain Agric*, 36(6):595–598, doi:10.1080/10440046.2012.695331
- Ioannidis J (2005) Why Most Published Research Findings are False. *PLOS Med* 2(8):e124, doi:10.1371/journal.pmed.0020124
- Jordan T, Andersson P, Ringér H (2013) The spectrum of responses to complex societal issues: reflections on seven years of empirical inquiry. *Integral Review* 9(1):34–70
- Kaner S, Lind L, Toldi C, Fisk S, Berger D (2014) *Facilitator's Guide to Participatory Decision Making*. Community at Work, San Francisco, California: Jossey-Bass.
- Kemmis S, McTaggart R (2005) Participatory Action Research: Communicative Action and the Public Sphere. In: Denzin NK, Lincoln YS (eds) *The Sage handbook of qualitative research*. Sage Publications Ltd., 559–603.
- Lang DJ, Wiek A, Bergmann M, Stauffacher M, Martens P, Mol, P, Swilling M, Thomas C (2012) Transdisciplinary research in sustainability science – Practice, principles and challenges. *Sustain Sci* 7(1):25–43, doi:10.1007/s11625-011-0149-x
- Leach M, Scoones I, Stirling A (eds) (2010) *Dynamic Sustainabilities: Technology, Environment, Social Justice*, London: Earthscan
- Lock K, Smith RD Dangour AD, Keogh-Brown M, Pigatto G, Hawkes C Fisberg RM, Chalabi Z. (2010) Health, Agricultural, and Economic Effects of

- Adoption of Healthy Diet Recommendations, *Lancet* 376(9753):1699–1709, doi:10.1016/s0140-6736(10)61352-9
- Méndez VE, Bacon CM, Cohen R (2013) Agroecology as a Transdisciplinary, Participatory, and Action-Oriented Approach. *Agroecol Sust Food* 37(1):3–18
- Muhammed M, Wallerstein N, Sussman AL, Avila M, Belone L, Duran B (2015) ‘Reflections on researcher identity and power: The impact of positionality on community based participatory research (CBPR) processes and outcomes. *Crit Sociol* 41(7–8):1045–1063, doi:10.1177/0896920513516025
- Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, Mullany EC, Biryukov S, Abbafati C, Abera SF et al. (2014) Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 384(9945):766–781, doi:10.1016/S0140-6736(14)60460-8
- Pimbert M (2006) *Transforming Knowledge and Ways of Knowing for Food Sovereignty*, London: International Institute for Environment and Development (IIED)
- Pimbert M, Wakeford T (2002) *Prajateerpu: A Citizens Jury/Scenario Workshop on Food and Farming Futures for Andhra Pradesh, India*. London: IIED and Sussex: IDS
- Reason P, Bradbury H (eds) (2001) Introduction: Inquiry and Participation in Search of a World Worthy of Human Aspiration’ in *The SAGE Handbook of Action Research*, London: SAGE, 1–14
- Reason P, Bradbury H (eds) (2008) ‘Introduction’ in *The SAGE Handbook of Action Research*, London: SAGE, 1–14
- Rosset PM, Martinez-Torres ME (2012) Rural social movements and agroecology: context, theory, and process. *Ecol Soc* 17(3):17, <http://dx.doi.org/10.5751/ES-05000-170317>
- Rothwell WJ, Sullivan RL (eds) (2005). *Practicing organization development: A guide for consultants*. John Wiley & Sons, Vol. 27
- Sage C (2013) The interconnected challenges for food security from a food regimes perspective: Energy, climate and malconsumption. *J Rural Stud* 29:71–80, doi:10.1016/j.jrurstud.2012.02.005
- Sandelowski M, Barroso J (2002) Finding the findings in qualitative studies. *J Nurs Scholarship* 34 (3):213–220.
- Tendall DM, Joerin J, Kopainsky B, Edwards P, Shreck A, Le QB, Kruetli P, Grant M, Six J (2015) Food system resilience: defining the concept’ in *Global Food Sec* 6:17–23, <http://dx.doi.org/10.1016/j.gfs.2015.08.001>
- Thompson J, Scoones I (2009) Addressing the dynamics of agri-food systems: an emerging agenda for social science research. *Environ Sci Policy* 12(4):386–397, doi:10.1016/j.envsci.2009.03.001
- Tittonell PA (2013) *Farming systems ecology: towards ecological intensification of world agriculture*, Wageningen, Wageningen University.
- UNCTAD – UN Conference on Trade and Development (2013) *Wake up before it is too late*. Trade and Environment Review 2013
- van der Ploeg JD (2008) *The New Peasantries: Struggles for Autonomy and Sustainability in an Era of Empire and Globalization* Oxon, London and Sterling, Earthscan, 356 p
- Wakeford T, Singh J, Murtuja B, Bryant P, Pimbert M (2008) *The Jury is Out: How Far Can Participatory Projects Go Towards Reclaiming Democracy?* In: *The SAGE Handbook of Action Research: Participative Inquiry and Practice*, London: SAGE Publications Ltd, 333–349
- Wezel A (2009) Agroecology as a science, a movement and a practice. A review. *Agron Sustain Dev* 29(4):503–515, doi:10.1051/agro/2009004
- Wiek A, Ness B, Schweizer-Ries P, Brand F, Farioli F (2012) From complex systems analysis to transformational change: a comparative appraisal of sustainability science projects. *Sustain Sci* 7:5–24 (Supplement 1), doi:10.1007/s11625-011-0148-y
- Wielinga E, Zaalmink BW, Bergevoet R, Geerling-Eiff F, Holster H, Hoogerwerf L, Vrolijk M (2008). Networks with free actors. Encouraging sustainable innovations in animal husbandry by using the free actors in networks (FAN) approach. Wageningen UR. Retrieved from <<https://edepot.wur.nl/22956>>[at 11 Nov 2020]
- World Bank (2014) ‘For Up to 800 Million Rural Poor, a Strong World Bank Commitment to Agriculture’. Washington DC: World Bank. Retrieved from <<http://www.worldbank.org/en/news/feature/2014/11/12/for-up-to-800-million-rural-poor-a-strong-world-bank-commitment-to-agriculture>> [at 16 Jul 2017]

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