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Relational rural geographies, resilience, and narratives of small-scale fruit farming in the metropolitan countryside of Rio de Janeiro, Brazil

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UNIVERSITY OF PLYMOUTH

RELATIONAL RURAL GEOGRAPHIES, RESILIENCE, AND NARRATIVES OF SMALL-SCALE FRUIT FARMING IN THE METROPOLITAN COUNTRYSIDE OF RIO DE JANEIRO, BRAZIL

by

FELIPE DA SILVA MACHADO

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Abstract

Relational rural geographies, resilience, and narratives of small-scale fruit farming in the metropolitan countryside of Rio de Janeiro, Brazil

This thesis analyses the processes through which farming and rural communities in transition economies build resilience in the face of changes to rural areas caused by globalisation and urbanisation. The study is based on analysis of how urban-rural interactions have affected small-scale farming in the metropolitan countryside of Rio de Janeiro, Brazil, an area where land-use, economic and environmental policies and urban land speculation have prompted increasing competition between agricultural, industrial, residential and conservation land uses within a highly multifunctional countryside. To achieve this, the research examined the pressures facing farmers in areas affected by the metropolitan dynamics of Rio de Janeiro, how these pressures have influenced farming practices, how farmers have developed individual and collective resilience, and the wider theoretical and policy lessons gained on how rural areas and farming communities respond to urbanisation and globalisation.

The research adopted a relational rural geographies perspective to investigate the lived experiences of farmers and farmers' associations and utilised a place- and community-based approach to engage closely with farmers' life histories and development pathways and gain 'on-the-ground' insights into their strategies for responding to rural and global change. The methods combined interviews with farmers and policymakers, participant observation in three farming communities, and archival research.

The findings indicate that small-scale fruit farmers have built resilience by adopting flexible strategies that utilised diverse types of knowledge, social organisation, innovation and cross-scale linkages to become proactive in the face of rural change in the metropolitan region. In addition to offering new insights into how farming communities negotiate their place in the metropolitan countryside, the thesis encourages readers to think beyond representations of rural spaces as passive in the face of urbanisation and industrialisation by seeing more clearly the continuing importance of local agency in shaping resilient rural futures.

Keywords: rural geographies, relational geographies, farming resilience, metropolitan countryside, rural-urban interface, rural futures, Rio de Janeiro Metropolis

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At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Doctoral College Quality Sub-Committee.

Work submitted for this research degree at the University of Plymouth has not formed part of any other degree either at the University of Plymouth or at another establishment.

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Publications

Machado, F.S., 2018. Approaching farming resilience in the rural hinterland of Rio de Janeiro and beyond: methodological pluralism in fieldwork research. In: Valeriã Paül Carril; Rubén Camilo Lois González; Juan Manuel Trillo Santamaría; Fiona Haslam McKenzie. (eds). *Infinite Rural Systems in a Finite Planet: Bridging Gaps towards Sustainability*. Universidade de Santiago de Compostela, Santiago de Compostela, pp. 107-115.

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Organiser/Chair

Machado, F.S.; Budy, F. New and Emerging Rural Researchers (1): Rural People, Mobilities and Cosmopolitanism, Royal Geographical Society with the Institute of British Geographers Annual International Conference, 2019.

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Conferences attended 2015-2019

Royal Geographical Society and Institute of British Geographers Annual International Conference, London, UK, 2019.

XXVII Colloquium of the International Geographical Union Commission on the Sustainability of Rural Systems (IGU CSRS), Macalester College e University of Wisconsin Eau Claire, Minnesota e Wisconsin, US, 2019.

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How to Make a Just Food Future: alternative foodways for a changing world, University of Sheffield, UK, 2019.

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Grow Green: Farming for a Plant-Strong Future, British Library, UK, 2019.

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International Conference Fifty Years of Local Governance, International Geographical Union Commission on Geography of Governance, University of Lisbon, Lisbon, Portugal, 2018.

International Symposium on the Global Countryside, Gregynog Hall, Wales, 2018.

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VIII ABEP Conference (Association of Brazilian Postgraduate Students and Researchers in the United Kingdom), King's College London, UK, 2016.

XI Plymouth Doctoral Colloquium, Plymouth, UK, 2016.

XXI Plymouth University Postgraduate Society Conference, Plymouth, UK, 2016.

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XVIII Colóquio de Geografía Rural e I Colóquio Internacional de Geografía Rural, Asociación de Geógrafos Españoles, Universidade Castilla-La Mancha, Ciudad Real, Spain, 2016.

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A handwritten signature in black ink, appearing to read 'Felipe S. J.' followed by a long horizontal stroke that ends in a small hook.

Plymouth, 14th October of 2019.

List of acronyms used in the thesis

ABIO-RJ - Association of Organic Farmers of Rio de Janeiro State
ACIPTA - Association of Citrus Growers and Rural Producers
AGB - Association of Brazilian Geographers
ALAF - Association of Farmers of the Rural Locality of Faraó
ANPII - National Association of Industrial and Intellectual Property
APRORIO - Agroindustrial Farmers' Association of Rio de Janeiro State
APTA - Citrus Agribusiness Advanced Technology Research Centre Sylvio Moreira
BART - British Atlantic Forest Trust
CEASA-RJ - Greater Rio de Janeiro Supply Centre
CEPEA - Centre for Advanced Studies in Applied Economics
CNODC - China National Petroleum Corporation Exploration and Development Company
CNPC - China National Petroleum Corporation
COMPERJ - Petrochemical Complex of Rio de Janeiro
CONAB - National Supply Company
DEFRA - The Department for Environment, Food and Rural Affairs
EMATER-RJ - Technical Assistance and Rural Extension Company
EMBRAPA - Brazilian Agricultural Research Corporation
FAO - The United Nations Food and Agriculture Organisation
FAPESP - Foundation for Research Support of the State of São Paulo
FIESP - Federation of Industries of São Paulo State
FUNDES - Economic and Social Development Fund
GDP - Gross Domestic Product
GI - Geographical Indication
GOIACAM - Guava Farmers' Association of Cachoeiras de Macacu
IAC - Agronomic Institute of Campinas
IBGE - Brazilian Institute of Geography and Statistics
IFOAM - International Federation of Organic Agriculture Movements
INCRA - National Institute of Colonization and Land Reform
INEA - State Institute of Environment
INPI - National Institute of Industrial Property
IPEA - Institute of Applied Economic Research
IPES-Food - The International Panel of Experts on Sustainable Food Systems
MAB - Movement of the Affected by Dams
MAPA - Ministry of Agriculture, Livestock and Supply
MDA - Ministry of Agrarian Development
OECD - The Organisation for Economic Co-operation and Development
PDRI - Integrated Rural Development Policies
PESAGRO-RJ - Agricultural Research Company of Rio de Janeiro State
PGS - Participatory Guarantee System - PGS
PNAE - National Programme for Public School Meals
PRONAF - National Programme for Strengthening Family Agriculture
PROSPERAR - The Rio de Janeiro State Programme for Small-scale and Family Agroindustry
REGUA - Guapiçu Ecological Reserve
SEAPEC-RJ - Sustainable Development Superintendence of the Secretariat of Agriculture and Livestock of Rio de Janeiro State, Animal Health, Plant Protection and Inspection
SEBRAE - Brazilian Service to Support Micro and Small Enterprises
TCU - The Court of Audit of the Union

TOMATEC - Tomato in Sustainable Cultivation
UERJ - University of the State of Rio de Janeiro
UFF - Federal University Fluminense
UFRJ - Federal University of Rio de Janeiro
UN DESA - World Urbanisation Prospects, Population Division of the United Nations
Department of Economic and Social Affairs
UNACOOOP - Union of Associations and Cooperatives of Small-Scale Farmers of Rio de
Janeiro State
UN-Habitat - United Nations Human Settlements Programme

Chapter 1. Introduction

The rural space is often assumed to be influenced predominantly by external actions but the reality is that rural areas and agricultural systems possess powerful internal dynamics which enable them to adapt in imaginative and varied ways to changes in the contemporary world. Woods (2005, p. 17) emphasised that ‘as rural social scientists we need not just to be able to describe the processes shaping the rural space and their effects – we need also to try to understand these processes, and to propose and critique explanations as to why particular processes operate in particular ways in particular places and have particular outcomes’.

The thesis contributes to debates concerning changes in contemporary rural space with an emphasis on multidirectional and multidimensional paths in the era of globalisation. Early discussion and theoretical positions concerning rural change were developed by researchers from countries with post productivist economies in order to explain the kind of rural transformations that occurred with the rise of non-agricultural activities alongside or in competition with farming (Marsden *et al.*, 1993; Ilbery and Bowler, 1998; Murdoch *et al.*, 2003).

However, in recent years researchers have displayed an interest in understanding the dynamics of rural spaces in developing regions of the world which are also affected by global processes in different ways (Marsden, 2003; Wilson and Rigg, 2003; Rigg, 2006; Wilson, 2007; Woods, 2007; Bryant *et al.*, 2008; van der Ploeg *et al.*, 2010). Recognition of the global inter-connection and inter-dependency of rural places points to a dismantling of the separation between rural research on the Global North and rural research on the Global South, and the promotion of more transnational research. As Woods (2005, 2011), in particular, emphasised, although rural geographers often consider the Global North and South separately, in an ever-shrinking world these two often come together.

Multidimensional and multidirectional perspectives have indicated that rural areas have become more embedded within a globalised rural world (Wilson and Rigg, 2003; Rigg, 2006; Parnwell, 2007; Wilson, 2008a). This research suggests that the repercussions of the challenges for rural areas in the early twenty-first century, including the resilience of farming communities, should receive more attention. Over recent years, a critical rural social science has developed which has employed a range of conceptual theories,

including political-economic concepts and post-structuralism (e.g. Handbook of Rural Studies edited by Cloke *et al.*, 2006; Woods, 2005, 2011).

Woods (2005) has highlighted how rural studies in recent years has owed much to the creativity generated by the fusion of ideas from different disciplinary traditions and the introduction of new theoretical perspectives from political economy to post-structuralism. As Cloke (1997) observed, rural studies have been influenced by a series of concepts, the result often being an interesting hybridisation between them rather than any clear paradigmatic shift from one to the other. Rural restructuring has given rise to hybrid articulations of the twenty-first century rural (Woods, 2011).

However, significant levels of academic attention have focused on empirically identifying economic and policy drivers in rural areas in countries such as Brazil (the focus of this study; see below) from a structuralist view, largely neglecting the agency of rural communities and sociocultural factors. To address the resulting literature gap, this study adopts an approach that combines political economy and contemporary approaches concerning rural change through in-depth farming community case studies of the metropolitan countryside¹ of Rio de Janeiro, in Brazil.

With deepening industrialisation, Brazil has gone from being the 14th largest global economy in 1970 to the 7th largest economy in recent years (Becker and Egler, 1992; Cohn, 2012). As the economy has globalised and industry decentralised away from

¹ This term is used in the thesis to describe geographical spaces where agricultural land, rural-urban landscapes, and nature have become entwined in the dynamics of metropolitan areas as a result of geographical and/or functional proximity. The concept of metropolitan countryside invites investigation of the effects of these entwinements, the possibilities of bringing the rural space and the metropolitan space together, and questioning of the potentials of agriculture and rural-urban landscapes in the contemporary metropolitan and global context. The metropolis and the countryside are typically understood as relatively distinct and incongruent forms of geographical space. However, the case of Greater Rio de Janeiro offers rich evidence of affinities between them. As the built-up area of Rio de Janeiro has expanded outward and as industrial and petroleum complexes and port facilities have been installed on the limits of the metropolitan region, agriculture has become juxtaposed with other functions and interests, leading to a mosaic of diversified land use in the metropolitan space and its countryside. Depending on the relative distance from the built-up metropolitan core, local agrarian histories and other factors, farmers have actively defended their permanence in this multifunctional countryside. As a result, it is common to encounter not just urban conversion but also contested countryside. The thesis thus uses the idea of the metropolitan countryside to explore farming systems and socio-ecological landscapes at the rural-urban interface as integral parts of a broad and hybrid rural-urban dimension of the metropolitan context, contributing to the call by Woods (2007) for a 'global countryside' and adding insights to this notion at the rural-urban interface.

metropolitan areas, profound changes have occurred in the rural peripheries, which are particularly marked in Rio de Janeiro state (Santos, 2003; Oliveira, 2008; Bonelli and Veloso, 2012; Oliveira, 2015; Oliveira and Melo, 2015). With ample petroleum resources offshore, Rio de Janeiro developed into a complex and economically dynamic state and this change has exerted pronounced impacts in the countryside (e.g. Pedlowski, 2013; Hoefle, 2014; Quintslr, 2014). The research question therefore relates to how farming communities within metropolitan countryside in emerging economies such as Brazil have been affected by socio-economic, political and environmental changes over recent decades.

The repercussion of the challenges for rural areas in the developing world in the early twenty-first century, such as the political economies of new strategies for economic development based on the use and management of resources and the resilience of rural communities to globalisation have been paid more academic attention in recent years (Wilson, 2012; Woods, 2012). This research aims to investigate the changes of contemporary rural geography in the context of its socio-economic integration into global capitalism by focusing on small-scale farming communities in the metropolitan countryside of Rio de Janeiro in the industrialised South-East Brazil.

Since 2014, Brazil has been affected by the worst economic recession in decades. The crisis is not expected to recede and may make it difficult to continue reducing poverty and inequality across the country. The Economist (January 2nd, 2016) pointed out that at the start of 2016 Brazil – ‘a former star of the emerging world’ - should be in an exuberant mood. ‘Rio de Janeiro is to host South America’s first Olympic Games in August 2016, giving Brazilians a chance to embark on what they do best: throwing a really spectacular party. Instead, Brazil faces political and economic disaster’.

As a result, one interesting and challenging research perspectives to emerge from this thesis relates to the notion of farming resilience in the era of globalisation and uncertainty. Indeed, since the early 1970s, notions of rural change have provided an important conceptual framework to understand how rural spaces respond and adapt to economic, societal and environmental changes (Marsden, 1996; Pierce, 1996; Ilbery, 1998). The complexity of spatial restructuring in the developing world under globalisation requires a deeper understanding of the contemporary rural, going beyond the view of inert spaces subject to external interferences. Cutter *et al.* (2008) and Wilson (2010, 2012) indicated

that there is a need for further research in rural arenas, arguing that processes of resilience should be measured and monitored at the local level.

Brown (2016) sees both scholarly and policy imperatives for new ideas about development in this age of uncertainty and recurrent crises. In many ways, resilience itself has entered the policy lexicon before it has really entered mainstream development studies. The contemporary debate concerning resilience has applied a broadly defined set of ideas around the concept to international development in the face of global change (Wilson, 2012). Resilience theory inspires integrated thinking and challenges some assumptions about the relationship between change and development and about human agency in the face of profound, rapid and irreversible changes (Brown, 2016). In the context of the metropolitan countryside, resilience theory provides a conceptual framework for understanding the complexity of processes of rural change in a globalised and urbanised world.

1.1 Research context

A number of theoretical debates about the nature, changes and future trajectories of rural systems have emerged over the last three decades. As Ilbery (1998) argued, the countryside can no longer be viewed as being on the margins of economic, social and political change. Indeed, rural areas and farming systems are at the centre of interest and debate.

When discussing economic change in rural space over recent decades, Marsden *et al.* (1993) emphasised a perspective for understanding rural restructuring that includes issues, such as capital mobility, flexible production regimes, complexity in the relationship between technology and environment, economic deregulation, and new political processes. According to these authors, in order to understand such processes, it is necessary to research the effects of globalisation at the local scale of action. Thus, the models of development that are internal to particular rural areas must be linked to external influences upon such areas.

In referring to the advance of globalisation in recent decades, it should be recognised as a complex, uneven and fragmented set of processes producing considerable geographical variation. Different uses of rural space are developing, with a multiplicity of social and

economic spaces that overlap the same geographical area (Woods, 2005). The notion of the 'differentiated countryside' (Murdoch *et al.*, 2003) explicitly refers to the patterns of geographical diversity that can now be found in rural areas. The countryside is now increasingly governed by regional and global policies, formulated and implemented by regional and global institutions.

As much of the critical literature on rural change and globalisation (Marsden, 2003; Woods, 2005, 2007; Bryant *et al.*, 2008) has emphasised, rural studies need a greater focus on the diversity of contexts in which rural restructuring takes place. Agricultural and non-agricultural production systems are involved in this process and are interconnected to different degrees, including rural and urban interactions and the articulation of rural dynamics with urban and global dynamics. The first two decades of the 21st century have probably seen dramatic changes in rural areas and the pace of change appears to be accelerating in an increasingly globalised and interlinked world (Robinson, 2004; Wood, 2007, 2011).

National and regional interests also play an important part, particularly in rural spaces with higher levels of rural and urban interaction, such as occurs with large industrial projects and transport infrastructure that converge on urban agglomerations and connect regions (Bicalho *et al.*, 1998). Sánchez (2000) points out that rural spatial transformations caused by large-scale development projects, such as dams, airports, electric transmission lines, oil exploitation or tourist resorts, imply spatial modifications that, in turn, cause changes and new dynamics in every aspect of local life, generating profound transformations for the rural population.

From the early 1990s onwards, rural studies supported the cultural turn in social science, encouraging new areas of enquiry and the application of new post-structuralist conceptual perspectives (Halfacree, 1993; Cloke, 1994; Murdoch and Marsden, 1994; Cloke and Little, 1997; Milbourne, 1997). Other notable themes have shaped subsequent debates, including globalisation in a rural context (Woods, 2007; Heley and Jones, 2012; McDonagh *et al.*, 2015); alternative food systems (Murdoch and Miele, 1999; 2004; Murdoch, 2000; Goodman, 2002; Marsden, 2003; Winter, 2005; Ilbery and Maye, 2010), migration and gentrification (Boyle and Halfacree, 1998; Phillips, 2010; Halfacree, 2012), agri-environmental schemes and policies (Winter, 1996; Potter, 1998; Wilson and Hart, 2001; Murdoch and Lowe, 2003); rural development and governance (Yarwood and

Edwards, 1995; Woods and Goodwin, 2003; Cheshire, 2006; Horlings and Marsden, 2014; Umans and Arce, 2014), and more-than-human networks and non-human agencies (Jones, 2003; Buller, 2014; Yarwood and Evans, 2000, 2006; Yarwood, 2015).

According to Woods (2012), five key challenges exist for rural areas in the early twenty-first century, and have started to emerge as foci for research by rural social scientists. These comprise: 1- redrawing of the contours of state intervention in rural societies and economies, including the consolidation of neoliberal reforms, especially the dismantling of agricultural support mechanisms; 2- the increasing authority of supra-national institutions and protocols, particularly in models for environmental protection; 3- the marketization of rural infrastructure and public services, and the increasing significance of privatised and market-based forms regulation; 4- the potential rationalisation of expensive rural public services and 5- the re-evaluation of state support for agriculture, conservation and community development in the context of economic austerity (Woods, 2012).

At the local level, different rural patterns are also driven by local elements and shaped by local, social, economic, and political forces that reflect distinctive social and geographical contexts (Marsden, 2003). The focus for rural studies has therefore been placed on the local community level, as it is at this level that the spatiality of resilience is implemented 'on the ground' (Seymour, 2004; Parnwell, 2007; Wilson, 2010, 2012). The justification for this is both analytical and pragmatic. As commentators such as Agrawal and Gibson (1999), Chaskin (2008) and Wilson (2012) emphasised, over the past decades there has been a resurgence in attention to the community as a critical arena for analysing a range of issues, including societal pathways of change and the resilience of local actors. To address these issues, the study questions how small-scale farming communities address resilience in the context of rural change and globalisation.

To develop a model for transition in different spatial and temporal dimensions, Wilson (2007, 2012) brings together a transition theory approach with the arenas of investigation of multifunctionality and rural community resilience. The debate is based on contemporary issues concerning rural change in the context of globalisation and presents an analysis of interconnections between globalisation and rural community resilience in a rapidly changing world.

1.2 Research gap

One key research gap is that traditional studies in Brazil have tried to explain and interpret the causality between globalisation and factors of rural change in a linear way and produced relatively homogenous conclusions. Consequently, to more comprehensively interpret the effects of different socio-economic and political change drivers on rural dynamics, the main issue is to explore the processes through which factors have affected farming resilience in Brazil with a focus on how different degrees of rural-urban interaction and global influences in the metropolitan countryside of Rio de Janeiro give rise to spatial diversity and rural complexity. These are likely to be non-linear and spatially heterogeneous, limiting the possibility to generate simple generalisations (Wilson, 2007, 2012).

Overall, the Brazilian literature mainly comprises of agricultural economies and analysis of agricultural policies, such as institutional change, agricultural technological development, and rural-urban migration, which emphasise the empirical evidence of how structural factors affect agricultural production (Delgado, 2012; Ioris, 2012). At present, great enthusiasm is expressed by the media and government for economic growth directly related to the spread of agribusiness-scale production in the Brazilian countryside (e.g. MAPA, 2013; CEPEA, 2017; FIESP, 2017).

In contrast, some academics have explored agro-industrial food networks through a critical perspective, placing agribusiness within a mass production model which emphasises productivism and standardisation (Bernardes and Freire Filho, 2005; Bernardes, 2015; Hosono *et al.*, 2016). Questions about social and environmental impacts, land use conflicts, and toxicity and pollution pose recurring problems for this global agro-industrial dynamic (Simmons, 2004; Simmons *et al.*, 2007; Bowman *et al.*, 2012). In these cases, the study of globalisation in a rural context has commonly focused on commodity chains and their contradictions. In this thesis, the argument is that a better understanding of the complexity of rural areas and their spatial diversity will contribute to better understandings of the multidirectional and multidimensional paths in the global countryside, going beyond the view of rural space as only subject to external interferences.

As Hogan has observed, ‘there is a discernible privileging of urban over rural in scholarly accounts of globalisation’ (Hogan, 2004, p. 22). Hogan suggests that the relative neglect of the rural follows from a recognition that it is in urban centres that certain hallmarks of globalisation are often most visible. Santos (1994, 1996) founded a new school of geography in Brazil based on his reinterpretation of traditional concepts of geography and insights to develop a criticism of globalisation. ‘Santos’s criticism of globalisation was preceded by a profound criticism of urbanisation in poor countries’ (Souza, 2009, p. 13).

Santos developed a critical reflection of globalisation mainly applied in large cities, especially in developing countries (or Third World such defined by Santos), where he suggested the majority of the population exists under precarious conditions. Recognising the research gap in relation to understanding the impact of globalisation on rural areas in Brazil, the thesis relates the potential for a revitalised rural geography of globalisation by tracing the consequences of a relational perspective on place for understating the remaking of rural places under globalisation and key challenges for farming communities in the early twenty-first century.

In geographical theories of rural restructuring since the 1990s the role of local actors has been highlighted, mainly involving how local people transforms rural spaces (Bryant, 1997; Pierce, 1998; Woods, 2005). Structures, other than purely economic ones, are taken into consideration by Pretty (1995), Van Huylenbroek *et al.* (2007) and Wilson (2010), allowing for local decision-making, control and management, i.e. focussing on the peculiarities of different kinds of social agents and modalities for organising rural space. Collective strategic thinking, involving regional institutions and organisations oriented towards territorial development, including the political perspectives of local social actors, is considered to be fundamental to the success of governance.

Local development may be deemed to result from coherent initiatives and actions, based on the mobilisation of local social actors who agree to contribute expertise and assistance to improve specific territories. ‘Actors or a group of actors may contribute in all four functions necessary and required for developing a territory: information, integration, planning and action’ (Clément and Bryant, 2004, p. 191). Participation, cooperation, joint work and the construction of partnerships give rise to networks of local actors who devise strategies of resistance, resilience or adaptation of rural communities to new global contexts (Wilson, 2012). A similar concern is present in assessments of environmental

impacts and in socioeconomic policy in developing countries that highlight the need for integrating local knowledge into planning and evaluation of development projects (Bryant *et al.*, 2004).

Recent studies concerning contemporary rural change (Woods, 2011, 2012) offer new theoretical and methodological reflections and contribute to understanding global economic growth and its interactions with local decision-making and, at the same time, the intensification of local and regional processes of rural-urban interactions. Complex relationships, divergent interests, and multiple actors are reflected in new territorial dimensions, requiring new explanations concerning rural dynamics (Murdoch, 2000, 2006; Cloke *et al.*, 2006; Halfacree, 2006; Woods, 2011; Heley and Jones, 2012). The past theoretical and conceptual basis of the analysis of rural space cannot always explain the complexity of current rural transformations. Therefore, rural geography has encouraged new analytical parameters and procedures.

Rural studies have encapsulated the intellectual excitement which has arisen from the application of new theorisations of rural life, landscape, work and leisure over the past decades. These theorisations have involved engagements both with critical political economy and the cultural turn in social sciences, both of which have led to very significant insights into the assemblages of power, process, practice, and change which have (re)produced and (re)encultured rural areas over recent years.

In this thesis, the analysis of social, economic, political and environmental restructuring reshaping rural areas is conducted in a political-economic framework, whilst the discussion of people's experiences of rural life owes much to the cultural turn. In the 1990s, the emphasis in rural studies shifted again to bring people back in through the enculturing of political economy approaches (Woods, 2005).

There is still little consensus on the future role and management of rural communities and rural environments in an era of global change. Rural research has examined these issues but has primarily highlighted their complexity and on-going dynamism, buffeted by the intensification of globalisation, the growth of environmentalism, and the rise of neoliberalism (Winter, 1996; Robinson, 2004; Woods, 2007, 2011; Aguayo, 2008).

The increasing embeddedness of many rural communities into the global capitalist system is, therefore, often associated with the loss of endogenous power and control of communities over internal decision-making structures. However, globalisation may also offer opportunities for raising resilience through, for instance, improved infrastructure, reduced dependency on external funding, improved education or better information about how to tackle environmental degradation (Rofe, 2009; Geels, 2011, de Hann and Rotmans, 2011; Wilson, 2012).

The notion of resilience is rapidly gaining ground as both a targeted process of societal development and as a research topic in its own right (Barry, 2012; O'Brien, 2012; Wilson, 2012; Brown, 2016). In the contemporary world, the rising power and current political and economic crisis of Brazil have aroused increasing attention. This study situates the Brazilian case within the international context of transition economies to shed light on broader debates about resilience and the global economy, focusing on vulnerability and adaptation in a time of crisis and uncertainty.

Globalisation has a pervasive influence in transforming rural economies and societies, with implications for the major societal challenges of environmental change and resource security. However, in comparison to studies of the global city, relatively little research has focused on the 'global countryside' (Woods, 2007), and existing research lacks integration. Woods (2007) has developed an integrated perspective by drawing on relational analysis to focus on the detailed mechanics by which rural localities are 're-made' through engagement with globalisation processes, examining the mediating effect of national and regional context and opportunities for local interventions.

The key contribution of this thesis will be to build upon academic knowledge of the complexity of farming in the metropolitan countryside (Bryant *et al.*, 1982; Lawrence, 1988; Bryant and Johnston, 1992). Inclusion of the voices of small-scale farmers and their associations will allow for an understanding of the relational agricultural systems that are formed between rural and urban interactions and demonstrate how these are dynamic and changing. It will also reveal one of the most prominent features of contemporary rural localities, in the way in which traditional rural economies have become woven into translocal networks of production and consumption. These entanglements will implicitly forge new connections, interdependencies and affinities between rural places and other rural and urban localities (Jones *et al.*, 2018).

The study will contribute to our understanding of relatively ‘invisible’ and under-researched small-scale farmers’ communities in Brazil, presenting relevance to other localities. It will attempt to deconstruct previously made assumptions that rural space is only subject to external interferences and actions. The study will argue that rural spaces should also be seen to possess their own dynamics and resilience that contribute to complex outcomes in which the leadership of social actors creates new forms of spatial ordering and to adapt to scenarios of change.

1.3 Research aims and objectives

Densification of cities is presently one of the dominating strategies for urbanisation globally. However, how densification of cities is linked to processes in peri-urban landscapes is less well understood. The research starts with the hypothesis that globalisation has changed rural space and reshaped farming resilience in the metropolitan countryside of Rio de Janeiro, a study area in South-East Brazil affected by global processes such as urbanisation, industrialisation, and environmental pressures.

As highlighted above, the resilience of agricultural systems, and of rural communities, has become an important concern in rural and agricultural policy. What are the different strategies that farmers, rural residents and other decision-makers in rural areas are using to enhance resilience? How do the outcomes of implementing these strategies vary according to spatial and temporal factors? By addressing these questions, the thesis will provide a deep analysis of the resilience of farming communities in the metropolitan countryside. The aim of this study is, therefore, to analyse rural change and farming resilience in the era of globalisation in the Eastern Rio Metropolis affected by incorporation into metropolitan dynamics. The study has the following four objectives:

1. To analyse how globalisation has affected the farming communities in the metropolitan countryside of Rio de Janeiro since the 1970s.
2. To assess how globalisation has affected the practices and spatiality of farming in the metropolitan countryside of Rio de Janeiro by investigating the complexity of small-scale fruit farming at farm-level and in farmers’ associations.
3. To analyse the resilience of small-scale fruit farming systems affected by urbanisation and industrialisation in this metropolitan countryside.

4. To discuss how urbanisation and industrialisation have affected small-scale farming pathways in the Brazilian metropolitan countryside and to discuss policy implications and wider theoretical understandings of relational rural geographies and farming resilience in a global era.

1.4 Structure of the thesis

The structure of the thesis will mirror the theoretical approaches outlined above. Chapter 2 will provide a framework for understanding contemporary rural space based on an extensive literature review and will discuss the diverse characteristics of rural change debates, focusing first on developed world contexts. The chapter will also discuss rural space in the era of globalisation and discuss theoretical approaches to assess the global countryside and resilience based on relational rural geographies, combining macro-political economy and the analysis of local and regional strategies (political ecology and cultural approaches). A multidimensional and integrated perspective will be presented to suggest that, over time, many rural areas in transition economies, such as Brazil, have changed and increased their embeddedness into a globalised rural world, and because of increasing global challenges, for instance, there is a growing need to recognise territorial diversity and examine processes of rural resilience-building.

Chapter 3 will then introduce the case study approach and explain why it is an important approach for understanding the link between farming resilience pathways and rural change in the era of globalisation. The chapter will particularly provide an analytical framework based on research methods in human geography and how these may help in analysing farming resilience at the local level in the era of globalisation. The chapter also explain and justifies how the research was designed and conducted, and data were analysed.

To address the objectives, Chapters 4-8 will then focus on key conceptual issues and their interlinkages with contemporary rural space and farming systems in a metropolitan context. The focus of Chapter 4 will be on rural change at the regional level and its importance for understanding how the contemporary Brazilian context shapes pathways of change from the global level to farming communities at local level. Case studies will be examined to illustrate how globalisation has affected rural areas and farming resilience in the metropolitan countryside of Rio de Janeiro.

Chapter 5 will then look at how farmers have learned to live with change and uncertainty and the regional dimension and contemporary challenges to agricultural development in the case studies, addressing objectives 2 and 3. The focus will be on exogenous and endogenous constraints and opportunities and the political economy dimensions of new strategies for agricultural development that make certain pathways difficult to implement. However, the chapter will highlight that some farming communities are resilient and create new forms of spatial ordering and so adapt to change. Beyond the exogenous macro-structural processes that have been debated, the thesis contends that the rural should also be seen to possess its own dynamics and resilience which contribute to complex outcomes. Case study examples highlight how some small-scale farming communities have managed to change their trajectories in response globalisation pressures, while others illustrate how farming communities remain on pathways that may lead to increased vulnerability to scenarios of the global countryside.

Chapters 6, 7 and 8 will then focus on the concept of farming resilience and its interlinkages with rural change under globalisation, addressing objectives 2, 3 and 4. The focus of the chapters will be on how small-scale fruit farming communities in the metropolitan countryside of Rio de Janeiro have been affected by the socio-economic and political changes. The case studies examined will illustrate how global changes can affect farming trajectories. The notions of spatial diversity, knowledge, social organisation, and policy challenge through case studies will be analysed to assess why these notions are important for understanding farming resilience in the context of rural change under globalisation. Specific issues to be discussed will include, for example, multidirectional pathways influenced by the internal decision of farming communities and external factors and actors such as the State, government, and global drivers.

Chapter 9 will provide a synthesis of Chapters 4-8 by discussing small-scale farming resilience in the metropolitan countryside of Rio de Janeiro and how the rural space in the metropolitan context has been analysed and how the findings have addressed the four objectives of this study. The case studies debated in the previous chapters will be used to illustrate the complexities of rural space and contemporary challenges to agricultural development pathways. The chapter will conclude the thesis and will point towards avenues for future research in rural studies in Brazil and beyond.

Chapter 2. Rural change in a global era and farming resilience ‘on the ground’: approaching a relational rural geographies perspective

2.1 Introduction

The aim of this chapter is fourfold. First, it will provide an analytical framework based on notions of relational rural space (Section 2.2). Section 2.3 aims to discuss the theoretical approaches in contemporary rural studies and debate how these approaches may help conceptualise rural change over the last four decades. This period has seen ‘some of the most interesting and challenging theoretical debates about the nature, changes and future trajectories of agricultural and rural systems from a variety of economic, social, political, and environmental stances’ (Wilson, 2009, p. 269). Third, Section 2.4 will discuss perspectives and characteristics of rural resilience that may find applicability in any rural setting in the world. The aim will particularly be to highlight the complexity of rural change in the era of globalisation through contemporary debates of community resilience in the context of the global countryside. This chapter ends with a discussion of key hypotheses for Brazil emerging from previous approaches and studies surrounding contemporary rural development, arguing that rural spaces in both the Global North and South are characterised by multidimensional and hybrid development pathways. Section 2.5 will provide concluding remarks.

In sum, this chapter of the thesis provides a framework for understanding the rural, based on an extensive literature review, and discusses the diverse characteristics of this process, primarily in developed countries. It also includes a discussion of rural change and globalisation in developing countries, with a focus on the contemporary conceptual debate concerning rural resilience in the global world (Wilson, 2007, 2012), as well as methodological approaches to assess the global countryside (Woods, 2007, 2011) ‘on the ground’.

2.2 Understanding the relational rural in a global era

Rural areas are dynamic and constantly changing in response to a range of social, economic, environmental and political factors. In recent years, rural areas in developing market economies have diversified as a result of broader socio-economic transformations. Consequently, uneven development and increasing differentiation are now characteristic features of rural space. As Bardhan (2006) stated, accelerating

globalisation processes exacerbate the already precarious situation in many rural districts in both the Global North and South, as virtually all areas are affected by global forces often ‘outside’ the control of regional/national regulatory structures.

Cloke (1985) noted in rural areas of the Global North in the mid-1980s the historic trend of depopulation seemed to have given way to a new trend of counter-urbanisation, but the development of the trajectory was still unclear, and with traditional industries in decline there was yet to emerge any consensus as to what post-industrial society had in store for these areas, either socio-economically for the communities concerned or environmentally in terms of landscape, land use and other conservation. Meanwhile, in rural areas of the global South, the persistence of poverty appears to defy attempts at amelioration (Rigg, 2001, 2006). Rural poverty continues to be persistent both in the Global South – despite economic growth in some countries – and in pockets within the Global North (United Nations Statistical Commission, 2010-2018).

The contemporary countryside presents multiple dynamics, not only economic in relation to global influences, but also social due to regional, national and local processes. Rural restructuring involves the maintenance of old productive functions alongside new functions (Marsden *et al.*, 1993). This new scenario of diverse functions led to the emergence of new approaches in the geography of rural change - the multifunctionality paradigm (Wilson, 2007). Policy-based approaches have seen the policy environment as a key driver for multifunctionality and holistic approaches that also incorporate the strengthening of social, economic and environmental capital and changing societal perceptions of farming as key components of multifunctionality (Wilson and Dünckmann, 2010). Yet, although multifunctionality has been much debated in European countries, it is poorly researched in the context of contemporary agricultural change in developing world regions (Wilson and Rigg, 2003). Improving understandings of multifunctionality would mean moving away from the rigid notion of simply ‘exporting’ indicators developed in advanced economies to other world situations towards an analytical framework that emphasises relative rural changes.

The geography of agriculture in developed market economies has undergone a substantial restructuring in the post-war period (Newby, 1985, 1987; Marsden *et al.*, 1986; Cloke, 1987, 1989) and two phases of change can be identified: the productivist phase and the post-productive phase (Cloke and Goodwin, 1992; Ilbery and Bowler, 1998; Wilson, 2001). The productivist phase was based on raising farm output, lasted from the early 1950s to the mid-1980s, and was characterised by an intensive modernisation and industrialisation of agriculture (Marsden *et al.*, 1993; Ilbery and Bowler, 1998; Halfacree and Boyle, 1998; Potter, 1998; Pretty, 1998).

The post-productivist phase or the post-productivist transition denotes the aim to reduce farm output and is characterised by the integration of agriculture within broader rural economic and environmental objectives (Marsden *et al.*, 1993; Winter, 1996; Hart and Wilson, 1998). According to Wilson and Rigg (2003), the post-productivist era for advanced economies is generally seen as the ‘mirror-image’ of productivism. Therefore, ‘post-productivist agriculture is characterised by a reduction in the intensity of farming through extensification, diversification, and dispersion of agricultural production, with a move away from agricultural production towards the consumption of the countryside’ (Wilson and Rigg, 2003, p. 682).

This concept has been developed largely within an advanced economies framework. However, the notion of a post-productivist transition has caused intensive academic debate as the concept of post-productivism is theoretically weak for understanding contemporary agricultural change in developing world regions (Wilson, 2001; Wilson and Rigg, 2003). Although similar patterns can be observed in rural areas of the developing economies, there is confusion about the exact meaning of complex rural activities. Thus, Wilson and Rigg (2003) questioned the linearity of the traditional concept of the productivist/post-productivist transition and argued that the concept needs to be adapted and developed to address specific conditions in the South. They suggested that the concept cannot be imported indiscriminately and that it needs to be adapted and developed to address conditions outside the developed world, possibly by embedding it within theoretical discussions surrounding the Southern-based concept of ‘deagrarianisation’ (Rigg, 2001, 2006).

The new set of interests, activities, and functions that rural space assumes constitute multifunctionality. In this perspective, Wilson (2001), Woods (2005, 2011) and Mather *et al.* (2006) stress the need to acknowledge that current spatial reorganisation results in a new ordering under changed premises. At the general level, there are two opposite forms: the agricultural production-oriented model and the multifunctionality model. However, there is a need to define the wide variation in spatial restructuring processes because contemporary rural space presents multiple characteristics and functions, combining different types of production with multifunctionality (Wilson, 2007, 2008b; Wilson and Burton, 2015).

The notion of multifunctional agricultural and rural spaces has been used since the early 1990s by policymakers to highlight that the rural is not only characterised by food and fibre production but also by the ‘production’ of associated environmental and social functions for rural communities. Firstly, the notion of multifunctionality centred largely on agricultural multifunctionality and arose over concerns related to the production of commodity and non-commodity goods to society by agricultural actors. Debates have since widened to focus on the multifunctionality of rural areas and communities (e.g. Wilson, 2008b, 2010; Wilson and Dünckmann, 2010). Recently, researchers have begun to acknowledge that there may be different levels or ‘qualities’ of multifunctionality, and the notion of a ‘multifunctionality spectrum of decision-making’ has been proposed, ranging from weak to strong multifunctionality associated with different emphases placed by rural communities on productivism or non-productivism (Wilson, 2010).

The debate surrounding multifunctionality has dominated academic and policy debates in the rural field. In recent years, this has assumed even greater importance as global agriculture has faced renewed productivist pressures (Wilson and Burton, 2015). This is also beginning to have repercussions for decision-making processes at the farm level, where some farms that had begun disconnecting from the productivist regime started re-intensifying production in developed economies. This suggests a kaleidoscope of farm transitional pathways (Wilson, 2007). While some farmers have continued with a productivist strategy, others have opted for pathways closer to the non-productivist end of the decision-making spectrum including the commoditisation of the countryside and a re-evaluation of the meaning of farming itself (Marsden, 2003).

According to Ioris (2016), post-productivist and multifunctional tendencies represent only part of the neoliberalising pressures that have reshaped contemporary agriculture and subjected it to the imperatives of flexible accumulation, market globalisation and the systematic concealment of class-based tension. ‘The intricacies of global agri-food activities today are, at once, product and also co-producer of the dominant modernisation of capitalism according to the discourse and strategies of neoliberalism’ (Ioris, 2016, p. 85).

Accumulation crises in capitalist societies provoke periodic and, sometimes, radical restructuring of productive processes in order to establish new investment opportunities, a consequence of which is the reassessment of resources and spaces previously deemed unproductive or marginal. For several reasons, some rural areas that were previously deemed places of declining economic activities start to be seen as investment frontiers (Marsden *et al.*, 1993) and rural elements, which until then had little social or economic value are re-envisioned and re-functionalised. Good examples are the ‘commoditisation’ of nature, landscapes for tourism and environmental preservation, production of healthy foods and creation of rural leisure activities, all of which are part of the ‘re-localisation’ agenda in reaction to globalisation and rural restructuring. Multi-functionality debate and transition theory, as discussed above, come under a political economy approach and the discussion on commoditisation of the countryside.

Sánchez (2012, p. 49) highlighted that there is an increased need for understanding governance in spaces where conflict can exist between different agents and institutions. Some examples are: ‘disputes for land and natural resources, real estate speculation for new non-agricultural activities, gentrification, external investors, spatial mobility of rural population or even strengthening the rural land market with new farm activities’. Therefore, the focus on the territorial dimension is crucial for managing and enforcing public policies in multifunctional rural space.

Additionally, a recurrent theme in rural studies has been the significance of diverse globalisation processes as drivers of rural change. The variety of contexts in which globalisation has been encountered - economic production, services and tourism, migration, and environmental protection – points to the multiple characters of globalisation. As a result, new directions in rural studies have called for research that examines the impact of globalisation on everyday life (Woods, 2007, 2012). Methods in

rural studies in the era of globalisation have provided wider theoretical frameworks and insights into the rural domain through in-depth studies, bottom-up models and multidimensional approaches (e.g. political economy, political ecology and cultural studies) (see Table 2.1).

Table 2.1. Theoretical frameworks and approaches for examining rural change and globalisation (Source: Author).

Approach	Global critical issues	Rural change in globalisation
Political economy	A critical account of the impacts of planning and policy-making, and by interpreting decision-making for rural areas in a political economy context (Newby, 1985; Cloke, 1987, 1989; Marden <i>et al.</i> , 1993).	During the 1980s, rural geography was a field for political-economy analyses of agriculture, planning, rural development and rural class composition.
Political ecology	It has indicated the environmental problems that result from inequality associated with the spread of capitalism and emphasises the need for change in political and economic processes at local, regional, and global levels to solve environmental problems (Watts, 1983; Hecht, 1985; Neumann, 1998; Peet <i>et al.</i> , 2011).	Political ecology looks beyond regional and national boundaries to the structural contexts and transnational interests, networks, and discourses that shape many local cases (Moore, 1995; Escobar, 2001; Robbins, 2012). Political ecology presumes relations and conflicts at more 'local-global' scales.
Cultural turn	In the 1990s, it introduced post-structuralist theory and prompted interest in the multiple experiences of rural life by different social groups (Murdoch and Pratt, 1993; Cloke, 1997; Halfacree, 1993, 2006).	The dilemmas of local actors who resist and adapt to contemporary rural contexts.

Globalisation has changed the relationship between urban and rural areas. The city and the countryside modify their dynamics through the intermediation of global exogenous factors, strengthening local-global direct connections. In this way, the rural is not reduced to a mere geographical location; it becomes a place where the mediation of macro (including global) social and economic operations occurs. The nature of these processes, however, are different in the political and social content interacting with the exploration of local resources that depend on the characteristics and the relationships of the countryside in the regional context (Cloke, 1990; Marsden, 1990).

Woods (2007) posited the notion of the ‘global countryside’ as a geographical and conceptual counterpoint to the ‘global city’. The global countryside is presented as a space that has become increasingly integrated and interconnected through globalisation process. The global countryside is a hypothetical space, corresponding to a condition of the global interconnectivity and interdependency of rural localities. This emergent global countryside is not a uniform, homogenous space, but, rather, is differentially articulated and contested in particular rural places. According to Woods (2007), the concept of place is a space of interconnections reconstituted by globalisation into hybrid dimensions of transformations and interactions between local, national and global actors (see Table 2.2).

Wilson’s (2012) work on community resilience and transitions particularly pointed towards exogenous macro-scalar ‘transitional corridors’ being shaped by national and global decision-making processes, and analysed how such corridors influence community resilience. He argued that the critical literature often portrays macro-scale corridors as ‘negative’ for innovation. He then analysed the importance of macro-scale lock-in effects external (e.g. globalisation) to communities and discussed how these can shape community pathways and resilience in both positive and negative ways (see Table 2.2).

