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Abstract

There is significant potential for family farming to contribute to several dimensions of the Sustainable Development Goals (SDGs) adopted by the United Nations General Assembly in 2015. Our research aims to provide insights to help strengthen sustainable family farming. We focus on initiatives that have advanced sustainable family farming innovations in Colombia and analyse the factors and dynamics that have led to the limited penetration of those

innovations across the country. To that aim, a transformative methodology is applied involving representatives of farmers' associations, supporting organisations and researchers from various disciplinary fields. We analyse the network of initiatives against the conceptual background of sociotechnical niches and identify a stable niche where generic lessons are being systematically identified and used to establish replication projects. However, this niche is still limited in its breadth, which results in a low capacity for expansion and a strong dependency on international donors for reproducing experiences. Specific recommendations are outlined for broadening the type of actors involved in the interpretation and dissemination of lessons from the niche. Moreover, we outline suggestions for further research and conceptualisation in two directions: for exploring effective ways of broadening the niche and translating niche lessons to state policies and for deepening the understanding of interactions between the niche and other levels.

Key words: family farming; agroecology; sustainability transition; sociotechnical niches; case-based mutual learning; Colombia

INTRODUCTION

Smallholder agriculture has a major role to play in any attempt to move towards sustainable development pathways. Transitions to sustainable agriculture can make direct contributions to several dimensions of the Sustainable Development Goals (SDGs) adopted by the United Nations General Assembly in 2015. (FAO 2015) On the one hand “[t]he majority of the world’s poorest and hungry live in rural settings and depend directly on agriculture” (IAASTD 2009)

and most of these populations rely on small-scale farms, i.e. plots of less than two hectares of land, which account for about 60% of arable land worldwide (ibid). These farming systems rely mainly (or entirely) on family labour for their operation and management. Thus, strengthening family farmers will be key for tackling poverty and hunger, which are the global challenges addressed by the first two SDGs. On the other hand, there are growing indications that the striking growth in productivity in industrial capitalist agriculture during the last half century is associated with the externalisation of environmental burden and social inequalities (Weis 2010). Agriculture is, therefore, both a driver of detrimental environmental impacts, such as climate change, deforestation and increasing water scarcity, and is also negatively affected by those changes (Gordon et al. 2010, Smith and Olesen 2010, Hosonuma et al. 2012). Though, innovative approaches have been emerging that allow smallholders to improve food production while enhancing the functional biodiversity of agroecosystems as well as the energy and resource efficiency of their farming systems (Pretty et al. 2003, Altieri and Toledo 2011, Kremen et al. 2012).

The overall objective of our research is to provide insights to help strengthen sustainable family farming. We focus on initiatives that have advanced alternative approaches to family farming in Colombia and explore whether the network of farmers' associations and supporting institutions driving those initiatives can be considered as an emerging sociotechnical niche. Our specific aim is twofold: firstly, we investigate how farmers' associations can best contribute to strengthening sustainable family farming. To achieve this, we apply a transformative methodology that allows for mutual learning based on the joint investigation of cases involving representatives from the supporting organisations, farmers and researchers from various disciplinary fields. This allows for societal learning and the transformation towards sustainability through collaborative research (a transformative objective). Secondly, we analyse to what extent the network of farmers' associations and supporting institutions can

be considered an emerging sociotechnical niche (a conceptual objective). Based on conceptualisations of sociotechnical niches and the mechanism of their emergence, development and growth, the analysis aims to provide insights into the challenges and difficulties faced in broadening the diffusion of sustainable family farming practices in Colombia, as well as to offer suggestions about how to overcome these obstacles.

In this article, we elaborate on a network of initiatives that have advanced sustainable family farming practices in Colombia. The main focus is on the ability of the initiatives to diffuse innovative practices that have been developed and tested – in some cases over a period of more than two decades. The research is based on a broad understanding of innovation that includes ideas, practices and objects that are perceived as new by potential adopters (Rogers 1983). Thus, innovations are not restricted to technical aspects (e.g. new ways of organising and operating in physical domains, such as soil, crops, animals and forests), but also cover new ideas and practices in the social and cultural domains of family farming, such as cooperatives, policies and markets. In our research, we apply a quasi-evolutionary perspective to technological change in which technology and society co-evolve in the same process (Rip and Kemp 1998). From this perspective, diffusion can be conceptualised as learning processes within and between different sociotechnical structuration levels (i.e. niches and regimes), which cover not only lessons about technology but also about preferences and rules (see 'Conceptual framework – sociotechnical niches' section). Likewise, our research methodology is organised as a mutual learning process within and between different levels and combines different qualitative content analysis techniques (see 'Methodology' section).

This article is structured as follows: the second section provides an overview of the development and current state of the initiatives that aim to strengthen the family farming sector in Colombia. The third section offers a review of the conceptualisation of sociotechnical

niches, which is proposed as the conceptual framework for assessing the potential of the network of initiatives studied to induce the broader diffusion of the innovations in Colombia. The fourth section presents the methodology applied to advance both the transformative and conceptual objectives of the study. In section five, the network of initiatives is analysed against the conceptual background of sociotechnical niches and in section six we explore the implications of our analysis from two perspectives. We derive recommendations concerning the possible dynamics of the wider diffusion of the analysed sustainable family farming practices in Colombia. We reflect on the suitability of the conceptualisation of sociotechnical niches for grasping the complexity of the environment in which the analysed network of initiatives operates, and derive suggestions for further theoretical considerations concerning sociotechnical niches. The final section summarises the main findings of the study and offers an overview of areas for further research.

FAMILY FARMING IN THE COLOMBIAN AGRARIAN CONTEXT

The family farming concept in Colombia

The term family farming is used to refer to farming system types that vary across different countries. Heavy reliance on family labour, the role of the family in the management of farm operations and the size of the farm are the most common characteristics of the different notions of family farming (Garner and de la O Campos 2014). The term is, however, often linked to other ideas that go beyond the economic (productive) functions. The concept of family farming also encompasses a social and cultural dimension and refers to a particular relationship between farming families and the environment (Schneider and Niederle 2008). This makes the concept of family farming particularly suitable for exploring transitions towards sustainable agriculture.

In Colombia, the term family farming is not widely used. The concept of family farming (*agricultura familiar*) that responds to the contextual particularities in Colombia has only been recently recognised and is still in the early stages of development. Some examples of this process are the characterisation of family farming systems through academic studies (Forero-Álvarez 2013, Acevedo-Osorio 2016a), as well as the definition of a category for policymaking (MADR 2014). Consequently, there is still very little literature in which the term is explicitly used. However, the core productive notions of family farming – i.e. the predominance of family labour and the farm size – match the characterisation of peasant farms or the peasant economy (*economía campesina*), which is a term commonly used by academics analysing Colombian agrarian and rural development (Reinhardt 1988, Salgado Araméndez 2002, Zamosc 2006). Moreover, the productive notion of family farming is also evident in the categorisation of small farmers or small producers (*pequeños productores*), which is a concept commonly used in policy formulation, such as in the national development plans (DNP 2015a).

In this study, we use the term family farming to encompass the conceptualisations that have been commonly used to date, while – additionally – recognising the other non-productive functions of the farming systems it refers to. The cultural meanings and environmental dimensions of family farming are particularly relevant in the Colombian case. Farming units and practices are components of the identity-building of social groups with ethnic links, such as the indigenous (Hristov 2005, Cano et al. 2010, Corrales Roa 2011a) and Afro-Colombian populations. Agricultural cooperatives bringing family farming units together have also been prominent in creating the notion of social groups (Gutiérrez 2014). In the environmental dimension, family farms exhibit greater reliance on inputs and services from the ecosystem in which they operate, and use fewer commercial inputs (e.g. fertilisers, seeds and fuel) than large agricultural organisations (Forero-Álvarez et al. 2002). Moreover, environmentally-friendly practices, such as the sustainable management of soil, agroforestry and multi-

cropping, are critical for maintaining and improving livelihoods on the areas of land, which are often extremely small, managed by family farmers (Corrales Roa 2011b, Nicholls et al. 2016).