Table 2.2. Contemporary rural change, concepts and global critical issues (Source: Author)

Concept	Debate	Global critical issues
<p>The global countryside (Woods, 2007, 2011; Cheshire and Woods, 2013; McDonagh <i>et al.</i>, 2015)</p>	<p>Rural space that has become increasingly integrated and interconnected through globalisation process.</p>	<p>Globalisation alters employment opportunities, raise or depress income levels, and changes patterns of local service provision. The impact of globalisation on everyday life in a rural context is key.</p> <p>Rural spaces are central to both the reproduction and the mitigation of many identified ‘global challenges’ – food and water security, competition for natural resources, responses to concerns for energy security and the impact of climate change on agriculture and on the natural environment.</p>
<p>Rural resilience (Wilson, 2010, 2012; McManus <i>et al.</i>, 2012; Scott, 2013; Welsh, 2014)</p>	<p>The potential of social innovation and collective agency at the community scale in exploring new development.</p>	<p>The various aspects of community resilience within rural localities and an exploration of farming and its role in rural resilience. Resilience refers to the capacities of an agricultural system to adapt and transform itself so it can persist in the long term (Walker <i>et al.</i>, 2004; Darnhofer, 2014). Learning to live with change and uncertainty, and combining different types of knowledge appear critical for building resilience.</p>

With regard to experiments in local development in different parts of the world, the Sustainability of Rural Systems Commission of the International Geographical Union has produced a number of studies exploring rural restructuring in different countries (e.g. Pierce, 2000; Kim *et al.*, 2001; Bicalho and Hoefle, 2004; Frutos *et al.*, 2010; Kim *et al.*, 2013; Bicalho and Laurens, 2014). These studies focus on the influence of globalisation, internationalisation of agriculture, urbanisation of rural areas, the rise of multifunctionality, strategies for promoting sustainable rural development and territorial governance, all linked to the new functions of rural space and the dilemmas of local actors who resist and adapt to new rural contexts.

2.3 Approaching the relational rural in a global era

This section will explain three theoretical approaches and how they have been used for understanding the link between rural change and globalisation. Specific focus will be placed on how these theoretical approaches can help better understand global critical rural issues related to rural change in the era of globalisation. New directions in rural studies have called for research that examines the impact of globalisation on everyday life (Woods, 2012). Methods in rural geography in the era of globalisation have provided wider theoretical frameworks and insights into the rural domain through in-depth studies, bottom-up models and multidimensional approaches (political economy, cultural studies, and political ecology).

2.3.1 Political economy

As Woods (2005) highlighted, the approach based on theories of political economy had a major impact on rural research by providing a framework through which the study of rural economies and societies could be connected to wider social and economic processes. This approach helped to highlight that rural areas do not exist as isolated, discrete territories but rather are shaped and influenced by actors and events outside the rural space.

Newby (1985) observed that the introduction of the political-economy approach led not only to new ways of thinking within rural studies but also to new fields of enquiry. The political-economy approach asserted that agriculture operates in the same way as any other form of capitalist production – by seeking to maximise profit. While traditional rural studies tended to understand community solidarity over class differences, the

political-economy approach reversed this by investigating class conflict and oppression. 'As Buttel and Newby (1980) observed, [...] four key areas of concern can be identified with the political-economy approach in rural studies: agriculture as a capitalist enterprise, class, change in the rural economy, the state' (Woods, 2005, p. 22). Class also became a basis for analysis of population change within rural areas, with later studies in the 1980s and 1990s examining the role of a new group, the service class, and the effects of middle-class in-migrants displacing working class residents or gentrification (Cloke, 1989, 1994; Little, 1991; Lowe *et al.*, 1993; Murdoch and Marsden, 1995).

The political-economy approach sees the state not as a neutral administration, but rather as complicit in creating favourable conditions for capitalism (Bourdieu, 2000). As such, rural researchers have analysed the role of the state in areas such as agricultural policy and planning (Marsden *et al.*, 1986; Winter, 1996). Changes in rural policies are creating different power relationships and a range of development trajectories in the countryside (Murdoch and Marsden, 1994).

The important focus on implementation in planning has largely been confined to studies in urban and regional contexts (Soja, 1980; 1989; Harvey, 1982; 1989; Smith, 1984). Rural studies have redressed this imbalance by dealing with the implementation of policies in rural areas and have provided a conceptual framework for analysis both by offering a critical account of the impacts of planning and policy-making in rural areas, and by interpreting decision-making for rural areas in a political economy context (Cloke, 1987; Marsden *et al.*, 1993).

Newby *et al.* (1978) and Mormont (1990) highlighted the changing relationship between society and space in the countryside. The increasing mobility of capital, people and information has helped to erode local communities and open up the countryside to new uses (e.g. post-productivist agricultural regimes – developed largely within a UK/advanced economies framework). This, in turn, has led to the creation of new power relationships and actor networks which are likely to be dominated by external rather than internal linkages (Munton, 1995; Murdoch and Marsden, 1995). Marsden *et al.* (1993) emphasised the importance of regional and local variation in the rural restructuring, suggesting that any set of national policies have different policy consequences.

Such deregulation of the economy has been accompanied by the privatization of many services, conflicts over land use and the growth of external interferences in local politics and planning (Marsden *et al.*, 1993; Marsden, 1999; Woods, 2005, 2011). Social and economic changes in the countryside have brought increased pressures on rural resources and caused governments to re-evaluate their policies for the countryside. Thus, the political economy approach suggests that regulation has become an important element in some areas, notably in relation to sustainability and environmental conservation (Lowe *et al.*, 1993).

The political economy approach has also enabled the development of more radical rural studies which sought to expose social and economic inequalities in the countryside and to challenge established structures of power. However, the approach has limitations. From a political-economy perspective, rural areas cannot be identified as having sufficient common, distinctive characteristics that would allow for the positioning of the rural as a discrete object of enquiry (Woods, 2005). The emphasis on economic structures and on collective identities, such as classes, also meant that individual agency and personal experiences tended to be marginalised¹. ‘In the 1990s the emphasis in rural studies shifted again to a move to bring people back in though the enculturing of political economy approaches’ (Woods, 2005, p. 24).

2.3.2 Cultural turn

Another framework for exploring the idea of rurality was provided by the ‘cultural turn’ in human geography and the introduction of post-structuralist theories into rural geography as recognised in the following: ‘In recent years, there has been something of a resurgence in rural studies, which has become somewhat more *mainstream* than previously in the academic space of social science’ (Cloke, 1997, p. 367). The attention of rural geographers accordingly also began to shift away from the structural characteristics and dynamics of rural localities, to representations of the rural (Halfacree, 1993, 2006; Murdoch and Pratt, 1993; Cloke, 1997). In this approach, rurality is

¹ In Brazil, during the opening session at the XI National Conference of Agrarian Geography (ENGA), held at the Federal University of Santa Catarina (UFSC) in December 1988, Galvão argued that, lacking a solid body of theory, the Agrarian Geography in Brazil was confronted with crucial methodological issues that required a concentration of efforts to push boundaries toward new levels and insights of knowledges. ‘Broader analytical structures than conflict of the class are needed to explain the diversity of economic, social and spatial inequalities in the countryside, and which, depending on the scale of occurrence, escape the pure and simple determinations of the logic of capital’ (Galvão, 2009 [1988], 230).

understood as a social construct – that is an imagined entity that is brought into being by particular discourses of rurality that are produced, reproduced and contested by academics, the media, policy-makers, rural lobby groups and ordinary individuals. The rural, according to this approach, is ‘a category of thought’ (Mormont, 1990, p. 40).

At the end of the 1980s, human geography and the social sciences, in general, entered into the cultural turn, defined by ‘a new understanding of culture as the product of discourses through which people signify their identity and experiences’ (Woods, 2005, p. 24). Cultural geographers started to explore spatial relations and meaning of place through examining questions of identity, representation and consumption’. As Cloke (1997) observed, the cultural turn supported the resurgence of rural studies, lending both respectability and excitement to engagements with rurality. Rural geographers, for example, drew upon ideas of identity and representation to examine the ways in which rurality is discursively constructed (e.g. Halfacree, 1993; Murdoch and Marsden, 1994; Woods, 1998). Additionally, several key concerns developed in cultural geography more broadly, including the spatiality of nature, landscape, and otherness, led to constructive engagement with rural spaces and environments.

As Halfacree (1993) highlighted, the proliferation of diverse representations of rural space means that rurality is becoming increasingly detached from the referent of rural geographical space, as stated by Woods (2011, p. 9): ‘The way in which the countryside is imagined in popular discourses may have little correspondence with the actual ‘realities’ of rural space and rural life’. As a result, there is a recognition of the importance of cultural constructions of rurality and of the need to be sensitive to different ways of ‘seeing the rural’ (see Figure 2.1). There is also an acknowledgement of the complex relations of power in the countryside which determine the differing ways in which scholars make sense of the rural.

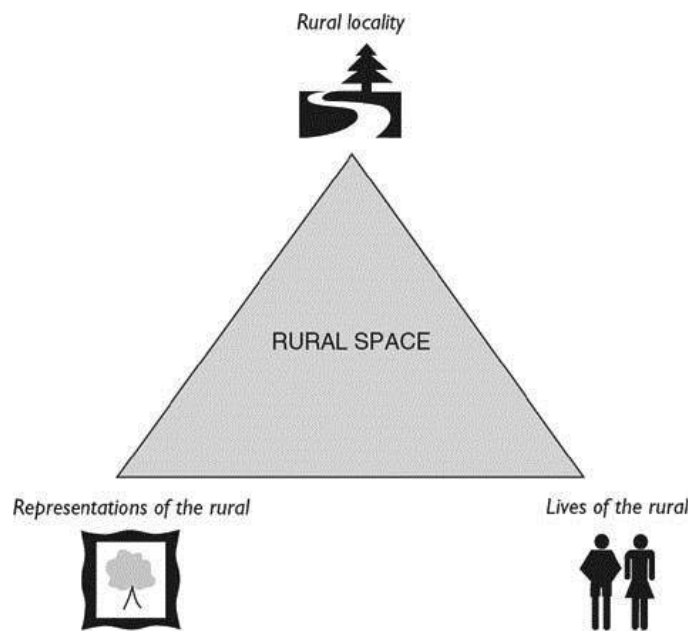


Figure 2.1. Representations of the rural, rural localities and the lived experiences of rural life (Halfacree, 2006).

Society in rural areas is fractured along numerous lines of difference. Yet, rural geographers have often been guilty of focusing on the white middle classes, ignoring the experiences of ‘other groupings’. In contrast to both positivist and political economy perspectives, cultural theory holds that there is no objective truth waiting to be discovered. What matters is the way in which individuals, and institutions, construct their own realities in order to make sense of the world. Using this cultural approach, rural geographers started to deconstruct the ways in which dominant ideas about rurality had been produced and reproduced, as well as exploring alternative experiences and meanings of rurality articulated by subordinate groups’ (Woods, 2011, p. 8).

Philo (1992) concluded his review of rural geography by recognising that the social life of rural areas is fractured along numerous lines of difference constitutive of overlapping and multiple forms of otherness, all of which are deserving of detailed study by geographers. The challenge has subsequently been met by a range of studies which emphasise that the experience of rural ‘others’, and the meanings they ascribe to living in the country do not necessarily fit in with the dominant imaginings of rural life.

As Woods (2011, p. 25) highlighted ‘rural researchers have become adept in understanding how particular theoretical ideas can help to throw light on particular aspects of the rural economy and society’. As a result, the analysis of the processes of

social, economic and political restructuring that are reshaping rural areas, for example, has been conducted in a political-economic framework, while the discussion of rurality and people's experiences of rural life by the cultural turn approach. However, Woods (2011) pointed toward the fact that research on rural geographies in the Global North (conducted by 'rural geographers') has been largely divorced from research on rural geographies in the global South (conducted by 'development geographers'), with the latter tending to be more concerned with social and economic structures, and less influenced by the 'cultural turn'.

In this doctoral thesis, the analysis of the process of social, economic, political and environmental change that are reshaping rural areas in transition economies is conducted in a political-economic framework, whilst the discussion of people's experiences of rural life owes much to the cultural turn. The question of scale is also important for both approaches - the political-economy approach contributes to macro-scale analyse and the cultural turn approach offers more micro-scale perspectives and 'on-the-ground' narratives.

The thesis also emphasises the 'euro-centric' dominant view of the contemporary debate in rural geography, advocating the need for other relational and hybrids perspectives in emerging countries and transition economies such as Brazil. As a result, this research debates the (re)positioning of rural geography in globalisation from a political economy approach to contemporary debates and the (re)orientation rural development in the global world. Against linear and structural thinking concerning the contemporary rural in globalisation, this study argues that little attention has been paid to investigating the rural space and farming systems by combining macro-political economy with the analysis of local and regional strategies (political ecology and cultural approaches) and calls for relational rural geographies in Brazil.

2.3.3 Political ecology

Political ecology emerged in the 1980s as an interdisciplinary field that has been analysed small-scale primary producers in rural areas of developing countries (Watts, 1983; Hecht, 1985). As an approach to the complex interactions between nature and society and a largely rural and agrarian world, it has explored how environmental problems result from inequality associated with the spread of capitalism and emphasises

the need for changes in political and economic processes at local, regional, and global levels to solve environmental problems.

The diverse field of political ecology also combines perspectives from cultural ecology (Neumann, 2005; Robbins *et al.*, 2010; Robbins, 2012). This dual heritage is reflected in a contemporary debate in political ecology: the political economy of resource patterns and the political interests and actions of the actors who participate in political-ecological conflicts (Bryant and Bailey, 1997). As a result, one of the main challenges for political ecology is how to account for the socio-economic production and discursive construction of nature. Addressing this requires a relational perspective similar to the discussion in the previous section, i.e. one that combines political economy and culture applied to environmental issues.

Early political-ecological works emphasised that all actors have some power in shaping the environment (Watts, 1983; Blaikie, 1985). According to Bryant and Bailey (1997), states, multilateral institutions and capital are the dominant forces affecting the outcomes of environmental conflicts and many environmental problems can be traced to the oppression of grassroots actors. Bryant and Bailey pushed political ecologists to expand their horizons beyond traditional concerns, criticising the limited focus on land-management issues. They also challenged others in the field to broaden their views beyond the local level and to pay more attention to the influence of processes associated with globalisation on contemporary environmental problems in developing countries.

As a community of practice (Robbins, 2012), most political ecologists focus on socio-ecological transformations while emphasising uneven power relations in both current and historical perspectives. Recently, scholars have devoted much effort to investigating the relationship between neoliberal globalisation dynamics and regional socio-ecological outcomes (Peet *et al.*, 2011).

As Neumann (2010, 2011) indicated, political ecologists express a growing interest in the theorisation of the social production of space to investigate the co-constitution of nature, space, and society. Other approaches emerge from the confluence of political ecology and the political economy of natural resources (resource conflict) (e.g. Zimmerer, 1993; Neumann, 1998; Hollander, 2005). More recently, there is an interest in discourse theory and post-structuralist projects (e.g. Escobar, 2001; Hollander, 2008).

As Neumann (2010) noted, the theorisation of scale in political ecology focused on either the third or first-world region is theoretically a dead end. He therefore called for ‘a more universal and theoretically robust regional political ecology, which builds on the central insight in human geography that regions are historically contingent processes [...] inseparable from the transformation of nature within prevailing relations of power’ (Neumann, 2010, p. 372). Nevertheless, while research in the Global North has frequently stressed conflicts around diverging nature and landscape visions (Woods, 2011), according to Rainer (2016), conflicts over material living conditions have gained importance and are documented frequently in political ecological studies in Global South: ‘Grassroots movements struggling for land, water, and a decent home have emerged and increased strength in the last years’ (Rainer, 2016, p. 114). Thus, from the Global South perspective, political ecologists argue that a stronger focus must be put on the role of speculative investment and unequal power relations and structures.

Political ecology is particularly concerned with relations and conflicts at more ‘local’ scales, ‘it assumes that informal property relations, micro-politics, socially unequal distributions of risks and benefits, attachments to particular livelihood, unjust exclusion from protected natural areas, and many other factors difficult to model, and best discoverable through intensive qualitative research’ (McCarthy, 2005, p. 954). McCarthy (2005) critiqued political ecology’s traditions of fieldwork and ethnography, and accepted that some research unavoidably stems from and reproduces elements of lingering colonial geographical imaginaries and power relations, critiquing research for being colonial in attitude.

Rural geographers have recently indicated that the rise of multifunctional landscapes incorporates production, consumption, and conservations elements (Holmes, 2006; Wilson, 2007; Woods, 2011). The production of multifunctionality in the Global South is an important component of globalisation related to rural change and, as such, provides the opportunity to gain insights into this broader process while simultaneously exploring similarities and differences across regions. Altieri and Toledo (2011) and Rosset and Altieri (2017) argued that the ‘agro-ecological revolution’ conforms to the mode of resource use exhibited in the process of ‘repeasantisation’: resources are predominantly retrieved from the ecological environment rather than acquired through

market transactions, and production is largely based on and sustained by ecological processes.

Political ecology provides useful conceptual insights to address the complexities of rural change. ‘Most political ecological studies examining ex-urban landscapes in the Global North centre the discussion on land use planning as an arena in which distinct actors struggle over particular visions of nature, as well as future management and use’ (Rainer, 2016, p. 106). Thus, post-structuralism has introduced to political ecology an emphasis on new social movements based on socially constructed identities. In particular, it has introduced the idea of discourse analysis in political ecology research and the importance of exploring and revealing the ways in which the environment and environmental problems are constructed (Perreault, 2003; Peet and Watts, 2004; Whatmore, 2006).

Unlike rural geography, political ecology has focused more on the Third World as discussed above. This thesis is drawing on both bodies of work, outlining that a global political ecology does not overlook the globalised rural spaces and related changes that occur by initiatives in selected rural places around the world. As this research attempts to show, rural spaces are produced and politically laden as the spaces that are currently at the centre of global political ecology’s interest (Peet *et al.*, 2011).

2.3.4 Relational rural geographies based on political economy, cultural approaches and political ecology

Starting with the first debates concerning rural change, this thesis has highlighted that there have been a number of academic studies charting the development of rural geography; from the studies of the 1960s and 1970s, through political-economic perspectives on restructuring, to post-structuralist approaches to constructions of rurality and considerations of otherness, rural geography has been subject to extensive reflection.

The literature underpinning this thesis reveals that the process of rural change is uneven, a consequence of the complexity associated with the involvement of the interrelated dimensions of change, actors, and diverse places. Capturing this unevenness and its causes often reveals conflicts of choice, purpose, representations and voices (Long and

van der Ploeg, 1994; Halfacree, 2006; Heley and Jones, 2012; Umans and Arce, 2014). In unpacking these approaches to provide answers to rural problems, researchers have progressed beyond using individual approaches to mixing traditional approaches and methodological boundaries at different points of their research.

How researchers choose and reflect on the choices of research approaches has implications for the knowledge produced and disseminated. A more critical perspective has again been developed that has examined the political processes shaping rural development policies and strategies, connecting moves toward more 'bottom-up' or endogenous strategies in rural development to shifts in the mode of governmentality and the rise of neoliberalism.

Contemporary human geographers reflect the theoretical stimulation that has resulted from debates and engagements within and across different schools of thought. Social geographical theory is varied but can be understood as a way to establish different explanations or interpretations or critiques or readings of the social world. Quantitative and positivist approaches saw the rise of geographical explanations, humanist approaches resulted in geographical interpretation, Marxist approaches produced geographical critiques, and post-structural approaches have seen the increasing popularity of geographical readings and deconstructions (Flowerdew and Martin, 2005). Geographers are influenced by existing research and knowledge and engage with, challenge and extend different perspectives (Valentine, 2001; Hoggart *et al.*, 2002; Panelli, 2004).

The development of a more critical approach in rural geography in the 1980s fuelled a growing interest by rural geographers in the political processes shaping rural economies and society (Woods, 2005). This resulted in research on the operation and structures of the state in rural areas, and analyses of rural policymaking processes. More recently, research has examined the governing processes and institutions in rural areas and the development of a 'new rural governance' with an emphasis on partnership working and community participation. Rural geographers have also traced and explored the emergence of social and environmental conflicts in rural areas, often produced by tension created by social and economic restructuring, and studied the political mobilisation of rural actors against external pressures. These various influences are all evident in rural geography as practised today (see Table 2.3). 'Rural development is not

just about ‘new things’ being added to established situation. It is about newly emerging and historically rooted realities that are currently reappearing as rural development experiences [...] A particularly decisive element will be the combination of the ‘old’ with the ‘new’ (van der Ploeg *et al.*, 2000, p. 400).

Table 2.3. Features of the modernisation paradigm and the new rural development paradigm (Source: Woods, 2011)

Modernisation paradigm	New rural development paradigm
Inward investment	Endogenous development
Top-down planning	Bottom-up innovation
Sectorial modernisation	Territorially based integrated development
Financial capital	Social capital
Exploitation and control of nature	Sustainable development
Transport infrastructure	Information infrastructure
Production	Consumption
Industrialisation	Small-scale niche industries
Social modernisation	Valorisation of tradition
Convergence	Local embeddedness

In sum, this section discussed and set up the approaches adopted in this research. This has involved engagements both with critical political economy, political ecology, and cultural approaches, which have led to very significant insights into the assemblages of power, process, practice and change which have (re)produced and (re)encultured rural areas over recent years. Accordingly, Woods (2011, p. 292-3) pointed that ‘a relational rural geography will expand the boundaries of rural research and lead rural geographers into new associations [...] in teasing out the messy entanglements of the rural and the urban’. In this thesis, the analysis of the process of social, economic, political and environmental restructuring that are reshaping rural areas will be conducted in a political-economic framework; whilst the local micro-politics and the discussion of people’s experiences of rural life owes much to the political ecology and cultural turn approaches.

Ward *et al.* (2005) emphasised that any rural locality includes a mix of endogenous and exogenous forces and that the local level must interact with the extra local; however, developing the capacity of local resources to steer these wider processes to their benefit remains a critical issue. In this sense, the next section will argue that resilience thinking does not represent a ‘clean break’ within the rural development literature, but that

resilience thinking opens up new perspectives and provides the potential to ‘re-frame’ rural studies.

2.4 Understanding rural change and farming resilience in a global era

This section will explain resilience theory and how it can be used as a concept for understanding the link between rural change and globalisation and farming community resilience and vulnerability in ‘the global countryside’. Specific focus will be placed on how resilience theory can help better understand critical issues related to rural change and farming resilience in the face of globalisation processes. The importance of resilience theory in the social sciences is linked to recent radical changes in conceptualisations of societal change associated with the political ecology and cultural turn approaches. Davoudi (2012) argued that resilience provides a ‘bridging concept’, rather than an off-the-shelf rural development model. Within this context, resilience thinking offers two key contributions to rural studies. Firstly, resilience offers alternative analytical methods and insights for rural studies. Secondly, resilience provides an alternative policy narrative for rural development policy and practice (Scott, 2013).

2.4.1 Resilience theory

Resilience is a hot topic in international and national policy circles as a mechanism for enhancing the capacity of communities to cope with environmental change and disturbances. Recent years have seen a rise in the application of the term academic, policy and popular media, especially the field of global change generally, and global environmental change in particular. Therefore, much contemporary work on social resilience derives from research on vulnerability in the previous decade, either from a system view or from components of community systems such as livelihoods (Wilson, 2012; Hatt, 2013; Brown, 2014).

Community resilience is defined as the ability of local communities to adapt to and/or recover from disruptive events. In the wake of both natural and anthropogenic disasters around the world, there is growing recognition that local resources and relationships are essential for aiding communities in absorbing the impacts of, and coping with, exogenous shocks. Yet community resilience extends beyond issues of disaster

management and is recognised as a key ingredient in assisting local places to deal with more subtle forms of social disruption (Folke, 2006; Forbes *et al.*, 2009; Magis, 2010).

Brown's (2014) study indicated three emerging topics in investigations examining the social dimensions of resilience: community resilience; transformations; and resilience as an organising concept for radical change. In particular, this study emphasised: how recent studies of community resilience add to the understanding of social dynamics; how resilience theories conceptualise the relationship of resilience to transformational change rather than adaptation or maintaining the status quo; and how resilience ideas are being applied and whether they are in fact able to foster radical change. According to Brown (2014), there is still relatively little analysis of social difference and resilience, and there are tensions between normative and analytical stances on resilience. These characteristics are mirrored in policy discourses and local level actions on resilience.

A common criticism is that resilience fails to take account of politics and power relations. The transference of ideas about ecological systems to the social dimension is viewed as highly problematic. Building on social critiques of resilience, Hatt (2013) found fault in the limitations of sociology integrated into resilience concepts. 'Functionalist sociology understands the social as a system, but is based on equilibrium ideas, so actually gives a static, non-dynamic social perspective' (Brown, 2014, p. 3). Hatt (2013) went as far as to recognise that, 'by adopting a view of the social that rested on an assumption of consensus and mechanical equilibrium, resilience thinking was adopting a view it had rejected in its own theorisation on ecosystems' (Hatt, 2013, p. 35).

The literature has highlighted how resilience ideas have grown in 'remarkable isolation from critical social science literature'. At the same time, MacKinnon and Derickson (2013) claimed that resilience can be seen as the latest in a long line of naturalistic metaphors to be applied to cities and regions. Brand and Jax (2007) described resilience as 'two-faced'. But not only is resilience becoming increasingly vague and normative, its origins as a descriptive concept are being lost, and, it is increasingly conceived as a perspective or even as a way of thinking applied to social processes such as governance, social learning, or perhaps as a metaphor for the flexibility of a social-ecological systems over the long term.

One approach to socialising resilience has been to integrate ecological or social-ecological system perspectives on resilience with those from human development or psychology, emphasising issues of agency and capacity (Brown and Westaway, 2011; Coulthard, 2011). O'Brien *et al.* (2009) pointed to resilience thinking as a lens to examine changing social contracts under climate change, and to highlight how a social contract understanding of governance informs resilience in terms of bringing power and rights of distant and future others into the analysis.

Folke *et al.* (2010) asserted that adaptation and transformation are essential to maintain resilience, proposing that the very dynamics between periods of abrupt and gradual change and the capacity to adapt and transform for persistence are at the core of resilience of social-ecological systems. The resilience literature generally acknowledges that transformational change involves not just a shift in 'state variables' but also shifts in perception and meaning, patterns of interaction among actors, including leadership and political and power relations and institutional arrangements (Folke *et al.*, 2010).

Adjustments occur at all scales - individuals, society, institutions, technology, economy and ecology – and may involve changes to practices, lifestyles, power relations, norms, and values. Brown (2014), therefore, argued that another set of papers discuss the role and scope for agency, innovation, and novelty within resilience framing. 'While the debates about multiple meanings and interpretations of resilience rage on in the scientific literature, and the discussions between policy and science converge, resilience has been seized and is being used in quite different ways by civil society groups, social movements and communities' (Brown, 2014, p. 7).

Other authors have analysed resilience as a means of opening space for negotiations across government or between the state and publics. Goldstein *et al.* (2015) suggested the idea of collaborative resilience as a contribution towards deliberative planning, arguing that pursuing resilience through inclusive planning and engaging with communities through narratives reveals subjective and symbolic meanings of resilience. Thus, resilience is shown to support more transformative inclusive and dynamic approaches to designing regional planning in the context of globalisation.

2.4.2 Resilience in a global era

Globalisation is characterised by time-space compression and the acceleration of worldwide social relations which are transforming the structure and scale of human relationships as economic, social and environmental processes operate at a global rather than regional/local scale (Gray, 2002). Globalisation, thus, refers to the increasingly global economic interlinkages between geographical spaces, the embeddedness of local communities within complex financial and monetary flows, and processes associated with increasingly uniform patterns of economic embeddedness across the globe (Rofe, 2009).

Wilson (2012) investigated the notion of resilience and challenges faced by local communities around the world in dealing with disturbances that may threaten their long-term survival. Using global examples, specific emphasis is placed on how learning processes, traditions, policies and politics affect the resilience of communities and what constraints and opportunities exist for communities to raise resilience levels. Wilson (2012) highlighted how certain types of communities are losing resilience through increased embeddedness into globalised pathways of decision-making, while other communities may be gaining resilience, although no one system is either totally resilient or totally vulnerable.

Over the past few decades, there has been an increase in studies examining aspects of resilience at community level, with those focusing on social resilience particularly highlighting the importance of learning pathways, social memory and communication in enabling communities exposed to disturbances, hazards or catastrophes to adapt, change and adjust decision-making pathways (Cutter *et al.*, 2008; Davidson, 2010; Wilson, 2012).

Although such actions emanate from within communities, it is the embeddedness of community actors in global capitalist pathways that is often the key driver for intensification of production. Conversely, globalisation of a community may also enable more resilient pathways by offering more wide-ranging opportunities for development. In addition, economic factors play an important role based on how well community-region economic interactions are developed. Communities that are well linked within their regions tend to have more opportunities and regional support.

Social factors are also crucial for resilience because they mediate the relationship between the socio-economic and environmental components of the system. Social factors include levels of interaction between community members such as trust, relationships, conflict resolution processes, engagement of young and old people, learning and communication pathways, cooperation, strength of networks, bonding and bridging capitals, as well as community ‘cohesiveness’ (Cutter *et al.*, 2008; Wilson, 2010, 2012).

The institutional domain includes closely inter-connected factors linked to politics, governance and institutional bodies and structures. ‘Political factors are broadly linked to predominant ideologies and worldviews held by local, regional and national decision-makers. Political pathways are particularly affected by the type of political system (e.g. democratic, autocratic) and whether and how policy is enacted on the ground’ (Kelly *et al.*, 2015, p. 13). Changes in policy can also have positive impacts, locking-in development to more sustainable pathways (Wilson, 2013b). Moreover, ‘learning pathways’ are often closely linked to the political domain, although the macro-scalar nature of most political processes means that change at the nation-state level or beyond is usually slower than at community level (Cumming *et al.*, 2006).

In summarising the above narrative (see Table 2.4), resilience can help us understand and respond to the challenges of the contemporary age. As the concept of resilience has taken hold, these challenges are characterised by high uncertainty, globalised and interconnected systems, increasing disparities and limited choices. According to Brown (2016), resilience concepts can overturn orthodox approaches to international development that remain dominated by modernisation, aid dependency, and a focus on economic growth, and to global environmental change, often characterised by technocratic approaches. The particular area of interest for this research is how the resilience of farming communities in transition economies such as Brazil has been affected by the socio-economic and political changes in these countries.

Table 2.4. Resilience theory ideas about development in an age of uncertainty and recurrent crises (Source: Author based on the references)

Resilience theory	
Brown (2016)	Resilience concepts can overturn orthodox approaches to international development that remain dominated by modernisation and a focus on economic growth, characterised by technocratic approaches.
Lendvay (2016)	Resilience in human geography should dissolve the theoretical dichotomy and treat both large-scale structures and agency of individuals on the common ontological framework.
Scott (2013)	Resilience thinking opens up new perspectives and provides the potential to ‘re-frame’ rural studies debates. 1- resilience offers alternative analytical methods and insights for rural studies and 2- resilience provides an alternative policy narrative for rural development.
Welsh (2014)	A critical interrogation of plural resilience theories and wonders at their emancipatory possibilities, calling for a more sustained and critical engagement by human geographers with resilience studies and their effects.
Wilson (2012)	Explored the links between resilience and transition theory, how path dependencies affect resilience at community level, the impacts of globalisation on different community trajectories, and the importance of social memory for understanding constraints and opportunities for developing community resilience.

2.4.3 Rural change and resilience in a global era

‘Globalisation is not all-powerful. As noted earlier, it is perhaps more accurate to think of there being multiple globalisations, some of which are contradictory, and which present numerous opportunities for resistance and contestation’ (Woods, 2005, p. 39). The study of globalisation in a rural context has commonly focused on large-scale structural changes, transnational commodity chains, or dramatic examples of deindustrialisation, land-grabs, mass migration or rapid transformation into tourism. For the majority of rural communities, however, globalisation is experienced in more incremental and mundane ways (Woods, 2007, 2011).

‘The power of global capitalism, and, by extension, global corporations, is one clear example of this and is as significant in traditional rural economic sectors such as agriculture as in any industry. But globalisation is about more than just trade or corporate ownership’ (Woods, 2005, p. 33). Indeed, Pieterse (1996) argued that globalisation should not be seen as a monolith, but that there are many globalisations, sometimes contradictory, always fluid and often open-ended. Pieterse’s argument presents a means of understanding the multiple ways in which globalisation of different forms impacts upon rural areas, and the opportunities that exist for rural actors to determine their response.

As the world economy becomes increasingly integrated through trade liberalisation, international technology transfers, and greater mobility of capital and information, there is a growing interest in examining how these changes have affected the wellbeing of the poor in developing countries. Globalisation may affect poverty through several pathways (Pieterse, 1995, 1996; Wilson, 2012). Globalisation cannot be reduced to the subordination of the local by global forces. ‘Rather, the impact of globalisation in reshaping rural places is manifest through processes of negotiation, manipulation, and hybridisation, contingent on the mobilisation of associational power, and conducted through but not constrained by local micro-politics’ (Woods, 2007, p. 502).

Woods (2007) called for a new, multidimensional research agenda that emphasises the importance of place-based research for rural studies. At the same time, localised resistance to globalisation processes in both the Global North and the Global South has become a prominent feature of contestations over the meaning and use of rural space

and, as such, a significant focus for research concerned with the relational networks, processes and actors involved in its everyday reproduction.

According to Massey (2005), understanding these place-specific relations to the global requires, on the one hand, paying attention to the agency of local actors, whilst also examining the broader economic and political relations – both historical and contemporary – which locate places within wider networks. Applying this to rural contexts, Woods (2007) introduces the global countryside as a hypothetical space representing the ultimate outcomes of globalisation processes. This space is yet to be fully attained but is shown to be partially articulated to greater/lesser degrees in different rural localities based on ‘locally specific engagements with and responses to globalisation involving both human and non-human actors’ (Woods, 2007, p. 486). The plethora of globalisation processes impacting on the rural can be distilled into broad trends (Woods, 2007) (see Table 2.5).

Table 2.5. The plethora of globalisation process impacting on the rural (Woods, 2007)

Characteristics of the global countryside (Woods, 2007, p. 493-494)
<ul style="list-style-type: none">• The landscape of the global countryside is inscribed with marks of globalisation.• The global countryside is characterised by increasing social polarisation. Globalisation has polarised the socio-economic structures of communities in the global countryside.• The discursive construction of nature and its management are transformed in the global countryside. Locally embedded discourses of nature are also challenged by the dissemination of ‘global’ values.• The global countryside is associated with new sites of political authority. The imposition of nature parks and environmental regulations and challenges to traditional discourses of nature have all affected perceptions among residents.• The global countryside is a contested space. The transformations wrought by globalisation on rural spaces frequently meet resistance from local actors.

According to Aggarwal (2006), among these alternative pathways, an important but relatively less studied pathway works through the effects of globalisation on local ecosystems. Local ecosystems constitute a critical link because rural poor in developing countries derive a large part of their incomes from local, natural resource-based activities such as crop and livestock production, fishing, hunting, fuelwood, and minor forest product collection (Aggarwal, 2006). Thus, it becomes natural to ask how globalisation, in its various dimensions, affects local ecosystems, and thus the wellbeing of the rural poor who depend on it.

As ecologists point out, it is these cross-scale interactions that determine system behaviour. As a result, drawing upon this insight, Aggarwal (2006) showed how globalisation can be viewed as an external shock that brings about rapid change in some variables (like prices or technologies) while other variables (like institutions and culture) remain sluggish. Wilson's (2012) work on the resilience of communities in both developed and developing world contexts particularly pointed towards the fact that community resilience and environmental transitions contributes towards academic debates that argue that 'social resilience' (the resilience of human systems) is crucial for understanding constraints and opportunities faced by communities in a rapidly changing world.

Wilson (2012) analysed specifically how environmental, political and socio-economic transitions affect community resilience and suggested that community embeddedness into the globalised world can both raise and reduce community-level resilience. Wilson's study emphasised that relocalised community pathways in particular highlight how communities are attempting to recapture lost social and environmental capital to increase community resilience. Over the past two decades, there has been a resurgence in attention to community as a critical arena for addressing a range of issues, including rural pathways of change in the era of globalisation. Until recently, such communities were almost entirely restricted to developed countries, where the gradual loss of agriculture's position and importance in society has been particularly pronounced since the 1950s. However, increasingly, rural communities in the South are also characterised by processes of rapid deagrarianisation (Bryceson and Jamal, 1997; Bryceson, 2002; Rigg, 2006).

To develop a model for transition in different spatial and temporal dimensions, Wilson (2007, 2012) brings together a transition theory approach with the arenas of investigation of multifunctionality and rural community resilience. The debate is based on contemporary issues concerning rural change in the context of globalisation and presents an analysis of interconnections between globalisation and rural community resilience in a rapidly changing and urbanised world.

Strong multifunctionality has been used to describe agricultural systems with positive attributes that enable implementation of multifunctional pathways to help the survival of rural communities, while weak multifunctionality has been used to describe negative processes that are often increasing the vulnerability of rural communities (Pretty, 1995; Wilson, 2007, 2010). However, many researchers have questioned the applicability of the term beyond a European context where the notion of multifunctionality has largely been used as policy to defend subsidies of European agriculture (Potter and Burney, 2002; Potter and Tilzey, 2005, 2007). As a result, multifunctionality is still seen by many as a ‘European project’ with little relevance to non-European rural regions.

These debates and the global applicability of the notion of multifunctionality could be enhanced by linking discussion on multifunctionality to the emergent paradigms of both resilience and vulnerability in human systems. ‘Resilience can thus both be an outcome, especially when linked to improved adaptive capacity of rural communities, or a process linked to dynamic changes over time associated with community learning and the willingness of communities to take responsibility and control of their rural development pathways’ (Wilson, 2010, p. 366). Wilson’s study (2010, 2012) in relation to resilience and multifunctional agriculture and rural spaces examines place-based characteristics that contribute to weak or strong resilience, while also exploring the ‘flip-side’ of resilience – vulnerability.

A key contribution of Wilson’s work on multifunctionality and resilience is his examination of the temporal evolution of rural systems and the unfolding trajectories of contrasting development paths: from relocalised low-intensity rural systems to deagrarianised rural communities and superproductivist rural systems. Similar to the literature within regional studies, Wilson identified examples of suboptimal ‘locked-in’ development paths in rural systems and emphasises the need for mobilising a combination of local and extra-local resources in building more resilient futures.

The different approaches to rural resilience tend to either focus on structures, materials, and establishments or foreground the agency of community members as individual actors. Recognising the shortcomings resulting from the gap between the two approaches (e.g. structuralism and post-structuralism), recently there have been calls for the dissolution of this binary by applying a relational perspective focusing on interactions. Lendvay (2016) argued that resilience in human geography should dissolve the theoretical dichotomy and treat both large-scale structures and agency of individuals in a common ontological framework.

As Scott (2013) highlighted, resilience thinking opens up new perspectives and provides the potential to 're-frame' rural studies debates, providing a bridging concept between two key contributions of resilience are identified: 1- resilience offers alternative analytical methods and insights for rural studies and 2- resilience provides an alternative policy narrative for rural development practice. This includes an emphasis on adaptive networked governance that embed ecological concerns into rural development practices and a call for blending the local and global in rural development processes. Within the rural studies literature on resilience, two key themes are prominent: first, farming and its role in social-ecological resilience and second, community resilience within rural localities (Scott, 2013).

The next section examines key drivers affecting rural community resilience, in particular, globalisation and the increasing embeddedness of many farming communities into the global capitalist system – processes that remain controversial with regard to their impact on rural spaces.

2.4.4 Resilience at the farm level: understanding farming resilience 'on the ground'

Darnhofer *et al.* (2010) examined farming as part of a set of systems across spatial scales, from farm to global, and encompassing agro-ecological, economic and political-social domains. Rather than a focus on production and efficiency, they argued that farm sustainability is achieved through adaptability, learning, and change. Echoing the key themes within evolutionary economic geography, the authors suggested that in the case of the farming sector, resilience is more likely to emerge when farmers have the capacity to transform the farm, when farm production is attuned to the local ecological

carrying capacity and when learning and innovation are targeted outcomes. This forms key part of analytical structure in analysis section (see Chapter 4-8).

Family farms play an important role in the countryside, yet their number is declining. This raises the question of what conveys resilience to family farms, i.e. the ability to persist over the long-term through buffering shocks and adapting to change. Within the current approaches to farm resilience, two perspectives exist: the first focuses on material structures and highlights that farmer agency and wider social forces also play important roles. Darnhofer *et al.* (2016) argued a perspective focused on social relations, and that has the potential to overcome both the structure/agency and ecological/social dichotomies.

There is increasing consensus that change is accelerating and becoming less predictable, as global interconnections lead to events that produces consequences beyond their immediate context. Policy measures reinforce the impact of neoliberal agricultural policies and market deregulation. ‘They also face the contradictory demands to increase food production to feed the rising world population while having to reduce the ecological impact of intensive production methods. Indeed, biodiversity is declining, soils are losing their organic matter, fresh water resources are being polluted’ (Darnhofer *et al.*, 2016, p. 111). These multifaceted dynamics and often ambiguous demands may combine with sudden events such as volatile markets or food scares to generate unexpected outcomes.

Indeed, farms play an important role in maintaining social cohesion, producing food, providing energy from renewable resources, offering recreational and health care services, and maintaining the cultural landscapes. At farm level, empirical studies have focused mostly on the structures that enable flexibility, which is seen as key to the ability of farms to adapt over time. It is little surprise, therefore, that within this context of economic turbulence and ecological instability, the concept of resilience at farm level has gained prominence both in political rhetoric and in research. Darnhofer *et al.* (2016) built specifically on the concept of social-ecological resilience (Holling, 2001), as it emphasises the interdependence of social and ecological dynamics – two key aspects of farming – and emphasises the need to adapt and change, rather than the ability to buffer shocks and return to ‘normal’, an argument linked to political ecology.

Farmers are relevant actors in the investigation because farms are transferred from one generation to another, sometimes for several centuries. As such, farmers resist and survive despite economic and political, technological and social changes. The complexity of spatial restructuring over time in the metropolitan countryside of Rio de Janeiro will be investigated to better understand rural change by going beyond the view of inert rural spaces subject to external linear global forces². For this reason, the researcher uses a multidimensional approach and multiple methods to analyse the global rural-urban interface of the metropolitan countryside by examining the interaction of both urban-global expansion and the social resilient context of different parts of the area through analysing farming systems in processes of change. Based on Berkes (2007) and Darnhofer (2010), the study will identify four main factors that create resilient systems at farm level during fieldwork research (see Table 2.6):

- learning from changes and uncertainties;
- nurturing spatial diversity in its various forms;
- combining different types of knowledge and
- learning and creating opportunities for social organisation and relational and multi-scalar links.

² There have not been common in studies developed over the past few years understanding the complexity of farming systems nearby big cities and metropolitan areas at the rural-urban interface. Bicalho (2008) highlighted that attention has focused much more on new activities in the context of the multifunctional and global rural, mostly non-agricultural and associated with services and consumption of the countryside, and not on agricultural production and farming systems themselves.

Table 2.6. The characteristics of farming resilience in a global era: examining weak to strong resilience (Based on Folke *et al.*, 2003; Berkes, 2007; Darnhofer, 2010).

Main factors that create resilient systems at farm level in the context of globalisation

<p>Capability to learn from crisis (Chapter 5)</p>	<ul style="list-style-type: none"> • The perception of the members of the small-scale farm, and ensuring a degree of flexibility and adaptiveness. • The farmers keep debt at a reasonable level relative to farm assets.
<p>Nurturing diversity in its various forms (Chapter 6)</p>	<ul style="list-style-type: none"> • Identifying various ‘variables’ that contribute to diversity, such as: biodiversity, diversity of economic opportunities, diversity of resources, diversity of information sources and communication partners, and diversity in types of relationships. • Connection to a variety of social networks. • Farmers diversify their marketing channels, for example by building alliances or implementing cooperative projects.
<p>Combining different types of knowledge (Chapter 7)</p>	<ul style="list-style-type: none"> • Ability to combine scientific information with farming traditional knowledge. • Bringing together parties with different strengths in terms of knowledge and background and thus to create a positive leaning environment. • Combining different types of information and sharing in various networks.
<p>Creating opportunity for organisation and cross-scale linkages (Chapter 8)</p>	<ul style="list-style-type: none"> • Ability of the farm community to maintain local capacity for social and political organisation. • At community level, the ability to self-organise is strongly linked to social competencies. • Engagement with various institutions builds important cross-scale linkages.

Bicalho and Machado's (2013) study of agricultural change in Brazil in the context of spatial transformations associated with the construction of a new petrochemical complex is an example of the processes that take place in the rural space of the metropolitan region of Rio de Janeiro. This study identified tensions but also highlighted the persistence and resilience of rural space in which many farmers adapted to the new situation. The farmers have been able to resist conversion to urban uses by developing flexible strategies of capitalisation adapted to the availability of financial and human resources and by taking on select quality products. However, not all farmers have seized these new opportunities. The above study identified contradictions in land use policy which threaten farming, but also highlighted the resilience of rural space whereby some farmers have adapted to new situations that arose. New rural-urban interactions contribute to complex outcomes in which local actors create new forms of spatial ordering and so adapt to new scenarios of change.

Fonte (2008) highlighted that during the industrialisation of agriculture, the role of farmers' knowledge has greatly diminished and much of this knowledge has become lost altogether due to the spread of productivist logic and standardised solutions, and a decline in the size of farming communities and their sense of cohesion. However, 'in the face of the many contemporary challenges facing agriculture: climate change, food security and resource depletion, to name but a few, there is an emerging recognition that farmers' and local knowledge is a valuable resource that can reorient modern agriculture towards more sustainable and resilient paths of development' (Šūmane *et al.*, 2018, p.232).

In recent years, agricultural sustainability has been linked with the concept of resilience, which emphasises dynamics, disequilibrium and unpredictability in agricultural development. Learning to live with change and uncertainty, and combining different types of knowledge appear critical for building resilience because change appears to be needed to develop adaptive capacity (Folke *et al.*, 2003). Among the diverse knowledge sources and learning forms that farmers use (see Table 2.7), Darnhofer *et al.* (2016) have pointed to the particular role of farmers' experimental learning and networking in increasing the resilience of small-scale farmers. Thus, Šūmane *et al.*, (2018) related the potential of informal knowledge in improving sustainability and resilience to its embeddedness in the specific social, economic, environmental contexts and its holistic character and dynamics in response to emerging opportunities, uncertainties and risks.

Table 2.7. Typical farmers' informal knowledge types and learning modes (Source: Šūmane *et al.*, 2018, p. 234)

Knowledge types	Local, practice-based, traditional, lay, farmer, tacit, endogenous, indigenous etc.
Learning modes	Self-education, learning by doing, experimenting, observing, from own or others' experiences, in social interaction etc.

Informal farmers' knowledge is often compared and contrasted to formal knowledge. According to Šūmane *et al.* (2018), it is helpful to compare informal and formal knowledge as this illuminates the different characteristics of each of type of knowledge (see Table 2.8). However, 'it does not accurately reflect the reality of farming in which farmers often integrate and use all the kinds of knowledge that they have access to or which they find relevant. The seeming differences between scientific and informal knowledge regarding their content, methods, epistemology and contextual embeddedness are too simplistic' (Šūmane *et al.*, 2018, p. 234).

Local knowledge can be scientifically valid, and scientific knowledge can provide solutions for specific local contexts. Some studies have indicated that farmers tend to value on practice-based knowledge (Scoones and Thompson, 1994; Lyon *et al.*, 2011; Knickel *et al.*, 2018) and are able to mobilise this knowledge to resist scientific discourse (Clark and Murdoch, 1997). Local knowledge has relevance for agricultural sustainability and resilience, as it tends to be holistic, dynamic and adaptive.

Table 2.8. The different characteristics of informal and formal knowledge (Source: Šūmane *et al.*, 2018, p. 234)

	Informal farmers' knowledge	Formal agricultural knowledge	
		Academia	Industry
Source	Farmers' experimentations and practical experiences on the farm	Research stations	Research stations
Ownership and certification	Practitioners, farmers, local community	Scientists	Specialists, scientists
Approach	Holistic	Complexity	Fragmentation, specialisation
Transferability	Locally specific solutions	Standardised and locally specific solutions	Standardised decontextualized solutions
Transmission and access	Exchange with peers, passed through generations	Peer-reviewed articles, conferences, formal education	Formal education, training groups, professional literature

Combining different types of knowledge is related to the ability to combine scientific information with traditional knowledge (Agrawal, 1995), and the ability to share insights, to bring together parties with different strengths in terms of knowledge and backgrounds and thus to create learning environments (Berkes, 2007). At the farm level, this can be found in the variety of information sources that farmers tap into and use to make decisions, in the variety of networks in which they are involved and in their ability to build on experiences and traditions.

In conclusion, the different approaches to rural resilience seem either to privilege the material structures or to highlight that the agency of farmers and other social groups plays an important role. Thus, while the importance of interactions between the ecological and social domain is acknowledged, it remains a challenge to fully integrate both domains, while at the same time capturing the dynamics of on-going change in the context of the globalisation ‘on the ground’. This study is also attempting to integrate the domains at the rural-urban interface, bringing the rural space and the metropolitan space together and contributing to the discussion on farming resilience in the metropolitan countryside.

2.5 Conclusions

The argument in this thesis is based on the critical discussions that have moved away from the rigid notion of simply ‘exporting’ indicators developed in advanced economies to the developing world situation towards an analytical framework that emphasises complex rural space (Cloke *et al.*, 2006; Woods, 2007, 2011). This thesis will, therefore, explore the diverse meanings that have been attached to globalisation as a driver of rural change, arguing that it needs to be adapted and developed to address conditions found in the developing and urbanised world. Further, this analysis will question the implied linearity of the traditional concept of rural space and will explore different perspectives in human geography, building a theoretical view from Brazil in the context of rural change. In summary and building on authors such as Marsden (2003), Wilson (2007, 2012) and Woods (2007, 2011), the research is based on debates concerning contemporary rural space with an emphasis on processes of resilience and globalisation in a rural context.

Based on three approaches (political economy, cultural turn and political ecology), the research will highlight the importance of developing a theoretical-methodological approach that reveals rural change in the metropolitan region and its countryside, the ambiguous relationships of its spatial processes and the relevance of territorial analysis in the framework of relational geographies. Based on the evidence from primary and qualitative data, the thesis will reveal some critical issues of agriculture in a global context, addressing the theory of farming resilience in the metropolitan countryside of Rio de Janeiro. The study will apply these three approaches by visualising the relational geographies of farming cases based on methods developed in political ecology and cultural studies. Contemporary human geography has applied multi-methods that enable researchers to engage more closely with farmer's individual multifunctional life histories, farm trajectories, transitions and development pathways. Chapter 9 will discuss in detail the major contribution of this thesis that discusses the relational rural geographies through these three approaches combined.

This research will particularly explore the diverse meanings that have been attached to the recurrent significance of globalisation as a driver of rural change, arguing that it needs to be adapted and developed to address conditions found in the developing world. Further, this analysis questions the implied linearity of the traditional concept of the rural, building a theoretical view from Brazil in the context of globalisation. This thesis is based on debates concerning rural change with an emphasis on: 1) globalisation in a rural (a hybrid rural) context; 2) small-scale farming resilience in a metropolitan (and a hybrid rural) context; 3) in-between rural places and 'invisible' cultures in the era of an urbanised society; 4) from a top-down development to bottom-up and translocal strategies in an global era; and 5) for relational rural geographies and new directions in Brazilian rural studies.

As highlighted in this chapter, the concepts of the global countryside and resilience will serve as the theoretical basis for understanding global interaction in the context of recent social and economic change resulting from global drivers in the rural space. Building on work by Marsden *et al.* (1993), Wilson (2007, 2010) and Woods (2007, 2011), the importance of globalisation and spatial restructuring in the creation of a space with different premises, this research will endeavour to analyse rural space in its relation to both endogenous and exogenous forces interacting with local actors.

Of particular interest for this research is the relationship between rural change and globalisation, specifically how those relationships can be harnessed to improve resilience pathways in transition economies, with evidence from Brazil. According to Woods (2005), contemporary rural change is distinguished by two characteristics. The first is the pace and persistence of change. Rural economies and societies are not just changing, but changing constantly and rapidly, affected by successive trends and innovations that roll in like the waves of an incoming tide (Marsden *et al.*, 1993; Hoggart and Paniagua, 2001; Woods, 2005, 2011). This vigorous pace of change is driven by the rate of technological innovation and social reform in late modernity. The second characteristic is the totality and interconnectivity of change.

Many historical instances of rural change were revolutionary for those directly affected but were spatially limited. In contrast, today's processes of rural change resound around the globe. Rural areas, it seems, are tightly interconnected by global social and economic processes that cut across rural and urban space in a condition of advanced globalisation. 'The rural is, and always has been, a dynamic and diverse space, made elusive by its relationality. The idea of the rural has had a powerful resonance throughout history and has attracted, inspired and confounded geographers in equal measure' (Woods, 2011, p. 293).

Against linear and simplistic thinking concerning rural change, the research is to address the resulting literature gap, adopting an approach that combines political economy, political ecology, and contemporary approaches concerning rural resilience through in-depth case study communities of the metropolitan countryside of Rio de Janeiro. There is a general trend in Brazil toward greater political participation of small-scale farmers who have created local and trans-local associations to represent their interests. Bicalho (2013) investigated such a case in Rio de Janeiro and showed how the organisation of the rural population in community associations has resulted in the creation of considerable social capital which enables them to dialogue with different actors involved in territorial development.

Wilson (2010, 2013a) has discussed the complex interlinkages between community resilience and the policy challenge, linked especially to the notion of policy corridors and who should be in charge of the global resilience transition. This approach relates to attempts to understand how changes in community resilience pathways are linked to

various capitals and how these interact with exogenous policy processes. According to Wilson (2012), human geography is particularly well placed to provide insights into the spatial discontinuities and heterogeneities of community resilience across a range of various community types and globalisation process. Therefore, this thesis questions how the resilience of rural communities in transition economies such as Brazil has been affected by the socio-economic and political changes in these countries over the past few decades.

The study is based on the contemporary debates concerning rural change in the context of economic globalisation and should be seen as an analysis of interconnections between globalisation and rural resilience in a rapidly changing world. In a rural community reality, Marsden (1999) indicated the importance of understanding the balance of economic, social and environmental processes which shape the contemporary countryside, and the interrelationships between these in particular localities. Contemporary rural studies is a very inter-disciplinary field, with similar types of research being conducted by geographers, sociologists, anthropologists, agricultural economists, planners and political scientists. At the same time, relational rural geographies have expanded the boundaries of rural research and led rural geographers into new associations (Marsden *et al.*, 1993; Murdoch and Pratt, 1993; Murdoch, 2000, 2006; Woods, 2005, 2011; Cloke *et al.*, 2006; Halfacree, 2006; Heley and Jones, 2012).

Therefore, it is important that this research develops an understanding of approaches and methods in rural studies. For several decades, development theory and practice were based on the conviction that rural development problems could be solved by making use of scientific knowledge, technology, and capital. In the 1960s these elements were expressed in modernisation theory, which held that the delivery of modern, external inputs would trigger innovation, industrialisation, and modernisation (Woods, 2005). Modernisation was seen as a fixed, linear structural transformation through a number of different stages and in various dimensions.

‘Neo-Marxist theories were different in aspects of political economy but very similar regarding assumptions and practices of one-size-fits-all fixes. Both modernisation and neo-Marxist theories were structuralist, abstract, general of the complex heterogeneity of the real world and reliant on grand simplifications’ (Umans and Arce, 2014, p. 337). Both theories were characterised by the use of techniques to fix or solidify realities.

However, as Booth (1994, p. 4) noted, in ‘failing to reflect the diversity and complexity of the real world of development, the earlier theories were incapable of explaining it’.

During the 1990s, the need to rethink social development was recognised. Studies started to focus on actors and agency, the social construction of reality, practice and policy relevance and multiple scale levels (Murdoch and Pratt, 1993; Yarwood and Edwards, 1995; Edwards, 1998; Woods, 2005). This body of work revealed many on-the-ground transfer failures and divergences in development experiences. This has highlighted the extent to which rural development has moved beyond tradition approaches and embraced multiple viewpoints and multiple approaches. Collectively, this research has helped to produce a more nuanced, multi-vocal representation of contemporary rural life (Cloke *et al.*, 2006; Halfacree, 2006; Heley and Jones, 2012).

Drawing extensively on the latest research in rural geography, this study explores the diverse meanings that have been attached to the rural, examines how ideas of the rural have been produced and reproduced, and investigates the influence of different ideas in shaping the social and economic structure of rural localities and the everyday lives of people who live in rural areas (Woods, 2007, 2011).

Considering these backgrounds above, the thesis outlines the main concerns of a multiple and mixed method and an integrated and multi-scale analyse (see Chapter 3). It will pay particular attention to participant observation at the grassroots level, applying results from place- and community-based methods to address technical field practice by rural people, state, and different spatial actors, to inform policy and practice. This mix of methods in hybrid research is embodied in the work of rural researchers (Morris and Evans, 2004; Rigg, 2006; Parnwell, 2007; Price and Evans, 2009; Cheshire and Woods, 2013). The study will, therefore, offer insights for advancing rural resilience through an analysis of rural restructuring related to the current global changes ‘on the ground’. It attempts to develop a connection between rural change, farming resilience and broader rural studies in the context of the global (and metropolitan) countryside.

Chapter 3. Research design and methodology

3.1 Introduction

In Chapter 2, current debates relating to the concepts of rural change, farming resilience, and globalisation were analysed. Throughout the analysis of published literature, there was scant evidence of studies addressing rural change and farming resilience in the context of the global countryside based on the concepts identified by this research. The purpose of this chapter is to describe the methodological approach applied to this research. Good research design is fundamental to articulating the theoretical connections of research objectives and is a fundamental tenet of good research incorporating both inductive and deductive methods (Valentine, 2001; Clifford and Valentine, 2004; Flowerdew and Martin, 2005).

During the past 20 years or so, qualitative methods have gained popularity in human geography as part of attempts to research everyday life and practice. Deconstructing the more nuanced findings and meanings from data gathered through interviews and textual analysis often forms the heart of this work. As a result, human geographers have utilised ethnographic methods combined with interviews and other methods to learn more about the lived experiences of people on the ground in particular places.

Chapter 2 highlighted that a recurrent theme in rural studies has been the significance of globalisation processes as drivers of rural change. Therefore, new directions in rural geography have called for research that examines the impact of globalisation on everyday life (Woods, 2007, 2011, 2012). Using qualitative methods, rural studies of the effects of globalisation have provided new theoretical frameworks and insights into the rural domain through in-depth studies, bottom-up models, and multidimensional approaches. The aim of this research is to analyse rural change and farming resilience in the era of globalisation in the metropolitan countryside of Rio de Janeiro.

This chapter begins by reviewing the research design and approach, followed by the case study design and its approach. The mixed methods design is then considered for the case studies. Next, the limitations of this research are considered followed by a discussion on reflexivity and positionality and finally, ethical considerations are highlighted.

The aim of this chapter is twofold. First, it will provide an analytical framework based on research methods in human geography and how these may help analyse farming resilience at the local level in the era of globalisation (Section 3.2) in the metropolitan countryside of Rio de Janeiro (Section 3.3), investigating the viability and the complexity of farming systems and rural landscapes in this study area. Second, it will discuss the methods used in the study, highlighting the complexity of interactions of different methods that together provide insights into and understanding of resilience in a rural and global context.

To initiate development of the research framework, Section 3.3 sets out the rationale for using case study approach (Yin, 1993; 1994; Kitchin and Tate, 2000). Section 3.3 also explains the basis for choosing the Eastern Rio Metropolis to explore rural change and resilience in the face of globalisation. Section 3.4 provides context to the methodology as part of an on-going tradition of human geography research (Cloke *et al.*, 1991; Valentine, 2001; Hoggart *et al.*, 2002; Clifford and Valentine, 2004; Panelli, 2004; Flowerdew and Martin, 2005), describing the data collection techniques used, which include document analysis and in-depth interviews with key stakeholders. Section 3.4 also explains the data analysis, and Section 3.5 explores issues of researcher positionality and reflexivity. Section 3.6 will provide concluding remarks.

3.2 Methods in Human Geography

Since the dominance of spatial science in the 1960s, human geography has taken a strongly philosophical turn as human geographers have sought new approaches and methods to their research and towards the end of the 1990s, there was a growing interest in multimethod research in human geography. As Cloke *et al.* (1991), Flowerdew and Martin (2005) and McKendrick (2009) emphasised, multimethod research describes the application of more than one method to engage a research question. However, this deceptively simple description belies a wide range of approaches to research.

Although fading from the fore in the methodological debate, multimethod research continues to be widely practised by human geographers. Indeed, ‘multimethod research is not uncommon in geography and should be considered as one of the defining features of the regional geography paradigm that prevailed in the second-half of the nineteenth and the first-half of the twentieth century’ (McKendrick, 2009, p. 128).

As McKendrick (2009) highlighted, multimethod research is a generic term that encompasses a wide range of research strategies: it may be used over the course of a research project to examine different facets of a problem, and it may breach the qualitative/quantitative divide or be practised within each camp. Multimethod research fulfils a number of research objectives, is consistent with traditional models of scholarship, offers a model of research which destabilises methodological dualism, and, perhaps most importantly of all, provides the means to improve the effectiveness with which these issues are addressed (Philip, 1998; Hoggart *et al.*, 2002).

The diversity of methods stems from the different philosophical perspectives geographers adopt. However, these cannot be seen as discrete and mutually exclusive positions. Rather, human geographers reflect the interconnections and cumulative influence of different approaches. Geographers are influenced by existing research and knowledge and engage with, challenge and extend different perspectives. Therefore, contemporary social geographers reflect the theoretical stimulation that has resulted from debates and engagements within and across different schools of thought. Social geography continues to value structured forms of inquiry, but also now combines an increased recognition of the need to reflect on the position and politics shaping the purpose and practice of social geography (Valentine, 2001; Hoggart *et al.*, 2002; Pain and Francis, 2003; Clifford and Valentine, 2004; Pain, 2004, 2006; Panelli, 2004).

Hoggart *et al.* (2002) argued that, methodologically, the cultural turn has involved an embrace of various qualitative methods, such as discourse analysis and semiotics, in-depth interviewing, and ethnography. Politically, cultural turn has been associated with the development of cultural, feminist and post-colonial geographies that seek to give 'voice' to the different understandings and perspectives of marginalised 'others' (Philo, 1992). 'Conceptually, the cultural turn has been fuelled by an ontological understanding of the world as meaningful and therefore text like, in the sense that its meanings must always be interpreted' (Hoggart *et al.*, 2002, p. 22). They also emphasised that an important element in making ethnography more accessible to both practitioners and outsiders (e.g. funding agencies) is a more open and explicit discussion of how ethnographers come to know what they know (Johnson, 1990). Hoggart *et al.* (2002, p. 251) argued 'as part of the growing awareness that research processes do not merely describe social life but construct a particular 'reality', there has been considerable interest in the relationship between researchers and their research'.

As Chapter 2 discussed, geographers interested in rural issues have been influenced by different theories and discourses, including behaviourism, systems analysis, political economy, and post-structuralism (Cloke, 1997; Little, 1999; Marsden, 1998; Whatmore, 1999; Cloke *et.al*, 2006; Halfacree, 2012). A recurrent theme has been the significance of diverse globalisation processes as drivers of rural change. As a result, rural scholars have called for research that examines the impact of globalisation on everyday life (Woods, 2007, 2012). Approaches used to investigate these issues include in-depth studies, bottom-up models, and multidimensional approaches.

Woods (2005, 2011) particularly demonstrated the challenges and strategies geographers used when faced with questions of power and politics associated with globalisation. While recognising established theories, they must also try out new perspectives in both conceptual and empirical studies. For instance, he notes that his early work had been a reaction to structuralist approaches to power in urban geography and the political economy analyses in rural studies that explained power relations in terms of class. Using a discursive approach to read the local geographies of power in the rural, Woods's (1998) example of changing power structures showed how different narratives of rurality were linked to different interest groups who led local government over the twentieth century.

A multidimensional research agenda that emphasises the importance of place-based research for rural studies and beyond has since emerged. Woods (2007) highlighted localised resistance to globalisation processes in both the Global North and the Global South has become a feature of contestations over the meaning and use of rural space and, as such, a significant focus for research concerned the relational processes and actors involved in its everyday reproduction. As a result, rural researchers have begun to investigate the cumulative impact of different manifestations of globalisation on specific rural localities and the responses of rural residents, asking questions about precisely how rural localities are being remade (Stahler-Sholk *et al.*, 2007; Aguayo, 2008; Caldeira, 2008; Jones *et al.*, 2018; Woods, 2018).

3.3 Case study

3.3.1 Introduction

A case study has been defined as the intensive study of a single research unit with an aim to generalise across a larger set of research units and that each unit is spatially bound (Gerring, 2004). Case studies thus allow a useful construct to capture real life events and processes. This research investigates the research questions in an inferred and explanatory way, applying ‘how’ and ‘why’ orientated questions to the phenomena being observed. This approach favours case studies over experimentation approaches (Yin, 1994) with a view to a non-reductionist, holistic approach retaining complexity and contextual richness.

3.3.2 Using case study approach to research rural change and farming resilience in globalisation

The case study approach in human geography is useful in research, particularly when an in-depth investigation is needed. The study of a single place, a particular group, or a specific issue in one location is helpful in narrowing down research topics. This approach tends to be selective, with an emphasis on one or two issues that are fundamental to understanding larger research questions. ‘Case studies are most appropriate when a researcher wishes to utilise a set of mixed methods of data collection and analysis in order to bring out the viewpoints of multiple participants in the study’ (Hardwick, 2009, p. 441). At least five different types of case studies have been discussed in the geography and social science literature: intrinsic, collective, explanatory, descriptive, and exploratory. In each of these types, there may be single-case or multiple-case approaches used.

Hardwick (2009) argued that particular attention must be paid to considering how best to test for reliability and validity when assembling the methods used to conduct case study research. ‘One of the best ways to accomplish this is to use multiple sources of evidence including the use of such approaches to data gathering as interviews, field observation, textual analysis, participant observation, analysis of government and other statistical records, and spatial analysis’ (Hardwick, 2009, p. 442). As a result, case study research most often involves a multimethod approach that is well grounded in data triangulation (see Section 3.4.2). This approach helps confirm the validity of findings on the particular

case study and may employ an overlapping set of both qualitative and quantitative methods.

The use of the case study approach in research has also been criticised. Hardwick (2009) argued that the reasons for this are twofold. First, case study research has been criticised for its unscientific nature (findings cannot be replicated) and reliance on over-generalizable findings. ‘Key to overcoming this first limitation is triangulating a rigorous set of mixed method approaches [...] maintaining a chain of evidence to argue a case. The second criticism is best mitigated by using the findings from the case study to address and contribute to larger questions, issues, and theories in human geography’ (Hardwick, 2009, p. 444).

The procedural characteristics are grounded by taking into account that there are many variables of interest, multiple sources of evidence and theoretical propositions to guide the collection and analysis of data (Yin, 1994). Case studies based on multiple sources of evidence have proven to be rated higher in overall quality than those that relied on a single information source. Reflecting positively on the validity of the qualitative data provided.

Hardwick (2009) also emphasised that since almost all case studies involve interview methodologies or ethnographic work, a strong argument for their validity is that larger-scale data sets often overlook the significance of individual stories. Case study research, in contrast, has the potential to capture and analyse the lived experiences of people, and understand more about particular places on the ground. In summary, ‘despite criticism related to studies that focus on specific places, groups, or issues, scaling up the findings from small-scale projects to respond to larger research questions makes case study research and teaching critical in helping link local issues to larger global challenges’ (Hardwick, 2009, p. 444).

Globalisation processes are helping to produce a new countryside at the start of the twenty-first century, however, the long-view perspective on the production and reproduction of the rural adopted in this study shows that the influence of global actors on rural localities is nothing new. This study explores the complexity of rural change present in the metropolitan countryside of Rio de Janeiro and contributes to a better understanding of the rural in general and in the context of globalisation, going beyond the view of the rural as composed of inert spaces passively absorbing external interferences.

Against a simplistic view, this thesis argues that the rural should also be seen to possess its own dynamics and resilience which contribute to complex outcomes in which the leadership of local actors can create new forms of spatial ordering and adapt to new scenarios of regional and global change.

One important implication of this approach is that it means agricultural communities do have the agency to affect the outcome of globalisation processes – maybe not to hold them back completely, but at least to divert, modify and manipulate them. Understanding place-specific ‘relations to the global’ requires paying attention to the agency of local actors, whilst also examining the broader economic and political relations – both historical and contemporary – which locate places within wider networks (Heley and Jones, 2012).

Deciding upon case studies was an important part of the learning process. Before selecting sites, I wanted to investigate the visions, dilemmas and entanglements of the contested countryside and farming resilience in a metropolitan context. However, I was unsure how case studies would open up new lines of enquiry or offer a means to identify critical research gaps. After conducting desk-based research, it was clear that there was no one ‘critical case’ that could stand for all cases of rural change and farming resilience in global era. As Chapter 2 demonstrated, rural practices are highly diverse in the context of globalisation, especially at the rural-urban interface. Therefore, I decided to choose three case studies which enabled a certain amount of analytical generalisation (Curtis *et al.*, 2000) by providing gentle points of comparison.

Lastly, any sustainable multifunctional space is best approached from a multi- and nested-scale perspective in terms of analysis and facilitation because no single scale is sufficient for comprehensive analysis or facilitating processes. It should be recognised that cross-scale processes and interactions are as important as scale. Case studies are not closed systems, but subject to external influences that also need to be considered in a case study approach. Therefore, going beyond the vertical and horizontal interactions across scales, to ensuring rural change and farming resilience are nested to global-local policy frameworks can be critical for success in the (global) resilient countryside approaches.

As a result, this study uses a 3-level case study approach, ranging from the national (Brazil; Level 1), regional (the Eastern Rio de Janeiro Metropolis; Level 2), and three

case study municipalities within that region for more in-depth study (Level 3). The following will outline each case study levels in more detail.

3.3.3 Case study Level 1: Brazil, a transition economy as a case study

As Chapter 4 will outline in detail the recent processes of rural change in Brazil, the aim of this section is to explain briefly and to justify the selection of Brazil as a case study country (Level 1), suggesting that Brazil reflects the diversity and the complexity of a transition economy in the context of globalisation. The research question, thus, relates to how rural areas and farming communities in emerging economies such as Brazil have been affected by socio-economic, political and environmental changes in this country over the past few decades.

In the contemporary world, the rising power and current crisis of Brazil have aroused increasing attention. This study situates the Brazilian case within the international context of transition economies to shed light on broader debates about resilience and the global economy. The Brazilian economy is the world's ninth largest economy by nominal GDP and eighth largest by purchasing power parity (International Monetary Fund, 2019). The Brazilian economy is characterised by a mixed economy that relies on import substitution to achieve economic growth (Becker and Egler, 1992; Cohn, 2012). As of late 2010, Brazil's economy is the largest in Latin America and the second largest in the Americas. From 2000 to 2012, Brazil was one of the fastest-growing major economies in the world, with an average annual GDP growth rate of over 5%, temporarily making Brazil the world's sixth largest economy. However, Brazil's economic growth decelerated in 2013 and the country entered a recession in 2014. In 2017, however, the economy started to recover, with 1% GDP growth in the first quarter (IBGE, 2018). As the economy globalised and agribusiness, industry, and services decentralised away from metropolitan areas, profound changes occurred in its rural peripheries.

Brazilian rural development cannot be understood as merely consisting of the actions and interventions of the State and international organisations in poor and backward regions. From 1970-1990 the state had an almost exclusive role in rural development. At that time, rural development programmes, such as the 'Integrated Rural Development Policies' programme (PDRI), were seen as the only mechanisms capable of creating and providing feasible solutions to poverty and the underdevelopment of social groups and regions that

were incapable of engaging in the modernisation process (Ellis and Biggs, 2001). ‘This approach, based on modernisation theory, promoted compensatory mechanisms intended to provide alternatives for those farmers and/or rural regions that struggled to modernise their agriculture or faced difficulty in developing other economic activities, such as industry, commerce and services’ (Schneider *et al.*, 2010, p. 226).

Since then, there has been an important change in both the focus and the understanding of rural development. There are several reasons for this. The first is that rural development is no longer seen as being solely about social assistance or pro-poor policies and marginalised regions. Secondly, rural development initiatives now seek to give local rural actors an active role in the design, planning, implementation and evaluation of policies. The mandate for sustainable development provides a third incentive. Since the environmental critiques of agricultural modernisation gained strength in the 1980s, many social organisations and even state-run initiatives started to promote an ‘alternative’ agriculture (Schmitt, 2009), which later translated into organic farming and the agro-ecology movement. The latter has now become the strategic driver in challenging dependency on industrial inputs in family-scale farming (Schneider *et al.*, 2010).

Schneider *et al.* (2010) made some initial exploratory steps in this direction by describing and analysing the new and still largely unknown realities that are emerging from the current rural development process in Brazil. To this end, it is important to note that the last twenty years have seen a number of changes that have structurally altered the characteristics of Brazilian rural areas.

These transformations were accompanied by broader changes in Brazilian civil society (Melo, 2001; Dagnino, 2002; Avritzer, 2009). In the 1980s, the social movement and organisations that had been repressed during the military dictatorship returned to the political scene. In the 1990s civil society changed their focus, from concentrating on protest to having a more proactive character. They began to be active in several areas of social life, assuming roles that were not provided by the state and started to respond to the practical needs. In addition, these new collective actors also gained a role, with some degree of control over the actions of the state, and began to effectively participate in the management and governance of public policy (Schneider *et al.*, 2010).

Another important change was the incorporation of the notions of sustainability and environment within Brazilian political discourse. The United Nations Conference on Environment and Development in Rio de Janeiro (1992) mobilised institutions, the state and intellectuals, which had profound and long-lasting repercussions. Although these events did not lead to as many concrete changes in Brazil as might have been hoped for (the implementation of Agenda 21 is one possible notable exception), from the 1990s onwards the Brazilian State began to create different mechanisms and devices to deal with environmental issues. Many of these involved public regulations and control systems related to economic activities (e.g. land use, water management, and seed bank for conservation of genetic diversity). At the same time the discourses about sustainable development started to impact upon Brazil's political and intellectual agendas (Alonso and Maciel, 2010; Hochstetler and Viola, 2012; Peña, 2016).

On the other hand, the Brazilian rural studies literature is still mainly dominated by agricultural economies and analysis of agricultural policies, such as institutional change, agricultural technological development, rural-urban migration, which emphasise the empirical evidence of how structural factors improve agricultural production (e.g. Delgado, 2012; Ioris, 2012). The globalisation of the agri-food sector has also been extensively documented (Goodman and Watts, 1997; McMichael, 1994; van der Ploeg, 2006). Studies have detailed the multiplication, stretching and reconfiguration of 'global commodity chains' involving the transnational mobility of agricultural commodities and the enrolment of producers in transnational relations (Hendrickson and Heffernan, 2002; Wrigley and Lowe, 2007).

Brazilian agribusiness seems to thrive on a peculiar combination of tradition and modernity, and its apparent success attempts to temporarily placate the structural contradictions of capitalist agriculture while tensions and reactions become increasingly evident (Ioris, 2016). However, the vast majority of farms in Brazil have less than 20 hectares of land. This small-scale agriculture accounts for up to 65 per cent (3,273,067 farms) of some of the country's staple food production, employs the majority of the farm labour force and is responsible for one third of agricultural income (Census of Agriculture IBGE, 2017).

Although Brazil has never witnessed a widespread agrarian reform that tackled the great inequalities in land and income distribution in rural areas, most rural holdings in the

country are composed of family forms of production. These are designated as colonists, squatters, partners, settlers, peasants, and farmers. Since the mid-1990s, these ‘family farmers’ – an expression which includes these different forms of production for purposes of public policy formulation and for analysis (Schneider and Niederle, 2008) – have become an increasingly active social force, competing for public resources and social legitimacy with the so-called ‘agribusinesses’ (Silva, 2009). Medeiros (2001) and Martins (2002) pointed out that besides its economic importance, family-based agriculture’s social legitimacy and capacity for political action has significantly increased. Rural organisations and associated social movements have gained prominence on the national political scene last decades, thus contributing in a decisive way to the emergence of a fruitful debate on rural development in Brazil.

However, through a conservative turn in 2017, neoliberal and right-wing political groups have governed Brazil and agricultural policies have usually focused on making agribusiness-farming systems more robust against shocks in the short term. For those reasons, a broader view of resilience is needed to ensure a sustainable small-scale agricultural sector in Brazil, which can develop farmer capacities, adapt farming systems to changing circumstances and transform their agricultural models in order to maintain long-term supply of food and public goods. This research highlights patterns of the resilience of agricultural land use within the tensile relationship between urban, industrial and global forces on the viability of farming systems and rural landscapes in the metropolitan context of a transition economy such as Brazil.

The reasons why Brazil forms a useful Level 1 case study for this thesis are:

- The role the spatiality of agriculture plays in the historical construction of the social and physical landscape in Brazil. In opposing ways, the first Green Revolution, and the agrarian social movement’s more recent agro-ecological Green Revolution are found to structure farming knowledge and spatial imaginaries.
- Global processes produce differences in farming systems and multifunctional agriculture in Brazil. Variation also occurs within regions, exemplified by rural-urban complexity across the country. Brazil is facing multiple processes of change that affect the rural in many ways: demographic evolutions, migration flows, renewed urban-rural relations,

the rise and the fall of alternative food networks, the changing power of constituencies of the rural, changing patterns of land use and valorisations of natural resources, together with rapid technological developments. These change processes are embedded in a package of often-interrelated meta-trends (such as climate change and global markets) that position rural spaces in broader dynamics and result in uneven processes of change.

- These uneven processes of rural change are interconnected and multi-level, involving multiple actors and governance approaches. The modernisation of agriculture in Brazil has brought the idea of productivity associated with new techniques based on scientific knowledge, interests of the State and the accumulation of capital. Knowledge about agriculture is no longer only controlled by those who practice it directly but is also legitimised by external institutions. Today one question is how to approach the knowledge and practices according to the local characteristics and needs. Traditional knowledge has been juxtaposed with modernising tendencies in rural areas and has resisted the process of modernisation in the last decades. The result is the hybrid knowledge that to be understood needs to be analysed at different scales, and the recognition of local processes in a global era is fundamental.

3.3.4 Case study Level 2: The Eastern of Rio de Janeiro Metropolis

The rural periphery of Rio de Janeiro Metropolis has a long history of producing food for the urban market. In the early 1900s, as Rio City grew, farm production expanded, mainly with vegetables, table fruit, sweet manioc and small animals (see Plates 3.1 and 3.2). Growth of these activities was promoted by federal policies adopted in the 1940s and 1950s to create a green agricultural belt in order to feed the federal capital (which was Rio de Janeiro at that time). Policies included agrarian reform to benefit small farmers who produce for the domestic market. Two immigrant groups also were important for the rise of agriculture in the metropolitan countryside of Rio de Janeiro. Portuguese immigrants (Galvão, 1959) and several of their descendants are still farmers today. Interestingly, Japanese farmers were ceded land in agrarian reform projects in the 1950s and 1960s as part of international agreements between Brazil and Japan (Corrêa, 1962) and some of their descendants still grow vegetables, sweet manioc and fruits.

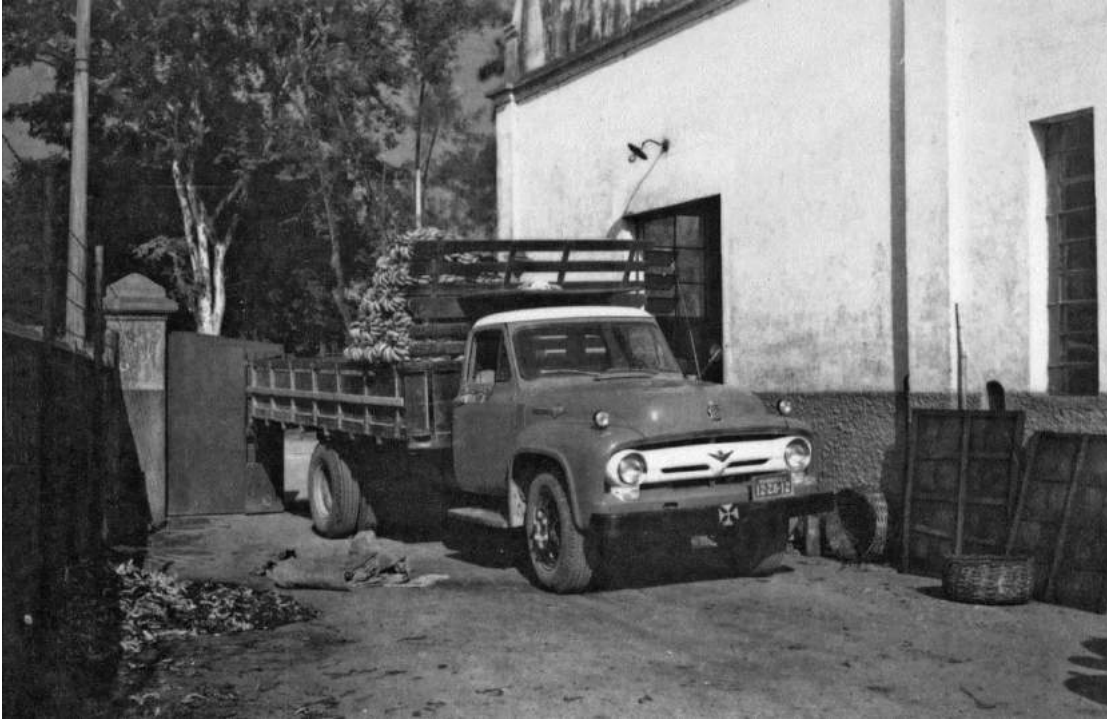


Plate 3.1. Unloading banana and guava from the municipality of Cachoeiras de Macacu, Rio de Janeiro in 1958. (Source: Guerra and Jablonsky, 1958)



Plate 3.2. Production of pineapple in Itaboraí, Rio de Janeiro, in 1958. (Source: Guerra and Jablonsky, 1958)

The Rio de Janeiro Metropolitan Region extends in an arc around Guanabara Bay connecting two major cities, Rio de Janeiro and Niterói (see Figure 3.1). Urban pressure has always been more intense on the Rio de Janeiro fringe, the core city of the metropolitan region, while Niterói grew at a slower pace. A first surge of urban expansion of Niterói occurred in the 1970s with the construction of the Rio de Janeiro-Niterói bridge across Guanabara Bay, which connected the two cities. Greater change took place inland in the 2000s when the COMPERJ petrochemical complex (see Plate 3.3) provoked rapid urban expansion. If only new industry and housing development are considered, it would appear at first sight that trends are at work in the Eastern metro area that mean that farming is destined to be eliminated. However, as Chapters 4-9 will highlight, farming communities in this area are resisting but they face new challenges which demand adaptations.

From the 1970s the built-up area of Rio de Janeiro expanded outward and the metro population increased from 10.4m inhabitants in 1991 to 12.3m in 2016 (IBGE, 1991, 2010, 2016). New industrial and petroleum complexes and port facilities were installed in the peri-metropolitan area but, according to IPEA (2012), the core still accounts for 53% of the metro population and 69% of gross internal product. Pressured by urban expansion and globalisation rural activities have diminished in the metro region but have not disappeared. This brings issues concerning resilience and strategies for adaptation in a context of intense rural-urban land use competition.

Increasing competition from industrial, residential and environmental functions are shown to present both opportunity and conflict for rural activities and so create a mosaic of diversified land use in both inner and outer metropolitan space. Some changes do not necessarily cause agricultural decline, but instead can induce rural development and adaptation where rural diversity responds to new demands of contemporary Brazilian society in the context of globalisation. Bicalho and Machado (2013) and Machado (2013) highlighted the resilience of rural space whereby agricultural community stakeholders have adapted to new situations that arose in Greater Rio de Janeiro and its countryside over years. New rural-urban interaction contributes to complex outcomes in which local actors create new forms of spatial ordering and so adapt to new scenarios of regional and global change.

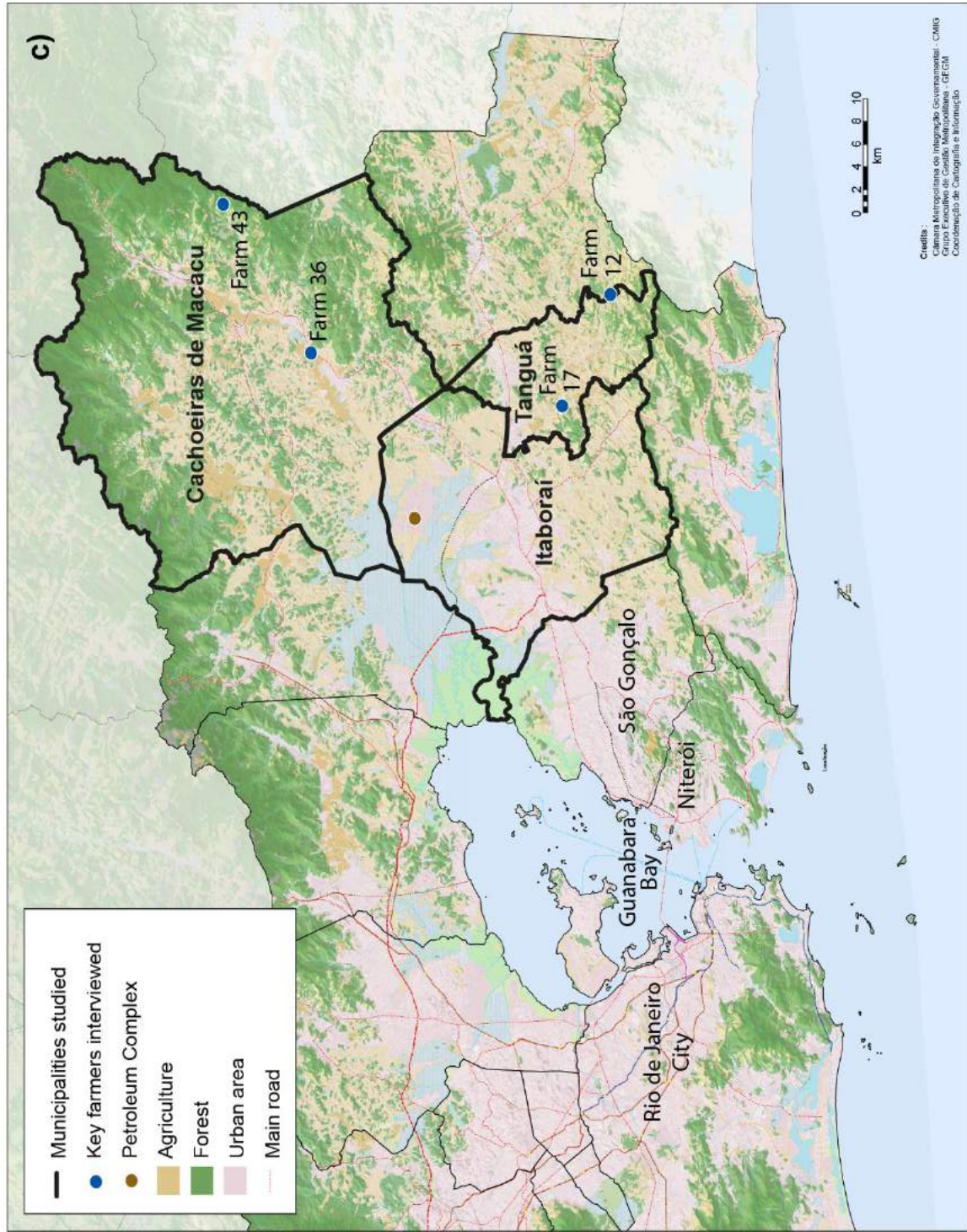


Figure 3.1 a) Brazil, b) Rio de Janeiro state, c) Rio de Janeiro City and study area in the Eastern of Rio de Janeiro Metropolitan Region



Plate 3.3. Land use impact caused by the COMPERJ petrochemical complex. (Source: Caderno Metropolitano, 2017)

The choice for Greater Rio's rural periphery as a case study is partly linked to research conducted in the area prior to this PhD as this provides an important baseline to analyse trends and developments in recent years. In recent research conducted for my undergraduate and Masters studies, a number of small and medium-sized farmers in the outer zone of Rio de Janeiro Metropolitan Area were found to be adapting well to urban encroachment by adopting more lucrative activities, investing in new methods and forms of marketing produce. The farmers have been able to resist conversion by elaborating flexible strategies of capitalisation adapted to their financial resources (Machado, 2013).

As a result, the present study used a case study area in the Eastern Rio Metropolis for empirical data collection. To summarise, the Eastern of Rio de Janeiro Metropolitan Region was selected as the Level 2 case study region for the following reasons:

- Rural localities and farmers have been affected by new industrial and petrochemical complex, the phenomenon of 'metropolisation', oil industry exploration and their associated infrastructure. Before these processes of urban expansion and industrialisation by oil-petrol, the municipalities in the outer

metropolitan zone and beyond had an agricultural-based economy with only basic services available.