Current state and role of family farming in Colombia

Family farming remains an important socio-economic arrangement in the rural context, even though the rate of urbanisation in Colombia has been increasing steadily over the last 60 years. Three-quarters of Colombian municipalities display rural socio-economic structures where social and productive relationships are organised around land tenure and use (UNDP 2011, DNP 2015b). Around 30% of the country's population (or 14.5 million inhabitants) lives in those predominantly rural municipalities. The last country-wide agrarian census (2014) showed a particularly high concentration of land tenure: 64.8% of the total agricultural area is owned by 2.8% of landowners, with landholdings larger than 100 hectares, while 70% of the landholdings dedicated to agricultural production are smaller than 5 hectares in area and cover only 4.8% of the total agricultural area (DANE 2016). In contrast to this marginal share of family farmers in terms of total agricultural area, family farmers remain significant actors for national food production: family smallholdings account for 47% of the total area cultivated with transitory crops and 56% of the area with permanent crops – i.e. the area dedicated to the production of food (Garay et al. 2010).

Although significant advances in human development parameters have been achieved in Colombia over the last two decades, poverty and marginalisation remain higher in rural areas. Around 46% of the rural population and 18.5% of the urban population lives in poverty (DNP 2015b). These disparities persist despite the rural development policies and programmes addressing the livelihood conditions of the rural population – and family farmers in particular – which have been implemented over the last two to three decades (Castro Murillo 1995, Borras

2003, World Bank 2014). Different dynamics have exacerbated the marginalisation of family farmers: the violent domestic conflict, the surge of illicit crop cultivation, the increasingly drastic consequences of climate change and the weak institutional presence of the state (Garay 2013, Gómez et al. 2015). However, several commentators also consider that rural development policies and government programmes have been ineffective in reducing poverty and marginalisation: the focus over the last two decades has been on integrating the national agricultural sector and rural economic activities into international commodity markets (i.e. food and raw materials) and on financial capital through technical modernisation and diverse incentives to invest in agro-business and other large developments (e.g. mining and large hydroelectric projects). This policy direction has not only intensified the concentration of land tenure (UNDP 2011, Garay 2013), it has also failed to recognise the productive particularities of family farming, such as diseconomies of scale (Reinhardt 1988, Forero-Álvarez 2013) or the multi-functionality of farming practices for the livelihood of the family unit (Acevedo-Osorio 2016b). Ultimately, the pauperisation of the rural population has been reinforced by government policy (Salgado Araméndez 2002, Tobasura Acuña 2011).

The current peace process between the Colombian government and the Revolutionary Armed Forces of Colombia – People's Army (FARC–EP) has produced expectations of the establishment of national policies for strengthening family farming in the country (Machado et al. 2013). Indeed, the first part of the agreement establishes the guidelines for "integral rural reform", which includes, among other promising aspects, measures for tackling the land tenure inequality, allowing and supporting displaced families to return to their farms, as well as improving support for family farmers in general (the last version of the peace agreement, signed on 24.11.2016, can be consulted online at http://www.altocomisionadoparalapaz.gov.co)

Initiatives for alternative family farming innovations

Numerous initiatives have applied alternative approaches to the livelihood conditions and needs of Colombian farming families. In contrast to the orientation of government programmes and large farmers' unions, which focus on the market competitiveness of farmers in single market segments, alternative approaches take into consideration the social, ecological, cultural and spiritual dimensions of family farming systems. A prominent surge in these types of alternative approaches can be traced back to the 1980s. This change came about as part of a dynamic in several Latin American countries, where numerous agroecology-based projects were promoted by NGOs incorporating elements of both indigenous knowledge and modern agricultural science (Altieri and Toledo 2011). Since then, the drive towards the integration of science-based agroecology techniques and indigenous farming technologies in Colombia has manifested itself in different ways. One notable example is the establishment of '*escuelas campesinas de agroecología*', which can be translated as 'peasant agroecology schools'. The concept has been influenced by the work of rural activists in Central America (Bunch 1985, Rodríguez and Hesse-Rodríguez 2000) and in other Latin American countries (Pumisacho and Sharwood 2005). Although the term encompasses a rather heterogeneous set of initiatives, the initiatives do share certain key characteristics. The concept refers to groups of farmers who are committed to meeting regularly to undertake training with the aim of mutual learning. The training is directly linked to the practical application of principles and techniques on a pilot farm or, preferably, on the participants' farms; the topics are chosen according to the specific conditions of the participants' farms and emphasis is given to promoting the exchange of knowledge and experiences between participant farmers. There are no precise statistics for peasant agroecology schools in Colombia. However, Mejía-Gutierrez (2006) reported more than 50 schools in the south-west region of the country and Acevedo-Osorio (2013) estimated that more than 100 could be operating across the whole

country. Different types of farmers' associations have also been advancing the development and promotion of alternative solutions for their members. These associations share a broad focus, i.e. they generally adopt a holistic perspective on the livelihoods of their associates instead of focusing on productive competitiveness in particular market segments (e.g. coffee, sugar, fruits or milk). The majority are officially registered as legal entities and operate in very limited geographical scopes, covering small administrative units – from one or several villages up to a couple of neighbouring municipalities (Acevedo-Osorio and Martínez-Collazos 2016).

Research initiatives applying participative approaches were already key during the surge of alternative approaches to family farming in Colombia in the 1980s and 1990s. Notable is the case of the research centre on sustainable agricultural systems (Centro para la investigación en sistemas sostenibles de producción agropecuaria,CIPAV), a non-academic institution which, since its foundation in 1986, has conducted applied research projects for the development of sustainable agricultural systems, integrating peasants and entrepreneurial farmers in the research process (Murgueitio 2002). The seminal work of Mejia-Gutierrez has also been particularly influential. It describes the diversity and suitability of existing indigenous agricultural systems in the country and highlights their social, cultural and spiritual value (Mejía Gutierrez 1997). Initially, there was little interest from academic institutions in adopting and advancing agroecology (not to mention integrating indigenous knowledge). However, this picture has been changing in the last decades. Agroecology programmes have been emerging in academic institutions and there has been growing interest from academic researchers in integrated family farming systems.

Despite their diversity in terms of their foundations and institutional settings, these initiatives share a reliance on firm concepts of sustainability. They take into consideration the social, economic, ecological and cultural dimensions of sustainability in family farming. However,

these approaches to family farming are still the exception in the overall Colombian family farming sector. Some indications of this marginality are reflected in the figures related to poverty measures revealed by the last agrarian census (as already outlined). Moreover, the absence of alternative approaches to the livelihood requirements of family farmers in the most recent central policies addressing rural development issues in Colombia raises questions about the potential for the country-wide diffusion of sustainable family farming practices.

Some efforts aimed at improving the connections between the initiatives are evident. Examples include networks such as the Colombian chapter of the agro-ecological movement of Latin America and the Caribbean (Movimiento Agroecológico de América Latina y el Caribe, MAELA) and the Colombian association of natural reserves of civil society (Asociación Red Colombiana de Reservas Naturales de la Sociedad Civil, RESNATUR). Recent initiatives have also fostered the systematisation of existing experiences, increasing advocacy and facilitating the broader diffusion of sustainable family farming practices. Two notable examples are the Colombian network for energy from biomass (Red Colombiana de Energía de la Biomasa, RedBioCol) and the national committee for the promotion of family agriculture (Comité de Impulso Nacional de la Agricultura Familiar en Colombia, CIN-AF). The former was launched in 2012 and focuses on facilitating networking and continuous knowledge exchange among local actors (Rodríguez Jiménez 2016). The latter emerged in 2014 and places strong emphasis in its mission statement on increasing influence at national political level (CIN-AF 2015).