- Rural localities and farmers have been affected by policies for protected areas management and the commodification of nature. As the Brazilian Atlantic Forest is the most threatened biome in the country, conflict exists between agriculture and environmental protection to the point of making it difficult to use agroforestry systems.
- Farmers are relevant actors in the investigation because they are mostly resilient. Several farms are transferred from one generation to another, sometimes for several decades. As such, farmers resist and survive despite economic and political, technological and social changes. Some contacts had already been established during my Master's thesis research (Machado, 2013). The return made it possible to deepen the observation of changes that have occurred in the last years and the adaptability of agriculture in the process of rural-urban interaction.
- Agriculture has become juxtaposed with other functions and interests, which has resulted in a mosaic of diversified land use in both inner and outer metropolitan space. Depending on the relative distance from the built-up metropolitan core and local agrarian history, urban and peri-urban farmers actively contest their permanence in a multifunctional countryside (Bicalho and Machado, 2013).

These factors suggest a rural area undergoing a process of change from its incorporation into metropolitan dynamics. It is a geographical space that reflects challenges of sustainability and multifunctionality in a global era and, therefore, makes it the ideal case study region (Level 2).

3.3.5 Case study Level 3: Farming communities, personal experiences, and networks in the municipalities of Cachoeiras de Macacu, Itaboraí and Tanguá

Most data for this study were collected at case study Level 3 in specific municipalities located within the Eastern of Rio de Janeiro Metropolis. In metropolitan regions, agriculture presents multiple dynamics resulting from the influence of the city and the internal conditions and characteristics of the farming systems. Urban activities exert constant pressure on their expansion movement over rural areas but at the same time demand certain products for their supply, which are often provided by these same areas.

The growth of cities and their consequent expansion are not able to convert all agricultural areas to urban use. Previous research taken by this author suggests that agriculture resists the advance of urbanisation and is part of a dynamic process of socio-spatial change, generated by a situation of permanent conflict of interests and disputes of areas by urban and rural uses, typical in agricultural areas of the metropolitan countryside (e.g. Machado, 2013).

At the same time, localised resistance to globalisation processes, in both the Global North and the Global South, has become a prominent feature of contestations over the meaning and the use of rural space. As such, a significant focus for research is the relational entanglement of networks, processes and actors involved in the everyday reproduction of rural space (Heley and Jones, 2012). It is these processes of globalisation, working through farming community resilience and diverse outcomes, that I investigated in previous research.

During the past 12 years, and especially in this PhD thesis, I have investigated the long-term viability of farming systems and rural landscapes in the Rio de Janeiro Metropolitan Region. Using a multidimensional approach to analyse agriculture practised at the rural-urban interface, and to analyse the historical agrarian context of different parts of the metropolitan region, I have argued that increasing competition from industrial, residential and environmental functions present both opportunity and conflict for rural activities within mosaics of diversified land use in inner and outer metropolitan spaces (Bicalho and Machado, 2013; Machado, 2013). Some changes do not necessarily cause agricultural decline but can instead induce rural development and adaptation through the diversification and intensification of farm production in response to new metropolitan and international demand. Such adaptive processes of farmers have improved some farming resilience but are also problematized by tensions in urban land-use policy that expose farming to new situations in Greater Rio de Janeiro (e.g. Machado, 2013).

This present thesis is, therefore, the result of a long-term learning process that began in 2007 when I was in the second year of the undergraduate degree in Geography at the Federal University of Rio de Janeiro. Since my first academic investigation, I have researched spatial changes of Rio's metropolitan region at the rural-urban interface, focusing on the complexity of agriculture in the context of rural change and urbanisation (Machado, 2010; Machado 2013; Machado, 2017). Plate 3.4 is one of my first fieldwork

research photographs. The research entitled ‘Urban agriculture in the city of Rio de Janeiro: horticulture in the transmission lines of Light Services of Electricity S/A’ (Machado, 2008) analysed the socio-economic characteristics of agriculture in areas of high voltage of electric energy in the inner zone of the city from Rio de Janeiro. Facing high pressure for urban land use, one strategy used by the company was to provide the area under the pylons to a group of urban farmers to grow vegetables. In that way, several issues were examined: forms, functions, and interaction of urban agriculture within a dense urban space; the functioning of marketing flows and the strategic role of this farming system as a form of occupation and resistance to advances in the urban.



Plate 3.4. Urban agriculture in the city of Rio de Janeiro: horticulture in the transmission lines of Light Services of Electricity S/A. (Source: Machado, 2008)

The horticulture developed in this urban space was territorially strategic. Carried out as a territorial approach of the company, its development was driven by the interests of Light Services of Electricity S/A and a group of Rio's residents who presented themselves as farmers and became partners of the company's security strategies. For decades, this was the approach used by the electricity company. However, agriculture had been failing and struggling to resist the advance of urbanisation and irregular occupations. The company, along with the public authority (Pereira Passos Institute), created new strategies more resistant than agriculture, generating new forms and functions for this space, for example in the urban project that involves partnerships and integration of several sectors of the

City Hall, Light Electricity Services, Supervia S.A. and Commercial Association of Madureira. The project created the Madureira Park as part of the urban restructuring of the central area of the neighbourhood, favouring the residential and commercial dynamism in the region. Part of the agricultural area that was investigated in the research in 2007 became an urban park in Madureira, a dense and central neighbourhood of the Northern Zone of Rio de Janeiro.

For my undergraduate dissertation (Machado, 2009), I sought to understand degrees of intensity of urban expansion in a rural area near the city of Rio de Janeiro that was converted into a peri-urban space, presenting the current conditions of the agrarian space in the municipality of Nova Iguaçu. Until the land subdivision process, the municipality presented rural characteristics and a social structure based on a citrus farming system. After the outbreak of the Second World War exports halted, leading orange production into a sharp decline. This theme was already discussed by Urban Geography studies from 1960 onwards. These studies had a perspective of the end of citrus farming and the beginning of intensive actions of agents of urban land use through the fragmenting of lands in Nova Iguaçu. I questioned to what extent there was such a rapid decline of the agricultural activity of the municipality, in order to lead its conversion from rural to urban use. The methodology was based on primary and secondary data, as well as a theoretical discussion about peri-urban and rural spaces, analysing the complexity of farming at the rural-urban interface. Agriculture resists the advance of urbanisation and is part of a dynamic process of continuous socio-spatial change generated by permanent conflicts of interests and disputes of areas by urban and rural uses, a typical spatial process in agricultural areas of metropolitan peripheries. In this sense, the study understood the dynamics of the peri-urban agrarian space, in order to identify its characteristics, limitations and recent trends.

The Masters' thesis research investigated the dynamics of agriculture within restructuring processes affecting rural spaces in Rio de Janeiro countryside regions, exploring the municipality of Cachoeiras de Macacu as a case study area (Machado, 2013). The spatial configuration of the Metropolis of Rio de Janeiro was presented as a 'double movement' involving the consolidation of metropolitan space and changes in its periphery, where urbanisation increases urban-rural interaction and conflicts over land use. The rural periphery, previously marginal to metropolitan dynamics, has been incorporated into peripheral urbanisation that has exerted profound effects on rural spaces. This research

experience, together with intricate knowledge of the area and its problems/pressures, was a key rationale for selecting specific municipalities within Rio Metropolis's Eastern.

For this PhD I planned to return to my MSc case study site as there were areas left unexplored that pointed towards further research opportunities (see Plate 3.5). On the other hand, I also decided to explore more the metropolitan context of the East Rio rural periphery for understanding rural change and farming resilience in a regional context rather than just in a single municipality. For that reason, I spent the first weeks of my PhD fieldwork research in Rio de Janeiro City, exploring libraries at public universities and archives. I also collected and analysed secondary resources from official institutions that held geographical and statistical data. In parallel, I travelled from Rio de Janeiro to the east side of Guanabara Bay several times, using public transport. On these journeys, I observed the dynamics of places and landscapes. I started to notice particularities in the fruit farming systems in the metropolitan countryside of Rio de Janeiro. I realised that small-scale fruit farming systems suggested signs of resilience in the context of conflict of land use with some regional particularities connected to the context of rural-urban interaction. The price of fruit is higher than for vegetables, and fruits from the rural periphery of Rio are appreciated by regional markets for their quality in comparison with production from more productivist areas in Brazil. In addition, fruits from Rio are consumed fresh, justifying the short distance between Rio City and its rural peripheries (see Plates 3.6 and 3.7).



Plate 3.5. I was moving back after a couple of years away from this area - old and new perceptions, offering me the chance to analyse processes of rural change in a longitudinal perspective. This photograph was taken in December 2012, when I did a fieldwork research for the Master's degree (Machado, 2013). The farmer offered me a long interview that formed the basis for many of the arguments in the study. The contact extended beyond the Master's research, and there were other visits to his farm, including during the fieldwork in 2017 for this doctoral thesis. The long-term perspective of the farmers' trajectories and the strategies adopted are fundamental to understand processes of learning, knowledge building, networks, and social organisation. (Source: Machado, 2013)

Another driving force was a curiosity for understanding the difference between vegetables and fruit trees in the context of land-use conflict in the metropolitan environment. A fruit tree is a permanent plant, which offers a fixed condition on soil and develops deep roots over time, whereas a vegetable is a temporary crop which is seasonally variable. Fruit trees are semi-permanent elements on the landscapes which is included in the analysis on agricultural territories in the context of conflict of land use in this thesis. In contrast to ephemeral horticulture crops, fruit trees can be interpreted as coping strategies of farmers to raise resilience and adapt to climate change in a context of conflicts over land use. For these reasons, a key focus of the analysis in Chapter 5-8 will be on fruit tree farmers and their resilience strategies.

This research into long-term agrarian history involved farming communities that were already part of my Master's thesis. I was able to include into this PhD research guava and banana farming systems in Cachoeiras de Macacu (examples also cited in my previous

research) and citrus farming in Itaboraí and Tanguá. This choice links studies developed at different times of my academic education with a longitudinal perspective and gives me an opportunity to consolidate arguments of an academic trajectory on agriculture at rural-urban interface in Greater Rio de Janeiro.



Plate 3.6. In the second week of PhD fieldwork in Rio de Janeiro, I was walking in street markets, observing the diversity of agricultural products, especially the impressive volume of sale and purchase of fresh fruit. (Source: Author, 2017)



Plate 3.7. 'Still life' at rural-urban interface. Guavas, oranges and pineapples are sold on one of the main roads of Itaboraí, Rio de Janeiro. (Source: Author, 2017)

Partly building on this experience and knowledge of the area, the case study Level 3 spatial context on which the farming communities analysis focused and on which this study was based for primary research are the municipalities of Itaboraí (where the petrochemical complex is under construction), Cachoeiras de Macacu and Tanguá (see Figures 3.1 and 3.2). Before the processes of urban expansion and industrialisation induced by oil (see above), these municipalities had an agricultural-based economy with only basic services available. The case study areas are therefore examples of agricultural communities experiencing recent and on-going globalisation influences (see Table 3.1). Communities and organisations consist of more than just people. They are composed of heterogeneous material bodies, including tools and machines, food and water, buildings and furniture. The word Deleuze and Guattari (1987) used to refer to the assembling of heterogeneities is ‘machinic’.

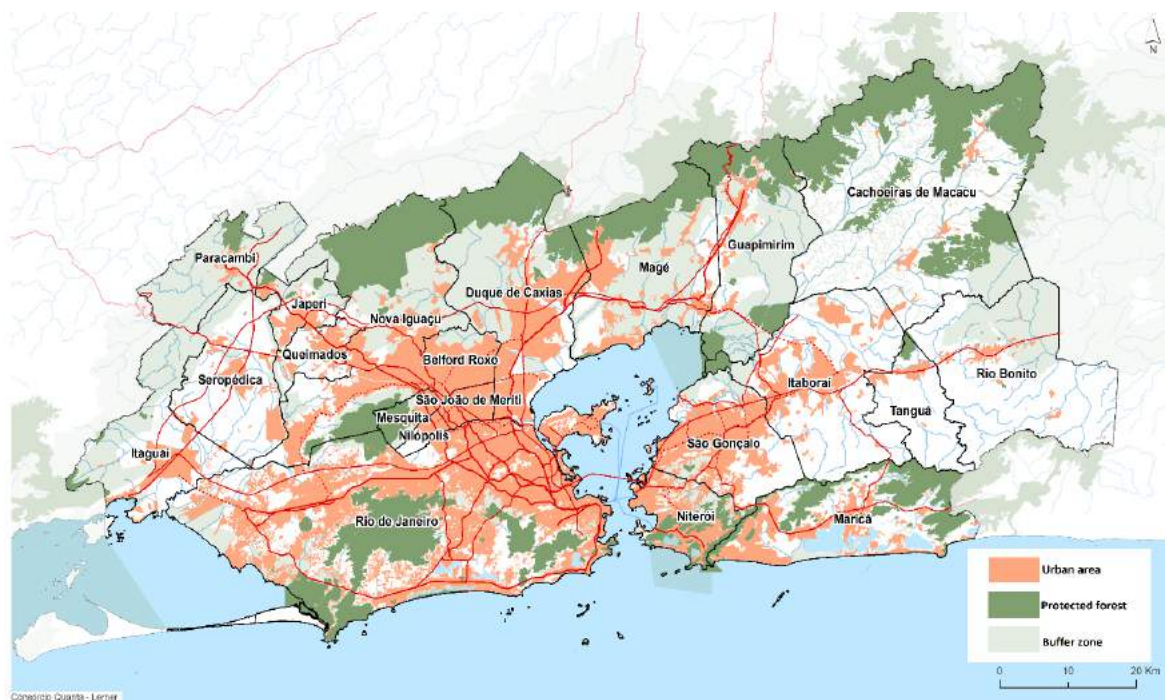


Figure 3.2. The complexity of land use in Greater Rio de Janeiro (urban areas, protected forest and buffer zone) and the location of the Level 3 case study municipalities Itaboraí, Cachoeiras de Macacu and Tanguá on the Eastern side of Guanabara Bay. (Source: Consórcio Quanta-Lerner)

The selected case study Level 3 areas share their challenges of agriculture at local or regional level and they are all shaped by regional and global conditions. Observational methods (see Section 3.4.4) were used to understand and compare the success of small-scale initiatives in contributing to regional development in the context of global challenges. Furthermore, the role of the various stakeholders – including farmers,

agricultural organisations, policymakers, and researchers – differs across the initiatives. A comparison shows the added value of the involvement of these actors in the success of the initiative, identifies common bottlenecks in initiatives and formulates policy recommendations which could enhance the contribution of the initiatives in terms of rural development and resilient rural futures.

It should be noted that the various farmers' associations presented internal diversity, a characteristic that reflects the multidirectional and multidimensional characteristics of contemporary rural space in the metropolitan periphery at the rural-urban interface. After the first few weeks of fieldwork research, following the first meetings with farmers, I began to observe internal tensions even though the farming community had a common goal: to strengthen the rural identity and the development of agriculture in the contemporary context of conflict of land use and the challenges of the rural space integrating into metropolitan dynamics. There were divergent opinions and disputes of leadership with different political positions. The complexity of the farmers' associations in the three case study municipalities became one of the issues to be investigated as it reflected the challenges facing rural communities in the context of uncertainties and instabilities. To capture and understand this diversity of voices within a social group, analysing the multiplicity of opinions and ideas was fundamental to reflect on farming resilience and the pathways of rural development in the context of globalisation.

Table 3.1. Overview of the case study Level 3 and the key knowledge and learning addressed in the context of globalisation. (Source: Author)

Case study Level 3	Case	Key knowledge and learning issues in a global era
Cachoeiras de Macacu Itaboraí/Tanguá	<ul style="list-style-type: none"> - Association of farmers of the rural locality of Faraó (ALAF), Cachoeiras de Macacu. - Guava Farmers' Association of Cachoeiras de Macacu – GOIACAM. - ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá). 	<p>These cases explore farmers' knowledge and learning practices and networks and highlight the importance of informal knowledge and learning among the farmers' associations.</p>
Cachoeiras de Macacu Itaboraí/Tanguá	<ul style="list-style-type: none"> - Association of farmers of the rural locality of Faraó (ALAF), Cachoeiras de Macacu and EMBRAPA (Brazilian Agricultural Research Corporation). - Guava Farmers' Association of Cachoeiras de Macacu – GOIACAM and the Corporation of Technical Assistance and Rural Extension (EMATER-Rio). - ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá, the Corporation of Technical Assistance and Rural Extension (EMATER-Rio) and the local Department of Agriculture. 	<p>The cases analyse the role of collaboration, competition and knowledge-exchange between farmers, research institutions and regional development agencies.</p>
Cachoeiras de Macacu Tanguá	<ul style="list-style-type: none"> - The Association of Organic Farmers of Rio de Janeiro State - ABIO-Rio and Organic farmers of Tanguá and Cachoeiras de Macacu adopting the method of cross monitoring. Participatory Guarantee Systems, operated by a Participatory Body for Conformity Assessment, and Social Control Organisations, operated by local organisations, intended to be used only to sell products according to direct marketing strategies. 	<p>The cases investigate the role of farmer-led networks, informal networks, informal knowledge building and knowledge transfer and the way they are supported (or not) by formal institutions.</p>
Tanguá	<ul style="list-style-type: none"> - The movement of Geographical Indication of Tanguá's Orange organised by the local Department of Agriculture, EMBRAPA, EMATER-Rio, Ministry of Agriculture, and the ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá) and a regional coordinator of SEBRAE (Brazilian Service to Support 	<p>The cases explore whether and how a farmers' associations internal governance structures and relational networks promote the integration of</p>

	Micro and Small Enterprises). An articulated process that involves a number of institutions at different spatial scales.	experimental and expert knowledge, and connect knowledge and learning to action.
Cachoeiras de Macacu Itaboraí/Tanguá	<ul style="list-style-type: none"> - Association of farmers of the rural locality of Faraó (ALAF), Cachoeiras de Macacu and EMBRAPA (Brazilian Agricultural Research Corporation). - ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá, the Corporation of Technical Assistance and Rural Extension (EMATER-Rio) and the Local Department of Agriculture. - Meeting at ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá) organised by the local rural extension company and a speaker from São Paulo State who produces certified seedlings following regulations of the Ministry of Agriculture of Brazil. 	The cases explore the role of agricultural knowledge systems in the metropolitan countryside of Rio de Janeiro, particularly advisory services, in stimulating farm activities at local level in both conventional and alternative ways.

In sum, the reasons why the case study Level 3 farming communities were selected for this thesis enabled the following characteristics to be investigated:

- Farming knowledge is gained over time in the transition towards quality production in the small-scale fruit sector due to the importance of on-farm experimentation in the learning process. The changing nature of agriculture and its links to other rural sectors require the development of mixed knowledge and learning networks that more broadly include both agricultural and non-agricultural stakeholders. It relates the potential of learning and knowledge sharing in improving sustainability and resilience to its embeddedness in the specific social, economic and environmental contexts and its holistic character and dynamics in response to emerging opportunities, uncertainties and risks.
- The process of globalisation and spatial restructuring can both provoke migration of rural social actors to urban-industrial sectors but also increase the resilience of a group that creates strategies - such as diversity in production and market mechanisms, diversity of knowledge, sources of information and communication, diversity in building alliances and in relationships between community members and beyond.
- Historical information about locality, memory, and perceptions about farming changes are critical to understanding a range of information and knowledge. The practice of agriculture involves acquired knowledge, preservation of values or the need to break with existing practice, by innovating. Farmers combine their own experiences and those recognised by the community in the process of sharing ideas. In the context of spatial diversity in the metropolitan countryside of Rio de Janeiro, the framework of incorporation to the Metropolitan Region results in an environment of multiple and hybrid characteristics.

3.4 Methods

3.4.1 Introduction

Having reviewed the overall approach adopted for this study and identified the study area and rationale for its choice, this section identifies and justifies the methods used to collect and analyse data. As mentioned in Section 3.3.2, one advantage of case studies is the ability to utilise different types of data and information resources (cross-checking). The present study used three different data sources to meet the research objectives: secondary sources (e.g. census data, published statistical data, historical records, research data, published papers, newspapers); interviews with rural community stakeholders in the metropolitan countryside of Rio de Janeiro and regional stakeholders; and ethnographic material. Using qualitative methods, rural studies in the era of globalisation have provided wider theoretical frameworks and insights into the rural domain through in-depth studies, bottom-up models and multidimensional approaches (Cloke *et al.*, 2006; Woods, 2011).

The relational perspective on the complexity of farming at the rural-urban interface in the metropolitan countryside of Rio de Janeiro was achieved through interviews with farmers and policymakers as well as participant observations conducted within farmers' communities. The fieldwork was supplemented by secondary data research in public institutions in Rio de Janeiro State and contextual and background information was obtained through supporting web-based research.

My goal was to take into account the opinions and positions of a wide variety of actors to grasp rural change from different viewpoints. This in-depth analysis cannot happen through 'statistical analyses of localities never visited, aggregate quantitative portraits of regions, and drive-through fieldwork' (McCarthy, 2002, p. 1297). Rather, in-depth, nuanced data on social dynamics typically merit extended fieldwork using intensive case studies and ethnographic techniques (McCarthy, 2002; Watts and Peet, 2004; Robbins, 2012; Doolittle, 2015).

This section begins by reviewing the research design and approach explored in the fieldwork. The data collection process enabled an iterative process of in-depth communication and feedback with respondents about specific questions. Reflecting on past experiences, farmers were asked about attributes they identify as crucial to the

adaptation of agriculture. The strategies and examples identified were analysed to assess how farming systems are related to the multiplicity of the process of globalisation in a rural context and the resilience of agriculture in Greater Rio's countryside.

To understand the complex interrelationships between global critical issues and farming resilience, the argument in this research assumed that rural studies should apply multi-method approaches that enable researchers to engage more closely with farmer's life histories, farm trajectories, transitions and development pathways. Another step was to develop an equitable academic partnership with rural communities.

The fieldwork research was carried out over five months in the three Level 3 case study communities highlighted above, which enabled in-depth communication with the interviewees on specific issues of agriculture in the global and regional context of the metropolitan countryside of Rio de Janeiro. During this immersion in the study area, I wrote descriptive and reflective notes, created sketches, and posed questions about everyday geographies in the area. The thesis explored the concept of communication and knowledge as part of the processes of understanding innovation and the resilience capacity of social actors in the framework of rural development in globalisation.

Table 3.2 shows the sequence of methodological steps, linear chronological, interweaving of different methodological stages, and also acknowledges blurred boundaries between methods.

Table 3.2. Methodological stages of this investigation (Source: Author)

Started with my own experience and knowledge about area based on previous research (see Section 3.3.5)
Secondary sources to get a feel for area (see Section 3.4.5)
Travel to area, including initial observation and informal conversations (see Sections 3.4.3 and 3.4.4) and to reconnect with some of the stakeholders interviewed as part of previous research (see Section 3.4.4)
Interviews with higher-level actors and decision-makers (see Section 3.4.3) and some observation (see Section 3.4.4)
Interviews and observation with/at key organisations in 3 case study communities: farmers' associations and local community officers (see Sections 3.4.3 and 3.4.4)
Emerging from knowledge acquired through interviews with associations, selection of individual farmer-based interviews from associations and beyond (see Section 3.4.3), farm-based observations (see Section 3.4.4) and use of additional methods such as photo elicitation (see Section 3.4.6) and/or use of secondary sources provided by farmers (see Section 3.4.5)

3.4.2 General approach: multi-methods; triangulation; cross-checking

With the ‘cultural turn’ in geography, scholars have become more focused on the politics of representation, fieldwork, and the research setting. In human geography, this epistemological shift has been accompanied by a methodological move toward intensive methods at the expense of extensive methods. Warshawsky (2014) suggested that mixed methods that utilise the strengths of both intensive and extensive methods can offset the weakness of each method. Moreover, results from the field suggested that the combination of intensive and extensive methods could produce unique insights only possible from a mixed method approach. ‘The use of mixed methods can help to fill empirical and theoretical gaps, add needed context, incorporate multiple truths, triangulate different sources of data off of each other, and produce the generalizable and the particular’ (Warshawsky, 2014, p. 161). This recursive process of data triangulation can change the direction of research (Bailey *et al.*, 1999; Jiang, 2003; Robbins, 2003).

Triangulation with other data sources is conducted to ensure adequate representation from multiple viewpoints, and a combination of quantitative and qualitative approaches is used to interpret the data. Triangulation refers to the claim that more can be known about a phenomenon when data generated and collected from diverse perspectives are brought together (Moran-Ellis *et al.*, 2006). In this way, methodological triangulation can shed light on different dimensions of a phenomenon, enabling a more detailed and rounded understanding of rich and complex socio-ecological systems (Yin, 1994). Triangulation involves using a variety of methods to collect data as opposed to relying on one single form of evidence as the basis for findings (Longhurst, 2009).

What constitutes the core of ‘triangulation’ is the idea that complementary methods add insight on a research question. Central to this approach is recognition that research is a learning process, whereby uncertainties arising from a lack of correspondence between data sources provide a focus for further investigation – much like grounded theory (Glaser and Strauss, 1967). Triangulation in this framework involves checking and progressive learning, with approximations from single data sources refined through a plural investigative strategy (Chambers, 1994).

When reflecting on new directions for rural studies, Woods (2012) called for a more thoroughgoing reflection on different methodological approaches and their value. As

such, this PhD research contributes to the methodological literature on the need for rural studies to engage with more innovative research methods.

In addition to being a structurally significant part of the agricultural industry, according to Prince and Evans (2009), family farms have provided a point of interest for rural social scientists. In moving beyond the ‘farm survey’ – commonly questionnaire-based – an approach which dominated the discussion of family farming in the 1980s and 1990s, ‘recent agricultural studies have deployed methodological innovations which have sought to get beyond facts to reach the underlying layers of feelings, values and processes embedded in the patriarchal way of life’ (Riley, 2014, p. 237). Research methods have included repeated life histories (Price and Evans, 2009), focus groups (Shortall, 2002), and mobile interviews (Riley, 2010).

The research design is heavily influenced by recent political ecological and cultural studies (see Chapter 2) that demonstrate the utility of ethnographic methods in examining the way in which globalisation processes re-work particular rural places (see Table 3.3). These studies ground understanding of globalisation by focusing on particular localities in which global-local engagements are forged. In this sense, ethnography is a powerful descriptive and explanatory approach that combines deduction and induction through research design. Ethnography does not claim objectivity and statistical representativeness but produces inter-subjective truths through a theoretically sound application and combination of predominantly qualitative research methods.

As Grele (2006) noted, when critics charge that interviewees are not representative of the population at large or any particular segment of it, they raise a false issue and thereby obscure a much deeper problem. Interviewees are selected not because they represent some abstract statistical norm, but because they typify historical processes. According to Hoggart *et al.* (2002, p. 203), ‘an appropriate objective for intensive methods is not to seek representative information, but to gain access to the cultural categories and assumptions according to which one culture construes the world’. ‘In other words, qualitative research does not survey the terrain, it mines it’ (McCracken, 1988, p. 17).

The methods were specifically designed for the aim of this research to explore ‘rural change and farming resilience in a metropolitan context’, including from a relational perspective. Four main methods were used: interviews (see Section 3.4.3), ethnography

and participant observation (see Section 3.4.4), document and secondary data analysis (see Section 3.4.5) and photo elicitation (see Section 3.4.6). Each of these supported different aspects of the research aim, illustrating specific visions, dilemmas, and entanglements. The ‘gathering’ process was an iterative one. I cross-cut different data, working back and forth between my observations and interviews, documents and research material, recordings practices. Each informed the other. For instance, if a specific issue was alluded to in several interviews I would investigate further, either through documents or observation.

Patton (1990) aligns qualitative data with the three dominant forms of qualitative methods. First, the data from interviews comprises direct quotations from informants, outlining matters such as their experiences, feelings, beliefs, and interpretations. Second, data from observations includes the researchers’ thorough descriptions of observable activity. Third, data from textual sources, including quotations and other selections, comes from a diverse array of documents, including letters, diaries, organisational records, official reports, newspaper articles, or government memoranda. These textual sources might also be expanded to include those other forms described previously, such as photographs, movies, or brochures.

Table 3.3. Multi-methods adopted and rural studies dimension (Source: Author, after Clifford, 1988; Emerson *et al.*, 1995; Valentine, 1997; Smith, 1999; Crang and Cook, 2007; Robson, 2011)

Multi-method/Assemblage/Triangulation and Longitudinal (and section where this issue is discussed below)	Definition	Rural studies dimension
3.4.3 Interviews	<p>Interviews are more unstructured or qualitative and take a conversational and fluid form (Valentine, 1997). Qualitative interviews lie between the structured and unstructured forms, and the degree to which interviews are structured relies on the research topics, purposes and so forth (Robson, 2011).</p> <p>Although the interviewer prepares a list of predetermined questions, qualitative interviews tend to unfold in a conversational manner. This offers participants the opportunity to explore issues they feel are significant.</p>	<p>The use of interviews to learn more about the lived experiences of people on the ground in particular rural places. The objective was to identify changes in agriculture in the last decades, at various scales, through qualitative interviews and ethnographic research with farmers and policymakers.</p>
3.4.4 Ethnographic approach and participant observation	<p>Ethnography is a methodological and practice-based approach to understanding and representing how people – together with nonhuman entities, objects, institutions, and environments - create, experience, and understand their worlds (Clifford, 1988; Emerson <i>et al.</i>, 1995; Smith, 1999; Crang and Cook, 2007). Ethnography is time intensive, iterative, and open-ended, and includes observing, listening, reflecting, experiencing, writing, and learning from people, places, situations, institutions, landscapes, and things.</p>	<p>The data collection process enabled an iterative process of in-depth communication and feedback with respondents about specific questions concerning rural change and farming resilience. During this full-time immersion in the study area, I wrote descriptive, reflective and interpretive notes; created sketches and maps and formulated questions about the everyday geographies, emotions, social spaces, and material encounters in the setting being researched. The fieldnotes were later treated as textual objects to be coded, interpreted, and analysed.</p>

	Participant observation is one type of data collection method typically used in qualitative research and ethnography. Its aim is to gain a close and intimate familiarity with a given group of individuals and their practices through an intensive involvement with people in their cultural environment, usually over an extended period of time.	The in-depth survey was conducted with some stakeholders, involving repeated visits and, for some of them, participant observations as I followed farmers and community decision-makers for several days. I did participant observation during farmers' association meetings and in several community meetings organised by activists intending to mobilise members on territorial development matters.
3.4.5 Secondary data and sources	Sources of secondary data for social science include censuses, information collected by government departments, organisational records and data that was originally collected for other purposes.	These data were instrumental in understanding the nature of the farming systems at the rural-urban interface, their contexts and backgrounds.
	A collection of historical documents or records providing information about a place, institution, or group of people.	Historical archives related to the metropolitan countryside of Rio de Janeiro and beyond were collected during the time of fieldwork in Rio de Janeiro, including historical documents concerning fruit farming systems organised by national and regional agencies for rural development. These documents were consulted in public libraries and universities in Rio de Janeiro and during travels that I have done around Europe and the US over recent years.
3.4.6 Photo elicitation	The art, application and practice of creating durable images. Photographs help to spot patterns of landscape change over space and time. Photo-elicitation is a method of interview in sociology	Photographs taken during the period of fieldwork were important in revealing and illustrating global critical issues in the everyday life of the locality, combining the research interests and the challenges of the rural community. The main purpose of

	research that uses visual images to elicit comments.	photo-elicitation interviewing was to record how subjects respond to the images and auto-photos, attributing their social and personal meanings and values in the context of rural change in a global era.
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3.4.3 Interviews

In contrast to questionnaire surveys, interviews are qualitative and take a conversational and more fluid form (Valentine, 1997). Qualitative interviews are among the most commonly used qualitative method in human geography. Interviews lie between the structured and unstructured forms, and the degree to which interviews are structured relies on the research topics, purposes and so forth (Robson, 2011). In-depth interviews are useful for investigating complex behaviours, opinions and emotions, and for collecting a diversity of experiences. 'In-depth, semi-structured interviews make a significant contribution to geographic research especially now that debates about meaning, identity, subjectivity, politics, knowledge, power, and representation are high on many geographers' agendas' (Longhurst, 2009, p. 583).

Although the interviewer prepares predetermined questions, qualitative interviews tend to unfold in a conversational manner. This offers participants the opportunity to explore issues they feel are significant. It involves directing respondents to some degree mainly by talking and listening to people but in ways that are self-conscious, orderly, and partially structured. However, qualitative interviews are more than simply chats. Valentine (1997, 1999) argued that a prominent strength of interviews is that they are more sensitive and people-oriented, giving more freedom for interviewees to organise their own opinions according to their experiences and interests. In addition, qualitative interviews are used to understand how individual people experience and make sense of their own life, rather than to be representative. The method is also useful for collecting a range of opinions on a topic. Sometimes interviews reveal consensus but often they illustrate that people of different ages, ethnicities, gender, and sexualities have diverse opinions and experiences.

However, qualitative or in-depth interviews can be problematic in some respects. The most significant issue is interviewer bias, which implies that the respondents may give the answer that they think the interviewer wants (Denscombe, 2003). Therefore, to conduct a valid and reliable in-depth interview, as Bryman (2008) recommended, confidential, trustable and honest relationships between the researcher and interviewees need to be carefully built up. As for how to select interviewees, qualitative interviews often adopt sampling techniques to select the interviewees. There are many strategies for recruiting participants for interviews.

‘While the aim of many quantitative methods is to choose a random or representative sample, to be ‘objective’, and to be able to replicate the data, the aim of qualitative methods is to choose respondents who will help the researcher make sense of people’s experiences’ (Longhurst, 2009, p. 581). Choosing whom to interview, then, involves targeting people who are likely to have the desired knowledge, experiences or positionings, and who may be willing to divulge that knowledge to the interviewer (Cloeke *et al.*, 2007). As Smith (1998, p. 22) has argued: ‘any attempt on the part of an analyst [geographer] to enter the life-world of others is above all, strategic...it makes both moral and analytical sense to expose the power relations inherent at an early stage of the research.’

As part of the design process, I identified key stakeholder groups who would offer diverse insights on my research questions. These included farmers and decision-makers. Decisions regarding the recruitment of interviewees was sometimes constrained by who was willing to participate (Emmel and Clark, 2009) and this goes for all forms of research methods. However, as Valentine (2005, p. 112) points out, ‘the aim... in recruiting participants for interview is not to choose a representative sample, rather to select an illustrative one. Choosing who to interview is therefore often a theoretically motivated decision’. Herbert (2016) argued that fieldwork takes time, then, multiple observations of the same phenomenon are commonly necessary before its significance is clear. Prolonged familiarity with the group’s members is often required to create trust and more open conversations. For this reason, the qualitative researcher must restrict the number of cases examined.

I used in-depth methodologies to collect data, including interviews with key farming representatives (e.g. to understand how spatial processes have affected the dynamic of agriculture) and in-depth interviews (e.g. to understand complex issues of local cohesiveness and farming learning processes at farm level). A key problem is the representativeness of individual/stakeholder groups interviewed, and issues related to power networks (powerful actors more likely to be heard) have to be considered throughout (Cloeke *et al.*, 2004; Flowerdew and Martin, 2005). Triangulation with other methodological steps ensured some cross-checking of the representativeness of views, but it was acknowledged that ‘complete’ information could never be gathered (Perry, 1997; Hardwick, 2009; Moran-Ellis *et al.*, 2006; McKendrick, 2009).

There are multiple and heterogeneous stakeholders in the metropolitan countryside of Rio de Janeiro, including farmers, non-farmers, local workers, residents, commercial marketers, community decision-makers, regional decision-makers, professional and public administration officials and so forth. All these actors actively participate in the process of rural change. Therefore, qualitative interviews can be very appropriate to collect various voices from different groups of people. Farmers were the stakeholder group selected as a key target audience for monitoring information concerning rural change and resilience in the context of the global countryside. Interviews with regional decision-makers were conducted outside the study area. These interviews took place in the cities of Rio de Janeiro, Niterói and Macaé.

My overarching aim was to interview members of the three level 3 farming communities going beyond their leaders (see Plate 3.8). Snowballing was used as a sampling approach. It is a technique used by researchers whereby one contact, or participant, is used to help recruit another. The number of participants soon increases rapidly (Longhurst, 2009). It is a sampling method in which research subjects are selected by a chain of referral, with one set of contacts providing further contacts. As Ruane (2005) argued, snowball sampling refers to the fact that researchers first make contacts and build trustful relationships with contacts, and then ask the contacts for other possible respondents or participants. Under these circumstances at local level, connections were utilised.



Plate 3.8. Interviewing members of farming communities beyond their leaders and obtaining intergenerational narratives. (Source: Author, 2017)

Farmers and farmers' associations were the target audiences in monitoring information on rural change. Several farms are transferred from one generation to another, sometimes for several decades. As such, farms resist and survive despite economic and political, technological and social changes. Some contacts had already been established during the author's Master's thesis research (Machado, 2013). The return made it possible to deepen the observation of changes that had occurred in the intervening years and the adaptability of agriculture in the process of rural-urban interaction. Conducting interviews with previously contacted rural actors allowed access to information addressed through a longitudinal approach, which helped explain changes in recent years. These long-term relationships and returns to farms several times permitted analysis of rural change and the challenges for a resilient rural future in a longitudinal perspective.

Many researchers return to field sites that are previously known in different capacities, thus upturning traditional notions of the 'field', particularly in qualitative fieldwork, of unknown places whose depths the researcher encounters anew. Returning in a different capacity affects not just the researcher, but also the participants, and raises questions about research ethics with regard to changing positionality (Sharma, 2018).

Sharma (2018) examined the dynamic positionality of 'returning', as understood through the changing expectations of colleagues and participants, as well as the impact on ethics and the production of knowledge. She argued that just as multiple identities in the process remain fluid, with one never completely displacing the other, so too do the corresponding expectations and ethical concerns.

The interviews with farmers were arranged by initially contacting community leaders in the study sites, and, a snowballing method was used to garner further contacts. I adopted a 'purposive sampling' technique (Sarantakos, 2005, p. 164), choosing interview participants based on my own judgement as to their relevance. This sometimes involved going through 'gatekeepers' (Cloke *et al.*, 2004), at other times it involved 'stratified snowballing' (de Wit, 2012), and participants were recruited mostly through personal invitation when I contacted them directly or using recommendations from others. Table 3.4 illustrates the main groups of interviewees targeted. I conducted seventy-seven interviews in total. Not all interviewees fell neatly into one category. However, they have been categorised in this way because they provide what Valentine (2005) calls 'illustrative cases'. Appendix 2 shows list of respondents.

Table 3.4 Main groups of interviewees targeted and numbers interviewed. (Source: Author)

Main social group of interviewers	Citrus farming community (Posse dos Coutinhos, Itaboraí/Tanguá, Rio de Janeiro - Brazil)	Guava farming community (Japuiba, Cachoeiras de Macacu, Rio de Janeiro - Brazil)	Banana farming community (Faraó, Cachoeiras de Macacu, Rio de Janeiro - Brazil)
Farmers	<p>Association of Citrus Growers and Rural Producers of Tanguá – ACIPTA (n=33)</p> <p>Association of Organic Farmers of Rio de Janeiro State - ABIO-Rio and Organic farmers of Tanguá (n=6)</p> <p>Other farmers (n=6)</p>	<p>Guava Farmers’ Association of Cachoeiras de Macacu – GOIACAM (n=4)</p> <p>Association of Organic Farmers of Rio de Janeiro State - ABIO-Rio and Organic farmers of Cachoeiras de Macacu (n=2)</p>	<p>Association of Farmers of the rural locality of Faraó – ALAF (n=3)</p>
Policymakers	<p>Corporation of Technical Assistance and Rural Extension - EMATER-Rio, Tanguá (n=2)</p> <p>Corporation of Technical Assistance and Rural Extension - EMATER-Rio, Itaboraí (n=1)</p> <p>Animal Health, Plant Protection and Inspection - SEAPEC-RJ, Tanguá (n=1)</p>	<p>Corporation of Technical Assistance and Rural Extension - EMATER-Rio, Cachoeiras de Macacu (n=2)</p> <p>Local Department of Agriculture (n=2)</p> <p>Local Department of Environment and Nature (n=1)</p>	

	Local Department of Agriculture (n=4) Local Department of Tourism and Culture (n=1)		
Project influencers	Regional articulator of the Ministry of Agrarian Development – MDA (n=1) Independent cultural agent in the Eastern Metropolitan Region of Rio de Janeiro (n=1) Regional coordinator of SEBRAE (Brazilian Service to Support Micro and Small Enterprises) in the East Rio de Janeiro (n=1) Corporation of Technical Assistance and Rural Extension - EMATER-Rio, State programme for supporting small-scale and family farmers – PROSPERAR (n=1)		
Researchers	Agricultural Research Company of the State of Rio de Janeiro - PESAGRO-Rio (n=1)	Farmer and independent researcher on guava varieties (n=1) and production system (n=1)	Brazilian Agricultural Research Corporation – EMBRAPA (n=2)

I used semi-structured interviews which give more freedom to interviewees to organise their own opinions according to their specific experiences and interests (Flowerdew and Martin, 2005). Semi-structured interviews, as Valentine (2005) puts it, ‘take a conversational, fluid form, each interview varying according to the interests, experiences and views of the interviewees’ (2005, p. 111). I had a set of broad themes for all interviewees and some question tailored to the individual’s role or relationship to the community. For decision-makers the questions focussed more on planning and its processes. Appendix 1 shows list of interview questions and Appendix 3 illustrates farmers’ compilation about major changes in agriculture in the last decades.

Interviews normally took place in a location that was meaningful to the participant. There is growing recognition that attending to the location in which interviews take place is important (Elwood and Martin, 2000; Anderson, 2004; Riley, 2010). In a study such as this where place and participation are central themes, it made intuitive sense to offer participants a choice as to where the interview was conducted. Most opted for places that were familiar or where the surroundings were relevant to the topic being discussed (Kvale, 2007). With many participants, I took inspiration from recent interests in mobile interviews, including go-alongs (Kusenbach, 2003; Middleton and Yarwood, 2013) and walking interviews (Jones *et al.*, 2008; Brown and Durrheim, 2009).

Mobile interviews (see Plate 3.9) worked well with some farmers and rural extension officers who felt more comfortable being interviewed ‘on the move’ where they could point out features and challenges of farming whilst being asked questions. They also worked for farmers who preferred to be interviewed whilst doing their routines. These mobile interviews tended to elicit the more affective and emotional aspects of the subjects’ relationships with the local area – something that was factored into the analysis (Evans and Jones, 2011). In my interviews, conversations would invariably turn to the place itself, with participants offering information on specific buildings or landscape features as we overlooked or passed them. This seemed appropriate for this study, which sees place, land and person as inextricably linked.

In addition, I held range purposeful conversations with existing user groups from across the three study areas. These informal exchanges were often the start of more long-term relationships with particular farmers on site or after the meetings at farmers’ associations and they worked well for ‘hard to reach groups’ (Emmel and Clark, 2009). This was a

particularly important strategy for farmers in Tanguá, who were reluctant to be interviewed for different reasons, mostly because they were anxious about internal political tensions within the farmers' association and initially thought that I was working for the local government or the rural extension company (see positionality Section 3.5). However, they were happy to talk in a more informal/ad-hoc way.

Both interviews and purposeful conversations offered a chance to discuss particular events or practices and to hear participants' interpretation of what 'rural change and farming at the rural-urban interface' meant for places and individuals. They provide important background to places and spatial changes, deeper insights into the ethos and ethical logics for transitions in the rural periphery of the metropolitan region, as well as some of the dilemmas and tensions with the contemporary changes on land use and global pressures. To fill any gaps, I also conducted interviews with 'fringe' actors who were not directly involved in the farmers' association but who were developing or spearheading farming practices in relation to spatial changes in the locality (see Table 3.4 above). They provided insights on similar challenges that were operating elsewhere within the peripheral countryside in a global era, or provided relevant insights in a particular field of the regional context of Greater Rio's countryside, such as the viability of farming in the rural periphery of a metropolitan region.



Plate 3.9. Catching a ride, collecting stories. Conducting ad-hoc interviews ‘on the go’. Doing fieldwork research in the metropolitan countryside through multiple forms of mobility. (Source: Author, 2017)

I always requested that the participant selected the time and location at which the interview would take place and this generally turned out to be either their farm or at the farmer’s association office. Once I had re-familiarised myself with the interview data through transcribing, translating and re-reading, I coded the material according to the topics and themes that were discussed (e.g. the capacities of learning at multi-interfaces, nurturing the spatial diversity, sharing knowledge and crossing multiple links, social organisation and community). Some of these initial themes were then divided into sub-themes. This process, known as ‘open coding’ (Longhurst, 2009), enabled emerging themes and relationships to be investigated and helped to un-pick the data.