Against this background, the transformative objective of our research is to advance the understanding of how farmers' associations can effectively contribute to the sustainability of Colombian family farms and, in this way, support networking initiatives such as RedBioCOL and the CIN-AF in their attempt to achieve the broader diffusion of sustainable family farming practices.

CONCEPTUAL FRAMEWORK – SOCIOTECHNICAL NICHES

In the literature on sustainability transitions, niches are conceived as "protected spaces that allow the experimentation with the co-evolution of technology, user practices, and regulatory structures" (Schot and Geels 2008). In such protected spaces, alternative technical solutions to persistent sustainability problems can be tested and improved. Sociotechnical niches are conceptualised in contrast to regimes, which are the incumbent sociotechnical systems where mainstream technologies for the provision of societal functions – such as the provision of energy, food and water – are operated, maintained and reproduced (Smith et al. 2010). Regimes are conceived as strongly structured systems which cover a high share of the corresponding markets and rely on stable sets of understanding, values, norms and practices. They restrict the search for innovation in technical designs that conform to the existing regime's configuration and rules (Geels 2002). In contrast, niches are less structured configurations, where understanding, values, norms and practices are still in the process of definition. They are, therefore, spaces for developing more radically different designs. However, the novelty of those designs commonly implies inferior qualities when compared to well-established commercial/mainstream solutions, e.g. in terms of convenience, price or comfort. In this sense, niches are regarded as societal configurations where promising innovations can be nurtured, i.e. continuously tested and improved.

Given the functional role of niches in the generation of sustainable innovations, considerable research has been undertaken to understand how they emerge, operate and grow. The conceptualisation of emerging sociotechnical niches can be described around four central concepts: protection, co-evolution, internal niche-building processes and the twofold level of niche development. Protection is fundamental to allow for the testing and further development of inventions which are still immature and which should be nurtured to the point

where they can compete and survive in mainstream markets. There are a variety of means of protection, provided by different kinds of actors. The state is often involved through the mobilisation of public resources in the form of research and development (R&D) programmes or subsides, or through direct involvement in innovation projects that are of particular societal relevance, such as in the field of military technology (Schot and Geels 2007). Important protective resources can also be found in cultural milieus by means of cognitive and normative settings, which put forward alternative lifestyles and question the suitability of mainstream technology configurations to respond to sustainability issues, such as in the case of the environmentalist milieu that supported the consolidation of an organic farming niche in the UK (Smith 2007). The protective space offered by sociotechnical niches allows for more than the testing and improvement of the novel technology: the experiences gained from the innovation also generate insights into issues such as user preferences, routines, assumptions and regulations. In this way, the novel technology – as well as the social environment in which it is embedded – co-evolve in the same process (Schot and Geels 2007). This co-evolution of the social and technical dimension is conceptualised as taking place by means of three internal niche-building processes, which are described by Geels (2011) as follow (words in italics from the original):

- The articulation (and adjustment) of *expectations* or *visions*, which provide guidance to the innovation activities, and aim to attract attention and funding from external actors.
- The building of social *networks* and the enrolment of more actors, which expand the resource base of niche-innovations.
- *Learning and articulation processes* on various dimensions, e.g. technical design, market demand and user preferences, infrastructure

requirements, organisational issues and business models, policy instruments, symbolic meanings.

These processes are expected to lead to the aggregation of generic lessons and the emergence of a "community that shares cognitive, formal and normative rules" (Schot and Geels 2008) to stabilise the social practices and technical designs that co-evolve in the protected spaces. The development of such a community – or the stabilisation of the sociotechnical niche – is conceptualised by Geels and Deuten (2006) as progressing on two levels and through four phases: interested actors engage in the design, use and re-design of innovations by setting local projects of an experimental character. In the initial stages those are rather isolated projects, where expectations, designs and rules might exhibit local characteristics (the local phase). Through the reiterative exchange between actors within local projects, knowledge and experiences can be compared and aggregated and generic lessons and rules begin to be articulated at a more global level (the inter-local phase). Intermediaries and relatively stable networks of actors emerge, which systematically gather the knowledge from local projects required to constitute and stabilise the global level (the trans-local phase). Finally, the rules, resources and the community stabilise to the point where local projects are framed and coordinated by the global niche level (the global phase). According to Geels and Deuten, the aggregated knowledge "is sufficiently general, abstracted and packaged, so that it is no longer tied to specific contexts" (ibid) at this level and can diffuse more broadly. The extent to which niche innovations can challenge and substitute mainstream (i.e. regime conforming) practices does not solely depend on the niche's own expansion dynamic. Rather, regime change is a process of co-evolution and mutual interaction within and between the levels (Schot and Geels 2008). Moreover, co-evolution patterns do not necessarily imply full substitution of the old (regime) by the novel (niche). Other possible patterns imply processes in which niches "branch,

pile up, and contribute to changes in the behaviour, practices and routines of existing regime actors" (ibid).

Starting from the conceptualisation of sociotechnical niches, the conceptual objective of this research lies in exploring how far the network of farmers' associations and supporting institutions that advance sustainable family farming innovations in Colombia can be considered as an emerging sociotechnical niche.

METHODOLOGY

Our research applies a transformative methodology which combines a transdisciplinary research methodology with qualitative content analysis. We built a network of farmers' associations, scientists and supporting institutions in Colombia and realised a *case-based* Mutual Learning Session (*cb*MLS), as described by Vilsmaier et al. (2015). The *cb*MLS was conceived to advance the transformative objective within a transdisciplinary research setting. Concerning the conceptual objective of the research, qualitative content analysis techniques were applied to textual materials generated during the *cb*MLS to validate the hypothesis of a sociotechnical niche building process around sustainable family farming practices in Colombia. **Fehler! Verweisquelle konnte nicht gefunden werden.** shows a schematic description of the applied methodology.

Case-based Mutual Learning Sessions (*cb*MLS)

Mutual learning sessions are group-based methods for transformative sustainability research that aim for both knowledge production and societal transformation by enabling knowledge integration and transfer. Mutual learning sessions can be considered temporary transdisciplinary research spaces. They serve two central aims. On the one hand, they are

created to allow people from different cultures of knowledge, cognition, sociocultural or political contexts, or everyday practices, to express and jointly process their individual perceptions and conceptualisations of a specific sustainability challenge (Vilsmaier et al. 2015). This should ensure the plurality of perspectives and the consideration of different knowledge bases, all considered equally important. On the other hand, *cb*MLS support knowledge transfer between different cases that deal with similar sustainability issues and between different scales; i.e. they support the up and down-scaling of experiences and learning between different scales, such as administrative units (ibid.). *cb*MLS provide a general procedure and principles that ensure a certain degree of traceability of the learning process, knowledge production and transfer, and enhance the robustness of the obtained results by framing and structuring highly dynamic, vivid transdisciplinary research situations.

In *cb*MLS, a case or a set of cases serve as boundary objects (Star and Griesemer 1989) through which different perceptions and conceptualisations of the phenomenon the case stands for are analysed and negotiated (Vilsmaier et al. 2015). The organisation of a *cb*MLS comprises three phases: (i) a preparation phase, (ii) a case encounter and (iii) a post-processing phase. During the preparation phase (i) the goal and specific objectives of the session are defined. A representative case (or a set of cases) is selected and perspectives and knowledge about the case(s) are gathered and systematised; moreover, relevant actors are connected in order to build a team of participants. The composition of the team is crucial. To ensure the robustness of the results a balanced team is recommended in terms of representatives of the relevant knowledge fields, cases or policy institutions, diversity aspects and — according to the issue of concern —sociocultural backgrounds. During the case encounter (ii) the participants engage directly with the case by interacting with case agents and, if possible, by visiting the case site. They work on the objectives defined during the preparation phase for the session. The detailed structure of the encounter can vary in type, size and duration. However, the general aim is “to

construct a shared view on what components/aspects of the case are crucial for sustainable transition and to document alternate/contrasting views" (Vilsmaier et al. 2015). The post-processing phase (iii) allows for the consolidation of the results mutually agreed by all the actors involved, the illustration of divergences and contradicting viewpoints, the documentation of what is considered to lead to more sustainable pathways and/or requirements for further knowledge. Results are prepared for the different societal spheres that are challenged by the issue of concern. Accordingly, they are elaborated in different publication formats and (technical) languages to serve decision making on different levels and in different societal fields.