I was careful to document everything I heard and saw, making both written notes and sometimes audio recordings with the permission of participants. I later listened to all records, transcribed and coded key-discussions for the arguments of this thesis and translated selected fragments from Portuguese to English. I noted the seemingly ‘mundane’ aspects of meetings or encounters. My fieldwork materials were incomplete, often captured in the moment, but they helped me ‘place’ the event in enough detail so that, when it came to writing up, I could convey a vivid impression of actually ‘being there’ in the setting (Cook, 2005, p. 181) as well as what it was like to witness ‘the clash first-hand’ (Desmond, 2014, p. 559).

3.4.4 Ethnography and participant observation

Participant observation was an effective way of exploring the dilemmas and entanglements that emerge when ‘rural change and farming resilience’ plays out in specific rural-urban areas. Participant observation is a central technique in qualitative research and has long been a staple method in human geography. It involves living and/or working within particular communities or settings in order to understand how they work ‘from the inside’ (Cook, 2005). As Cook (2005, p. 167) noted, participant observation ‘involves researchers moving between participating in a community – by deliberately immersing themselves in its everyday rhythms and routines, developing relationships with people who can show and tell them what is ‘going on’ there, and writing accounts of how these relationships developed and what was gleaned from them.’ It involves the twofold task of observing-listening whilst, wherever possible, taking part in the ‘normal’ everyday activities of community participants.

Although my observations were guided by my research questions, I was guided from the field and open to surprises. Having decided to do a relational ethnography, my observations covered multiple interactions between different social actors, which meant that I often ended up with a lot of material. There was always a risk that my descriptions were inadequate, subjective or biased, having limited knowledge. Conscious of these constraints – constraints simply being my situated ‘view from somewhere’ – I wrote ‘thick descriptions’ (Whatmore, 2002) nevertheless and sought expertise and further insight afterwards, to ‘flesh out’ as much as I could (more in section 3.5 on positionality). As I became more familiar with the sites, patterns and themes began to emerge, as I observed similar events occurring or as similar narratives from different angles.

Ethnography as a method of data collection represents, in its sensitivity to difference, culture and individual experience (Till, 2009). In this most characteristic form it involves the ethnographer in participating overtly or covertly in people's daily lives for an extended period of time, watching what happens, listening to what is said, asking questions – in fact collecting whatever data are available to throw light on the issues that are the focus of the research (Hammersley and Atkinson, 1995).

Ethnography is a methodological and practice-based approach to understanding and representing how people – together with other people, nonhuman entities, objects, institutions, and environments (see Plates 3.10-3.12) - create, experience, and understand their worlds (Clifford, 1988; Emerson *et al.*, 1995; Smith, 1999; Crang and Cook, 2007). Ethnography is time intensive, iterative, and open-ended, and includes observing, listening, reflecting, experiencing, writing, and learning from people, places, situations, institutions, landscapes, and objects. 'The questions ethnographers ask always change during the research process because a significant part of any study entails being sensitive to the political relationships and ethical responsibilities associated with framing, generating, co-creating, and representing knowledges' (Till, 2009, p. 626).

Burawoy (2000) presented a group of ethnographic studies from different sites across the world, each attempting to elucidate a particular extralocal dynamic 'from the ground up'. Anderson and Harrison (2012) indicated that putting process at the centre of ethnography can help to denaturalise the complex extralocal relations involved and problematize them in new ways. At its most basic, a process-based approach attempts to deal with the relations among several disparate types of elements as they interact across space and time.



Plate 3.10. Agrochemical waste is found during a walk in the rural area. (Source: Author, 2017)



Plate 3.11. Agro-ecological farmer shows a gift that she received from a committee of Chinese researchers who visited her farm dedicated to citrus production in the agro-ecological system. (Source: Author, 2017)

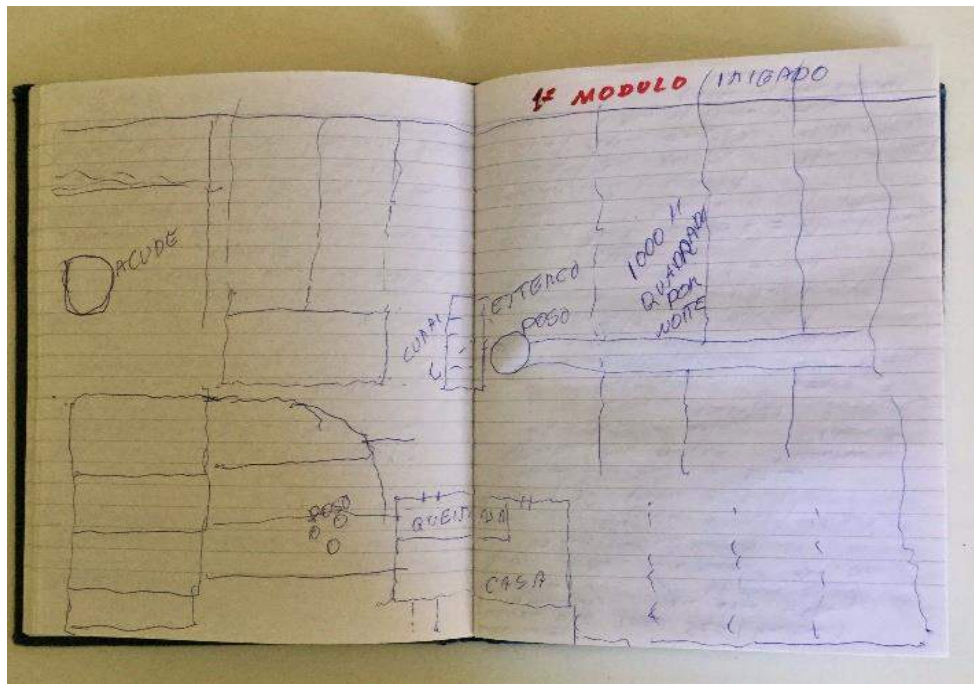


Plate 3.12. A farmer draws the map of his farm. Detailed data on dynamics of agriculture in Rio de Janeiro required fieldwork with farm case studies and ethnographic approaches. (Source: Author, 2017)

In geography, ethnographic research has long been a significant methodology in cultural ecology, development studies, and feminist geography; more recently, it has become established in social, political, cultural, and nature-society geography (Hay, 2000; Herbert, 2000; Crang, 2002). Geographer-ethnographers examine every-day processes of meaning making and materiality in a range of settings by focusing on spatial practices, including place making, inhabiting social spaces, consumerist spatialities, becomings, memory, transnational citizenship, and grassroots activism. While geographers still draw upon anthropological and sociological traditions, they now are making significant contributions to transnational, collaborative, and creative analytical ethnographic research (Till, 2009).

Observation, writing, fieldnotes (see Plates 3.13 and 3.14) and collecting material culture are the methods most commonly identified with ethnography and are also the most controversial, given ethnography's colonial legacy. The status of the ethnographer as the expert arbiter of knowledge is not only questionable – analyses are challenged by the people studied – but so too is the assumption that a local 'scene' observed is typical for any social group. For this reason, observation should be thought of as a context for social interaction rather than as a social science method per se.



Plate 3.13. I was taking an active and participatory approach in order to create an understanding of the situated perspectives involved at the farm, and thus regularly pitched in with various agricultural activities. I had chosen to be open about my note-taking on the farm, in order to take more accurate notes at the time of observation. (Source: Photo elicitation, Farmer 36)

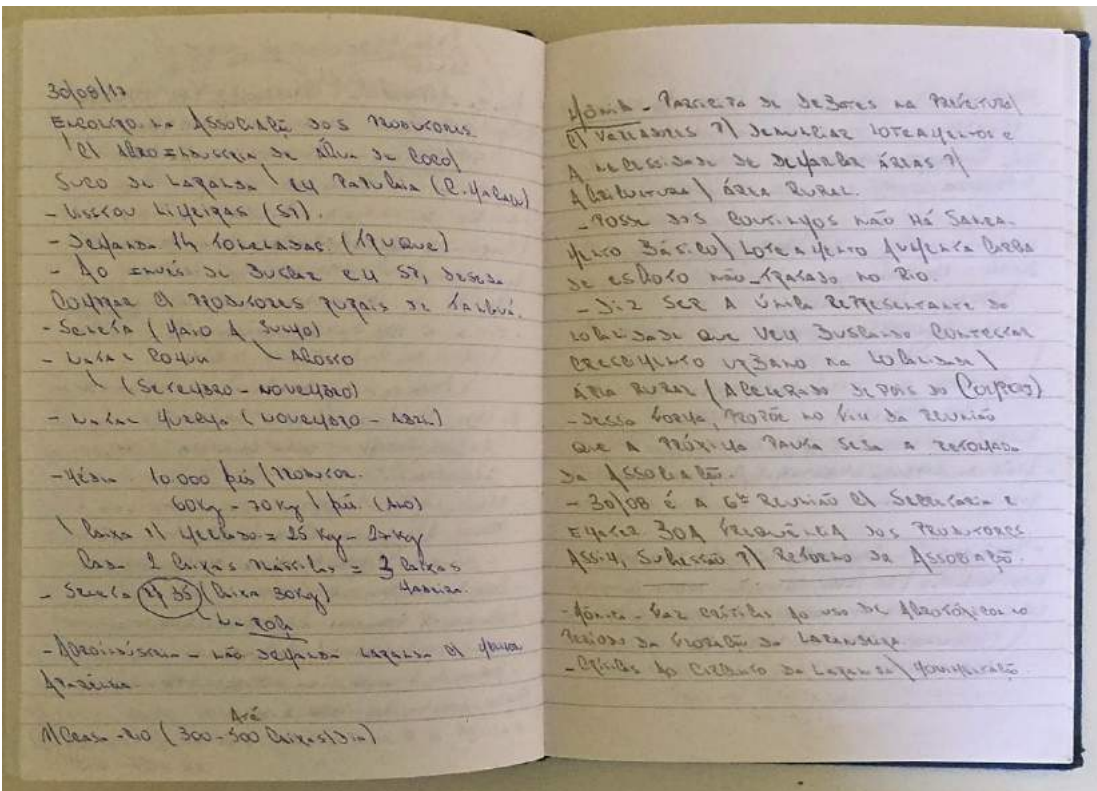


Plate 3.14. I attached great importance to fieldnotes; they provide the foundational moments of ethnographic representation, turning the situated, ambiguous and fleeting into a representable and analysable format. (Source: Author, 2017)

Nowadays, a growing number of students and researchers from the Global South who have been trained at Northern institutions return to their home countries for fieldwork (Giwa, 2015). The return to Rio de Janeiro after my first years of doctorate abroad allowed me to return with broader theoretical and methodological perspectives on rural studies and human geography (see Plate 3.15). Before starting the fieldwork, I developed and structured the theoretical debate and methodology of the fieldwork research, which helped with my choice of empirical method used based on qualitative and ethnographic research with social actors involved in the geographical space under analysis. When I was designing my research, colleagues often asked me where I planned to undertake my fieldwork. Every time I responded that I would go back home, I thought about how ‘the field’ would compare to ‘home’ in my research: how were they the same, and how were they different? As Zhao highlighted (2017), fieldwork at home never simply equates to insider research, and a born-and-raised local is not always an insider in his or her hometown. ‘I further note that one side of the insider/ outsider duality may outweigh the other without dissipating it – depending on the topics under inquiry and the characteristics of the people the researcher is interacting with at a certain moment in time’ (Zhao, 2017, p.189).

In addition to the research in the rural area, in the first weeks after returning to Rio de Janeiro I tried to understand the spatial context of the city and its countryside. I travelled around the neighbourhood in the suburb of Rio de Janeiro where I was born and grew up, visiting the street market on Sundays and observing the diversity of food, with special attention to those from Rio’s countryside (see Plate 3.16). I also visited supermarkets and the food supply centre of Rio de Janeiro. I walked around areas in the city, where when I was a child I used to walk with my father, looking for fresh food and diversity of agricultural products. I also went to other areas of the city, including, observing Rio de Janeiro and surroundings from the top of the Tijuca Mountain, which offered me a view of the landscape on a regional perspective of the metropolitan area (see Plates 3.17 and 3.18).

In the first few weeks, I visited one of my sisters who lives in the Baixadas Litorâneas region and was able to observe the context of integration and the differences of landscapes between Rio City and other regions of Rio de Janeiro state. In this way, the period I spent in Rio was beyond the fieldwork and the activities that were part of my personal agenda were often filled by geographical views of the space where I was inserted and in constant

movement. During the fieldwork process, in-betweenness facilitated my research in various ways: it allowed me a certain ‘distance’ from my participants and gave me a degree of flexibility in deciding how to represent myself.



Plate 3.15. This photograph was taken in 1958 in the period of expansion of housing plots in Irajá, a Rio suburb’s neighbourhood where I was born and grew up. The landscape presents some similarities with the case study area of this thesis, as it has been in the process of incorporation into metropolitan dynamics of Rio de Janeiro nowadays. (Source: Brazilian Institute of Geography and Statistics, IBGE)



Plate 3.16. On 20th August 2017, on my personal Instagram account, I published the photo above taken in a street market in Irajá, Rio’s neighbourhood where my parents live, with the following description: ‘When I was a child, my father introduced me to the Rio street markets. On Sunday, I found one of the objects of my PhD research there’. (Source: Author, 2017)



Plates 3.17 and 3.18. First photos in Rio de Janeiro in 2017 revealing my perception after a couple of years outside Brazil. I took pictures as a tourist, an issue that reveals my identity as insider and outsider (Zhao, 2017). Rio de Janeiro, 05th August 2017. (Source: Author, 2017)

Moreover, the ethnographer is more likely to understand the ways that people experience and create their worlds (Till, 2009). ‘Through this close attention to lived and unspoken geographies about particular places, ethnographers may better understand the overlapping and often abstract processes that connect and separate domestic, national, biographical, daily, spontaneous, and socioecological spaces and times’ (Till, 2009, p. 627). In addition

to treating observation as a form of social interaction and embodiment, ethnographers learn about everyday spatial tactics, practices, and strategies from listening to people telling stories about the places and things that are important in their everyday lives (see Plates 3.19-3.21).



Plate 3.19. Most of the time, when I returned to my parents' home Rio de Janeiro City on weekends, I brought agricultural products that the farmers gave me after the interviews. (Source: Author, 2017)



Plates 3.20 and 3.21. Most of the time, after the interviews, farmers would invite me for a lunch or a coffee which allowed me to extend the conversation in a more informal and friendly way. (Source: Author, 2017)

The choice of a research method involving both the farmer's association and individual farmer and his/her family was due to the nature of this study. I chose to explore the rural periphery of the metropolitan region using multiple mobility alternatives. During the fieldwork carried out in 2017, I never arrived in the rural locality/farm using a private car and instead used public transport (see Plates 3.22 and 3.23) or got a ride with farmers or policymakers of local public institutions for rural development (see Plates 3.24 and 3.25), either by car or sometimes by motorcycle when I was walking on the main road (see Plates 3.26 and 3.27) for an interview scheduled, and members of the community already recognised me as a student and researcher. This method challenged me in terms of limitations. I was just able to reach local leaders and farms where the public transport

circulated or located where it would be possible to walk or if someone on the way could offer me a ride.



Plate 3.22. As a methodological strategy to understand the spatial mobility of social actors in the metropolitan countryside of Rio de Janeiro, I travelled with public transport. Sometimes, informal conversations on the way were important for a better understanding of ongoing space processes from everyday life narratives. (Source: Author, 2017)



Plate 3.23. One of the main intercity buses that I took to make the connection between the city of Rio de Janeiro and the East metropolitan region, crossing the Guanabara Bay. The route was fundamental for observing the landscape and perceptions about the spatial changes, the relational rural geography and integration of the rural area within the metropolitan dynamic of Greater Rio. (Source: Author, 2017)



Plates 3.24 and 3.25. An official of the Technical Assistance and Rural Extension Company-EMATER-Rio and a farmer observe the landscape and share their knowledges. I followed farmers and rural extension officers during meetings of technical assistance. (Source: Author, 2017)



Plates 3.26 and 3.27. I often took long walking routes, which contributed to moments of observation of the landscape and reflections on issues that arose during the day-day of the fieldwork research. (Source: Author, 2017)

I did not have the opportunity to explore remote areas, farms located on top of mountains, or have the opportunity to interview a significant number of farmers who did not participate in the farmers' association or another social group with whom I was conducting this investigation. I did not have the opportunity to explore in detail the condition of agriculture practiced by farmers who are not part of public rural development institutions or the local farmers' association. In this way, this research neglected some voices as the method focused on involved institutional articulations and networks. I nonetheless had several informal conversations on the bus, in the car or on a motorbike that offered valuable information to understand some issues. The method offered

surprises, but also serious limitations and moments of precariousness. The choice to understand more deeply the everyday life of a group of farmers and policymakers, thus, is related to the nature of field research in rural areas (see Plates 3.28-3.31), which imposes limitations on the research due to its territorial extension, isolation of certain areas and the lower intensity of connections in public or alternative transport, and the precarious infrastructure in some marginal areas.



Plates 3.28 and 3.29. Observing landscapes of contrasts: the first image represents a classic dimension of the countryside, the productivity and agricultural characters of the rural locality, while the second picture indicates a rural space in the metropolitan periphery with urban rubbish deposited in a field. (Source: Author, 2017)



Plates 3.30 and 3.31. Walking in the rural area can help to observe the complexity and diversity of social practices and spatial processes at different times. A traditional house of the Brazilian countryside in the rural periphery of Greater Rio and the practice of burning vegetation reminiscent of colonial times and sugar cane production systems. (Source: Author, 2017)

In addition to the experiences in mobility, I had reflections and impressions in the hotel that I stayed in the first months of the fieldwork research. The location reflected the condition of developing space in an emerging economy with diverse social actors and multidirectional trajectories. The owners of the hotel came to Rio de Janeiro from South Brazil and decided to open the hotel in Tanguá because of its proximity to the BR-101, one of the main national highways that connect South Brazil to the Northeast, crossing the two largest metropolitan areas in Brazil: São Paulo and Rio de Janeiro. They were attracted by the movement of capital with the installation of the Petrochemical Complex

of Rio de Janeiro (COMPERJ), which also attracted workers, entrepreneurs, and investors from different parts of the country during the period of construction. The hotel was a place for people who were crossing the rural periphery of Greater Rio de Janeiro, seeking investments in a peripheral region of the metropolitan region. For example, I had an informal conversation with a construction manager from South Brazil who was in the region looking for land to rent for the extraction of 'areola', one of the components of the region's soil that has attracted extractive engineering companies. This contact suggested critical issues that I found in the rural locality researched later.

Fieldwork is an essential period of research for allowing direct contact with the social actors involved in the spatial analysis process and the insertion of the researcher in the environment where the research objects are inserted. For that reason, the mobility in the area of research through public transport became an important way to understand the insertion of the rural locality and the rural community in the metropolitan region. Public transport and the alternatives created to reach the rural area reflected connections, infrastructure conditions and the degree of precariousness and integration of the rural locality to contemporary space dynamics, highlighting the spatial diversity and the multidimensionality of the process of rural change in the Metropolitan Region of the Rio de Janeiro.

The field notes (see Box 3.1) illustrate a myriad of pathways for diversification at farm level. All pathways open up new possibilities for change based on farmers' capacities and the markets in which they operate. The extent of diversification and the spatial scale at which it is implemented can determine which capacity for resilience is bolstered. For example, looking for new but similar markets for existing products, or even finding another crop altogether but still within a similar production system, may enhance the persistence of the current regime in expanding activities, thereby strengthening transformability.

Box 3.1. Field diary, August 2017.

Rural space in process of change from the incorporation of the area in the metropolitan dynamics. Space that reflects the challenges of sustainability and multifunctionality. Even in the face of external pressures, farmers have responded to changes through complex pathways. The complexity of the metropolitan rural space reveals diverse situations, resilient actors and actors vulnerable to the process of spatial change. Who is more resilient? Who is vulnerable? Why?

Farmer 36

Farmer of fruit growing in the lowland. The family farm seeks product quality, with improved packaging for better presentation of the product to the consumers. The cultivation of guava is intensive, with production throughout the year through specific techniques of pruning. The cultivation presents higher productivity because it has been selected during the last years with the introduction of specific varieties of guava developed through the knowledge built in the relationship between farmers.

Farmer 12

Switch from productivist system to an organic system with recovery of forest areas. She is a local leader on environmental issues and a voice of resistance to the process of urbanisation. As she is involved on rural development council, she challenges the local policy that does not recognise the complexity and diversity of rural areas.

Farmer 15

A local nursery. He has local knowledge on the development of seedlings of citrus. Grafting and propagation of the best varieties of orange trees. What would be the consequences of the introduction of seedlings produced in São Paulo for the group of local nurseries?

Farmer 6

A farmer that seeks diversity on production and marketing channel. His production has been part of a short alternative circuit and supplied to the National School Meal Programme through local policies and federal law requirements. The farmer needs to have an official declaration of family farmer. The supply for school meals cannot exceed \$ 4,000/year. He bought a pickup truck through rural credit.

Farmer 30

Property in instalment of land due to inheritance process. The farmer's income is obtained through pluriactivity. In recent years, he has sought to diversify agriculture through higher productivity seedlings obtained through the network between local farmers and public institutions for agricultural development. In addition to the amount from his inherited land, he collaborates with his brothers and has a partnership with farmer 18 in a small area which they are growing passion fruit. He was a leader in the local farmers' association and represents the community in the Rio Rural project. Implemented by the Sustainable Development Superintendence of the Secretariat of Agriculture and Livestock of the State of Rio de Janeiro (SEAPEC), Rio Rural is funded by the World Bank and the United Nations Food and Agriculture Organisation (FAO). The activities involve a broad network of partners, including governmental and non-governmental organisations, businesses, municipalities and hundreds of rural associations. The programme's strategy also involves financial incentives, research and technical assistance. By 2018, US\$ 233 million from the World Bank and the Government of Rio de Janeiro will have been invested.

Farmer 18

A traditional farmer that sales the citrus production to intermediaries. Even retired, he keeps production area under partnership arrangements. His grandson is involved in the production and marketing system. He has a partnership with Farmer 30. He is one of the leaders in the 'mutirão' (a volunteering work promoted by members of the farmers' community) that takes place every Friday. He criticises the conventional agricultural production system. He said that he would practice organic farming system if he was younger.

Farmer 43

He has extensive knowledge of the rural community of Faraó (Cachoeiras de Macacu, Rio de Janeiro) and has a relationship with a broader network of external actors and institutions. The foundation of the peasants' association was in the 1980s. After the first joint efforts between farmer and residents, the idea emerged of the formation of the association linked to the influence of a local leadership that participated in the debate on peasant rights and influence of a religious from the Catholic Church. They were encouraged through EMATER-Rio and the federal policy for buying trucks and direct entry into CEASA-Rio through a specific sales outlet for farmer associations and participation in the National Union of Cooperatives and Associations. Nowadays, with the competitiveness of bananas from other productivist areas, the association has lost market in CEASA-Rio and was strengthened through the purchase of products for school meals. He recognises that the banana production from Faraó may have more quality than the intensive system of the other intensive agricultural areas, but he does not visualise other marketing mechanisms for banana in a system that could be considered organic, identifies the changes occurred in the Batatal river area, with increase of forest and the production of banana associated to the slope with fragments of Atlantic Forest.

Geographers are particularly sensitive to the different forms of power/knowledge that enable access for some individuals and prevent movement for others. Because of the kinds of questions geographers ask, they are contributing in significant ways to new forms of ethnography, in particular about transnational and multi-temporal spaces. Transnational ethnographic projects in geography analyse forms and effects of globalisation through networks and multiple sites.

The in-depth ethnographic surveys were conducted with some of the initially interviewed stakeholders, involving repeated visits and, for some of them, participant observations as I followed farmers and community decision-makers for a few days. Meanwhile, I attended farmers' association meetings and in several community meetings organised by activists intending to mobilise members on territorial development matters (see Plates 3.32-3.36). Finally, I met various actors involved in the State sector – including managers and executives from cooperatives and researchers. Appendix 4 shows flyers of events and meetings organised by the farmers' associations and policymakers.



Plate 3.32. Attending meetings at City Council in Cachoeiras de Macacu, a place to establish proximity and to observe the internal conflicts and relationship between leaders of rural localities and the local public sector. (Source: Author, 2017)



Plate 3.33. Connecting to farming community and its social diversity and cosmopolitanism through farmers' association (Association of Citrus Growers and Rural Producers of Tanguá – ACIPTA) and rural and agricultural extension company. (Source: Author, 2017)



Plate 3.34. Attending meetings at farmers' association, a place to establish proximity and to observe the cosmopolitan social environment and internal conflicts. (Source: Author, 2017)



Plate 3.35. Meeting organised by organic farmers. This methodological positing allows greater sensitivity for the discovery of new forms and patterns of production and consumption, for the idea of farming with nature, and for rethinking and reconceptualising social categories that shape development in the context of global processes. (Source: Author, 2017)



Plate 3.36. Gathering data and using analytical methods that reflect emerging theoretical base from which to validate critical perspectives concerning the global and metropolitan countryside in Rio de Janeiro. (Source: Author, 2017)

Participant observation was also used for data collection, including attendance at the City Council assembly and farmers' association meeting to present and discuss the research; participation in Agricultural Policy Council and associated activities; attendance at

Tanguá local farmers' markets and several local street markets (see Plate 3.37) and participation in working groups promoted by the City Council, EMATER-Rio and EMBRAPA. Besides local fieldwork, using an assemblage approach to understand the complexity and long-term perspectives on small-scale fruit farming in Rio, I found relevant historical materials in surprising places such as Sicily (Italy) (see Plate 3.38) and California (see Plate 3.44) that offered me valuable additional contextual insights.



Plate 3.37. Local trader and producer of orange shows differences between the orange bought in the supermarket and the orange sold by him. (Source: Author, 2017)



Plate 3.38. During a research visit to Sicily, while exploring the street markets of Palermo, I found a wide variety of fruits. For example, one of the main commercial varieties of orange called '*Brasiliani*' has interesting historical connections with varieties produced in Rio de Janeiro. (Source: Author, 2017)

3.4.5 Secondary data and sources

Sources of secondary data for social science include censuses, information collected by government departments, organisational records and data that was originally collected for other research purposes. Official information is of enormous importance for research in human geography (Cloke *et al.*, 2007). Official documents are textual, as well as statistical, and geographers make good use of these. Official information is important because of its particular authority. However, like other organisations in society, governments 'have particular objectives in obtaining, processing and presenting information and particular interests at stake in its content. Official information should therefore be treated with the same healthy scepticism which most good researchers bring to the study of unofficial sources' (Cloke *et al.*, 2007, p. 41).

I took a critical approach to documents and secondary sources in this PhD, acknowledging that they are 'cultural artefacts, produced by administrators with priorities and ways of seeing the world...' (Clarke, 2005, p. 58). This involved a twofold approach. In one way, I treated documents as a means to corroborate and augment evidence from other sources (Yin, 1994, p. 81), for instance by using them to inform interview questions or lines of inquiry in the field. In another way, I treated documents as a means to elicit and situate some of the assumptions that were being made by project officials. Here, I was interested in the way information was being drawn upon, interpreted and used by the projects. This twofold approach was especially important for the identification of the visions, rationales and logics for 'rural change and the complexity of farming systems' in the peripheral countryside of metropolitan regions of a transition economy.

Some documents I sourced through archival research and internet searches. Other documents were supplied through the projects as 'internal' documents and included site improvement plans and project communication strategies. Other documents were unavailable or I was unaware of their existence, but what I gathered gave strong sense of project visions, logics, and rationales. I collected documents until returns on new texts had become largely uninformative.

Firstly, I used documents to build a background/contextual picture of my case studies. I developed a systematic procedure for reviewing documents to tease out and critically evaluate project agendas, corroborating and augmenting evidence with other sources

(Corbin and Strauss, 2008). This was an iterative process (Bowen, 2009) involving skimming documents (superficial examination), then reading (thorough examination) and then interpreting how and why certain rationales were being used for the planning projects (Plate 3.39). Once understood thematically, the contents of documents proved useful in participant observation situations and for pre- and post-interview situations, i.e. to cross-check interview data and vice versa. The key was to remain critical at all times and remember that documents were illustrative of wider political-economic and ideological agendas.

Secondly, I wanted to critically explore the use of texts to reveal what ‘facts’ were accepted and endorsed by projects, how and why. Since documents are cultural artefacts (Clarke, 2005), I took the time to follow up any relevant references (scholarly or public) used within project documents – especially when they informed the knowledge base upon which projects were founding their visions/rationales. This was unnecessary in all cases, but whenever project documents appeared to lean on a particular discourse, I familiarised myself with that discourse. This meant sifting through local planning documents, land use strategies, biodiversity and conservation agendas. In doing this, I identified when and how ‘rural change and the complexity of farming’ in the study area reflected wider policy agendas at a local, regional, national and global level.

First, the structure for this research was informed by collecting and interpreting secondary data. Past investigations ‘on the ground’ provided key knowledge about individual case study localities. Based on this knowledge and the regional knowledge obtained in the first month of empirical research, I selected specific farming communities to be investigated (defined for the purpose of the study as ‘translocal rural’ and rural actors entwined in globalisation).

When in Rio de Janeiro, I sought to reconnect with institutions that could offer institutional support during the fieldwork. I visited the Metropolitan Chamber of Government Integration that promotes the implementation of the Integrated Urban Development Plan of the Metropolitan Region of Rio de Janeiro (Caderno Metropolitano, 2017). The material produced through the integration between institutions provided an overview of the spatial processes of change of the metropolitan region and the dynamics of agriculture there. The focus of the study is essentially on urban integration of the

Metropolitan Region, neglecting agriculture and its multifunctional characteristics in the context of rural change.

In addition, I visited public libraries and archives in Rio de Janeiro City and Niterói, Cachoeiras de Macacu, and Tanguá, seeking historical and geographical features of the region (see Plate 3.39). During this research, I searched for issues related to the rural space (see Plate 3.40) and the dynamics of agriculture in the area's metropolitan countryside (Plate 3.41). After defining the area of study, I read documents, books and articles including internal issues of agriculture, e.g. agricultural technical knowledge and materials developed by agronomists concerning small-scale fruit farming in the research area (Cavalin and Monteiro, 2012; Pedreira *et al.*, 2014; EMATER-Rio, 2017). Understanding the characteristics of agricultural practices was fundamental for better subsequent communication with rural extension public institutions and the farming community. Through these technical issues, I could then analyse other dimensions of agriculture, integrating internal issues of agriculture and its external features.

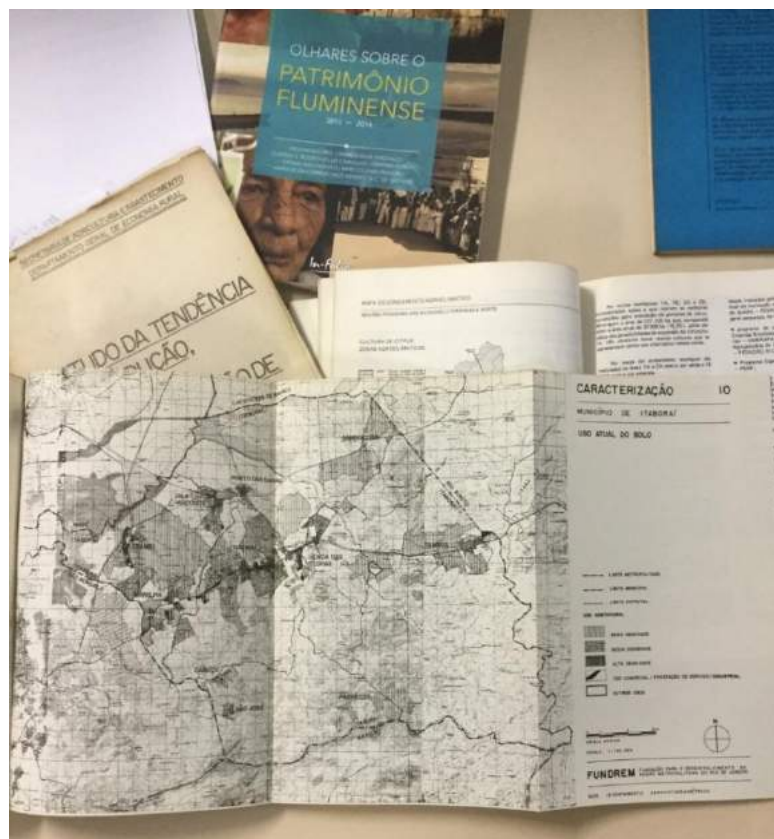


Plate 3.39. Before starting the fieldwork in the study area, I visited libraries, public archives, and universities in Rio to consult documents and maps of the rural periphery of Rio de Janeiro Metropolitan Region and its historical process of formation. (Source: Author, 2017)

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Plate 3.40. Past academic studies, in particular, those developed within the regional geography approach and presenting descriptive aspects in their analyses, were fundamental for better understanding regional processes and for defining and delimiting the case studies area and farming communities investigated in this thesis. (Source: Author, 2017)

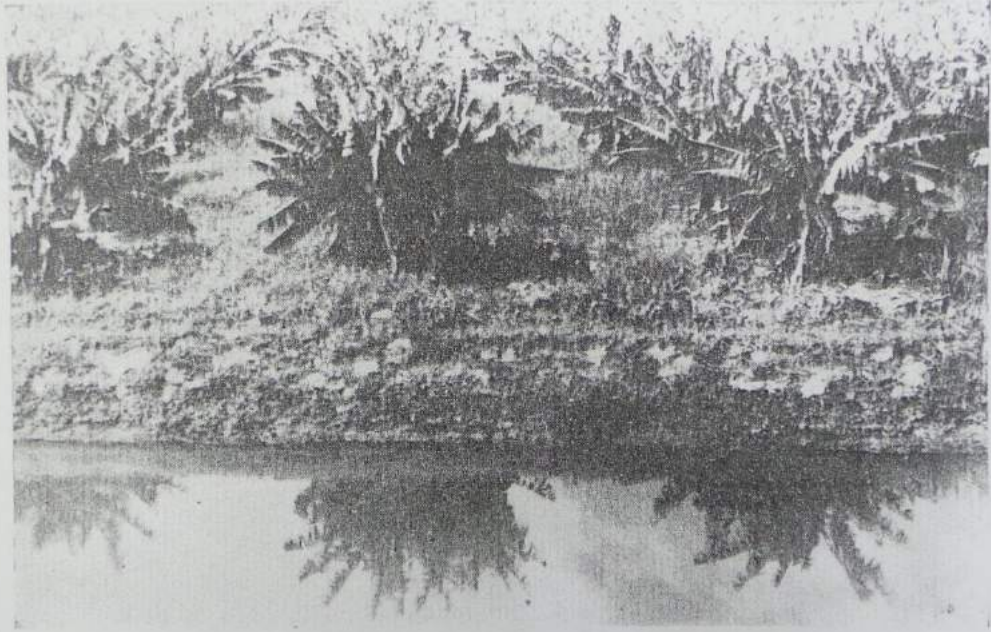


Fig. 169 — Os bananais adaptam-se admiravelmente nos antigos alagadicos, dando aproximadamente 2 000 touceiras por hectare com um rendimento de 3 000 cachos de 20 quilos.

(Foto DNOS)



Foto 5. Colina da zona de Itaboraí, parcialmente ocupada por um laranjal e uma plantação de abacaxi. A presença das capoeiras e o estado em que se encontra o laranjal atestam ainda os efeitos da crise da citricultura.

Foto C.N.G. — Jablonsky.

Plate 3.41. The books 'O Homem e Guanabara' written by Lamego in 1948 and 'Rio de Janeiro: cidade e região' by Bernardes and Soares (1987) were fundamental for a better understanding of the historical process of occupation in the rural periphery in Greater Rio and its regional aspects from a long-term perspective. (Source: Author, 2017)

Material from historical archives related the rural periphery of Rio de Janeiro Metropolis and beyond was collected during the fieldwork, including historical documents concerning fruit farming systems organised by national and regional agencies for rural development (see Plates 3.43 and 3.44). These documents were consulted in public libraries and universities in Rio de Janeiro and during travels around Europe and the US. Using an assemblage approach to understand the complexity and long-term perspectives on small-scale fruit farming in Rio, I have found relevant historical materials in places such as Sicily (Italy) and California (see Plate 3.42) that have offered valuable contextual insights.

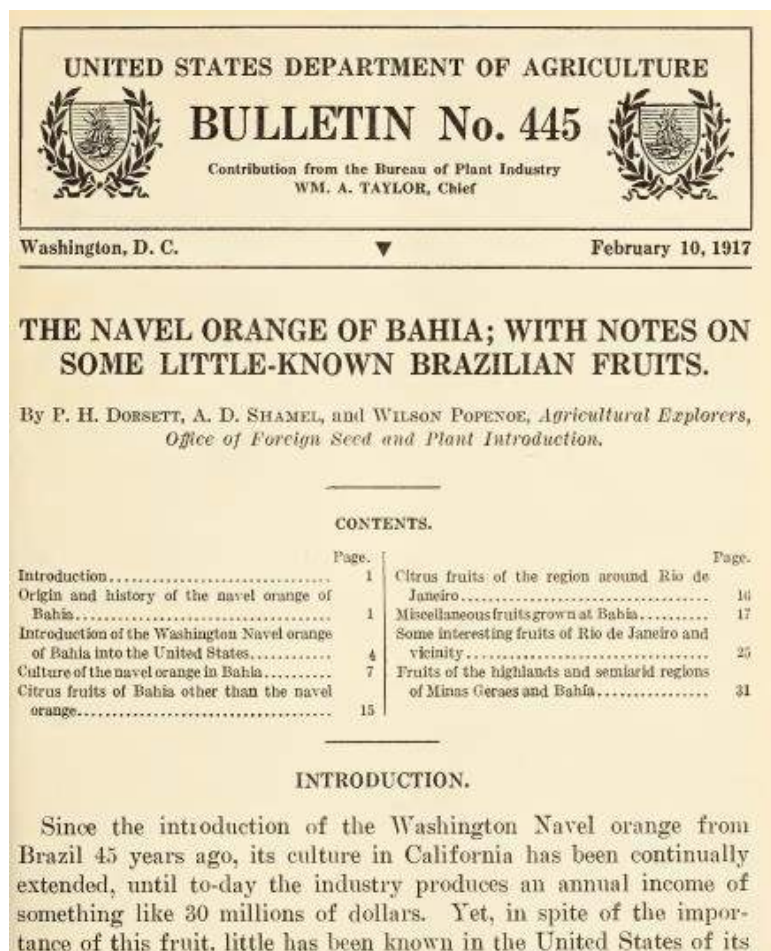


Plate 3.42. A paper found during a visit to the Berkeley University Library indicated a study from 1917 describing agriculture in the outskirts of Rio de Janeiro. (Source: Author, 2018)

current spatial processes in the metropolitan countryside of Rio de Janeiro and gave me support to justify the importance for understanding the tendencies and dynamic of agriculture in the context of rural change in the region. (Source: Author, 2017)

3.4.6 Photo elicitation

The cultural turn has played a significant role in promoting the diffusion of more 'evocative' or non-textual research strategies to capture or explore the values and emotions of social relations. Photo-elicitation, a frequently used technique, is based on the principle of using images in an interview and asking the informants to comment on them. The images may be produced by the informants or the researcher. In the first case, the informants produce the images and then discuss their meanings with the researcher. Photo-elicitation interviewing has various advantages. For instance, within education and youth studies, visual materials promote rapport and enable researchers to grasp people's viewpoints and social worlds (Capello, 2005). The majority of researchers have also recognised the power of images, over oral interviews, to trigger richer conversations about the community, memories, and reflections (Holliday, 2000; Davenport and Hall, 2002; Clarke-Ibanez, 2004).

Developed by Aitken and Wingate (1993), self-directed photography is similar to photo-voice and visitor-employed photography in recreation scholarship (Cherem and Driver, 1983; Chenoweth, 1984; Goin, 2001). In most approaches, the researcher gives participants disposable cameras and asks them to take photographs related to the topic. Interpretation is pursued through follow-up interviews. Researchers have reported that self-directed photography enables residents to capture the multi-layered meanings and visual references that constitute their complex attachments to locale (Aitken and Wingate, 1993; Stedman *et al.*, 2004). The images typically display an assemblage of social and natural elements, which allows for an exploration of the nature-culture connections and spatial relationships.

For the former type, I gave participants a camera and asked them to identify the values and perspectives they were trying to communicate. I also used interviews to identify and explore farmers' and rural extension officers' diagnostic assessments of the landscape. Again, after the completion of fieldwork I compared themes across the photograph sets to detect which patterns were associated with specific reference groups (see Plates 3.45-3.48). Finally, I identified and coded for basic categories of objects present in the

photograph (see Table 3.5). The combined photography and interview results support the idea that although individual variations in normative and diagnostic place imagery certainly exist, most reference groups possessed distinctive frameworks for perceiving, interacting with, and evaluating the landscape. Some groups were more coherent than others in their image preferences and assessments.



Plate 3.45. The photograph above is part of the personal collection of a farmer interviewed. The farmer took the picture in the period of introduction of the first varieties of guava trees on his land in the 1980s. (Source: Farmers' archives)

Table 3.5. Farmers and rural extension officers' photography coding results. (Source: Author)

Group	Landscape themes		
	Normative	Diagnostic	Object(s)
Conventional farmer	Production	Water	- Fruit packing house - Irrigation equipment
Small-scale farmer low capitalised	Not discernible	Drought	- Non-productive field - Traditional seedling
Agro-ecological farmer	Agro-ecological production	Water	- Source of the river - Fruit trees
Rural extension official	Production	Development	- External seedling - Natural method for nitrogen fixation



Plate 3.46. Photographs of the farmers' personal collection were an interesting tool during in-depth interviews to understand rural change and transitional pathways at the farm level. (Source: Farmers' archives and Author, 2017)



Plates 3.47 and 3.48. Oral histories, a form of interview used to gather, preserve and interpret the voices and memories of people about past events using photographs from farmers' personal archives. (Source: Author, 2017)

3.4.7 Analysis and coding of qualitative results

After completing the fieldwork, I began organising material and coding topics related to the research questions. In this way, I sought to identify in the interviews, field notes, secondary materials and archives common and particular questions of the set of voices, images, and insights accumulated during the period of fieldwork. There were four main codes for identifying ongoing processes in the case studies analysed: 1) learning from the context of rural change and uncertainties; 2) the dimension of diversity in different forms; 3) building and sharing knowledge; 4) the ability for social organisation and the creation of multiple-scale connections.

Analytic coding takes the researcher above the data, searching to develop ideas, categories, and concepts that seem apparent within it. It is about evolving and germinating categories. 'Coding is a foundation to analysis: it moves the researcher towards analysis through the process of creating and developing abstractions from the data' (Richards and Morse, 2013, p. 151). The four markers were instrumental in structuring the analysis and composition of the chapters of analysis (Chapters 4-8) and involve critical questions that are related to the theoretical debate on farming resilience in the era of globalisation and uncertainties.

Codes reveal the adaptability of social actors in the multidirectional and multidimensional context of the contemporary countryside. The subjective questions of the analysis and the adoption of globalisation and resilience through emancipatory perspectives as analytical lenses also related to the method of qualitative and ethnographic research. The discourses of social actors were analysed in relation to macro-scale structural issues present in the contemporary context of the metropolitan countryside of Rio de Janeiro as well as the personal narratives of the individual in a scenario that imposes global challenges.

The amount of empirical material amassed was hard to comprehend and organic. In some ways, the timing of arrival and departure from the field demarcated the scope of my analysis, as well as the access I was granted to activities, meetings or documents. In other instances, I needed to make active choices as to where to focus my investigations based my research questions. I took a fluid but 'grounded' approach to the research process, entering into 'an ongoing simultaneous process of deduction and induction, of theory building, testing and rebuilding' (Ezzy, 2002, p. 10).

After the fieldwork period, I organised and assembled data collected, including recordings, transcripts, texts, journal articles, field notebooks, artefacts and photos. I then mapped the various actors and categorised them into broad 'cases' based on their relation to the project and the place. I then worked up from topics to themes, which involved more of an analytical step to establish links with the research questions and conceptual framework.

Notes helped to identify linkages between themes, processes, drivers, and the principle actors involved/implicated (see Plate 3.49). This also involved identifying centres of

power and asking questions, such as 'what strategies do actors employ to do what they do?' (Lofland *et al.*, 2006). This was an iterative and hermeneutic process that involved listening to participant voices by reading and rereading transcripts/field notes, listening to recordings, writing memos, creating concept maps and chronological sequences of events. It also involved revisiting the academic literature and seeing how my data spoke to it. 'The challenges of gathering high-quality qualitative data are numerous and substantial, but they can be addressed effectively, and thereby provide unparalleled opportunities to understand and document the complex undercurrents of sociospatial life'. (Herbert, 2016, p. 5431)

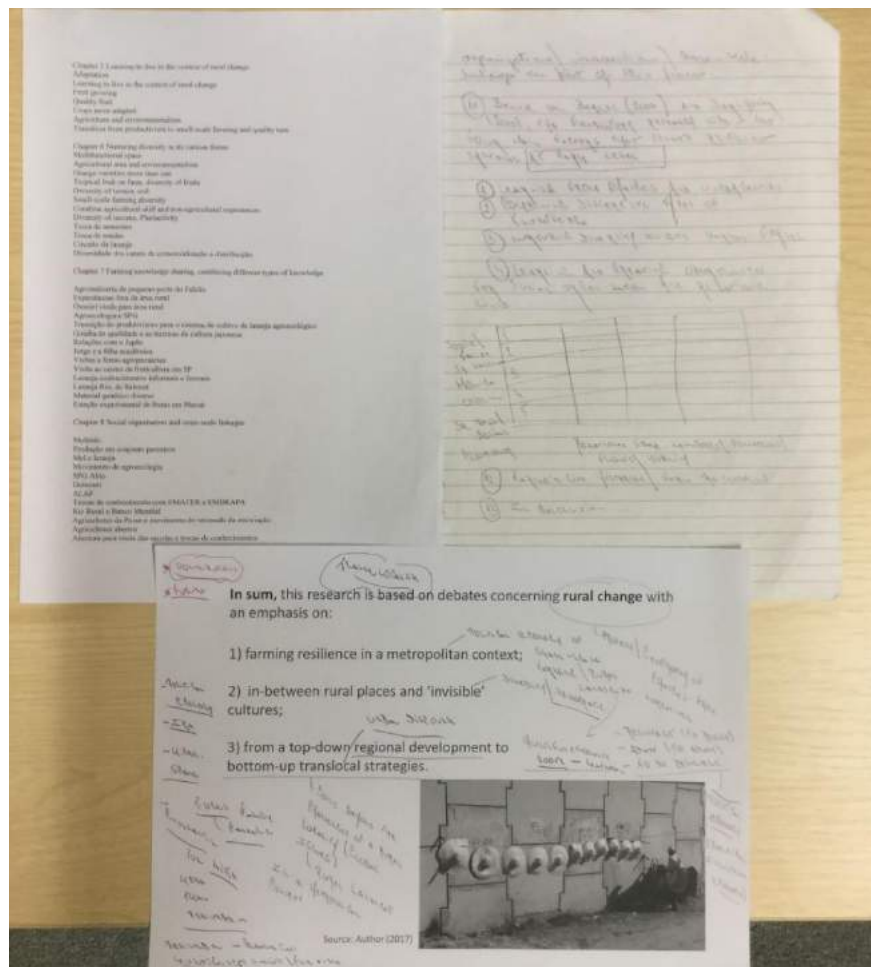


Plate 3.49. Coding and highlighting critical issues revealed from analysing process of interviews and field notes. Throughout the development of the thesis, I sought to establish connections between the case studies and multiple issues in the context of relational rural geographies. One of the challenges was to understand the meaning of rurality at the rural-urban interface of the metropolitan countryside in Greater Rio de Janeiro. (Source: Author, 2017)

3.5 Reflexivity, ethical issues and positionality

Over recent years, it has become increasingly important to emphasise ethical considerations in the conduct of research (Penslar, 1995; Hay and Foley, 1998; Hay, 2003; Cloke *et al.*, 2004). Methods demand the establishment and ongoing negotiation of social relationships for eliciting findings, and the quality of these relationships is critical to the research. Immersion in the field site generates particular ethical dilemmas for the participant observer around notions of intimacy, while also potentially increasing other ethical dilemmas facing qualitative researchers (Bosco and Moreno, 2009; Longhurst, 2009). Intimacy is central to research methods, evoked in the language of rapport, trust, and friendship. The ethnographic approach advocates developing close relationship with the researched to become accepted. This usually involves distinct, deliberate efforts by the researcher and sometimes ‘learning to act’ in certain ways to fit in. Reflexivity involves examining one’s own practice in order to gain new insights into research’ (Longhurst, 2009, p. 580).

Positionality describes a person’s position within the midst of complex, shifting and overlapping political, economic, cultural, social, sexual, gendered, and racialized processes. ‘How people are positioned in relation to various contexts of power affects the way they understand the world. Some geographers have argued that reflecting carefully on and declaring one’s positionality may lead to more sound research because it becomes apparent that all knowledge is partial’ (Longhurst, 2009, p. 580). Also ‘fundamentally, increased researcher reflexivity is part of a broader movement in geographical scholarship to break down the false objectivity projected by the researcher-subject relationship’ (Warshawsky, 2014, p. 160).

Since the ‘cultural turn’ in geography, scholars have become more concerned with issues of power, race, ethnicity, class, and gender as they relate to the researcher, subject, and their unequal relationship (Kobayashi, 1994; Crang, 2002; DeLyser *et al.* 2010). Chiswell and Wheeler (2016) highlighted that young researchers face a number of ethical and safety challenges during fieldwork in the rural and farming context and indicated the need to consider the impact of researcher positionality on the researcher, the participant and the overall research process. To obtain participant consent, several steps have been suggested by researchers. As Robson (2011) highlighted, four steps can be identified: 1. To explain what the research is about to participants; 2. To let them know they can have

time to think about participation; 3. To provide participants with a consent form; 4. To check and double-check with participants that they fully understand the research, their role in the study, and any implications it has for them.

The questions ethnographers ask always change during the research process, because a significant part of any study entails being sensitive to the political relationships and ethical responsibilities associated with framing, generating, co-creating, and representing knowledges. A large number of participants were involved in this project, including local stakeholders, regional decision-makers, conservation officers and professionals, public administration, academics and researchers. Among those actors, different values, customs, religions, knowledge levels, and power positions were implicated in the research process. Diverse participants and research methods made ethical issues a serious concern in every stage of this project.

A key problem is linked to the representativeness of individual/stakeholder groups interviewed, and issues related to power networks (powerful actors more likely to be heard) have to be considered throughout. Chiswell and Wheeler (2016) considered how the particularities of farmer interviews – including the geographical remoteness of many farm holdings, the strength of tradition in farm families and the male-dominated nature of the industry – pose a challenging prospect for the young researcher. First, to stay respectful towards participants is fundamental to the integrity of this research. In rural localities, relationships regarding power, family, and affinity are ubiquitous and close attention has to be paid as to how research affects these relations. For instance, farmers and non-farmers in the rural localities or small-scale farmers and actors involved with agribusiness hold unequal power positions, but all of them deserve equal respect. In addition, confidentiality and anonymity are basic rights for everyone, so in the whole process of the current research, the privacy of all participants was respected and any intrusion of their privacy was minimised. The researcher was sensitive to the rights and cultural context of the researched, as well as to their position within power relations.

Critical histories of geography began to take shape in the 1990s, drawing attention to imperialist expansion. ‘Geography as ‘the science of imperialism par excellence’ whose focus on ‘exploration, topographic and social survey, cartographic representation and regional inventory – the craft practices of the emerging geographical professional – were entirely suited to the colonial project’ (Livingstone, 1992, p. 170). In the field, ‘the ‘craft

practices' of geography became inextricably linked with the intellectual production of Empire as 'explorer- conquerors' travelled and evidenced a world that needs or is open to European expansion' (Griffiths, 2017, p. 4). These important reflections quite rightly emphasise the privilege I enjoy as a 'western' geographer. 'The imperative for western academics is to think through issues of postcoloniality, to recognise the privilege we carry and to consider our advantageous positions in the context of historical cleavages' (Griffiths , 2017, p. 5).

Ethnographers write descriptive, reflective and interpretive notes; create sketches and maps and formulate questions about the everyday geographies, emotions, social spaces, and material encounters in the setting being researched. The ethics of recording (through notes, video, audio tapes, and maps) remain heavily debated. Maintaining confidentiality is an effective way to protect the identity of participants. Researchers have an obligation to protect confidential information from participants. In this research, many are not aware of the importance of taking care of their own confidential information. For example, some stakeholders provided lots of private information, but information for long-term use was carefully selected. In reporting the project and further publications, personally identifiable information concerning participants of this research will not be disclosed.

The researcher informed the interviewees about all aspects of the investigation, and the interviewees gave their informed consent before any research began. The researcher was also open to questions that participants raised, giving opportunities for them to question any aspects of this study. These issues of research ethics, reflexivity and positionality are crucial to undertaking of the kinds of methodologies discussed in this chapter.

Due to my background personal interests, I entered the field with great enthusiasm for the projects that were taking place in the case study sites. Throughout the chapter, I highlighted my position as both a researcher and a person born in the city of Rio de Janeiro, who had an interest in the dynamics of agriculture. When I was a child, I usually went with my father to the street markets in our neighbourhood to buy fresh fruits and vegetables or even to the Agricultural Supply Centre in Rio de Janeiro, which is located a short distance from my parents' house. I remember going with my father on Saturdays to a small hounding near our residence in the suburb of Rio. From one moment to the next, this piece of land became a residential area and that small and hybrid fragment of land was converted for urban use. In those spaces in Rio de Janeiro, my father introduced

me to the diversity of agricultural products from different marketing scales in Rio City. A number of interesting methodological points arose during the research related to the negotiation of 'researcher' status (Merriam *et al*, 2001). These shall be detailed throughout the thesis to provide a reflexive exploration of the effects that I, as a researcher, had on the data collected.

The second dilemma concerns my role as an observer-participant. Farmers and the rural community would often witness me walking independently around the site, taking field notes, photographing the landscape and making recordings. This prompted enquiries about my study and, after recognising I was not a regional/local institutional representative, they would talk willingly and often at length. The more I explained what I was interested in, the more participants would open up and take an interest in my project – often kindly opening me up to new people to speak to, new areas to visit, and new lines of inquiry to pursue. The more detail I gave about my own life, the more participants shared about themselves. Farmers and rural community members were intrigued by my lifestyle choices, including living in the UK and doing a research in the area.

The third dilemma concerned how my assumptions about places were unsettled during the fieldwork. First impressions are often very telling in terms of expectations, including ideas about 'the rural'. Before starting to conduct fieldwork, I had a preconceived idea of small-scale farms in a peripheral metropolitan countryside, based on what I had read and heard. Despite once living in Rio de Janeiro, I had never been to Posse dos Coutinhos and assumed that it would be a fairly generic rural area. However, I remember being struck by the multiple geographies that emerged, with different aspects of agriculture at the rural-urban interface in Rio de Janeiro Metropolitan Area.

There has been an increasing self-awareness among geographers about how the politics of research are affected by the institutional and geographical positionality of academics (Jazeel and McFarlane, 2010; Jazeel, 2014). In geography, debates have arisen on the responsibility of academics to engage more actively with policy and politics (Massey, 2000, 2002; Dorling and Shaw, 2002), and the need for ethical and political engagement in research. This thesis argues that the analysis of resilience has policy relevant outcomes.

As Longhurst (2009) highlighted, the notion that knowledge is simply 'out there' waiting to be discovered has been challenged. Instead, knowledge is 'embodied', that is, it is made

by people who are situated within particular contexts. Knowledge can only ever be partial and situated (Haraway, 1988) and interviewers are implicated in the construction of meanings to the extent that the resulting data should be seen as essentially collaborative (Cloe *et al.*, 2004). Gender in particular is well recognised as influencing the power dynamics of a research situation (Logan and Huntley, 2001). Thus, the interplay between my positionalities as young, urban and male academic, born in Rio City, descendant of Portuguese (when Brazil was a country colonised for centuries by Portugal), and cultural context of the farming industry have a significant impact on how farmers react to me, and myself to them, in both the recruitment and conducting of the interview, thereby shaping the nature and outcome of the research process.

As Little (2002) highlighted, ideas of what it means to be a farmer are traditionally masculine and associated with stereotypical male attributes, which exclude and marginalise women. 'Farming identities are also imbued with particular cultural beliefs, values and practices associated with being a 'good farmer' that are likely to affect the way they interpret and respond to interview questions, particularly around farm management issues' (Chiswell and Wheeler, 2016, p. 231).

There are practical considerations associated with interviewing on farms, which 'are often located in remote areas distanced from major population centres and where mobile-phone signals are frequently weak or non-existent. This isolation gives rise to issues of physical safety for the lone researcher' (Chiswell and Wheeler, 2016, p. 230). The fact that unlike interviews in locations that are clearly demarcated, such as homes, workplaces or public spaces, the farm is a place where the lines between home and work are blurred (Gasson and Errington, 1993). 'This can shift or confuse what is considered acceptable participant behaviour, and equally affect the way in which the interviewer feels able to respond to certain situations in the participants' home, such as offers of hospitality or potentially threatening remarks' (Chiswell and Wheeler, 2016, p. 230).

Finally, to take this reflexive process on knowledge and positionality a little further, it is important to say that being broadly familiar with the case study areas helped my research pragmatically, in terms of knowing the basic geography of these areas, as well as local politics and cultural norms. Whilst at times this familiarity may have dulled my sensitivity to any extraordinary characteristics of the contexts I was working within (Laurier, 2003), I was constantly met with surprises because of the unique user groups at each site and

because I understood my fieldwork as a 'process of engagement' (Massey, 2003) or 'co-fabrication' (Whatmore, 2003).

3.6 Conclusions

This chapter set out a critical discussion of possible methodologies to assess farming resilience in the context of rural change in globalisation, highlighting that multiple method approaches that combine quantitative and qualitative approaches are probably best. For instance, research methods such as interviews, and textual analysis are useful in documenting and analysing social structures or individual experiences and relationships. Therefore, this research draws on multiple methods within the quantitative to qualitative realms or at its nexus and combines multiple and diverse data sources in new and innovative ways beyond the traditional approaches.

As Wilson (2012) emphasised, in some cases PhD research has been used by local teams to research one or several blocks of questions. A key problem is linked to the representativeness of individuals/stakeholder groups interviewed, and issues related to power networks have to be considered throughout. Therefore, I used the most appropriate methodologies to collect data, ranging from statistical information, interviews with key local representatives, and in-depth interviews. Being both a person from Rio and a rural geography advocate, I always took an interest in the nature of agriculture in my home city and around. It was very much this combination that prompted me to try to explore how small-scale farmers resist globalisation in a global metropolitan region.

The complexity of spatial restructuring over time in the metropolitan countryside of Rio de Janeiro was analysed in an attempt to better understand rural change by going beyond the view of inert rural spaces subject to external linear global forces. For this reason, I adopted a multidimensional approach and multiple methods to analyse the rural-urban interface of the metropolitan countryside by examining the interaction of both urban-global expansion and the social resilience context of different parts of the area through farming systems in the process of spatial change.

This chapter has presented a detailed evaluation of the methods employed in this research, highlighting the limitations and ethical issues associated with them. It has explained how the ethnographic approach that was taken is appropriate to the aim of the thesis, which

seeks to understand complex social issues and the social practices of the 'everyday' life. It has also attempted to understand the effect that I, as the researcher, have had on the data that were collected, especially with regard to the issue of 'insider status' and how this was negotiated during data collection. As with all methodologies, the research was not without its weaknesses, however these have been identified and were taken into account when analysing the findings. Despite the weaknesses, the ethnographic approach resulted in a wealth of rich data that revealed valuable insights into the experiences of farming communities in the metropolitan countryside of Rio de Janeiro.

Chapter 4. Rural change and globalisation in the Eastern of Rio de Janeiro Metropolis (and beyond)

4.1 Introduction

In the previous chapters, it was argued that we can conceptualise farming resilience in the metropolitan countryside of Rio de Janeiro in a global era by paying attention to how changes in agriculture over recent decades, at various spatial scales, including changes at regional and local level, develop at the community level. The thesis also argues that resilience theory provides a helpful lens for understanding rural changes and globalisation in the Brazilian context. This study has also seen that the major changes in agriculture go beyond the metropolitan countryside of Rio de Janeiro as part of geographical processes at various scales.

Building on the discussion of farming resilience and globalisation in Chapter 2, the aim of this chapter is twofold. First, it sets the wider context for Chapters 5-8 by identifying processes of rural change and major transitions in Brazilian agriculture over recent decades, including at the regional and local levels. This first section (section 4.2) will debate how these processes may help conceptualise rural change and farming resilience in Brazil. In contrast to more linear views of external influences in rural places, the research argues that rural communities and farmers possess resilience, which contributes to complex outcomes in the Brazilian metropolitan context and beyond.

Second, the chapter will discuss characteristics of rural change and farming systems Rio de Janeiro state and in the metropolitan countryside of Greater Rio in sections 4.3-4.5. The aim will particularly be to highlight the diversity and the complexity of the metropolitan countryside of Rio de Janeiro through contemporary debates of rural change as analysed in Chapter 2. The findings discussed in Chapters 5-8 suggest a rural space undergoing a process of change from its incorporation into metropolitan dynamics. It is a geographical space that reflects the challenges of sustainability and multifunctionality. Even in the face of external pressures resulting from the position of the metropolitan area within global rural-urban interactions, rural actors have responded through multidimensional and multidirectional trajectories. The countryside in Rio de Janeiro Metropolitan Region reveals diverse situations, including both resilient actors and actors vulnerable to the processes of rural change influenced by urban-industrial development, conflict of land use, and resource competition.

4.2 Rural change in Brazil: the diversity and the complexity of a transition economy

Brazilian agriculture began a process of induced modernisation to facilitate urban-industrial expansion. Since then, the farm sector has met demand for food, industrial raw materials and export products. Strong State intervention occurred through subsidised farm credit to change the technical basis of production through mechanisation, use of fertilisers, pesticides, herbicides, and selected seeds. The aim was to increase production to meet demand for both external and domestic urban markets. An important goal was to overcome food shortages, which caused price increases and pressured urban-industrial salaries (Silva, 1981).

The first Green Revolution in Brazil took the form of agricultural modernisation from the 1960s (Ricardo, 2011). As Gutberlet (1999) highlighted it consisted of increased reliance on fossil energy (e.g. mechanisation, chemical fertilisers, pesticides, and herbicides), large-scale irrigation, reduced labour during production, and increased consolidation of economic surplus (see Plates 4.1 and 4.2). Agricultural modernisation took place in Brazil causing an adjustment of farm production to modern industrial, commercial, financial and urban life standards. Basic food crop production for local markets was replaced by fully commercial production for non-local markets. By understanding the impact of such processes on rural space, several responses to the introduction of new technologies can be observed in the Brazilian countryside, which reflect not only farming dynamics and economic structure but also the organisation of the society it serves.



Plate 4.1. Equipment for large agricultural production area at an agribusiness fair in Dourados, Mato Grosso do Sul state, one of the main areas of soybean production in Brazil. (Source: Author, 2012)



Plate 4.2. Large farmers invest capital into farm infrastructure improvements to reach high levels of productivity. Silos for storage of soybeans in Maracaju, Mato Grosso do Sul state. (Source: Author, 2012)

This chapter also focuses on rural change in Brazil and points out that small-scale-based agriculture's social legitimacy and capacity for political action have significantly increased since 1980s. Organisations and social movements associated with rural areas have gained prominence on the national political scene, contributing effectively to the emergence of a fruitful debate on rural development in Brazil. The new wave of rural development policies has only been running for a short time, so the results of these policies have yet to be properly evaluated. There is a critical shortage of empirical studies about the role of stakeholders in the development and management of policies, new forms of ownership of resources and the newly emerging relations of power and domination (Schneider *et al.*, 2010).

Since the late 1980s, some sectors of Brazil have experienced an ongoing political process of democratisation, which has been accompanied by significant reductions in social inequalities. A framework of economic growth with income distribution was established at the end of the 1990s. This began to foster new pathways for interactions between rural and urban areas, creating new market opportunities for social groups, such as small-scale family farmers, that had historically been marginalised. Schneider *et al.* (2010) explored some of these policies and social processes and emphasised how they contributed to reduced income inequalities and improvements in access to land and credit for production. One can argue that these positive results are due both to state intervention and to social actors who have played a fundamental role in constructing new mechanisms for accessing existing markets and creating new ones.

A new definition and perception of rural development started in Brazil in the late 1980s, closely related to the country's return to democracy. The economic crisis of the early 1980s had left deep scars that triggered awareness that macro-economic stabilisation, re-democratisation and opening up to the outside world were the key challenges facing the country. 'Economic stabilisation created room for debate on the country's future development prospects. Many innovative proposals emerged, many providing new perspectives on rural development. At the same time, the New Federal Constitution of 1988 created new legal frameworks' (Schneider *et al.*, 2010, p. 228).

The social impact of this process was changes in work relations and the urbanisation of the countryside (Silva, 1981). Modern agriculture reduced the need for large numbers of non-contracted farm workers, who historically had been linked to rural settlement through

the practice of extensive production methods. Rural exodus occurred and small and medium-sized cities grew as shantytowns expanded around their periphery. Where rural capitalisation took place more intensively, urban areas also received new industries. Within this context, the modernisation of agriculture, which implies the adoption of new technologies requiring capital, provoked both social and regional inequalities (see Plates 4.3 and 4.4).



Plate 4.3. House of a low-income farmer in the rural periphery of Rio de Janeiro Metropolitan Region. Agricultural areas with low productivity level (as compared to high agricultural production areas for the global market) may reveal a multidirectional agrarian history and regional contrasts in the context of the Brazilian countryside(s). (Source: Author, 2017)



Plate 4.4. Small-scale farmer shows diseases and pests affecting his fruit trees and income in recent years. Major agricultural diseases and pests generally begin in areas of intensive

production, and then spread to other agricultural areas, affecting low-income farmers. (Source: Author, 2017)

Recent research on the integration of peasants and family farmers into dominant economic systems in both developed and developing countries has revealed that such interactions generate both productive differentiation and social heterogeneity in rural spaces. Therefore, by understanding the local and regional dynamics of the integration of family farming in economic processes, it is possible to broadly comprehend changes and development in the rural world.

Adopting an ‘actor-oriented approach’ (Long, 2001; Long and van der Ploeg, 1994) combined with a ‘livelihoods diversification perspective’ (Ellis, 2000; Scoones, 2009), Schneider and Niederle (2010) discussed the emergence of a new set of strategies among small-scale family farmers in Southern Brazil reacted against green revolution policies - consolidated the skills of local farmers in soybean cultivation, at the same time increasing their dependence on resources controlled by agro-industrial companies, banks, and agricultural cooperatives (Conterato, 2008; Niederle, 2007). This is an area of Brazil most affected by technological changes in agriculture since the 1970s. Such strategies involve innovations in labour and production, and a common denominator among such strategies is the search for ‘autonomy’ in a context of increasing social vulnerability. In this context, farmers have built livelihood diversification strategies (e.g. pluriactivity, alternative markets and networks), which indicate the emergence of new forms of resistance based on a wide and heterogeneous set of farming practices (Schneider *et al.*, 2010; Bicalho and Machado, 2013; Bicalho and Feres, 2014).

Rural development in peri-urban areas around the urban-rural interface, normally come under the control of the urban authorities concerned. Given their hybrid character, planning for their development also requires a hybrid approach that draws upon both urban and rural planning experience. In practice, urban and rural planning have differing perspectives and practices and there has been little overlap or communication between the two. Clearly, the time has come to bridge the gap and to recognise the potential for studies at the rural-urban interface in the Brazilian context.

There are nine large metropolitan regions in Brazil, corresponding to the most important state capitals, many located along the Atlantic seaboard, which together contain almost a third of the national population. However, significant metropolitan agriculture based on

vegetable and fruit farming for the urban market is only present near the state capitals of the industrialised Southeast and South regions, especially the two largest, São Paulo and Rio de Janeiro. These two centres have a combined population of more than 33 million, more than half of Brazil's total metropolitan population, and over 16% of the national population (Table 4.1). The industrialisation of Brazil after 1950 was highly concentrated in the largest metropolitan regions until 1990, where rural peripheries were pressured by intense competition for land from urban-industrial uses. Rural areas were progressively displaced but some rural actors remained behind and became urban-rural actors.

Table 4.1. Population in the principal metropolitan regions of Brazil, 1991, 2010, 2016. Source of data: Brazilian Institute of Geography and Statistics, IBGE (1991, 2010, 2016)

Metropolitan areas	Population 1991		Population 2010		Population 2016	
	(inhabitants)	%	(inhabitant)	%	(inhabitant)	%
São Paulo	16,567,317	34.8	19,683,975	34.5	21,242,939	34.5
Rio de Janeiro	10,389,441	21.8	11,835,708	20.7	12,330,186	20.0
Belo Horizonte	4,620,624	9.7	5,414,701	9.5	5,873,841	9.5
Porto Alegre	3,757,500	7.9	3,958,985	6.9	4,276,475	7.0
Fortaleza	2,344,560	4.9	3,615,767	6.3	4,019,213	6.5
Salvador	3,109,034	6.5	3,573,973	6.3	3,984,583	6.5
Recife	2,906,454	6.1	3,690,547	6.5	3,940,456	6.4
Curitiba	2,319,526	4.9	3,174,201	5.6	3,537,894	5.7
Belém	1,620,564	3.4	2,101,883	3.7	2,422,481	3.9
Total Metro	47,635,020	100.0	57,049,740	100.0	61,628,068	100.0
Total Brazil	146,825,475	32.4	190,755,799	29.9	206,081,432	29.9

Over the past twenty years, new forms of global development have promoted economic restructuring and decentralisation in Brazil, resulting in the relocation of industry and other activities previously undertaken in metropolitan regions. These have been relocated to rural hinterlands or rural areas further away from the centre, bringing an expanding area under the influence of urban and global forces.

Brazilian farming systems face a range of social, environmental, economic and political disturbances and changes, such as market fluctuations (Delgado, 2012), climate change (Assad *et al.*, 2013), technology (Ioris, 2016), and modification of governance structures (Caldeira, 2008; Wittman, 2009), each operating at a range of scales. A broader view of resilience is needed to ensure a sustainable small-scale agricultural sector in Brazil which can develop farmer capacities and adapt farming systems to changing circumstances and

to transform their agricultural models in order to maintain the long-term supply of food and public goods. This study seeks to understand whether governance arrangements and learning capacities effectively enhance the sustainability and resilience of small-scale farming systems in a metropolitan context.

4.3 Rio de Janeiro state in the era of colonialisation and globalisation

Building on above discussion of rural change in Brazil in the context of globalisation, this section examines rural change in Rio de Janeiro state. The complexity and richness of its history, provides an excellent laboratory for analysing structural changes which are redefining agrarian spatial organisation in regions where new forms of rural-urban interaction emerge.

Rio de Janeiro City, one of Brazil's main port and military centres, became the Capital of the Portuguese Colony in 1763; seat of the Portuguese Empire between 1808 and 1822; Capital of the Empire of Brazil (1822 to 1889); Capital of the Republic, from 1889 to 1960, and was the country's cultural and financial centre until the 1960. As a result, it became a privileged location for public and private companies, operating in Brazil and others Latin American countries. It also allowed Rio de Janeiro to occupy a prominent position in debates and research on the country and the world, though less attention was devoted until recently to regional issues.

European colonisation formed a major tipping point in the region's socio-ecological system. In colonial times, Rio City became the major shipping port in the Southeast of the Portuguese colony, where brazilwood (*Paubrasilia echinata*), sugarcane, coffee, and minerals from Minas Gerais were transported to Europe (Dean, 1995). With the establishment of plantation economies, the supply of workforce could not keep pace with growing demand for labour on the plantations (see Plate 4.5). According to Lamego (1964):

‘Sugarcane plantation dominated the contours of Guanabara Bay, transforming the landscape. Sugarcane was acclimatised in the marshy environment, unfolding, in the Baixada Fluminense¹, covering the area until Parati. The sugar economy raised the city itself and developed it two centuries before the Minas Gerais trade [precious metals exploration]’ (Lamego, 1964 (1948), p. 230).

When the plantation economy collapsed in the late nineteenth century, former plantations were successively transformed into pastureland and small-scale agriculture, which continue to dominate land-use in the region. The agricultural and infrastructural development of Rio de Janeiro state was driven by an active immigration policy in the early twentieth century, mainly attracting European and Asian migrants (Galvão, 1959; Corrêa, 1962). At the same time, urbanisation processes in the metropolis increased, leading to growing demand for resources and agricultural products, land-use intensification, and the expansion of intensive farming systems. These processes have created visible impacts in the landscape: highly fragmented secondary forests and severe soil erosion, as well as polluted rivers and other forms of land and water degradation.

Severe economic crises in Rio’s coffee and sugar cane production in the twentieth century, and the ongoing migration of rural workers into the city-region have led to a further concentration of industrial and domestic jobs in and around Rio (Abreu, 1987, 1992). Additionally, the progressive degradation of pasture and arable land caused by unsustainable and inappropriate land use has made the livelihood of small-scale farmers complicated and again pushed sections of the young generation to migrate to Rio de Janeiro metropolis.

¹ According to the ‘Historical Dictionary of Brazil’ by Levine (1979), Baixada Fluminense is delimited by the coastal lowlands interrupted only by low rounded hills and isolated hillocks, one of the colony’s principal population centres, and the location of the settlements in an around Rio de Janeiro.

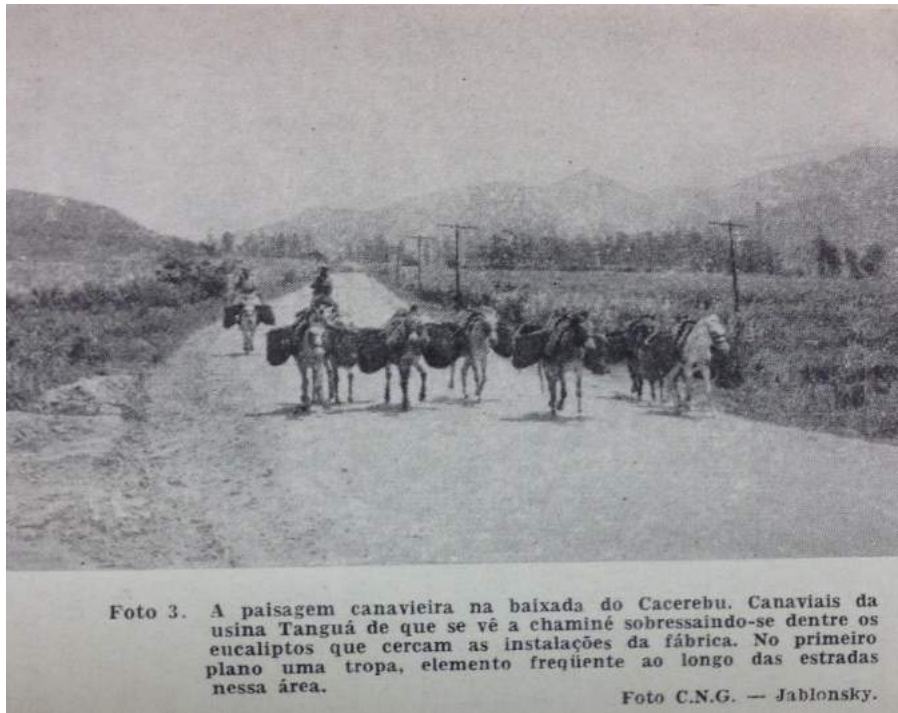


Plate 4.5. Sugarcane system landscape in the rural periphery of Rio de Janeiro. The historical land exploitation and intensive land use practices have left visible impacts in the landscape: highly fragmented secondary forests and severe soil erosion. (Source: Bernardes and Soares, 1987)

Rio de Janeiro state has several characteristics that distinguish it from the other Brazilian states; most notably, it is the Federation unit with the highest degree of polarisation of economic activities and population in the metropolitan region. This concentration is related to the fact that, even though Brasília replaced Rio de Janeiro as the national capital in 1960, the city has remained one of the country's (and South America's) economic and cultural hubs. The city's importance is also reflected in its rapid population growth. Rio City's population exceeded one million by 1920, and reached 3.3 million in 1960, 5.2 million in 1980, and an estimated 6.5 million in 2016 (IBGE, 2016). This growth has, however, been accompanied by segregation and suburbanisation processes with a continuous growth of marginal settlements.

Rio de Janeiro state has also undergone changes in the spatial organisation and planning of its territory in recent decades. Oliveira (2006, 2008) discusses the main economic changes that have occurred, in particular, economic processes that have promoted spatial displacements of activities and expressed new strategies for locating public and private companies and activities that imply new dynamics of population mobility and organisation of labour markets. According to Oliveira (2006, 2008), these spatial changes indicate a new regionalisation of the Rio de Janeiro state economy as an expression of its

insertion into the global economy. This perspective recognises that the economic base of Rio de Janeiro is no longer synonymous with the metropolitan region and the emergence of some industrial segments whose main orientation lies beyond the polarised nucleus of the city-region.

Although there is a trend of decentralisation among the industrial and service sectors in Rio de Janeiro state, the metropolitan region continues to generate the majority of urban-industrial employment. Although the metropolitan nucleus no longer attracts some types of industrial units, in its periphery, already benefitting by energy and communication networks, highways, railways and ports, both traditional industrial activities and technological companies of different sizes demand significant amounts of labour. This expansion of the metropolis is followed by municipal, state and federal public initiatives, as well as private, real estate and productive investments that have reinforced ongoing spatial changes.

As Brazil is characterised by diverse social-historic realities, areas of old settlement and internal frontiers responded differently to restructuring. As Becker (1991) argued many new frontier areas are created with a 'modern' orientation, i.e. they are integrated to a global capitalist logic of continuously searching for higher profits, oscillating between supplying international markets and supplying domestic industrial and food needs. Thus, the agrarian frontier has become entangled in the dynamics of wider national and regional restructuring in which technology and information are the privileged locus for reproducing capital on local, national and international scales.

Alongside structural changes in the Brazilian countryside, change has also taken place in rural-urban relationships, both in frontier regions and regions of older settlement. Within Brazil, urbanisation can also no longer be considered only in terms of spatial and population growth. The capacity of broadcasting through telecommunication and other networks has also disseminated lifestyles and consuming patterns typical of urban space throughout traditionally rural areas.

Even the internal frontier has seen the introduction of ways of thinking, acting, managing, producing and consuming previously considered to be specific to cities. The frontier also cannot be properly understood without taking into account the restructuring of regions of old settlement. In the latter, a higher or lower degree of dynamism can be observed in

productive restructuring in response to globalisation processes. Regions of consolidated occupation are heterogeneous because of the different actions and strategies used by actors from diverse backgrounds in response to technological innovations entering the countryside.

In consolidated regions, enclaves of development can be considered as dynamic internal frontiers and analysing these areas allows visualisation of the performance of different actors involved in processes associated with the rise of local spatial structures. In these enclaves: i) the State acts both through national farm policy and public-sector research and rural technical assistance and extension, inducing farmers to improve methods; ii) large private enterprises play a role in encouraging higher quality products; and iii) rural entrepreneurs introduce new technologies and rural innovation (Becker and Egler, 1992).

Located in Southeast Brazil, the industrial centre of the country, with high degrees of metropolisation, Rio de Janeiro state is different from the other states of this region due to the low performance of its agribusiness sector, especially when compared to São Paulo state. In the latter, an extensive network of research and technical assistance has integrated the greater part of productive farm-land to new demands of an urban-industrial economy, so that São Paulo has the highest level of rural modernisation in Brazil. Contrasting with this scenario, rural Rio is characterised by low-level use of new technologies and weak integration to modern sectors of the Brazilian agricultural economy as can be seen through the continued importance of traditional farm products (see Plate 4.6).



Plate 4.6. Traditional method of preparation of cassava flour in the rural community of Faraó, Cachoeiras de Macacu. The wood structure works through a water wheel. (Source: Author, 2013)

State incentives for rural modernisation have marginalised a large part of Brazilian older settlement rural areas, including Rio de Janeiro. The kind of farm modernisation which took place in São Paulo and the Central Plateau has proven inappropriate to Rio de Janeiro. The topography of Rio de Janeiro is composed of mountains and irregular plateaus, which limit the use of large machinery. Degraded soil (see Plates 4.7) and the high cost of its remediation, restricted capital resources and the lack of rural labour due to intense rural-urban and regional migration have also contributed to its peripheral condition (Galvão, 2009).



Plate 4.7. For centuries the economy in Tanguá and most of the rural periphery of Rio, was based on sugarcane, cassava, corn, beans, and cassava flour. The result of intensive cultivation is a landscape of few forest fragments and degraded soil. (Source: Author, 2017)

Today, small-scale farming prevalent in Rio de Janeiro faces socio-economic and ecological challenges. Farmers in Rio cannot compete with the large-scale agriculture from agribusiness areas; on the other hand, pasture degradation leads to a loss of farmland and reduced soil productivity. At the same time, weather and climate extremes have affected more vulnerable regions. Based on land use change analysis from 1991 to 2013, Castro *et al.* (2018) showed that this trend of socio-economic and ecological challenges is already in progress, particularly in northern parts of the state. From an ecological point of view, however, there are also opportunities, for example through the expansion of agroforestry systems and restoration of degraded lands.

It is in such rural spaces that new strategies to reverse this process have emerged. These strategies are represented by new ways of managing resources and innovations, which are changing the local state farming sector. These innovations represent a reaction to the process of decapitalisation experienced by farmers and simultaneously to a set of alternatives for transforming traditional agrarian activities in Rio de Janeiro state.

The implementation and expansion of such innovations are linked to both the natural condition of the state and farm policy for expanding production and diversifying activities. Within such a context, and as discussed in Chapters 5-8, it is through the action

of certain social actors in introducing innovation that new forms, movements and social relations emerge in rural space. At this moment, the role of an innovator gains vital importance in turning a promising activity into successful reality. These represent a new articulation of demands imposed by the global economy.

A discussion of different productive paradigms is necessary because intensified modernisation of Brazilian agriculture is based essentially on agro-chemicals and the intensive use of machinery, and has ignored the search for alternative farming activities based on rural-urban interactions. Global processes produce differences in farming systems and multifunctional agriculture in Brazil. Variation also occurs within regions, exemplified by rural-urban complexity observed across the peripheral countryside of Rio de Janeiro Metropolis, where land use, economic and environmental policies generate conflicts (Bicalho, 1992; Bicalho and Machado, 2013). As the metropolitan region expanded outwards land prices increased, productive strategies changed, family members and workers left to work in non-agricultural sectors and farmland was lost to urban sprawl and nature reserves.

Against a linear view of external interferences in rural places, the research argues that rural communities possess resilience (see Chapters 5-9), which contributes to complex outcomes in metropolitan regions and their countryside. Different types of knowledge, organisations, innovations and cross-scale linkages are part of this process in which rural actors are proactive in the face of change (Wilson, 2008b, 2010; Darnhofer, 2010, 2014; Darnhofer *et al.*, 2016). This resilience is often made possible by differences between rural processes present in Brazilian metropolitan regions and their countryside and those in agricultural regions more distant from, and less affected by, large urban centres.

4.4 Rural change in global era: evidence from Eastern Greater Rio de Janeiro

In the second half of the 19th century, Rio de Janeiro City had a population of about 300,000, in contrast to São Paulo, which had around 30,000 residents. Although Rio de Janeiro shows a continuous decline relative to São Paulo during the twentieth century, and in particular between the 1920s and 1960s, the dynamics of Rio de Janeiro's population reflect its privileged position as the seat of the former Federal District and centre of political power, which ensured that it continued to attract investment. The former Rio de Janeiro state, which Bernardes (1964) considered was a region polarised

by the city of Rio de Janeiro from an economic point of view, was a priority scenario for federal investments. By hosting the Companhia Siderúrgica Nacional (National Steel Company)², Fábrica Nacional de Motores (National Motor Company), Duque de Caxias Refinery and Companhia Nacional de Alcalis (National Alkalis Company), where investment location decisions were based on proximity to the Federal Capital, also mirrored dominant thinking in the central government, which, at the time, encouraged a counterpoint to the economic dominance of São Paulo.

Thus, economic indicators for the states and regions of Brazil show that the dynamics of Rio de Janeiro state remained close to the national average until the 1960s, with average GDP growth of 6.6% per year, compared with 6.7% for the Southeast region 7.1% for Brazil as a whole. This trajectory, observed between 1940 and 1960, is consistent with demographic changes, during the same period of 85.8% in the city and Rio de Janeiro state, compared with than 80.7% in São Paulo state. In the Southeast and Brazil as a whole, population growth was 69.3% and 72.2%, respectively (Caderno Metropolitano, 2017).

This evolution resulted from intensive migration to Rio City resulting from the factors identified above. However, this migratory flow occurred not just in Rio City, but also its peripheral areas. In Duque de Caxias, a municipality of Baixada Fluminense closest to the centre of Rio de Janeiro, population grew from 29,613 to 243,619 between 1940 and 1960. Nova Iguaçu increased from 29,859 to 181,440 inhabitants, an increase of 507.8%, while São João de Meriti expanded from 39,569 to 191,734 inhabitants, a percentage growth of 384.6%. São Gonçalo, on the other hand, evolved from 85,521 to 247,754 inhabitants, a percentage growth of 189.7%. In the municipalities that comprise the Baixada Fluminense and São Gonçalo, demographic indices show a growth of 362.7%. Similarly, the periphery of the Rio de Janeiro Metropolitan Region had a population growth of 224.3% percentage points, against growth in the Southeast Region of 69.3% (Caderno Metropolitano, 2017). In summary, between the 1940s and the present, Rio metropolis has presented a significant expansion, enlarging, and making a complex and hierarchical structure of urban centres.

² The national steel enterprise, establishes in 1941, and the administrator of the steel works at Volta Redonda, on the banks of the Paraíba river in Rio de Janeiro state, installed (with United States financing in part, in return for Brazil's support during the war) in 1946 (Levine, 1979).

In Rio de Janeiro, new industrial and petroleum complexes were installed in the metropolitan region and further out in the rural periphery (Becker and Egler, 1992; Randolph, 2011). These have benefited public and private energy, housing, transport and telecommunications infrastructure in rural areas but have also exerted less beneficial impacts. During this period, increasing competition from industrial, residential and environmental functions for land presented both opportunities and conflict for rural activities and so create a mosaic of diversified land use in both inner and outer metropolitan space (Bicalho, 1992, Silva, 1995; Wilkinson *et al.*, 2011; Bicalho and Machado, 2013).

The city of Niterói lies on the opposite side of Guanabara Bay in the metropolitan region (see Figure 3.1). In 2016, it had an urban population of nearly 500,000 and an overall conurbation population of around 1.5 million when combined with nearby São Gonçalo (IBGE, 2016). Until 1960, Niterói was the capital of Rio de Janeiro state³ when the city of Rio de Janeiro was the federal capital of Brazil. After 1960, it became the capital of Guanabara state. In 1975, the two states were merged with the capital in Rio de Janeiro. Before then, when it was a state capital, Niterói had a number of public institutions and maintained intimate ties with the municipalities located near it.

Urban expansion on this side of the bay and the north coast emanates from Niterói and, in recent years, has been intense due to the oil boom. The current spatial configuration of the Metropolitan Area of Rio de Janeiro seems to follow a double movement: consolidation of the metropolitan space and changes in the periphery of the metropolitan region, where the phenomenon of ‘metropolisation’ transfers issues of rural-urban competition and interaction to new peripheries (see Plate 4.8). For instance, Cachoeiras de Macacu municipality previously lay outside the metropolitan dynamic but has recently become incorporated into metropolisation processes that have impacted on its rural spaces. This municipality and Rio Bonito municipality have been part of Rio de Janeiro Metropolitan Area since December of 2013.

³ From 1889 to 1975, the state lying across from the city of Rio de Janeiro, which was variously the Federal District and, after the early 1960’s, the state of Guanabara. In 1975, facilitated by the construction of a bridge between Rio and Niterói across Guanabara Bay, the city and state were merged into the larger state of Rio de Janeiro (Levine, 1979).



Plate 4.8. Second homes for urban middle class are built on land that previously produced vegetables in a river valley with fertile soil. Rural locality of Faraó, Cachoeiras de Macacu. (Source: Author, 2012)

Most of Brazil's petroleum deposits have been discovered offshore in deep water close to Rio de Janeiro state and have required major investment in extraction, transport, processing, refining and administration. In response, residential development has expanded up the north coast to reach the city of Macaé, where offshore exploration operations are based. Construction of oil drilling platforms and other support craft has rejuvenated the harbour at Niterói, while a new petrochemical complex (COMPERJ) is under construction in the neighbouring municipality Itaboraí. Before this development, the nearby municipalities had an agricultural-based economy with relatively basic services. Some employment also existed in providing auxiliary services to travellers on BR-101, the main highway connecting Rio de Janeiro to the north of the state and other states. For other needs, these municipalities depended on Niterói or Rio de Janeiro.