_cb_MLS on sustainable family farming in Colombia

For the aim of the research presented here, a *cb*MLS was organised to provide a temporary transdisciplinary space in which interactions between the network of initiatives, scientists and supporting institutions could take place, which could result in stabilising a global niche for family farming innovations in Colombia. The *cb*MLS was realised between December 2015 and June 2016. Representatives from five farmers' associations and seven supporting institutions, as well as eight researchers from different research institutions and academic fields (i.e. sociology, agroecology, ecology, sustainability, geography, anthropology and cultural studies), were involved. The participating organisations are listed and briefly described in Table 1. The association of indigenous and peasant producers (Asociación de Productores Indígenas y Campesions, ASPROINCA) was selected as the case study for the *cb*MLS. It was founded in 1995 and currently has more than 200 members. ASPROINCA promotes sustainable agricultural practices and encourages the re-establishment of native varieties of beans, maize, sugar cane and fodder plants to increase household food sovereignty. It also trains farmers in sustainable agroecological practices, promotes the use of biogas from animal waste and

coordinates efforts to recover and protect micro-watersheds - among other initiatives aimed at improving the livelihoods of peasant communities in Riosucio and other neighbouring municipalities (UNDP 2012).

The central guiding question of the *cb*MLS was: "By means of which instruments and strategies can farmers' associations effectively contribute to strengthening the Colombian family farming sector regarding economic, social, environmental and cultural domains?" This guiding question depicts the transformative aim of our research and was developed jointly with representatives of ASPROINCA and of the RedBioCol network. The tools and strategies applied by ASPROINCA to support its members were set as the case study around which the mutual learning session was structured. During the preparation phase, expert interviews were undertaken with 15 participants via Skype™. The interviews were designed with two aims: (i) to make explicit the perspectives of the invited participants on the topic and collect their inputs in order to break down the central guiding question into more specific issues; and (ii) to provide qualitative data about the interactions between the participants and other actors involved in initiatives promoting sustainable family farming in Colombia.

The case encounter took place between 30th March and 1st April 2016 in Riosucio, Caldas, Colombia. The encounter comprised three stages: (i) visits to farms, (ii) sharing of experiences and (iii) group work units. The visits (i) provided the participants with first-hand experience of the type of family farming systems promoted by ASPROINCA and enabled them to interact with individual farmers and the staff of the association. The individual experiences from the field (ii) were systematically shared and collected through written and spoken statements. Finally, three units of group work (iii) were designed to induce mutual learning. The first two units aimed to stimulate knowledge transfer between similar cases and to generate recommendations for ASPROINCA and for other farmers' associations. The third unit promoted

the extrapolation of lessons to extract recommendations for the consolidation of the RedBioCol network. The results from the entire mutual learning session were synthesised and consolidated in the form of specific recommendations. A final document, which was created and approved by the participants, comprises a detailed description of the process, the results and the consolidated recommendations (the comprehensive Spanish *cb*MLS report can be consulted online at https://goo.gl/6x0lys).

Qualitative content analysis

Qualitative content analysis techniques were applied to the textual materials generated from the *cb*MLS to validate the hypothesis of a sociotechnical niche building process around sustainable family farming practices in Colombia. The materials analysed comprise the transcripts of the 15 expert interviews, written material produced by the different group work units during the case encounter and the *cb*MLS final report. The analysis combines procedures for inductive category development and deductive category application as described by Mayring (2000). The concepts of internal niche building processes (learning, articulation of expectations and networking) and the formation of the global niche level are applied as deductive categories for the analysis. The inductive strand of the analysis aims to characterise how those deductive categories were expressed in the interactions between the community of organisations and initiatives represented in the *cb*MLS. Consequently, questions guiding this work ask about the specific qualities of the presumed niche development in Colombia:

- Learning about what and how?
- Innovations to which sustainability problems/challenges?
- Based on what principles/values?
- Who is involved? Through which interactions?

- What are the local projects?
- How is the formation of a global niche level being promoted?

The analytical process combines techniques for summarising and structuring content in an iterative way. The main aim of the summarising technique is to reduce the text to obtain the essential content relevant for advancing the conceptual aim of the research (Mayring 2008). The structuring technique in our case involves filtering and organising aspects evidenced in the texts according to the deductive categories, i.e. according to the conceptualisation of sociotechnical niche development. The resulting set of categories (the code system) is shown in Table 2. The code system is organised into three orders. The first order of categories refers to aspects described and/or highlighted by single text passages. The number of passages containing relevant information about the corresponding aspect is indicated. First order categories were clustered into second order codes, as a first step in the aggregation of inductive categories within the structure provided by the key concepts of the sociotechnical niche. The criteria applied for this aggregation task vary. Categories relating to the articulation of expectations of the presumed niche community were grouped into two types of aspects: (i) those that provide common ground for what can be regarded as the shared vision of the niche community and (ii) those that refer to the most pressing problems or challenges faced by family farming, for which the innovations being nurtured should offer alternatives. Information about the learning process taking place within the presumed niche was clustered into five second order categories. The first four clusters gather the learning topics into groups of lessons according to their scope of application; i.e. lessons for individual farms, for the structure and operation of farmers' associations, for tackling commercialisation issues, and lessons with larger scope, which we refer to as the socio-ecological level. The fifth cluster gathers information about how the learning about those topics is being organised. During the coding process, the decision was taken to consider the deductive categories of 'networking'

and 'building of global niche level' together. Both concepts point to the set of actors involved in the niche development, their role and interactions. While the concept of networking is focused on the structure and growth of that set of actors, the building of a global niche emphasises how those actors engage in the sequential aggregation and application of general lessons. However, trying to differentiate single statements in terms of their information value about structure or role was problematic during the coding process. Therefore, first order categories relating to these two concepts were grouped according to the type of actors about which the considered text passages provide information.

RESULTS - THE NICHE OF SUSTAINABLE FAMILY FARMING PRACTICES IN COLOMBIA

In this section, the composition and the dynamic interactions between the community of actors promoting sustainable family farming practices in Colombia is described. This descriptive exercise is based on the code system resulting from the qualitative analysis displayed in Table 2. This section is structured according to the four key concepts of sociotechnical niches applied as deductive categories. Each subsection collates and summarises the information extracted from the analysed materials, corresponding to each deductive category. Therefore, the whole section can be understood as an attempt to reconstruct the community of initiatives promoting sustainable family farming in Colombia by applying conceptualisations of sociotechnical niches.

Articulation of expectations

Common expectations and visions provide coherence to niche development by guiding the search for alternative solutions in different locations (Geels and Raven 2006). They are conceptualised as "a special set of cognitive rules that are oriented to the future and related to action" (ibid). Two types of aspects were analysed to capture the common cognitive rules

guiding the work of the initiatives considered in the present study, i.e. aspects of common problems and challenges and components of the shared vision of the niche.

The central challenge is the conventional perception that equates peasant or rural with poor and backwards. A critical manifestation of this perception is that small farming systems are assumed to be unproductive and economically unfeasible by nature, which seems to be the background against which rural development policies have been designed over the last two to three decades. This underestimation of family farming (and of the rural environment in general) is also reflected in the extremely weak physical and social infrastructure in rural areas of the country, which became evident in the most recent agrarian census (see previous section 'Current state and role of family farming in Colombia'). Accordingly, national policies are regarded as unsuitable (or even detrimental) for supporting the sustainable livelihoods of family farmers. This applies not only to policies concerning agricultural issues, but also to those with direct effects on land distribution and use, such as the definition of areas for mining developments and large hydroelectric projects. An additional challenge is evident in the conventional commercial channels, which involve several intermediary stages and result in low prices being paid to farmers, not to mention the high risks involved in the primary production stages and the uncertainty of the market. This general situation and the ongoing armed conflict have been the main drivers of the continuous migration of the rural population to urban centres, particularly amongst the youth. This has resulted in difficulties in ensuring the availability of labour to sustain family farms. As one of the interviewees commented, "the land is now full of elders".

The most prominent component of a shared vision is more often referred to as food sovereignty. The concept comprises different notions. The most basic is the idea of producing crops for self-sufficiency. Background to this common expectation is the fact that a significant

proportion of small farmers has adopted an entrepreneurial approach to farming, which implies specialisation in a single (or few) commercial crop(s). One side-effect of this approach is that self-sufficiency (in terms of food consumption) has considerably decreased and farming families now rely heavily on supplies from the national (and increasingly international) markets. More broader meanings of food sovereignty entail notions such as the recovery of native seeds, the application of indigenous knowledge, and practices in crop production as well as the concept of responsible consumers (beyond the rural context) who look for regionally produced crops. Linked to autonomy in the production of food for self-consumption is the search for farming practices that are better integrated in the features and functions of the ecosystem in which the farm is located. In this respect, agroecological principles are also seen as options for improving the autonomy of individual farmers by diminishing (or avoiding) the need for external inputs. In addition to expectations about specific features of individual family farming units, there are recurrent indications about expectations relating to the role of farmers' organisations. One prominent aspect is the search for organisational autonomy, which refers to the growth of the own resource basis of farmers' associations (e.g. in terms of human, financial and political capital) to provide appropriate services to their members in a continuous way. Another prominent component of a shared vision is the configuration of commercial channels that ensure fair prices. This is often linked to the development of processing steps that add value to the produce and to the reduction of intermediary steps between farmers and end consumers.

Learning processes

The development and stabilisation of sociotechnical niches imply learning processes on multiple dimensions (Schot and Geels 2008). The topics that are the subject of learning processes within the community studied can be organised into four categories. These

categories reflect the scope of application for which the lessons are most relevant; i.e. on individual farms, at organisational level, in terms of commercial channels and at socio-ecological level.

Learning about technical innovations, such as agroecology techniques, bio-digesters, improved biomass stoves or biological soil recovery and protection practices, is particularly relevant at individual farm level. This includes the training of farmers on techniques that are applicable to the specific conditions of their farms and are compatible with their own planning and expectations. Learning processes at this level can take place in different formats. They often involve a trainer or facilitator working with a group of farmers to foster the exchange of knowledge and experiences between farmers. Moreover, emphasis is put on the practical implementation of the innovations by the participating farmers on their own farms, which in turn fosters the process of learning by doing and the development of variations or adaptions that respond to the specifics of the individual farms, the family farmers and the local ecosystem. Other relevant lessons at individual farm level deal with options to counteract generational and gender imbalances; these are perceived to be very common among farming families. This kind of learning is less prominent than technical farming innovations. However, there are indications that some actors are interested in greater consideration and exchange on innovative and effective ways of integrating the younger generations into the family farming processes and of improving the status of the role of women among all family members (including the women themselves).

At organisational level, the niche community was most interested in how to effectively improve and maintain the autonomy of farmers' associations. Some notable examples of topics of interest are: a) the establishment of revolving funds managed by the associations which open up the possibility of providing micro-credits to their members to support the

transformation of their farms; b) building and maintaining a staff of 'promoters', i.e. trained farmers with the technical knowledge and methodological skills to provide training and technical advice to associated farmers and follow up the transformation of their farms; c) the development of tools and methodologies for diagnosis, planning and monitoring the farms, which are adapted to the particularities of the family farmers served by the associations; and d) the continual maintenance of documentation about the progress of individual farms and/or programmes implemented by the associations. Learning about these issues largely relies on the direct exchange of experiences between farmers' organisations, rather than on the circulation of information through printed or digital materials. Moreover, these types of issues are rarely covered in publications, booklets or guidelines produced within the niche community. Direct exchanges between associations are commonly facilitated by NGOs. Such exchanges often form part of single (short-term) projects or (long-term) programmes initiated and coordinated by supportive NGOs. Programmes led by NGOs usually include the advisory services of external professionals who provide training and/or guidance to farmers' associations in organisational issues, which complement the case-specific knowledge exchange between associations.

Another type of lesson being shared comprises innovative practices to address issues related to the socio-ecological systems in which family farming and farmers' associations are embedded. One prominent example is the establishment of seed banks that facilitate the recovery of native species and the dissemination of crops, weeds and trees that are required to build the farming systems promoted by the studied initiatives. There are also indications of initiatives for the recovery of local animal breeds (cattle, poultry and swine). Another example is the carrying out of territorial planning exercises with broad geographical scope, such as landscapes, micro watersheds or biotopes. The developed plans help to align measures at farm

level with broader aims; e.g. the protection of a watershed. The plans can also contain measures beyond the scope of individual farms, such as the establishment of forest reserves.

In addition, there is considerable interest in finding effective ways to establish commercial channels that better respond to family farming. The specific experiences that are currently feeding learning processes in this field cover diverse initiatives led by farmers' associations and range from establishing processing capacities, registering and managing own brands, establishing community shops to coordinating regular markets dedicated exclusively to the sale of produce from family farmers. Learning in this field largely relies on direct exchanges between associations in the form of project site visits and participation at events with links to the commercial issues faced by family farmers, such as markets, fairs or festivals. The systematisation of experiences and knowledge consolidation in this field are scarce.

Networking

Networking in the conceptualisation of sociotechnical niches refers to processes that "facilitate interactions between relevant stakeholders, and provide the necessary resources (money, people, expertise)" (Schot and Geels 2008). To characterise the networking processes that build the niche community of sustainable family farming in Colombia, we propose a typology of actors and describe the main patterns of interaction.

The actors involved in the niche community can be divided into six categories: (i) individual farm families, (ii) farmers' associations, (iii) supportive NGOs, (iv) international donors, (v) researchers and (vi) state entities. The family is the main analytical unit around which the concept of family farming is organised. For our study, the individual families (i) represent the 'end users' of the technical innovations being nurtured in the sociotechnical niche. Their role in the innovation process is manifold. They are involved in the processes of learning by doing,

by adapting and applying the alternative sustainable farming practices on their own farms, as well as in the dissemination of knowledge through learning formats that facilitate exchanges between farmers. Their agency is also central in the establishment and operation of farmers' associations. The farmers' associations (ii) involved in the analysed niche community are organised groups of different kinds of family farmers. Important support for the establishment and operation of farmers' associations is provided by a variety of non-governmental organisations (supportive NGOs) (iii), which have rural development issues as part of their field of action. Support is commonly linked to the implementation of single (short-term) projects or (long-term) programmes coordinated by supportive NGOs and can comprise diverse activities, such as professional advice and follow-up, training campaigns, facilitation of knowledge exchange among farmers and associations and direct investment in inputs and equipment. Financial resources for the realisation of those projects and programmes is often secured through grants from international donors (iv). Some donors have been supporting the niche community more or less continuously for decades. As well as projects and programmes led by supportive NGOs, financial support from international donors has been key for the realisation of research studies and the systematisation and documentation of knowledge within the niche community. To achieve this aim, the participation of researchers (v) committed to alternative approaches to agriculture has been key since the early stages in the 1980s and 1990s. Finally, various state entities of regional or local character (vi) have supported projects undertaken by farmers' associations, supportive NGOs or researchers within the niche community.