The petrochemical complex has transformed local economies on the opposite side of Guanabara Bay. In addition to the refinery, auxiliary industries have emerged to service the various sub-processes of the new complex. This development created considerable employment in construction, industry, commerce and services that have affected resilience processes of the local community and the vulnerability of small-scale farmers. In-migration surged and the metropolitan region expanded outward creating new urban

peripheries (Randolph, 2011). However, this pressure has declined since 2015. In the wake of the worst economic crisis in Brazilian history, the construction of the refinery was suspended and may take years to be completed.

The Petrochemical Complex of Rio de Janeiro (COMPERJ) represented an investment of around US\$ 8.4 billion, making it Petrobras' largest single enterprise and one of the largest in the world. This project became the heart of a large industrial park, which intended to transform the region's industrial, economic and environmental features. The complex has been built in the municipalities of Itaboraí (petrochemical units) and São Gonçalo (Liquid products drainage centre) in the Rio de Janeiro metropolitan region. The logistical positioning - the proximity of the Port of Itaguaí, the Angra dos Reis terminals, the islands of d'Água and Redonda and the Metropolitan Highway of Rio de Janeiro - and the proximity to purchasers of oil-related products, such as the Duque de Caxias Refinery and the plants of Rio Polímeros, Suzano and Petrobras Research and Development Centre. The Region of Direct Influence now incorporate seven municipalities: Cachoeiras de Macacu, Guapimirim, Itaboraí, Magé, Rio Bonito, São Gonçalo and Tanguá.

Petrobras started the construction of COMPERJ in March 2008. However, since the launch of 'Operação Lava Jato' (Operation Car Wash, an ongoing criminal investigation by the Federal Police of Brazil and one of the largest corruption scandals in the history of Latin America) which led to the imprisonment of some Petrobras directors, the oil-petrol complex project became paralysed (see Plate 4.9), and Petrobras is prioritising other investments.



Plate 4.9. The Court of Audit of the Union (TCU) estimates that the Petrochemical Complex of Rio de Janeiro (COMPERJ) generated a loss of U\$ 12.5 billion to Petrobras. According to the Court, this was caused by ‘reckless management’ of the administrators of the state company that approved the construction even it proved to be ‘economically unfeasible.’ (Source: Márcio Fernandes/Estadão)

Some Petrobras sub-contracted companies and contractors have either failed or closed, and many investments in the region (e.g. engineering companies, hotels, shops and other businesses) have few activities (see Plate 4.10). The prices of real estate, products and services, which had been inflated, returned to normal market values. A round of bids for foreign companies to reassume the project began in 2017 (G1, 2017) and in October 2018. Petrobras signed an agreement with China's CNODC, a subsidiary of CNPC (China National Petroleum Corporation), to complete the construction of the COMPERJ refinery (see Plate 4.11). The new agreement provides for the creation of a new joint-venture company in which Petrobras will have an 80% share and CNPC the remaining 20% (O Globo, 2018). The agreement also goes beyond the oil-petrol refining project and will create another joint venture for oil exploration and production in Campos. Under the agreement, Chinese entrepreneurs will have 20% of the concessions of the fields of Marlim, Voador, Marlim Sul and Marlim Leste, areas of oil and natural gas exploration in deep waters of the Campos Basin.



Plate 4.10. Petrobras started building COMPERJ in 2008, bringing a regional development project and employment to the region. Over 30,000 were employed at COMPERJ at the peak of construction. In 2014, corruption investigation indicted over 100 top politicians and business executives, and projects suspected of harbouring corrupt activities were halted. Engineering companies, hotels, shops and other businesses in Itaboraí also suffered impacts. (Source: Author, 2017)

During the peak of land speculation, rural dynamics were directly affected and lost land to industrial sites and transport facilities near the complex, and to housing subdivisions and weekend homes for middle-class families from Niterói and Rio de Janeiro. However, these transformations also created demand for produce and conditions for access to new technical and management methods so that new dynamics arose amid conflict and rural actors have creatively adapted to the new situation by deepening multifunctionality (see Chapters 5-8).

These processes of change in the metropolitan countryside of Rio de Janeiro have produced a mosaic of farming systems and multifunctional agricultural and non-agricultural activities that have created rural-urban complexity across this area. Land use,

economic and environmental policies have generated conflict between older and new actors, impacting land prices, productive strategies, availability of farm labour, the loss of family members and workers to non-agricultural sectors and the loss of farm-land to urbanisation and industrialisation. At the same time, these forces have induced rural development and adaptation. As a result, in parts of the Rio de Janeiro metropolitan region, it is common to encounter not just urban conversion but also contested countryside, where rural actors resist and adapt to urban encroachment.

Petrobras convida só estrangeiros para licitação de obras no Comperj

Empresas brasileiras ficaram de fora devido aos desdobramentos da Lava Jato. Obra era da Queiroz Galvão, mas foi paralisada em 2015 e será retomada.

Por Daniel Silveira, G1 — Rio de Janeiro
11/01/2017 13h20 · Atualizado há 2 anos



Chineses terão 20% da refinaria do Comperj, diz Petrobras

Petroleira faz parceria também para exploração em campos da área de Marlin

Bruno Rosa
16/10/2018 - 08:48 / Atualizado em 16/10/2018 - 17:04



Prédio da Petrobras no Centro do Rio de Janeiro Foto: Mauro Pimentel / AFP

Plate 4.11. Two news items from media platforms in Brazil: ‘Petrobras invites only foreigners to bid the construction of the COMPERJ’ (G1, 11 January 2017) and ‘Chineses will have 20% of the COMPERJ refinery’ (O Globo, 16 October 2018).

In recent research, a number of small and medium-sized farmers in the outer zone of Rio de Janeiro Metropolitan Area were found to be adapting well to urban encroachment by adopting more lucrative activities and investing in new ways of marketing produce. The farmers have been able to resist conversion by elaborating flexible strategies of capitalisation adapted to their financial resources (Machado, 2013). National policies to

strengthen family farming have the aim of combating rural out-migration and the conversion of rural areas into urban areas. This, together with the initiatives undertaken by pro-active farmers requires more creative municipal government. The traditionally rural municipalities of the outer metro region have urban, rural and rural-urban transition zones that are not easily modified and require greater political negotiation between farmers organised in social movements and different levels of government (see Chapter 8).

Municipal planners do not have a free hand to zone land any way they please and Municipal Development Plans must conform to external political decisions taken at the federal level. In the case of the federal agrarian reform projects, it is difficult to rezone land as urban, which in this case works in favour of rural actors. The construction of the COMPERJ oil refinery presents an opposite case which went against the interests of local actors. The State oil consortium Petrobras exercised great influence over municipal administrations by pressuring them to convert land to industrial use. These problems are all evident in the Municipal Development Plan of the Cachoeiras de Macacu located nearby (Prefeitura Municipal de Cachoeiras de Macacu, 2006, 2011).

Brazil is a diverse country but the Atlantic Forest biome stands out for its high rates of endemism: out of twenty thousand plant species, approximately 8,000 are endemic. This corresponds to 2.7% of the worldwide number of vegetal species and makes the Atlantic Forest the fourth most important of the world's internationally recognised 25 hotspots (Myers *et al.*, 2000). However, the Atlantic Forest has been reduced to 7.26 per cent of its original area (SOS Atlantic Forest Foundation and National Institute for Space Research, 2008). For example, 'the Rio de Janeiro state is characterised by a historically strong human intervention, which has caused a lot of damage to this biome: it is estimated that, in 2000, the Atlantic Forest area merely corresponded to 16.73 per cent of the state' (Carneiro and da-Silva-Rosa, 2011, p. 3).

The Três Picos State Park located in the Rio de Janeiro Metropolitan Area and its periphery is the biggest one in Rio de Janeiro state (46.600 ha). It is considered of great ecological interest for having rare and endemic species, but also because it protects springs that are extremely important for the Guanabara Bay basin. It is an integral protection area which only allows indirect use of its natural resources for activities such as scientific research and tourism. Contrarily, it is a sustainable use unit that allows the

development of economic activities by the local population despite being subject to restrictions.

It is also important to notice that the establishment of a conservation area has an impact on its surrounding buffer zone area, where human activity is subjected to specific norms and restrictions to minimise negative impacts on the unit. The region is mainly involved with the production of vegetables, fruits, and farm products, because of its proximity to Rio de Janeiro City. Therefore, the implementation of these conservation measures can cause conflicts between the various interests of local actors, particularly between the public bodies and the local actors (see Plate 4.12).



Plate 4.12. Banana production on the hill and Atlantic Forest biome. Rural locality of Faraó, Cachoeiras de Macacu. (Source: Author, 2012)

In Cachoeiras de Macacu municipality (one of the level-3 case study communities) located just north of the COMPERJ petrochemical complex, the previous type of agriculture practised was no different from that encountered elsewhere on the Guanabara Plain. The municipality has a history of smallholders producing basic food stuffs and being benefited by agrarian reform projects. The oldest project is Papucaia, which dates from the 1950s, and a number of other projects were set up during the 1960s, 1980s, and 1990s. In fact, this municipality was the one that most benefited from agrarian reform projects in the metropolitan area and involved 1,499 families farming an area of 27,762

hectares. Farmers are still there today and constitute the vast majority of rural producers in the municipality. In 2010, a new project was set up for 161 families on 471 hectares and the projects still have capacity for more families (INCRA cited in Castro, 2005; INCRA, 2016).

In the past, this outer peri-metropolitan area suffered less urban pressure because Niterói grew slower than Rio de Janeiro. A first surge of urban expansion occurred in the 1970s with the construction of the Rio-Niterói Bridge spanning Guanabara Bay (see Plate 4.13), which connected the two cities and shortened the distance to the north of the state (Silva, 1995). This investment boosted coastal tourism but not inland. Greater change inland only took place in the 2000s when the COMPERJ petrochemical complex prompted rapid urban expansion but of a dynamic kind and not just hollow speculation creating empty land.



Plate 4.13. President Costa e Silva Bridge, commonly known as the Rio–Niterói Bridge, crosses Guanabara Bay, in Rio de Janeiro state. It connects the cities of Rio de Janeiro and Niterói. From its completion in 1974 until 1985, it was the world's second-longest bridge. (Source: Author, 2017)

Increased levels of urbanisation in the region and the establishment of the Petrochemical Complex of Rio de Janeiro (COMPERJ) have resulted in increased demand for water from the region's supply systems. As Benevides *et al.* (2009) point out with regard to water consumption and water supply in the Guapi-Macacu and Caceribu river basins, there is currently more demand for water, due to insufficient supply services, especially

for residential consumption. Although there is no clear projection of total future water demand, with the installation and operation of COMPERJ and due to urban growth, water supply in the region will tend to worsen in the coming years.

The water issue is another example of urban encroachment in the rural area of peripheral municipalities of Greater Rio de Janeiro. A dam is planned for the Subaio district, where part of an alluvial plain of the Guapiaçu river (Plate 4.14) has been occupied by small-scale farmers who will be affected by the reservoir. Family farmers who can be expropriated have been settled in the area through past government agrarian reforms.

The situation of rural communities that may be forced to leave the area for the reservoir project is still uncertain. Most residents are small family farmers. It is a low-income population that depends on the income of small-scale agricultural production. Because of their socioeconomic conditions, these farmers can hardly recover, as their expulsion from the area can influence their life trajectories and eventual financial compensation is not fully guaranteed (see Boxes 4.1 and 4.2).

As a result of urbanisation, conservation and environmental protection, and oil-related infrastructure economy, the metropolitan countryside of Greater Rio has been subjected to a range of interests and external pressures that conflict over land use and change social and economic structures. Urban-industrial processes have replaced territorial processes delineated by an agrarian history, triggering a spatial restructuring of uncertainties for the local communities.

Box 4.1. Government of Rio de Janeiro state seeks an agreement to build the dam on Guapiaçu River

'The controversial construction of a dam in Cachoeiras de Macacu, which would flood more than 2,000 hectares of an agricultural area in Rio, returned to the state government's agenda. On Monday afternoon, a group of farmers and residents of Guapiaçu, rural locality affected, met with Secretary of the Environment, André Corrêa. The 750 farmers are divided. Many of them fear leaving their lands without compensation.

This is the case of Edmilson Teixeira, 41 years living in Guapiaçu. He grows cassava, maize, guava, and okra, and leases 31 hectares of land. It took three loans, totalling R\$ 185,000 with Banco do Brasil to start the business. He needs to pay back this amount in ten years. He explained to the secretary that: if he must leave the land, which is not in his name, he will still have obligations to the bank. For this reason, he wants at least some sort of indemnity.

André Corrêa is convinced that the Guapiaçu dam - a project created eight years ago by the environmental sector of Rio de Janeiro - is essential, especially at a time when drought threatens Niterói and São Gonçalo. He opens the possibility of bidding the project. At least he returned to discuss and meet with farmers and residents, interrupted since May 2014. It was when INEA (State Institute of Environment) suspended the license, in favour of the engineering company Carioca Engenharia. Corrêa intends to dribble resistances and put the project in progress still in his term.

Lenílson Biazati, director of a farmers' cooperative of Guapiaçu, predicts that the secretary will have many difficulties ahead. Moreover, he warns that the main obstacle is not land tenure, nor financial:

'We are five generations producing and selling vegetables and other agricultural products. 35% of the tubers sold in Rio de Janeiro state come from Guapiaçu region. The concern is how to maintain this productivity in another area'.

O Globo, 26th October 2015.

The screenshot shows a news article from O Globo. The header includes the O Globo logo and a 'SEGUIR +' button. Below the header, there is a 'VOLTAR PARA A HOME' link and a section for 'Sobre o blog' with a short paragraph about environmentalism. The main article title is 'Governo do Rio busca acordo para construção da barragem de Guapiaçu' by Emanuel Alencar, dated 26/10/2015 10:19. The article text discusses the dam project in Cachoeiras de Macacu, the impact on local farmers, and the political stance of Secretary André Corrêa. It mentions that the project was suspended in 2014 and that Corrêa is now seeking to restart it despite local resistance.

Box 4.2. Guapiaçu: um Rio (de Janeiro) Ameaçado, a documentary film produced by a national social movement

‘The Movement of the Affected by Dams (MAB) produced the documentary Guapiaçu: a Rio (de Janeiro) Threatened. Collectively made by participants from the movement, the film depicts the situation of the population of Cachoeiras de Macacu, 100 kilometres from Rio de Janeiro, affected by the project for a dam in the Guapiaçu River by a state government project. The dam could flood an area of more than 21 square kilometres and directly reach agricultural and livestock activities. More than three thousand people may be affected. The region has a daily production of 55 tons of vegetables and fruits, destined mainly for consumption in Rio de Janeiro.

According to the State Department of the Environment, water diverted by the dam would supply the demand for the Imunana-Laranjal treatment system, which supplies the Eastern metropolitan area of Rio de Janeiro, including municipalities such as São Gonçalo, Niterói, Itaboraí and Ilha de Paquetá.

Irregularities in the licensing process were pointed out by civil society organisations. According to the Association of Brazilian Geographers (AGB), there is an irregularity in the very role played by the Environment Department, which is both a project proponent and evaluator. The organisation also points out irregularities in the expropriation of the area that are likely to be flooded by the dam's lake’.

https://www.youtube.com/watch?v=0is_OqCg78A

<https://www.youtube.com/watch?v=0VjZ6ro6BCk>



Plate 4.14. The alluvial plain of the Guapiaçu river has been occupied with small-scale vegetables and fruit farming that will be affected by the dam. Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2012)

International agreements have also played a role in promoting and policing new global standards in these rural areas. As Potter *et al.* (2004) highlighted, it was only in the 1970s that substantial programmes for rural development appeared, framed by a new discourse of ‘integrated rural development’ that was promoted by bodies such as the World Bank. Implemented by Sustainable Development Superintendence of the Secretariat of Agriculture and Livestock of Rio de Janeiro State, Rio Rural is funded by the World Bank and support by the United Nations Food and Agriculture Organisation (FAO). The activities involve a broad network of partners, including governmental and non-governmental organisations, businesses, municipalities and hundreds of rural associations.

The programme's strategy also involves financial incentives, research, and technical assistance. By 2018, US\$ 233 million had been invested from the World Bank and the Government of Rio de Janeiro. Despite its relevance for the state’s economy, agricultural production is far from fulfilling its potential, especially in rural areas. Problems such as deficient infrastructure, low connections to markets, and the use of inefficient and unsustainable practices are commonly identified as major reasons for low agricultural productivity.

The current spatial configuration of the Metropolitan Region of Rio de Janeiro shows a double movement: consolidation of the metropolitan space and changes in its periphery, where the process reaches new areas and transfers the issues of contact and rural-urban conflict. Some municipalities, until then marginal to metropolitan dynamics, have been ‘infected’ with the logic of the metropolis. In his work on rural protest movements, Woods (2003) referred to a rhizomic effect (taken from rhizomic plants like bracken that spread through underground roots), where new nodes of urban influence pop up and proliferate.

The dynamics of the rural spaces during their incorporation into the metropolitan logic corroborates with the thesis that the spatial changes in the periphery of the metropolis are not linear, and do not result only from the conversion of typical agricultural areas into urban areas. Although some rural areas are converted, others have maintained agricultural uses, and in others rural and urban activities and functions are mixed, constituting multifunctional spaces of rural-urban interaction.

In recent decades, significant spatial changes have taken place in peripheries of metropolitan regions, which have been incorporated in the dynamics of urban-industrial segments and new forms of insertion into the globalised economy. When considering Rio de Janeiro state, it equally appears that urban-industrial segments have been consolidating outside the central nucleus of the metropolis, displacing the industrial primacy of the nucleus and establishing new relations between the capital, its immediate hinterland and peripheral regions. The process of incorporating the peripheral countryside into Metropolitan Region of Rio de Janeiro is part of a new regional dynamism and influence resulting from the expansion of urban peripheries in areas that have been incorporated into the metropolitan logic.

One of the major challenges is how to redefine and consider the rural space in this interaction as part of a dynamic process of continuous spatial change, generated by situations of conflict and adaptation. From an applied point of view, rural-urban interaction relates to new policies for managing the diversity of rural processes that recognise new spatial dynamics that are emerging in rural areas that have been in contact with, and incorporated into metropolitan logics, where the transition from agrarian to peri-urban and dynamics of the rural are key issues to consider.

4.5 The hybrid (rural) geographies of metropolitan regions: farming systems and the diversified countryside in Eastern Greater Rio de Janeiro

Chapters 5-8 will highlight that the metropolitan countryside has reinforced its identity within the metropolitan area as a territory in transition that reflects the actions of different endogenous and exogenous actors and presents great potential to accommodate the multiple activities in metropolitan economies. Rural peripheries that are incorporated into the metropolitan dynamic at the same time encounter questions of land use, planning and conflict around urban and rural functions and issues related to participation and power. The location and position of the municipalities and their rural areas create and reinforce new interests that overlap in the metropolitan territory and conflict with the local agricultural uses, which requires strategies for local agriculture maintenance in a multifunctional context.

Studies on the dynamics of rural areas within metropolitan spaces have been concerned with different incompatibilities between new uses of land in urban and rural contexts.

‘Different has been the new approach, based on the concerns of understanding the conditions under which new urban-industrial investments can occur without eliminating existing rural activities’ (Bicalho *et al.*, 1998, p. 112). Interactions between rural and urban forces are also observed through the farmers’ decision-making, in which they become responsible for triggering spatial changes. According to Bicalho (2008), in agricultural areas where urbanisation processes are more recent, the substitution of agricultural activities and production systems are more prominent. Thus, the process of rural restructuring can still be linked more to productive functions than to the appearance of new functions of the rural space.

Besides the expansion of the Metropolitan Region of Rio de Janeiro, infrastructure improvements are also associated with the restructuring of Rio de Janeiro state, mainly driven by the oil economy. Although this global activity was previously concentrated in the Northern Region of the state, this economy has now affected other areas, including the municipality of Itaboraí (case study community level 3) and surrounding areas with the installation of an industrial complex that will benefit oil production in Campos. Actions triggered by new agents and actors can also be recognised on farms with new industrial infrastructures, such as Petrobras Transporte S/A (Transpetro) pipelines which transport gas from the Northern Region to other regions of the state (see Plate 4.15).



Plate 4.15. Petrobras Transporte S/A (Transpetro) pipelines which transport gas from the Northern Region, crossing a farm. This research focuses on the emergent positioning of farmers within the structural conditions of local and regional development pressures and their resultant ability to adapt. Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2017)

It is possible to observe changes in the management of rural establishments through external capital associated with urban investments interested in grass production for urban markets, gardens and soccer fields, which presents serious problems for soil loss due to their focus on intensive production. In this case, lowland areas close to roadways, when not under pressure from Itograss, a business group specialising in grass production, have been impacted by speculation and the conversion of areas for urban uses (see Plates 4.16 and 4.17). Some farms in the lowlands close to the RJ-116 road have resisted urban pressures by combining strategies emphasising productive systems and the distribution of the agricultural production that favours family farmers and ensure profitable and recognised production in the market (see Chapters 5 and 6).



Plate 4.16. A lowland area in Cachoeiras de Macacu under pressure from the Itograss, a business group specialising in the production of grass for the urban market. (Source: Author, 2012)



Plate 4.17. 18,000 m² of lowland for sale in Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2012)

A significant part of the Metropolitan Region of Rio is designated as an area of environmental preservation, while other areas with agricultural use are designated as a buffer zone. There are actions planned by international non-governmental organisations, for example, the Guapiçu Ecological Reserve (REGUA) project, financed by the British Atlantic Forest Trust (BART) and the World Land Trust, with researchers working to gain recognition of the diversity and biological value of the Atlantic Forest and to promote local environmental policies, including participation in the Rural Development Council.

The environmental issue is not exclusively associated with the preservation of the Atlantic Forest, but also incorporates the management of drainage headwaters and water quality forming the river basin. The municipality of Cachoeiras de Macacu is part of the Macacu-Caceribu hydrographic basin, one of the largest sources of water resources in Rio de Janeiro state (Benevides *et al.*, 2009). In addition, proximity to the Metropolitan Region of Rio de Janeiro was one of the locational factors that attracted the beverage company and other natural mineral water industries, in particular the drinking water supply capacity of the Macacu-Caceribu hydrographic basin (see Plates 4.18 and 4.19).



Plate 4.18. A beverage company attracted by the water resources in the valley. Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2012)



Plate 4.19. The water capacity in the valley river also attracts small-scale beverage companies such as the one located in the rural locality of Faraó. (Source: Author, 2012)

All these processes reveal how different actors face and impose challenges to regional and local development. The local government has had a difficult task in mediating conflicts between local and regional interests. One instrument for mediating conflicts on territorial politics is the Municipal Development and Land Use Plan, which seeks to protect rural areas alongside accommodating new urban, peri-urban and environmental

functions. In so doing, territorial planning that seeks to develop a model of balanced growth and space, needs to have objective knowledge of the diversity and the complexity of land use when developing legislation on land use and occupation. As Chapters 5-8 will show, the rural area in the Eastern of Rio de Janeiro Metropolis becomes an unstable and uncertain space for agriculture when confronted by economic macro-dynamics and environmental pressures. It should be noted that there is limited integration and planning regarding local actions for rural areas and administrative discontinuities exist in local agendas of the sector and short-term political actions.

The Municipal Development Plan is not autonomous, however, as it is obliged to adapt the municipal territory to external decisions over which local power is limited. It is possible to detect within the actions of the Municipal Department of Agriculture, Fishing, Supply, and Regional Development the intention to stimulate production with measures aimed at promoting the transportation of products through road maintenance and support for the implementation of projects of the National Program of Family Agriculture - PRONAF.

These actions to encourage production are normally sectoral and rarely address the spatial dynamics of the rural-urban interactions described above. As Chapters 5-8 will highlight, the rural-urban configurations outlined earlier and the maintenance of agricultural activities depend not only on land use and development actions, but also on the profile of farmers and other rural actors affected by the changes, their responses, and their wish to stay in rural areas. In order to understand these social dynamics, a first step is to analyse the farming system to understand how globalisation processes have affected farming resilience pathways in Rio's metropolitan countryside and discuss policy implications in the Brazilian metropolitan context. Applying this approach would assist in better targeting of metropolitan countryside policies for the purpose of local and regional quality food systems and small-scale agricultural development strategies.

It is through local actors that new spatial configurations and dynamics are created and adapted to the rural-urban scenario. These dynamics involve issues beyond urban-industrial expansion from the metropolitan core and new behaviours and values, to an extent, independent of the urban itself. External values absorbed by society that influence and are transmitted largely in rural areas from urban centres reflect agricultural products with value added or with differentiated quality. The rural-urban interface is also related

to the emergence of new agricultural activities and the intensification of agricultural systems because the proximity of rural areas to the metropolitan region allows farmers to benefit from new technologies, infrastructures, and services in the locality of the farm. Through the new infrastructures, family farmers have the opportunity to increase their participation in the market and to increase its network of consumers.

The examples pointed out by this research in Chapters 5-8 will demonstrate that the incorporation of rural areas into the metropolitan context can boost the search for innovations and cross-scale linkages. The use of different types of knowledge allow farmers to create strategies to adapt to new contexts and spatial configurations. The examples represent a group of resilient farmers who thrive by combining different strategies in their farming systems. However, the diversity of agriculture in Rio's metropolitan countryside also points to the existence of other farmers who are more vulnerable as a result of the new rural-urban context. Therefore, local, regional and national policies should support family farming systems through strategic planning that recognises the potential and diversity of rural actors and agriculture in the metropolitan countryside of Rio and encourage farming through innovation, use of appropriate and diverse types of knowledge, products with quality, and greater insertion within regional and local markets.

To achieve resilience, it is important to consider the multiple realities of society, as well as the diversity of cultural values, environments and economic conjunctures. For this reason, maintaining agricultural production in urban and peri-urban areas is essential and is associated with the protection of spatial diversity. Agriculture in the urban, peri-urban and hinterland conserves parts of landscapes and stimulates local production and consumption of quality food, contributing to a dynamic farming system. In contrast with local and regional policies, which do not recognise the diversity of agricultural environments and potential farming systems in the metropolitan countryside of Rio and beyond, the study identifies farming systems that are adapting to evolving rural-urban configurations. They have made changes on their farms, such as the adoption of different strategies of marketing and distribution of production that indicate rural-urban interaction may not be totally unfavourable to agriculture.

It is argued that there are not only processes of conversion of rural use for urban use, and that changes are not limited to land use conflicts. There is also evidence of rural-urban

integration and adaptations of agriculture that have involved combining different types of knowledge, social organisation, innovations and cross-scale linkages in the farming system. Chapters 5-8 will argue that these factors have created relatively resilient farm-level systems and have been part of the process of rural change and adaptation of small-scale farming systems in the Brazilian Metropolitan context in a global era.

In recent years, rural areas have undergone spatial changes that include population mobility, land use conflict, the imposition by external pressure on land price and urban-industrial use. The incorporation of peripheral municipalities in the Metropolitan Region of Rio de Janeiro also challenges issues of scale, when territorial management starts to involve, in addition to local politics, global, national and regional interests.

4.6 Conclusions

Linked to the framework of farming resilience and globalisation developed in Chapters 1, 2 and 3, the aim of this chapter was to discuss the notion of rural and agricultural changes at various spatial scales and the role of social actors in the metropolitan countryside of Rio de Janeiro to set the scene for the in-depth analysis in Chapters 5-8. It enables a better understanding of the diversity and complexity of the countryside in a metropolitan and global context.

The chapter argued that global processes produce differences in farming systems and multifunctional rural spaces in Brazil. Variation also occurs within regions, exemplified by rural-urban complexity observed across the rural periphery of Rio de Janeiro Metropolitan Area where land use, economic and environmental policies generate conflicts. As the metropolitan region expanded outward land prices increased, productive strategies changed, family members left to work in non-agricultural sectors and farmland was lost to urban sprawl and nature reserves. These processes have created multiple challenges for rural areas and the resilience of farmer communities to macro-scalar lock-in effects has received significant attention in recent years (Darnhofer, 2010; Darnhofer *et al.*, 2016; Ingram, 2018; Knickel *et al.*, 2018; Wilson, 2008b, 2010; Woods, 2012).

The built-up area of Rio de Janeiro has expanded outward and the metro population increased from 10,389,441 inhabitants in 1991 to 12,330,186 in 2016 (IBGE, 1991, 2010, 2016). New industrial and petroleum complexes and port facilities were installed on the

limits of the metropolitan region in recent years. Under these circumstances, agriculture has become juxtaposed with other functions and interests, leading to a mosaic of diversified land use in both inner and outer metropolitan space. Depending on the relative distance from the built-up metropolitan core and local agrarian history, urban and peri-urban farmers have asserted their place in a multifunctional countryside (Bicalho, 1998; Bicalho and Machado, 2013). As a result, in different parts of the Rio de Janeiro metro region, it is common to encounter not just urban conversion but also a contested countryside.

Recent urban growth in the metropolitan region has focused on converting land into commercial, industrial and residential areas associated with renewed manufacturing activities and logistics development and not hollow real estate speculation like in the past. The expansion of the metropolitan region moves along two axes spatially projected further outward from the cities of Rio de Janeiro and Niterói respectively. This notwithstanding, there are inherent forces within rural areas which frame specific processes. Land tenure and social formation are results of past agrarian history and influence the course of converting farm-land into other uses as well as influencing resistance or dynamic adaptation in rural-urban interaction.

The chapter analysed the importance of a non-linear view of external interferences in rural places. I finish this chapter with a quote from 'O Homem e a Guanabara' written in 1948 by Alberto Ribeiro Lamego. From a regional school of geography and influenced by a nationalist period focusing on territorial development, he reported:

'No effort, no nation, no government in this case - a predestination - can dispel nature's purposes. All the socio-economic evolution of the Guanabara Bay, all of its agrarian past, all its historical struggle to adapt to a hostile environment for the cultivation of the land, was only a prelude to what would happen there. The concave region by the Guanabara Bay was planned for an immense city. In this way, it is the responsibility of the governments, supported by Geography, to foresee the directions of its expansion, and then we can present it to the world as the maximum exponent of the civilisation of a great nation'. (Lamego, 1964 (1948), p. 233).

In an era of globalisation, where agrarian traditions are confronted with multi-scale projects related to the oil-petrol economy, environmental issues, and large-scale urbanisation triggered by the consolidation of Greater Rio de Janeiro, I wonder how

Lamego might interpret the multiple processes in progress in the Guanabara Bay region and where the place of a contested countryside would be in a global and multifunctional territory influenced by urban-industrial development, conflict of land use, and resource competition.

Chapter 5 Learning to live with change and uncertainty in the metropolitan countryside of Rio de Janeiro

5.1 Introduction

In recent years, agricultural sustainability has been linked with the concept of resilience, which emphasises dynamics, disequilibrium, and unpredictability in agricultural development. Resilience refers to the capacities of an agricultural system to adapt and transform itself so it can persist in the long term (Walker *et al.*, 2004; Darnhofer, 2014). Learning to live with change and uncertainty, and combining different types of knowledge appear critical for building resilience (Folke *et al.*, 2003). Darnhofer *et al.* (2016) pointed to the particular roles experiential learning and networking in increasing the resilience of small-scale farms.

The following chapters form the basis for better understanding the importance of ‘learning to live with change and uncertainty’, ‘nurturing diversity in its various forms’ (Chapter 6), ‘combining different types of knowledge and learning’ (Chapter 7), and ‘creating opportunity for self-organisation and cross-scale linkages’ (Chapter 8). Section 5.2 will discuss what ‘learning to live with change and uncertainty’ means and how it is interlinked with innovation and adaptation of farming systems and changes of agricultural crops in the metropolitan countryside, focusing on fruit growing as an example of agricultural adaptation. Sections 5.3-5.5 will then discuss how a relational perspective allows for a more comprehensive approach to understanding farming resilience and how small-scale farmers in the Rio urban-rural fringe and hinterland are responding to pressures and opportunities from urbanisation and industrialisation, and how they respond to global connections and to the continuing importance of local agency in the context of the global countryside (Woods, 2007, 2011).

Focusing on relations enables closer analysis of how social processes undermine or strengthen resilience of the farm and the farming community in the context of conflicts, challenges, and opportunities made possible by the proximity of Rio de Janeiro City and metropolitan region. Conclusions are provided in Section 5.6 by highlighting that relations are continuously made and remade. The analytical emphasis is on change and the patterns that enable or constrain change for individual farms but also for the farming system as a whole.

5.2 Rural innovation and adaptation of farming systems: fruit growing as an example of agricultural adaptation

Data on the number of farms and agricultural land use area in East of Guanabara Bay from 1960 to 2017 indicate a multidirectional trajectory (see Table 5.1). Part of this can be explained by increases in population and urban activities discussed earlier and a decrease in the rural population in the coastal lowlands after the construction of the Rio-Niterói Bridge (1968-1974), which attracted a considerable flow of population to the region, and partly due to internal rural-urban migration in the municipalities in Eastern Greater Rio. These changes also reflect the redistribution of economic activities. With the influence of COMPERJ (Petrochemical Complex), these municipalities have been part of a new phase of urbanisation and industrialisation in the Rio Metropolitan Region. Farms became smaller over the period 1980-2006 but have since increased in size again during the last decade. This fact indicates that farming, particularly smaller-scale family farming, is reviving to an extent as agricultural activities re-establish themselves following the initial ‘onslaught’ of urbanisation.

Table 5.1. Number of farms and agricultural land use (hectares) in the municipalities of Magé, Guapimirim, Cachoeiras de Macacu, Itaboraí, Tanguá, Rio Bonito e Saquarema since 1960. Source: Brazilian Institute of Geography and Statistics, IBGE (1960-2017)

year	1960	1970	1980	1995	2006	2017¹
farms	3,812	8,761	10,856	3,959	3,713	5,417
hectares	157,062	166,558	159,158	103,363	85,777	99,301

The greater spatial mobility of the population due to the expansion of regional infrastructure and territorial integration of the state of Rio de Janeiro indicates the intensification of rural-urban interaction. With the urbanisation process and the new urban-industrial investments, the greater mobility and population dynamics allowed the migration of rural workers and members of rural families to other areas and urban sectors. The research argues that the process of rural change is not linear, and there may be resistance, resilience and adaptation by groups of social actors.

The loss of rural workers to other sectors, for example, requires farming systems to increase labour productivity and profitability. Replacement of crops is an indicator of agricultural adaptation in this direction, including, substitution of crops with lower market

¹ Based on preliminary results of the Census of Agriculture 2017 (Brazilian Institute of Geography and Statistics, IBGE).

value for products with greater market value, such as planting permanent fruit crops (see Table 5.2). Farming adaptation happens through the combination of different types of knowledge, social organisations, innovations and cross-scale linkages in the production system. These factors have created relatively resilient systems at the farm level and have been part of the process of rural change and adaptation of small-scale farming systems in the Brazilian metropolitan regions (Bicalho, 1992; Bicalho, 1996; Machado, 2013).

Table 5.2. Area of farmland by crop type in three peripheral case study municipalities of Greater Rio de Janeiro in 2016 used in this study (hectares). Source: Brazilian Institute of Geography and Statistics, IBGE (2016)

municipality	fruit	vegetables	tubers	total
Cachoeiras de Macacu	720	44	1,200	1,964
Itaboraí	95	12	29	136
Tanguá	764	48	150	962

Municipalities more directly affected by urban encroachment tend to shift to fruit crops while others have expanded manioc cropping (see Plates 5.1 and 5.2). Manioc² is a root crop that also requires fewer workers. It is a local delicacy habits and so has a guaranteed market in Rio de Janeiro (see Table 5.3). Production of fresh vegetables near cities continues to be important and is a land-intensive activity which can be cropped multiply per season on small plots of land. In general, farmers undertake a combination of different crops and stock raising so that the metropolitan region can be characterised as a polycultural area.

²According to the ‘Historical Dictionary of Brazil’ by Levine (1979), manioc is a Brazil’s staple food since the earliest colonial days. A starchy tuber grown from cuttings which needs virtually no care, and which could be stored indefinitely or left in the ground. The manioc tuber is scraped into a coarse powder and mixed with water, taken dry, or turned into farofa (meal). The word manioc comes from the Tupi - mandi (bread) and óca (house).



Plate 5.1. Low-priced agricultural crops have been replaced by crops that can produce high yields in small areas. If the farmers have a little more land, they grow high-value fruits, e.g. Farmers 36, 39, 40 and 41, Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2017)



Plate 5.2. Sweet manioc is a root crop that requires fewer workers and is highly appreciated in local food habits in Rio. Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2012)

Urban food supply dates from the first decades of the twentieth century, with the formation of horticultural production areas by foreign immigrants (particularly Portuguese and Japanese) in small farms near the urban centres of Rio de Janeiro and São Paulo to supply these large cities with fresh products (see Plate 5.3). The rapid growth of

the urban population has raised the issue of food supply to cities. This policy for the creation of production areas was never an explicit policy, but even so, agriculture near Brazil's major urban centres has been maintained and encouraged a strong presence of small-scale farmers.

Table 5.3. Agricultural production in the above peripheral municipalities of Greater Rio de Janeiro in 2017. Source: Technical Assistance and Rural Extension Company of Rio de Janeiro state, EMATER-Rio (2017)

municipality	fruit		vegetables		tubers	
	production (t)	value (R\$)	production (t)	value (R\$)	production (t)	value (R\$)
Cachoeiras de Macacu	16,340.2	25,810,600	11,519.5	14,346,828	15,033.9	18,710,822
Itaboraí	1,065.7	1,253,990	411.8	498,555	347.5	397,100
Tanguá	20,066.4	23,536,124	944.8	3,035,465	3,250.0	5,005,000



Plate 5.3. Brazil is home to the largest Japanese population outside Japan. According to the IBGE, there were approximately 1.5 million people of Japanese descent in Brazil in 2014. The image of good and hardworking farmers that came to help develop the country and to improve the agricultural systems helped erase the lack of trust of the local population and create a positive image of the Japanese community. The establishment of Japanese agricultural cooperatives further strengthened the growing influence of Japanese in Brazilian agriculture (Kumasaka and Saito, 1970). (Source: Farmers' archives)

Small-scale establishments and the predominance of owners-farmers (see Table 5.4) dominate the agrarian structure in the metropolitan countryside of Rio de Janeiro. In relation to the land structure in the municipalities of Cachoeiras de Macacu, Itaboraí and Tanguá, 82.2% of the rural establishments have less than 20ha (see Table 5.5). This agrarian structure results in part from the hereditary division of land by generations, and it is common to find farmers who are the sons/daughters and grandsons/granddaughters of former owners who benefited from land reform projects. Both tendencies are associated with a fragmented land structure and family labour relations.

The land structure of small rural establishments with intensive production systems (see Plate 5.4) and the prevalence of family labour relations are typical of rural areas in and around Brazilian metropolitan areas. During interviews Farmers 36 and 40 (Cachoeiras de Macacu, males) showed productive strategies that prioritise crops substitution and more land intensive production systems to increase profit as part of farmers' resilience processes, maintaining productive agricultural areas in a rural-urban setting. In this highly unstable and complex space, strategies of productive adaptation arise amid the pressure for urban conversion.



Plate 5.4. Small area with vegetable production around residences and very close to the large beverage industry in Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2012)

Table 5.4. Number of rural establishments by legal status of farmer in Cachoeiras de Macacu, Itaboraí and Tanguá in 2017. Source: Brazilian Institute of Geography and Statistics, IBGE (2017)

municipality	owner	leased	partner	on loan	occupant	without property's title
Cachoeiras de Macacu	75%	4,3%	8,6%	3,6%	1,5%	7%
Itaboraí	81%	5,7%	6,5%	3,5%	3,3%	-
Tanguá	79,9%	4,7%	10,8%	2,9%	1,3%	0,4%

Agricultural crops and changes in cultivation methods reflect regional transformations. Most rural establishments are small (see Table 5.5) with the use of family labour. Many respondents explained that hired labour is scarce because many rural workers have left agriculture sector to urban, industrial and service sectors. The increased demand for land for non-agricultural uses makes it possible to increase the price of land and makes it difficult to purchase more land to expand production. Consequently, the land is intensively cultivated, e.g. Farmer 36, Cachoeiras de Macacu, male (see Plate 5.7 and observe the intensive use of land with guava production of high commercial value).

Table 5.5. Number of rural establishments by total area group in Cachoeiras de Macacu, Itaboraí and Tanguá in 2017. Source: Brazilian Institute of Geography and Statistics, IBGE (2017)

municipality	less than 20 ha	20 to 100 ha	100 to 200 ha	200 to 500 ha	500 to 1000 ha	more than 1000 ha	total
Cachoeiras de Macacu	83,5%	13,4%	1,9%	0,6%	0,5%	0,04%	2151 (100,0)
Itaboraí	79,5%	13,2%	3,3%	2,4%	0,9%	0,7%	448 (100,0)
Tanguá	83,7%	12,9%	2%	0,7%	0,5%	0,2%	441 (100,0)

It turns out that some small and medium-sized farmers are adapting to urbanisation by adopting more lucrative activities, investing in new methods and forms of commercialisation of agricultural products (e.g. Farmers 17, 36, 39, 40 and 41). Proximity to urban areas increases demand and competition for land and labour, but also increases the demand for agricultural products that can promote agricultural development. Low-priced agricultural crops, such as beans and corn, have been replaced by crops that can

produce high yields in small areas (see Plates 5.5 and 5.6). If the farmers have a little more land, they grow high-value fruits (see Plate 5.7). Citrus cultivation has been re-stimulated and guava cultivation can generate considerable yield and income in the metropolitan context. High quality fruit is commercialised in the Metropolitan Region of Rio de Janeiro (Machado, 2013). However, opportunities must be perceived by farmers who engaged with rural innovation (Bryant and Johnston, 1992)

In relation to the productive system, one element that deserves to be emphasised is the framework for substituting agricultural crops, which indicates the dynamism and strategies for adapting agriculture to the rural-urban configuration, as argued during interviews with Farmers 12, 17, 33, 36, 40 and 43. In a few decades, there have been several changes in the production system and the introduction of new agricultural crops that accompany appreciation of specific urban agricultural markets.



Plate 5.5. Farmer 36's personal archive showing the development of agriculture in the Macacu River Valley. The photo shows two members of the Japanese community growing vegetables in the 1960s. (Source: Farmers' archives)



Plate 5.6. The transition from temporary crop (as observed in Plate 5.5) to permanent crop on farmer 36's property; in this example, the introduction of a guava variety for fresh consumption demanded from the urban market in Rio City. (Source: Farmers' archives)



Plate 5.7. Farmer 36 presents an aerial image of his property. It shows the intensive use of land with fruit production of high commercial value, in this example, quality guava commercialised for an urban niche market in Greater Rio. (Source: Author, 2017)

Since the end of the 1970s, fruit production has been the most resilient and adaptable to urban pressures and is becoming more important in municipalities, with some rural producers seeking to achieve quality standards. Its suitability to the environment of the countryside of the Metropolitan Region of Rio de Janeiro is due to its profitability and continuous production to generate income throughout the year, as argued by Policymakers 1, 4, 13, 16 and 1 and Farmers 12, 36 and 40. Specialised sets in a given production are distributed in hillside and lowland areas. The slope is an area dominated by banana production, while the lowland tends to specialise in other fruits, especially guava and citrus (see Table 5.6).

Table 5.6. Agricultural production of the main fruit products in the municipalities of Cachoeiras de Macacu, Itaboraí and Tanguá in 2017(tons). Source: Technical Assistance and Rural Extension Company of Rio de Janeiro state, EMATER-Rio (2017)

fruit	Cachoeiras de Macacu	Itaboraí	Tanguá
banana	1.643,00	238,70	110,00
coconut	665,00	46,80	490,00
guava	12.085,00	-	-
orange	350,50	583,00	17.959,00
lemon	862,00	138,90	1.542,35
passion fruit	735,00	-	-

Rural areas close to large cities are also characterised by social heterogeneity, due to the multifunctionality of the contemporary rural space, which combines agricultural and non-agricultural activities. Bicalho (2008) indicated that, considering the agricultural exploitation of areas with strong rural-urban interaction, horticulture and fruit-growing activities stand out. They are also characterised by the presence of small-scale production with differentiated levels of capitalisation, intensive systems in the use of land and capital, diversity as to the commercial purpose of production and the way of insertion in the market. Thus, it is possible to affirm that, in the process of spatial restructuring in the metropolitan countryside, agricultural activities that traditionally have been located in these areas of rural-urban interaction remain significant.

5.3 Agricultural change and fruit crop varieties most adapted to social, economic and environmental conditions of the metropolitan countryside of Rio de Janeiro

The context of rural transformation challenges agriculture in the metropolitan countryside of Rio de Janeiro. In recent years, rural areas have undergone spatial changes that include population mobility, conflict of land use, imposition by external social actors on land price, and strong pressure for urban-industrial use (see Chapter 4). The incorporation of peripheral municipalities into the Metropolitan Region of Rio de Janeiro also challenges the scale, when territorial planning involves global and regional issues in addition to local politics.