The formation of a global niche level

The formation of a global niche encompasses the aggregation and circulation of generic lessons, and – in the case of niches at an advanced phase of development – the application of those generic lessons for the design of replication projects (Geels and Deuten 2006). To

capture the presumed formation of a global niche in the case study, the typology of actors introduced in the previous section is extended by focusing on the role of those actors in aggregating, circulating and applying generic lessons.

The work of supportive NGOs appears relevant for the formation of a global niche. They play an important role in the aggregation of lessons from several local projects and the consolidation of generic rules, for instance in the sense of generic procedures and know-how about the design, formulation, fundraising and implementation of programmes that entail the initiation of new projects and/or the strengthening of existing local projects. The publication of printed and digital materials is also a common task of supportive NGOs, which contributes to the consolidation and circulation of generic lessons among the niche community. For instance, booklets or books on agroecological principles; handbooks for the construction and operation of bio-digesters, solar driers and other devices; or practical guidelines for the transformation process of individual farms. Research and academic institutions within the niche community also contribute to this aim through research studies evaluating local projects and their impacts. However, knowledge circulation to and at the local level seems to take place predominantly through direct exchange, which is in line with the preferred training formats that emphasise the direct practical application of knowledge on the farms. In this context, the professional staff of supportive NGOs play a significant role in the aggregation and circulation of knowledge.

International donors have been crucial in the development of the niche of sustainable family farming practices in Colombia. Supportive NGOs with long track records in the field of sustainable family farming practices (such as La Cosmopolitana, CIPAV and Podion) have counted on regular financial support from international donors (e.g. Misereor, Swissaid and Oxfam). Their support has facilitated the establishment of farmers' associations, such as

ASPROINCA, which relied on support from Swissaid in the initial stage of its development. International donors have been key for the systematisation and dissemination of lessons by supporting studies and publications in the field of sustainable family farming in Colombia. International donors have also supported certain recent initiatives carried out by supportive NGOs (particularly church organisations) and universities, which have fed the current debate on rural development issues in a post-conflict scenario through studies presenting insights into the current state of sustainable family farming and future alternatives. Moreover, international donors appear crucial when considering processes in which generic rules are used to achieve replication, i.e. to frame and initiate new local projects and to expand the niche. Here too, the mobilisation of required resources often depends on support from international donors.

This rather simple analytical pattern, linking the activities of farmers' associations with a local niche level and the agency of NGOs and researchers supported by international donors with the formation of a global level, reflects the distribution of roles that are found in most of the interactions and concrete activities of the community. However, there are notable exceptions to this common pattern that point at other alternative processes of global niche level formation, where farmers' associations and local government entities play significant roles. It is not uncommon to find references to activities undertaken by individual farmers' associations or projects coordinated by supportive NGOs that have been supported by government entities, such as local municipalities, regional environmental agencies or state-owned utilities (e.g. water and energy utilities). However, these examples of public support tend to be sporadic contributions emerging from local circumstances, rather than expressions of a national or regional long-term programme or policy. Moreover, there are hardly any examples of long-lasting public support of local projects within the niche community. This demonstrates that the

flow and translation of knowledge, lessons and rules into policymaking at government level does not seem to happen.

Another interesting process of niche formation that does not fit the common pattern described above is found in a handful of replication initiatives autonomously formulated and implemented by farmers' associations. Partnering with well-established farmers' associations for the initiation and implementation of new programmes is a common strategy followed by supportive NGOs. The experiences and capacities of mature farmers' associations provide important resources (e.g. knowledge, skills and demonstration sites) for projects that aim to replicate good practices in other communities. However, tasks such as project formulation, fundraising, project management and reporting are commonly assumed by supportive NGOs. ASPROINCA offers a couple of examples in which the association was the initiator and coordinator of projects aiming to use its own consolidated knowledge to support the establishment of new local projects. Interestingly, financial support for these unusual replication activities was secured mainly through public resources from government entities: a regional environmental agency and the state organisation managing national parks and natural reserves. To date, these projects have not led to further replication or variations and remain an exception in the development of ASPROINCA.

DISCUSSION

In this section, the results of the study are discussed from two different perspectives. The first perspective seeks to characterise the current state of the analysed community of initiatives as per the conceptualisations of sociotechnical niches and to derive suggestions about how the community might advance towards the broader diffusion of the innovations that are being nurtured. The second perspective aims to reflect on the applicability of the conceptual

framework to the studied case and emphasises the particularities of the case, which point at aspects that are still underrepresented in the conceptualisation of sociotechnical niches.

Characterising the analysed community of initiatives

The analysed community of initiatives that advances sustainable family farming practices in Colombia displays features of the inter-local and global phases proposed by Geels and Deuten (2006). Generic lessons are being systematically put into practice by supportive NGOs and researchers within the community. Over the past two or three years, there have been increased efforts to consolidate and transfer knowledge from the niche community to wider audiences – and in particular to policymakers – in order to feed into the political debate about rural development, which is a crucial issue in the ongoing peace process. Moreover, supportive NGOs are often involved in the replication of experiences, i.e. by framing and coordinating new local projects. However, our analysis indicates that the scope of influence and the expansion of the niche depends, to a large extent, on the resources and agency of almost the same constellation of supportive NGOs and international donors that have been actively promoting the niche community since its initial stages. Broadening the type of actors involved in the niche is imperative for the expansion of the niche. The involvement of relative outsiders can increase the scope of the cognitive frameworks and resources (e.g. knowledge, access to other networks, political influence and finance), which, in turn, can increase the influence of the niche and its capacity to replicate generic lessons more widely. This lack of breadth points to poor communication and dissemination of consolidated knowledge and generic lessons to wider audiences, i.e. beyond actors already involved in rural development and agricultural issues. Important lessons and resources for the niche might be found in other communities that deal with environmental sustainability issues, such as water protection, climate change or biodiversity. Moreover, links to urban contexts seems to be scarce and these could be

important for developing the commercial aspects that are prominent in the niche learning processes.

Related to the lack of breadth of the niche is the irregular and unsystematic involvement of state entities. The sporadic involvement of state entities in supporting single projects points to difficulties in the flow of lessons between the niche and regime actors; or a lack of translation processes as conceptualised by Smith (2007). The guiding vision of the niche community (which could be summarised as strengthening Colombian family farmers' livelihoods) calls for the adoption of lessons from the niche by state entities. For state entities are fundamental in preserving the incumbent sociotechnical regime by the continuous promotion of mainstream agronomic techniques for increasing market competitiveness as a means of improving the living conditions of family farmers. The required adaptation of lessons learned involves dealing with the paradox of niches that aim to reformulate the existing sociotechnical configurations, whose lessons should now be made functional in the regime, i.e. the sociotechnical configurations that are being challenged. This translation process comprises "reinterpreting elements of socio-technical practice in the niche and inserting them into regime settings, or modifying the niche in the light of lessons learnt about the regime" (Smith 2007). To achieve this, greater involvement of state actors in the niche would be necessary. The type of actors required are those who find promising options for their own field of work in practices being applied in the niche, and who can contribute to the niche learning processes with cognitive frameworks as used by incumbent state entities. Innovations being nurtured in the niche can offer promising alternatives for state entities, particularly at local (e.g. municipality and '*cabildos*') and regional (e.g. water basin agencies and '*departamentos*') administrative levels.

A prominent characteristic of the analysed niche is the great variety of topics that are tackled in the learning processes and the emphasis on organisational issues. As well as the technical

innovations directly linked to sustainable family farming practices, the niche can be considered to nurture organisational innovations; i.e. novel configurations and strategies within farmers' associations to advance the most basic elements of the shared vision – food sovereignty, autonomy, fair commercial channels and agroecology. This characteristic implies an additional paradox to further development: variety in the learning process is desirable in order to increase the likelihood of changes in cognitive frameworks and assumptions that might be fundamental to advance sustainability, but too much variety can also be problematic as it "dilutes precious resources and prevents accumulation […], creates uncertainty and may delay choices/commitments (by consumers, policymakers)" (Schot and Geels 2008). This paradoxical situation might translate into additional difficulties for broadening the niche community, making it challenging for new actors to embrace the same range of expectations and innovation strands that have provided consistency to the niche.

Reflecting on the applicability of the conceptual framework

Applying the analytical concepts of sociotechnical niches to the community of initiatives that promote sustainable family farming practices in Colombia is not without difficulty. The challenges emerge from two main particularities of the case: a) the analysed niche does not fit the basic assumption of market-based diffusion of innovations; and b) the case appears to be an example of supportive interaction (alignment) between the levels of the niche (the analysed community of initiatives) and the landscape (peasant movements).

Sociotechnical niches are more often associated with innovation trajectories of single technologies. Ideal trajectories lead to the consolidation of commercial products that compete in the corresponding markets (Raven 2007). Markets are the societal institutions through which the broad diffusion of sustainable technology innovation is expected to be reached. The

analysed case implies difficulties with these central assumptions. The motivations of the niche actors to engage in testing and adapting sustainable farming practices do not rest on expectations of commercialisation of the nurtured technologies. The organisational forms that are applied and co-created are based on solidarity values (e.g. associations and peasant schools), rather than on commercial interests (e.g. business models or companies). In this respect, the analysed niche displays features of what some academics refer to as "grassroots innovation" (Seyfang et al. 2014, Smith et al. 2016).

Moreover, in our study these particularities of the niche seem to reflect certain characteristics of the incumbent sociotechnical regime. The various aspects that are the subject of experimentation within the analysed niche can be seen as a search for alternatives to the provision of agricultural extension services for Colombian family farmers, i.e. training, technical innovation and commercial channels. Market-based structures for the provision of these services have not yet been established in the incumbent regime. The state is central to the provision of such functions through different policies, programmes and executive entities at all administrative levels; from national research institutions – such as the Colombian Corporation for Agricultural Research (CORPOICA) – to single municipalities through the Municipal Agriculture Extension Units (UMATAs). Private/commercial firms play a marginal role in the provision of the system elements that provide extension services to small farmers. Thus, the organisational innovations that are co-created in the analysed niche can be seen as alternatives to the structural deficiencies of components of the regime that deal with the techno-economic issues of small farmers. Some innovations – such as promoters' programmes, peasant agroecology schools, rotary funds and environmental committees – assume tasks that are generally provided by state entities, such as technical assistance, training, targeted financial schemes and environmental standards assurance. Consequently, one potential pathway for the niche to achieve the broad diffusion of the nurtured technical

innovations implies the reconfiguration or substitution of socio-political structures that provide extension services in Colombia, rather than the growth and stabilisation of a market niche. However, additional research and analysis is needed to identify how and to what extent non-technical innovations from the niche might be translated into socio-political reconfigurations of the relevant components within the regime, which in turn could facilitate the broader diffusion of the sustainable family farming practices nurtured in the niche.

The community of initiatives can be considered as a practical expression of broader social movements aiming for the socio-political recognition of peasants and their lifestyles. This link has connotations which are not solely national: the adoption and further development of agroecology by peasant movements in Latin America and other regions has been gaining interest amongst academics in the field of rural studies (Sevilla and Martinez-Alier 2006, Altieri and Toledo 2011). Peasant movements embrace agroecology as a means of achieving greater autonomy and control over their territories. “It aims at and materializes as the creation and development of a self-controlled and self-managed resource base” (Rosset and Martínez-Torres 2012). Our analysis also suggests supportive interaction (alignment) between the niche (the analysed community of initiatives) and the landscape (peasant social movements in Colombia and Latin America) levels. The peasant movement(s) provide a general ideological framework, which serves as a basis for articulating common understanding of the problematic issues and expectations of alternative solutions, while the niche tests and demonstrates concrete alternatives for specific problematic issues around the livelihood of peasant families, which helps to support the niche expectations and the ideological base of the peasant movement(s). This is, however, a simplified description of the interactions that might take place and more detailed analysis is still needed to fully understand how landscape components interrelate with niche level dynamics. The interaction between the niche and landscape levels attracts little attention in the literature on sustainable transitions (Geels 2011), and when

landscape elements are considered they are mostly analysed as sources of pressure to incumbent regimes (Smith et al. 2005, Elzen et al. 2011).

CONCLUSION

The study presented here aimed to provide insights into and recommendations for the development and diffusion of sustainable family farming practices in Colombia. A transformative methodology to induce learning processes was applied, which sought the generation of robust knowledge on strategies for strengthening the Colombian family farming sector in the economic, social, environmental and cultural domains. Moreover, the methodology enabled the investigation of the community of initiatives advancing sustainable family farming practices in Colombia in the light of conceptualisations of sociotechnical niches.

We found indications that a niche of sustainable family farming is developing in Colombia. It can be considered to be at a mature level of development (global phase), where generic lessons are being consolidated and used for framing new local projects. However, the niche lacks breadth (i.e. requires greater diversification in the type of actors involved), which results in a low capacity for expansion and a dependency on international donors for reproducing experiences. In this respect, and based on the conceptualisation of the sociotechnical niche, we recommend that the lessons learned from the niche should be communicated and disseminated to wider audiences, beyond those actors already involved in rural development and agricultural issues. Additionally, the niche has been ineffective in influencing policymaking at any government level in Colombia. The general recommendation in this context is to promote the re-interpretation of niche lessons through the cognitive frameworks and legal system of state entities. Awareness and caution is needed in this respect, as the process implies striving for a balance between the multidimensional and holistic approach rooting the

sustainable family farming practices nurtured by the niche and the search for standards and models that are easily replicable and compatible with existing administrative and governmental structures. Further research is needed to explore effective ways of broadening the niche and translating niche lessons to state policies, while maintaining (or reinforcing) the niche's strong sustainability approach.

The analysed niche may be searching for pathways that do not necessarily rely on markets for driving broad diffusion. The diverse non-technical innovations nurtured by the niche can be understood as responses to structural deficiencies within the regime. The open question here is whether those niche innovations can be translated into or induce socio-political reconfigurations of the relevant components of the regime. Thus, additional research would be needed to clarify the suitability of such pathways. Finally, the analysed case provides an example of alignment between niche and landscape levels. The interaction between these two levels is a field of study that has attracted little attention in the literature on sustainable transitions.

There is strong potential for family farming to contribute to the transition towards sustainable agriculture. It is an integrative and productive way of life directly linked to the environment, and is often based on a profound knowledge of the ecosystem. In the Colombian context, the socio-political dimension of agriculture is particularly relevant and strengthening sustainable family farming will be key to advancing the practical realisation of the peace agreements. The analysed sociotechnical niche is a source of promising alternatives that can contribute to shaping the transition to a fair, peaceful and ecologically friendly society in Colombia.

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TABLES

Table 1 List of the organizations participating to the case encounter. The descriptions focus on aims and/or activities relevant to the central guiding question of the *cb*MLS

Type of actor	Organisation	Quantity of representatives participating	Description
Farmers' Associations	Asociación de Cabildos Indígenas del Norte del Cauca (ACIN)	1	ACIN brings together 20 indigenous *cabildos* (local government councils) from the Cauca region. It was established in 1994. The association coordinates diverse programmes aimed at strengthening the political capacity and the living conditions of indigenous communities.
	Asociación de ganaderos y agricultores medioambientalistas de Ubalá (ASOGAMU)	1	ASOGAMU brings together 15 farming families living in the rural area of Ubalá, a municipality in the department of Cundinamarca. It was established in 2010. The focus of the organisation is on improving the production systems of their associates by applying agroecological techniques.
	Asociación de Organizaciones Campesinas y Populares de Colombia (El Común)	1	El Común brings together 25 farmers' organisations active in the department of Santander. It was officially established in 1986. Its main focus has been the promotion and strengthening of organisational processes aimed at improving their members' living conditions.
	Asociación de Productores de Puente Abadía (APPA)	1	APPA gathers together 24 farming families living in Puente Abadía, a small village (*vereda*) near Villavicencio, the capital of the department of Meta. It was established in 2010. It has particularly focused on establishing processing facilities and commercial channels. It owns two companies and manages its own coffee label.
	Asociación de Productores Indígenas y Campesinos de Riosucio Caldas (ASPROINCA)	2	ASPROINCA gathers together more than 300 farming families in the north-eastern region of the department of Caldas. It was officially established in 1995. It trains farmers in sustainable agroecological practices, promotes the use of biogas from animal waste and coordinates efforts to recover and protect micro-watersheds.
Science / Academia	Antioquia University - Research group culture, politics and social development (GICPDS)	3	One research focus of the group is on community forms of organisation - both in rural and urban contexts - and the ways in which they influence/participate in the formulation and implementation of development interventions.
	El Bosque University - Bioengineering department	1	One focus area is the design and optimisation of farming systems with a focus on food security and

			environmental sustainability.
	Javeriana University - Institute for Rural Studies	1	One central aim of the research is to provide scientific-based information on the economic, social and environmental performance of agricultural systems with roots in traditional knowledge and practices, i.e. those applied by peasant, indigenous and Afro-Colombian communities.
	Minuto de Dios University - Research group on agro-ecology and environmental management	1	One focus area of the group is the characterisation of family farming in Colombia and the development of tools for the design, implementation and monitoring of sustainable family farming systems.
	Leuphana University - Institute for Ethics and Transdisciplinary Sustainability Research	1	One focus of research is on epistemological and methodological foundations, and methods for inter and transdisciplinary research.
	Wuppertal Institute - Research Group Future Energy and Mobility Structures	1	One research area of the group is on the transition towards sustainable energy systems based on renewable energy technologies in the rural context of non-industrialised regions.
Supportive Organisations	Centro para la Investigación en sistemas sostenibles de producción agropecuaria (CIPAV)	2	CIPAV provides applied research, capacity-building and dissemination of technical innovations for sustainable systems of agricultural and animal production.
	Grupo Semillas	1	The organisation provides conceptual and technical tools to farmers' associations to promote the protection of their territories, conservation of biodiversity and food sovereignty.
	La Cosmopolitana Foundation	1	The foundation provides capacity building on agroecological tools and techniques as a mean of empowering rural families and communities, while helping to achieving food security, natural resource conservation and environmental protection.
	Movimiento Rios Vivos	1	Rios Vivos brings together organisations of people affected by the construction of large dams. It works for the defence of the rights of the affected communities.
	Podion Foundation	1	One of the areas of action of the foundation is rural development, which aims to contribute to achieving food sustainability while applying sustainable soil management practices. To that end, the foundation supports community associations in different regions of the country.

Proyecto Trueke	1	Proyecto Trueke is an initiative that promotes spaces for the exchange of goods and services without the use of money. It has also experimented in the use of complementary currencies. The initiative has been active for around 20 years, mainly in the metropolitan area of Medellín.
Red Colombiana de Energía de la Biomasa (RedBioCol)	1	RedBioCol is a network of individuals and organisations committed to contributing to the sustainable development of Colombian society by promoting the use of organic residues for energy generation.

Table 2 Code system obtained through the qualitative content analysis of written materials generated by the cbMLS

Code System	Text passages
Articulation of expectations	
Key problems/challenges	
Out-migration to urban centres	13
Lack of recognition of socio-economic significance	11
Unsuitable or harmful policies	10
Intermediaries and unfair prices	9
Components of shared vision	
Food sovereignty	10
Organisational autonomy	10
Fair commercial channels	9
Ecologically sound production	9
Learning processes	
Lessons at individual farms	
Agroecological techniques	13
Biodigesters	8
Integrating/valuing all family members	7
Lessons at association level	
Revolving fund	12
Building staff for technical advice (promoters)	8
Methodologies for promoting/following up farm transformation	7
Monitoring and documentation	6
Lessons at socio-ecological level	
Recovery of local species	8
Territorial planning perspective	5
Lessons on commercial issues	
Community processing facilities	4
'Peasant markets'	4
Community shops	4
Institutional procurement	3
Learning formats	
'Peasant to peasant' approach	8
Events for knowledge exchange	5

Training in the field	4
Written materials	3
Training at agroecological farms/schools	2
Networking & building of global level	
Interaction and roles of farmers' associations	
Participation in projects coordinated by NGOs	15
Beneficiaries of international donors	7
Outreach operations	5
Weakness in leading replication projects	3
Interaction and roles of NGOs	
Advice and training to associations	11
Design and realisation of rural development projects	6
Systematisation of experiences	5
Continuous support of international donors	4
Interaction and roles of academia	
Systematisation of experiences	7
Technical advice	2
Interaction and roles of state entities	
Support to individual projects	6

FIGURE LEGENDS

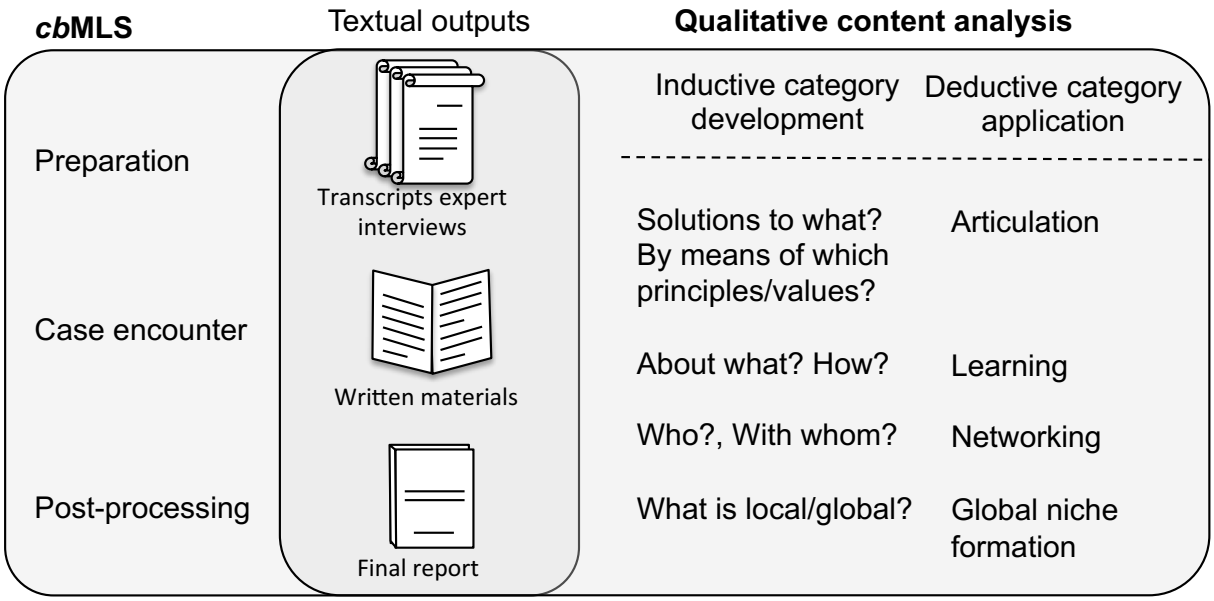

Figure 1 Schematic description of the applied methodology