A decrease of rural workers, for example, requires adaptation of technical systems to suit a lower intensity agricultural work. The process of replacing agricultural crops is an indicator of the adaptation process. In the case study areas, there has been a substitution of crops of lower market value and volume of production, with in most cases, from temporary to permanent crops of differentiated quality and greater value in the market. Substitution of temporary crops to fruit-growing products may also signify the adaptation of agriculture to decrease in the number of rural workers and high pressure for profitability on land use.

There is a linear interpretation that the modernisation of agriculture that all technological innovation and concentration of capital has eliminated large numbers of small-scale farmers in Brazil. In the study area, this view needs to be relativised. The rural space is not passive to spatial change resulting from the intensive contact with urban dynamics. The study defends multidirectional and multidimensional interpretations that reveal the complexity and spatial inequalities of rural change.

During interviews, Policymakers 1, 4, 16 and 17 explained that one of the most significant crises of citrus cultivation in Rio de Janeiro was the manifestation of pests in orchards. Other economic factors that also accentuated the crisis were the reduction of agricultural subsidies and State intervention in the context of the crisis of the Brazilian economy in the 1990s and the growth of citrus production in São Paulo state and its power in the domestic and global market. Because of economic market competition and natural crisis, most large farms abandoned orchards infected by pests and diseases. The tradition of citrus cultivation, the possibility of disease control, and alternative market dynamics in the context of small-scale production allowed flexibility in the treatment, maintenance,

and adaptation of small-scale farming. The following story by a rural extension officer (Policymaker 1, EMATER-Rio, Tanguá, male) illustrates this process:

‘Many people say that the cause for the decline of citrus production was diseases and pests. However, the federal government reduced agricultural credit to the citrus production at the same time. Increased fees discouraged production. Bank fees moved from 15% to 42% in a very short time. Farmers depended of bank credit began to transform agricultural crop areas to cattle pasture. At some point, the federal government cancelled all subsidy for citrus farming. That was the main reason for the orange farming crises. Rural works moved away. Small-scale farmers who relied less on agricultural credit was able to create mechanisms of adaptation in short-term. In the reality, the abandonment of the citrus orchard in large properties that brought diseases and plagues to the area. This was the main reason for the overthrow of citrus farming in Rio de Janeiro.

[...]

Itaboraí had another issue: land parcel. One of the factors for the decline of agriculture is that the area is flat and nearby Niterói and São Gonçalo. Urban investors began to subdivide land and farmers were pressured to sell the property. The movement of urban people to the countryside and the pressure to sell the land increased over the years. The small-scale farmers in Itaboraí stayed as long as they were not near the expansion of housing plots in the rural area. They resisted. Small-scale farmers produced a bit of everything, diversifying the production. As family farmers live on the property, they may have more control of the crops and the land. They transfer the land from generation to generation’ (Policymaker 1, rural extension officer, EMATER-Rio, Tanguá, male).

Agricultural modernisation in other regions of Brazil and national interests in the country's second largest urban consumer market create challenges for agriculture in the peripheral countryside of Rio de Janeiro Metropolis. Other adaptation strategies have been the transition from productivist regimes to an agricultural quality system that can guarantee better insertion and price through differentiation of products in the local and regional market. In free markets of Rio City and surroundings, it is possible to observe differences of price of ‘Rio’ or ‘Itaboraí’ oranges and products produced from other regions of Brazil. The same occurs with the guava crop that has been commercialised in boxes selected for specific markets in Rio de Janeiro, with the sale of a better-quality product, or in agro-industrial processing by the family farmer of Rio de Janeiro state benefited by the National Program for Strengthening Family Agriculture (PRONAF) (e.g. Farmers 36, 39, 40 and 41).

The dynamic contexts, complexity and the local specificity of the current challenges facing agriculture and the many roles it is being asked to fulfil require more inclusive, participatory, modes of governing the generation, integration and sharing knowledge. All stakeholders, including farmers, need to be recognised as equal co-authors of knowledge and all kinds of knowledge, both formal and informal, need to be enhanced and brought together in innovation processes (Šūmane *et al.*, 2018).

Local and regional history of orange crop indicates a non-linear trajectory in the rural periphery of Greater Rio de Janeiro. There was a drop-in production when the longer-term historical picture is analysed, but also maintenance, stability, and resistance of the crop in the last years. In this period of more than half a century, selection and adaptation of orange varieties combined with local conditions were occurred (see Plates 5.8 and 5.9). The following extract from a rural extension officer (Policymaker 1, EMATER-Rio, Tanguá, male) demonstrates this process:

‘The main agricultural product here [Tanguá] is orange. Rio de Janeiro state was the largest citrus cultivated area in Brazil. When I came to EMATER-Rio [rural extension company] 40 years ago, Rio was the second-largest producer in the country. Citrus farming started in Paracambi and then spread to Nilópolis and Nova Iguaçu. It was placed in Itaboraí, Rio Bonito and Araruama later. Itaboraí was the largest orange producer at some point. They have been growing orange for many years, presenting a long history of citrus farming.

[...]

Today the situation for small-scale farmers in this area is stable. Citrus farming has not diminished anymore. There was a reduction in production area due to the weather instability [drought period] and the pressures from COMPERJ [Petrochemical complex]. For the rural area, this project has impacted in a direct way. Rural workers has been attracted to urban project and investment in the petrochemical plant. The family farmers need to adapt and keep farming activities by themselves’ (Policymaker 1, rural extension officer, EMATER-Rio, Tanguá, male).

During interviews in Tanguá, Farmers 1, 5, 6, 12, 18 and 30 indicated varieties of orange that are combined with the market demand of Greater Rio guaranteeing production all year. One of the varieties of orange, which originates in the rural periphery of Rio de Janeiro, resists the high temperatures of summer in the lowland and drought period, keeping the fruit for a longer period than the other orange varieties. Trees are more resistant to drought and tolerant to citrus canker, citrus tristeza virus, and rubella, and can

be grown without irrigation and in regions where citrus canker is endemic (Stuchi and Donadio, 2000).



Plate 5.8. Production of orange in Itaboraí, Rio de Janeiro in 1950s. This photograph was taken by geographers from the Brazilian Institute of Geography and Statistics (IBGE) who were conducting fieldwork research in rural periphery of Rio de Janeiro. (Source: Guerra and Jablonsky, 1958)



Plate 5.9. A photograph from farmer 12's personal archives shows the substitution of temporary crops to fruit-growing. This process is one of the examples of adaptation of agriculture in the context of a decrease in the number of rural workers and high pressure for profitability on land use. (Source: Farmers' archives)

Farmers indicated three main varieties of orange (Farmers 1, 5, 6, 12, 15, 17, 18 and 33) that are combined to meet market demand of Greater Rio, guaranteeing year-round

production. One variety of orange, the 'Folha Murcha' [withered leaf] is an orange tree type Valencia [*Citrus sinensis* (L.) Osbeck], also known as 'Valencia Folha Murcha' and 'Natal Folha Murcha'. This cultivar originated from spontaneous mutation and was selected in Araruama, Rio de Janeiro (see Plate 5.10). Fruit maturation is extremely late. The harvest is carried out from October to December and can be anticipated or delayed due to the average temperatures of the region. The fruits can be kept in the trees for up to two months after maturation, as observed by Policymakers 4, 16 and 17 and Farmers 18 and 30. In addition, when harvested, fruits may be retained for more than one month under controlled cooling conditions. Due to its late maturity, 'Folha Murcha' is an option to maintain market demand for a longer period of the year. Brazil is the world's largest producer of orange juice. However, it has no tradition in the production of high-quality citrus fruits for fresh consumption as observed in Rio de Janeiro.



Plate 5.10. The 'Folha Murcha' [withered leaf] is an orange tree type Valencia [*Citrus sinensis* (L.) Osbeck] originated from spontaneous mutation in the rural periphery of Rio de Janeiro. The cultivar is more resistant to drought and tolerant to citrus diseases such as canker, tristeza virus, and rubella. (Source: Author, 2017)

The example of this orange variety reveals the adaptability of agriculture to internal and external conditions. A group of farmers (Farmers 6, 12, 15, 18 and 30) has criticised the introduction of varieties that were productive but demanded irrigation and were more suited to cultivation in lowland areas, as discussed in Chapter 7. The metropolitan countryside of Rio de Janeiro has been affected by new demands for water resources due to increased urban population in Rio's peripheral municipalities, and the scarcity and unpredictability of rainfall (see Plate 5.11). For that reason, during interviews Farmers 6, 12, 15, 18 and 30 questioned the substitution of an orange variety already adapted to environmental conditions to another variety that requires irrigation to prosper in Rio's climate and terrain.



Plate 5.11. Water availability has been one of the concerns in the rural periphery of Greater Rio and highlights the rural-urban conflict for different land uses. When I asked Farmer 36 to photograph the most important part of his land, he photographed the borehole water where he draws water to irrigate the fruit orchard. According to him, without irrigation, no viable production and productivity can be achieved. He asked me to position myself in the photo. (Source: Photo elicitation, Farmer 36)

These critical issues indicate tensions between the productivism of agricultural modernisation, with the introduction of external elements to increase production, and farmers who defend endogenous practices developed over long periods of time through knowledge sharing and learning processes (see Chapter 7). Top-down approaches have long been criticised in the international development literature because of the risk of introducing socially and environmentally inappropriate farm methods (see Chapter 2). Farmers work specific landscapes first-hand and understand the intricacies of local environments and ignoring this experience has been a flaw in development strategies for decades. Agriculture is highly dependent on natural processes and local environments are not blank slates on which a general technology can be transcribed without local feedback from farmers who use it (Chambers, 1983, 2005; Scoones and Thompson, 1994).

5.4 Small-scale farms resist pressures from urbanisation and industrialisation: changes from productivist systems to a quality turn in agriculture

Learning to live with change and uncertainty highlights the need to build and retain memories of past events, to abandon the notion of stability, to ‘expect the unexpected’ and to increase the capacity to learn from crisis (Berkes, 2007). At farm level, this factor is mostly related to the perception and the worldview of the members of the farm family, and to ensuring a degree of flexibility and adaptiveness.

The valuable contribution that small-scale farming systems make within rural and peripheral regions to local food production, including the enhanced reputation of regions for their food expertise and culture, has been widely acknowledged (Ilbery and Kneafsey, 2000; Murdoch *et al.*, 2000; Hinrichs and Welsh, 2003; Marsden and Smith, 2005; Tregear *et al.*, 2007). Speciality food enterprises are a central topic of discussion in the growing agri-food systems literature around ‘alternative food networks’, ‘short supply chains’ and the ‘turn to quality’ since the turn of the last century. This literature has explored the territorial embeddedness of food systems, with a focus on alternative food networks which are associated with concepts of quality, trust and place to characterise this phenomenon as a turn towards the re-localisation of food (Moragues-Faus and Sonnino, 2012).

The importance of network building within this context has been highlighted by Ilbery and Kneafsey (2000), and the network concept has assisted understanding of the diverse

forms of rural development (Murdoch, 2000). The network perspective recognises the myriad of connections that occur between actors and institutions in different spaces and places. However, while producer-consumer ties have received significant attention, relations and power dynamics between farmers remain underexplored (Chiffolleau, 2009; Bowen, 2011), and there have been calls from food systems scholars for greater examination of the context and environment within which alternative food networks operate (Sonnino, 2007; Bowen, 2011).

Multifunctional rural livelihoods will not simply replace specialised agricultural productivism in an evolutionary way throughout the world but rather the two systems can be seen as parallel modes of contemporary rural activities, land uses and social functions/values which are appropriate to different regions. Both modes are still present in post-industrial countries, even if many productivist activities have been transferred to emerging countries, such as Brazil (Wilson, 2007; Marsden and Morely, 2014).

Urban centres and their surrounding rural peripheries like the study area are given prominence in recent rural research. New foodscapes emerge in rural-urban spaces where alliances are forged between better-informed consumers with a health agenda and local farmers who offer organic and quality-food products through alternative distribution networks and so act as an environmental and social counter-force to intensive global food systems (Marsden and Smith, 2005; Goodman *et al.*, 2011; Marsden and Morely, 2014).

Global and regional processes at work in Brazil are producing regional differences in farming systems and multifunctional combinations of agricultural and non-agricultural activities. Variation also occurs within regions, exemplified here by rural-urban complexity observed across the metropolitan countryside of Rio de Janeiro, where land use and economic and environmental policies are shown to generate conflict between old and new urban and rural actors. As the metro region expanded outwards, land prices increased, productive strategies changed, family members and workers left to work in non-agricultural sectors and farm-land was lost to nature reserves.

Production of guavas is one of the most innovative activities as it involves new farm practices and marketing innovation in the form of packaging and select brand name to preserve the image and reputation of the product. This guarantees price stability, retains customer loyalty over time, and prices can be over two times higher than that for common

guavas. Selected speciality fruit goes to Rio and even São Paulo (Machado, 2013). The case illustrates how technical knowledge is gained over time in the transition towards quality production in the small-scale fruit sector and the importance of on-farm experimentation in the learning process (see Plates 5.12 and 5.13). Setting up small-scale sweet factories is another way to add value to guava production as it allows farmers to make use of a larger amount of fruit which would otherwise have been discarded. One producer has a farm with only 8.5 hectares but annually markets over 300 tonnes of a select branded guava, registered with the National Association of Industrial and Intellectual Property (ANPII) (Farmer 36, Cachoeiras de Macacu, male). Prices received are over two times those for common guavas³. The following extract illustrates this process:

‘I have adopted a high-quality guava production. We [small-scale farmers] have to adjust. I have used a bar code that permits the customer to know what product is that. It is for the customer to know that this product has good quality and its origin’ (Farmer 36, Cachoeiras de Macacu, male).

The promotion of local quality production has assumed a high profile in recent rural development strategies, as it promises a means of strengthening the position of traditional producers and their products. Production profiles and patterns are replaced by a kaleidoscopic representation, where the ‘multiplicity of technological and organisational productive systems co-exist. There is thus no longer a model of rural development but many possible trajectories’ (Murdoch, 2000, p. 413).

³ The fruit classification is part of the language of quality-product and its adoption ensures transparency in marketing. Nowadays, most market classification is based on the number of fruits per box, which defines the type of guava fruit. Thus, to say that guava is type 12 means that there are approximately twelve fruits of similar size in the box.



Plate 5.12. This photo from farmer 36's personal archive demonstrates how the marketing of agricultural products in the past was related to volume and intensive vegetable production. In contrast, production today is based on quality and selected products packed in special boxes for a market niche in Rio Metropolis, as seen in the Plate below. (Source: Farmers' archives)



Plate 5.13. Various types of technical knowledge gained during the transition towards quality production in the small-scale fruit farming in the metropolitan countryside of Rio de Janeiro. Production of guavas is one of the most innovative activities as it involves new farm practices and marketing innovation. Farmer 36 cultivates a select branded guava, registered within the National Association of Industrial and Intellectual Property (ANPII). (Source: Author, 2017)

Marketing has also witnessed considerable change as long market chains are replaced by more direct forms of selling produce, which reduces the number of intermediaries and

lowers transaction costs. With closer contact with final consumers, farmers have learned how to attend to preferences, habits, values and images concerning the product offered. This is particularly evident in organic and fruit farming in which production is adjusted to consumer demand and not vice versa. Farmers 12 and 36 reflected on this issue throughout the interview:

‘Farmers are still concerned about large-scale production. Here if everyone had quality, even being a small rural area, would have great visibility’ (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female).

‘There are several issues that we have to observe, what the customer wants, and the quality’ (Farmer 36 owns a farm with 8.5 hectares and annually markets 300 tonnes of a selected branded guava, Cachoeiras de Macacu, male).

‘Good farming practices’ have also increased. Crafts and traditional regionally identified products are reinforced. As a result, in different parts of the rural periphery of Rio de Janeiro Metropolitan Region it is common to encounter not just urban conversion but also contested countrysides, where farmers resist and adapt to urban encroachment. However, not all farmers have been able to seize new opportunities. Farmers who have good soils and have acquired some capital over time have been able to make the transition but farmers who have poor land, low capital or land subject to flooding have not. One point to make is the importance of farmers being open to change, which also contributes to the complex outcomes treated here. I have tried to show how many farmers in the metropolitan countryside adopt new methods and creatively combine agricultural and non-agricultural activities in order to adapt to new scenarios of regional change.

5.5 Understanding farms and farming communities in the context of (metropolitan) rural change: conflicts, challenges, and opportunities

The relationship between agricultural policy and groups of small-scale farmers in Brazil is not new and has had the purpose of giving greater amplitude to the action. Actions directed at the individual farmer level are often highlighted as generating smaller results in social promotion and rural development programmes.

Several social groups are formed outside the sphere of the State, often by the absence of State institutions or in reaction or resistance to it. However, once organised in associations or cooperatives, groups of farmers begin a collective dialogue with the State. Regardless

of the initial reason for their formation, social organisations are the basis of participatory processes and local governance, becoming the centre of convergence promoting sustainable and territorial development, attracting attention, government resources and non-governmental organisations, while at the same time strengthening the demands of farmers. However, farmers' organisations have also been at the centre of promoting rural transformation through the modernisation of agriculture. What is changing nowadays is the way in which the relationship between government and social organisation occurs, previously carrying actions from 'top-down' and today seeking more participatory dialogue (Ingram, 2018; Šūmane *et al.*, 2018; Meek, 2019).

One of the case studies is the micro-basin of the Batatal River, a tributary of the Macacu River, located in Cachoeiras de Macacu municipality (see Figure 3.1 in Chapter 3 and find Farmer 43's location). Faraó is situated on the steep escarpment of the Serra do Mar coastal mountains in a buffer zone of the Three Peaks State Park, an important conservation unit for the Atlantic Forest biome (see Plate 5.14). A large portion of the area has gradient in the 45-75% class. Vegetation is Dense Ombrophylous Forest, which covers 51% of the area of the municipality. The climate is hot and humid with local precipitation of 2,000 to 2,500 mm a year.

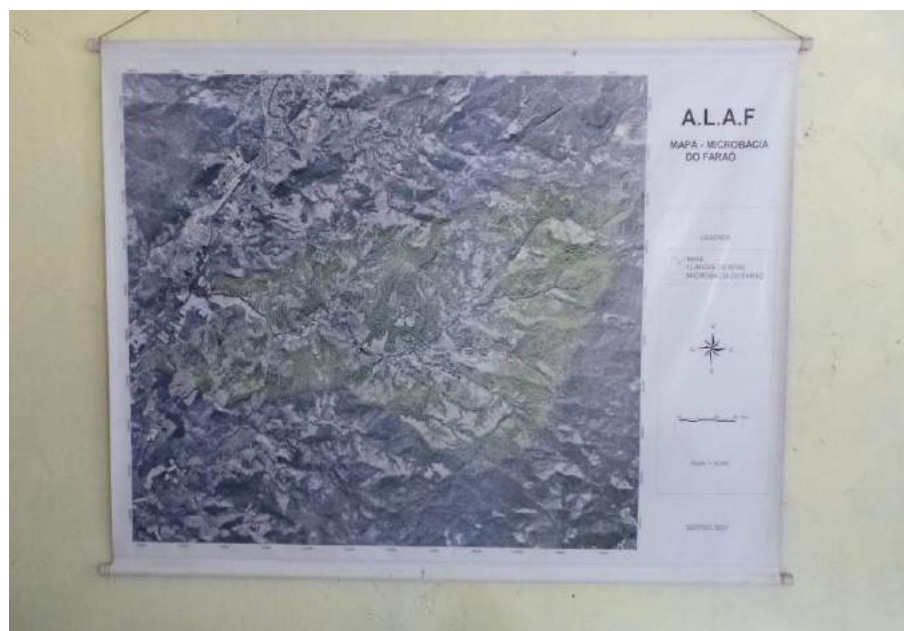


Plate 5.14. Satellite image found at the farmers' association office demonstrates the geomorphological complexity of the area inserted in a watershed in the rural periphery of Rio de Janeiro Metropolis. (Source: Author, 2017)

The Batatal micro basin is part of the Macacu River basin. A mosaic of forest and crops exists throughout the micro basin where small-scale farmers work on sloped fields subject to restrictions to land use and agricultural methods. Forest and bananas dominate the landscape, particularly on the slopes. Bananas are cropped in humid hollows surrounded by forest and some vegetables, maize and pasture are planted in bottomlands (Hoefle and Bicalho, 2012). 'Farming in forested and mountainous conditions of erosive susceptibility, risk of soil contamination and subject to deforestation requires promoting good agriculture practices (Bicalho and Peixoto, 2016, p.7). For that, communication between farmers and agronomists is essential (Farmer 43 as local leader and has a partnership with EMBRAPA - Brazilian Agricultural Research Corporation).

As already mentioned in Chapter 4, associations of small-scale farmers in Brazil have grown in numbers since the 1980s, stimulated by national policies. The associations facilitate the formalisation of participatory action by local actors within government agencies at different scales of power. In the case study, this view on the importance of associativism among small-scale farms is evident in different actions of the National Programme for Family Agriculture and the Sustainable Rural Development Programme in Hydrographic Microbasins - Rio Rural, financed by World Bank and Food and Agriculture Organisation of the United Nations (FAO). The actions of Rio Rural presuppose the existence of associations of family farmers.

Associations of small-scale farmers in Rio de Janeiro state precede the current orientations of agricultural policies and the oldest ones had roots in the 1960s, as part of the political movement hatched at the time. The old associations in Cachoeiras de Macacu, such as the Association of Farmers rural locality of Faraó (ALAF), originated from social movements of the 1960s and 1970s, and emphasised neighbourhood relations typical of bonding social capital. At first, the main objectives of such groups was to demand from the government improvements in access, road, and construction of a concrete bridge to facilitate access to the municipal centre. There was a partnership between farmers and the city hall, forming work groups with material from the city hall to carry out construction works. A formal entity was not created but the community acted in a collective way and this was the harbinger for the association formed later. The commencement of the community organisation in the municipality was supported by the Pastoral Land Commission, the rural extension service, the municipality government led by the Workers' Party, the Railroad Workers' Union and the Peasant Leagues, and was

part of a broader social movement in alliance with the Catholic Church and opposition political parties and leadership (Farmer 43, Cachoeiras de Macacu, male).

Parallel to the structures benefiting the community, the farmers' organisation sought better marketing channels, along with farmers from other municipalities, such as Paracambi, also around the metropolis of Rio de Janeiro and with interests of marketing their products. In this way, relations with external farmers' organisations began, uniting and exchanging experiences among different social groups with bridging links in the organisation of networks.

The external relations networks were expanded in the mid-1980s and were strengthened by state policies aimed at direct marketing at CEASA-Rio's Pavilion 30, an area reserved for associations of small-scale fruit and vegetable farmers from Rio de Janeiro state (see Plates 5.15 and 5.16). In 1985, the Food Supply Centres became state government authorities, and in Rio de Janeiro, the Department of Agriculture established a policy to encourage the direct marketing of small-scale farmers through associations. ALAF became an association and joined the Union of Associations and Cooperatives of Small Farmers of Rio de Janeiro state – UNACOOP, manager of the Pavilion 30.



Plate 5.15. The farmers' association owns a truck to commercialise banana production of the rural locality of Faraó (Cachoeiras de Macacu) at CEASA-Rio (Greater Rio de Janeiro Supply Centre). (Source: Author, 2017)

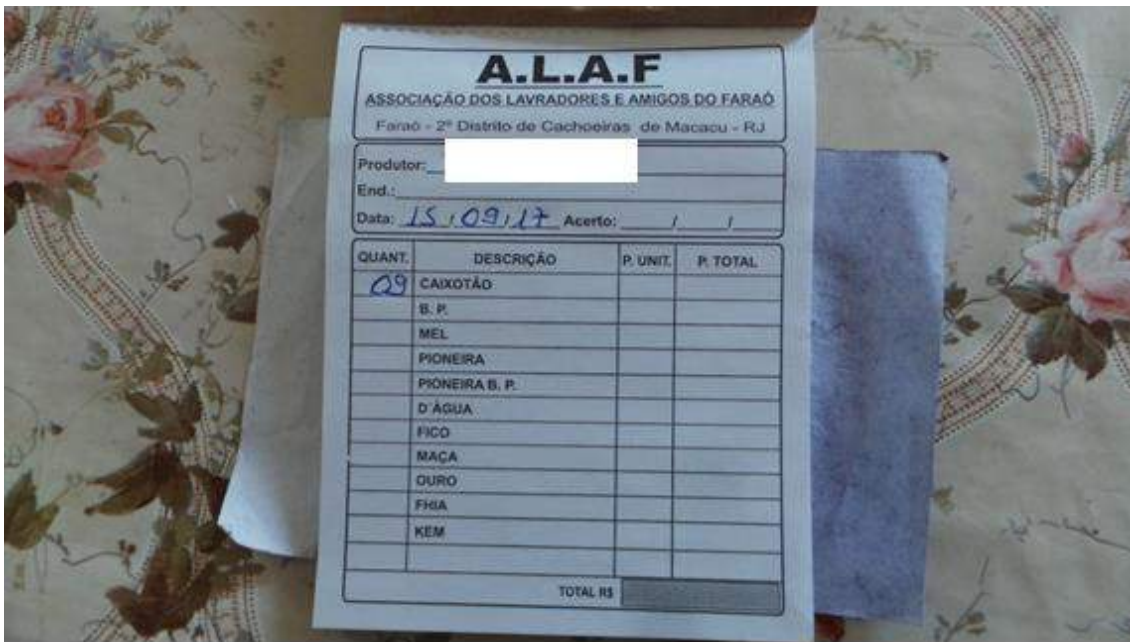


Plate 5.16. Each farmer who is part of the Association of Farmers and Friends of the Faraó (ALAF) has receipts to control the banana traded by themselves. The document below shows that Farmer 43 sold to the farmers' association nine boxes of banana on 15th September 2017 (Source: Author, 2017)

When ALAF adapted to PRONAF (National Programme for the Strengthening of Family Farming) in 2010, it acquired the Legal Declaration of Aptitude to PRONAF, a permit to participate in family agriculture programmes. During interviews, Farmer 43 highlighted that ALAF was the first association from Cachoeiras de Macacu to participate in the school meal programme. The great advantage of this programme is the guaranteed price stability of agricultural products and prices around double those obtained in the market. This farmers' association in Cachoeiras de Macacu is also important from the social point of view, providing necessary documentation for the retirement of associated farmers.

Brazil experienced the Green Revolution and a push to export production and to adopt agricultural methods and products inappropriate to the terrain of the Coastal Mountains and the socioeconomic situation of small-scale farmers (see Plate 5.17). Many farmers in Faraó have low levels of formal education, are middle-aged or elderly, grow food crops for markets located within the state, especially for the Greater Rio de Janeiro Supply Centre (Bicalho and Machado, 2013). As the study area is located far from major agribusiness regions of Brazil formal agricultural education is not available locally and farmers have little and sporadic technical assistance (Farmer 43, 48 and 49). Most of their agricultural learning comes from their life experiences but they are open to outsiders and new information (see Chapter 7 and see Plate 5.18).



Plate 5.17. In the Batatal micro basin, forest and bananas dominate the landscape, particularly on the slopes. Bananas are planted in humid hollows surrounded by forest and some vegetables, maize and pasture are planted in flatter areas. Farmers discuss in the field about local soil conditions with agricultural research officers of EMBRAPA-Solos, Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2014)



Plate 5.18. A group of farmers from Faraó in Espírito Santo, another Brazilian state, visiting a public research institution to improve quality on banana varieties. (Source: Farmers' archives)

Farmer perception has a direct relationship to their personal experience and the local history of land use associated with specific crops and production systems that altered the landscape over time. Until the 1980s, the rural landscape in Faraó was relatively uniform throughout the Batatal Valley, with crop land occupying the lowlands and slopes. A shifting-field system was used, with five-to-eight-year fallowing on the slopes and two-year fallowing in the valley floor (Farmer 43, 48 and 49, Cachoeiras de Macacu, males). Little primary forest remained, soil loss was a problem and flooding occurred in the valley during the rainy season. The area was noted for producing high-quality manioc and maize flour as well as bananas for the local markets.

In the middle of a general economic crisis in Brazil during the 1980s farming was transformed in the Batatal valley. Prices were poor for basic food crops and young people left the countryside, causing a shortage of labour. The result was drastic reduction in crop land. Only bananas remained on the slopes and vegetables and fruit trees were introduced in the lowlands. Environmental restrictions meant to reduce deforestation starting in the 1990s reinforced this pattern and the overall state of the agroecosystem changed.

Over subsequent decades, the abandonment of farm-land led to widespread forest regeneration. This introduced greater landscape differentiation across the valley producing a mosaic pattern with grassy open areas in the middle of different-stage forests and bananas on the slopes. In the upper valley, new environmental restrictions banned creating fields in fallow areas so that today farmers only plant bananas in the gullies following traditional farmer knowledge on soil quality (see Chapter 7 and Plate 5.19).



Plate 5.19. The micro-basin of the Batatal River, a tributary of the Macacu River, located in Cachoeiras de Macacu Municipality, Rio de Janeiro state. Faraó is situated on the steep escarpment of the Serra do Mar coastal mountains in a buffer zone of the Three Peaks State Park, a conservation unit of the ecosystem of the Atlantic Forest biome. (Source: Author, 2014)

However, marketing strategies have changed and bananas are now sold to the Rio de Janeiro market, e.g. Farmer 43 and all members of the Association of farmers of the rural locality of Faraó (ALAF) (see Plates 5.20). In the lower valley, with the rise of vegetable cropping in limited areas, some light mechanisation and use of agrochemicals were introduced but without the appropriate environmental and work safety guidelines. Modern methods are poorly understood and are not rooted in prior farmer experience (see Chapter 7) so that farmer knowledge is still based on local experiences. Consequently, farmer perception is rooted in the history of the socio-cultural landscape of Faraó, which reflects issues of long-term socio-economic viability of the local agroecosystem.

Studies focusing on social resilience have also highlighted the importance of learning pathways, social memory and communication in enabling socio-ecological systems exposed to disturbances, hazards or catastrophes to adapt, change and adjust decision-making pathways (Cutter *et al.*, 2008; Davidson, 2010). As Wilson (2012) argued, the notion of 'social resilience' is rapidly gaining importance, especially with regard to how the inbuilt 'memory' of a local community helps shape resilience pathways (social memory). He highlighted the interlinkages between social memory and community resilience with an emphasis on analysis of the importance of rites, traditions and social

learning processes for shaping community resilience. Folke *et al.* (2003) and Adger *et al.* (2005) emphasised that social memory comes from the diversity of individuals and institutions that draw on reservoirs of practices, knowledge, values and worldviews, and that social memory is, therefore, crucial in preparing a system for building resilience and for coping with surprises.



Plate 5.20. In the Batatal valley, new environmental restrictions banned creating fields in fallow areas so that today farmers only plant bananas in gullies following traditional farmer knowledge with regard to soil quality. Marketing strategies have changed and bananas are sold to Rio de Janeiro market. (Source: Farmers' archives)

One achievement of small-scale farmers' association in Rio de Janeiro state in recent decades was the guarantee of commercialising their agricultural production directly at the Greater Rio de Janeiro Supply Centre (CEASA-Rio), in a specific place for the sale of products from family farming of the state of Rio de Janeiro (see Plate 5.21). In this way, the Association of Farmers and Friends of the Faraó (ALAF) became less dependent on intermediaries in the commercialisation of production, with guarantee of access to central supplies. In recent years, with increased competition in one of the largest supply centres in Brazil, participation of these associations has declined.

In the case of ALAF, farmers have been hampered by the competitiveness of banana production from Minas Gerais state that produces on a large commercial scale to serve different markets in populated Southeast Brazil. During a visit to CEASA-Rio, I observed the sale of bananas from Minas Gerais at the site that was supposed to commercialise

products from small-scale farming groups in Rio de Janeiro state (see Plate 5.22). The commercialisation of the agricultural produce is still one of the major challenges for the economic sustainability among small-scale farmers in Rio de Janeiro state, especially as the state has also attracted several merchants from other areas in Brazil.



Plate 5.21. Pavilion at CEASA-Rio (Greater Rio de Janeiro Supply Centre) for family farming products. (Source: Author, 2017)



Plate 5.22. Boxes of banana at CEASA-Rio from Janaúba (Minas Gerais state) which is supposed to only sell agricultural products from family farming groups of Rio de Janeiro state. (Source: Author, 2017)

One of the marketing strategies used by a group of farmers is direct product sales to the nearby urban market. One of these strategies is the direct delivery using a vehicle for loading. Farmers 46 and 47 (Tanguá), for example, have a car financed by PRONAF (National Programme for the Strengthening of Family Farming). The family divides between the production of oranges and direct commercialisation of production with sale in Itaboraí and other Rio municipalities (see Plates 5.23 and 5.24). Farmer 6 received financing for the purchase of a car suitable for loading small-scale production, who already markets his product through different strategies.



Plate 5.23. Two farmers talk to the rural extension officer from EMATER-Rio during a technical visit to their orange orchard, Tanguá, Rio de Janeiro. (Source: Author, 2017)



Plate 5.24. A car financed by a national governmental programme - PRONAF (National Programme for the Strengthening of Family Farming) - that allows small-scale farmers to commercialise directly their agricultural production, Tanguá, Rio de Janeiro. (Source: Author, 2017)

The relationship between farmers and local, regional and national institutions was observed in several rural communities. In the case of Faraó, in Cachoeiras de Macacu, the local leadership (Farmer 43) presented the history of the farmers' association and networks with institutions at different scalar levels, including projects carried out with EMBRAPA (Brazilian Agricultural Research Corporation). Research projects involved farming knowledge sharing with agronomists, researchers, rural extension officers. Between 2012 and 2013, during my Master's degree, I had the opportunity to engage with the community through fieldwork visits conducted by EMBRAPA. Among these visits, I was at the 'Soil Sampling and Workshop on Soil Fertility Evaluation for Banana Crops', an event that sought to integrate knowledge among researchers, rural extension officers and local farmers (see Plates 5.25 and 5.26).

Amostragem de Solos

*Oficina sobre Avaliação da
Fertilidade do Solo para a
Cultura da Banana*

*Comunidade de Faraó – Cachoeiras
de Macacu - RJ*

19 de novembro de 2014



Embrapa
Solos

Plate 5.25. 'Soil Sampling and Workshop on Soil Fertility Evaluation for Banana Crops', an event that integrates knowledge among agricultural researchers, rural extension officers and farmers, Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2014)



Plate 5.26. The farmers' association of Faraó (Cachoeiras de Macacu, Rio de Janeiro) has maintained relationships with institutions at different scalar levels, including projects with EMBRAPA-Solos (Brazilian Agricultural Research Corporation). (Source: Author, 2014)

Field days are also organised by farmers themselves. I had the opportunity to participate in one on the farm of Farmer 12, who discussed the agro-ecological citrus system adopted (see Plate 5.27). In addition to a group of farmers interested in agro-ecological knowledge, Farmer 12 invited officers from the rural extension company of the municipality of Tanguá and the local Department of Agriculture (see Plates 5.28 and 5.29). This approach emphasises her strategy for disseminating her technical knowledge of agroecology to members of public institutions, thereby aiming to institutionalise, in the locality and beyond, her agricultural practices that have been carried out since the 1980s, when she converted from a conventional system of citrus production to an agro-ecological system, combining agriculture and recovery of native vegetation and water resources. When reflecting on agricultural transition, Farmer 12 commented: 'Just as the Atlantic Forest environment is very pleasant when we are nearby the woods, I think a fruit orchard should look like a forest and be pleasant too' (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female).



Plate 5.27. Farmer 12 is a pioneer in the alternative agricultural systems. Her knowledge of organic farming practices was built through contact with civil society movements and interaction with actors in the cities of Rio de Janeiro and Niterói combined with her experience in citrus production developed from past generations of her family and from local knowledge of the farmers' community. This photo shows the largest daily Rio's newspaper reporting about organic agriculture and she is illustrated in this report. (Source: Farmers' archives)



Plate 5.28. Field day promoted by farmers visiting an agro-ecological farm that combines citrus cultivation and reforestation of Atlantic Forest, Tanguá, Rio de Janeiro. (Source: Author, 2017)



Plate 5.29. Field day organised by organic farmers: switching from a productivist system to an agro-ecological system with recovery of Atlantic Forest areas, Tanguá, Rio de Janeiro. (Source: Author, 2017)

Another event that took place among farmers supported by ACIPTA, EMATER-Rio and EMBRAPA (Brazilian Agricultural Research Corporation) was the Tomato in Sustainable Cultivation – TOMATEC - field day, which presented tomato production and technical characteristics of the crop with reduced use of agrochemicals. Protecting the fruit using a plastic material ensures prevents it being affected by pests. The main practices that are involved are drip irrigation, bagging of fruits, and integrated pest management. The TOMATEC brand was registered at the National Institute of Industrial Property - INPI as EMBRAPA's property (EMBRAPA, 2005).

In addition to local farmers, officers from the rural extension and the Department of Agriculture participated in this event organised by Farmer 33, who is also an agronomist and researcher for EMBRAPA (see Plates 5.30-5.32). The tomato is sold to a niche market in Rio de Janeiro at a higher value than conventional products. During my last visit to Farmer 36 in Cachoeiras de Macacu, he reported that Farmer 33 visit him to present the technique that is also used by a group of farmers in the São Francisco Valley, in the Northeast of Brazil, an area of irrigated fruit production for export. Farmer 36 said he would use this technique for some guava trees (see Plate 5.33).



Plate 5.30. The TOMATEC field day was supported by the farmers' association, the rural extension company and EMBRAPA (Brazilian Agricultural Research Corporation), Tanguá, Rio de Janeiro. (Source: Author, 2017)



Plate 5.31. Farmer 33 shows tomatoes grown according to the TOMATEC system, which involves drip irrigation, bagging of fruits, and integrated pest management, Tanguá, Rio de Janeiro. (Source: Author, 2017)



Plate 5.32. Protecting the tomatoes using a plastic material ensures prevents it being affected by pests. (Source: Author, 2017)



Plate 5.33. Farmer 36 in Cachoeiras de Macacu does tests on guava cultivation, a technique suggested by Farmer 33 who grows tomatoes and oranges in Tanguá, Rio de Janeiro. (Source: Author, 2017)

At present, ten associations and cooperatives operate in Cachoeiras de Macacu municipality. These have been established since 1995 with the main objectives of develop joint actions to reduce intermediaries in the marketing of agricultural products, and to provide strategic direct marketing. Some farmers in the municipality became traders or local associations and state-level associations such as the Agroindustrial Farmers' Association of Rio de Janeiro (APRORIO), demonstrating the dynamics of the farmers' organisation. They collaborate with distant associations at state level and maintain links with governmental institutions at different scales, while promoting a participatory model among agents and local actors, government and farmers. (Darnhofer *et al.*, 2016; Ingram, 2018; Šūmane *et al.*, 2018).

The Guava Farmers' Association of Cachoeiras de Macacu (GOIACAM), for example, was founded in 2005. The association began with the search for solutions to pest attacks on guava crops. The objectives of the association were knowledge and information sharing among farmers, technical assistance, and the acquisition of cheaper agricultural inputs through economies of scale. In addition, farmers, via the association, sought new channels and forms of marketing through presentation of products and quality standards differentiation (see Plate 5.34). Social benefits are also achieved by the association, such as a collective health plan for all members of each associated farmer's family (Farmers 36, 39, 40 and 41).



Plate 5.34. Farmers of the Guava Farmers' Association of Cachoeiras de Macacu – GOIACAM displaying their products in an agricultural fair. (Source: Farmers' archives)

These relationships between farming communities highlighted that capacities for resilience cannot be developed by farmers alone, but depend on the collective activities of those collaborating with farmers, such as suppliers, customers, service providers and public institutions. The literature calls these cross-scale linkages the networking rurality (Murdoch, 2000, 2006) and the farming system (Walker *et al.*, 2004; Winter, 2005; Darnhofer, 2014; Darnhofer *et al.*, 2016). Each farming system provides unique opportunities to enhance resilience, depending on the interdependence between the actors in the farming system.

5.6 Conclusions

One of the research questions is to understand the processes involved in adapting farming systems and the learning processes that social actors go through as part of their attempts to survive and prosper in a changing rural context. The spatial mobility of the population resulting from the improvement of regional infrastructure and territorial integration in Rio de Janeiro state has led to an intensification of rural-urban interactions. Through urbanisation and new urban-industrial investments, the mobility and dynamics of the population include migration of rural workers and members of the family farms to urban areas. However, the research argues that the process of rural change is not linear and unidimensional, and there is evidence of resistance, resourcefulness, resilience, and adaptation by a certain groups of rural actors.

The changing nature of agriculture and its links to other rural sectors require the development of mixed knowledge and learning networks that include both agricultural and non-agricultural stakeholders. In some cases, such mixed knowledge networks were clearly operating, but in other cases, there were cognitive, structural or organisational barriers. These obstacles also point to the changes needed in agricultural research policy and rural extension services to respond better to farmers' learning and innovation needs (Diesel and Miná Dias, 2016; Šūmane *et al.*, 2018; Meek, 2019), as discussed in Chapter 7.

This chapter has evaluated a number of key formal and informal learning mechanisms. It examined how they operate and what types of learning were evident among family farm members to assist them in maintaining flexibility and adaptability to changing conditions

in the metropolitan countryside of Rio de Janeiro. The chapter demonstrated that change is enacted by exploiting opportunities through continuous resource combination and re-combinations in a multifunctional context. One way of encouraging these approaches and learning processes further would be to better target policies in Rio de Janeiro and beyond for the purpose of regional quality food systems and small-scale agricultural strategies.

This chapter has analysed farmers' learning practices, how these are related in various networks, and why learning really matters for sustainable and resilient agriculture in the rural periphery of Greater Rio and beyond. It relates the potential of learning and knowledge sharing in improving sustainability and resilience to its embeddedness in the specific social, economic, environmental contexts and its holistic character and dynamics in response to emerging opportunities, uncertainties and risks.

However, in order to practice more sustainable agriculture, which is non-prescriptive, knowledge-intensive and demands individual reflection (Ingram, 2018), some farmers may need to re-learn. A productivist approach to agriculture has been dominant for a long time and has been internalised in many farmers' thinking and practices. This finding underscores the need for a critical examination of farmers' learning and practices, but also those of the institutions and organisations involved in building sustainable and resilient agriculture systems on different scales (Berkes, 2007). Hence, this chapter also addressed the diversity in its various forms noted in the metropolitan countryside of Rio de Janeiro and the interactions between informal and formal knowledge and the stakeholders concerned – issues discussed in the following chapters.

Chapter 6. Nurturing diversity in the metropolitan countryside of Rio de Janeiro

6.1 Introduction

Brazil is facing multiple processes of change that affect rural areas: demographic evolutions, migration flow, renewed urban-rural relations, the rise and fall of alternative food networks, the changing power of constituencies of the rural, changing patterns of land use and valorisations of natural resources, together with rapid technological developments (Caldeira, 2008; Wittman, 2009; Schneider *et al.*, 2010; Delgado, 2012; Assad *et al.*, 2013; Ioris, 2016). These change processes do not occur in isolation but are embedded in a package of often-interrelated external meta-trends (such as climate change and global markets) that position rural spaces in broader and uneven dynamics of change.

These processes are interconnected and multi-level, involving multiple actors and governance approaches. Scholars agree that a transition towards sustainable agriculture is needed to meet challenges in the agri-food system. This entails a shift from a system characterised by the goal of increasing productivity to one built around the wider principles of sustainable production and rural development and resilience (Brunori *et al.*, 2013); social justice and food security (Goodman, 2004; Marsden, 2012; Sonnino *et al.*, 2016). Innovative forms of agriculture are emerging which can potentially contribute to such a transition, often associated with networks of actors advocating alternatives to mainstream agri-food systems.

Chapter 6 will discuss the spatial diversity of the metropolitan countryside of Rio de Janeiro, focusing on dynamics of agriculture in the context of multifunctionality. First, the diversity in agricultural crops is presented, reflecting the polyculture in this metropolitan context, including crops with a higher commercial value, such as fruit growing, and a tendency to diversify crops. Before presenting the diversity of agriculture in the metropolitan context, it is essential to discuss the transition from a productivist agriculture to a diversity of land uses, selection of agricultural products and quality recognition (6.2), differentiating local products from those produced on a large commercial scale in highly productive areas by Brazilian agribusiness. Farming resilience is interlinked with rural innovation, adaptation and changes of agricultural crops.

Diversity is also observed in terms of income. Family members seek different economic opportunities in the metropolitan and multifunctional context (6.3). Thus, the income of the family farmer is gained from agricultural production added to other income sources, including from the urban-industrial sector. This combination can guarantee resilient mechanisms in the rural locality and through rural-urban interactions. Knowledge and these spatial interactions are also part of the characteristics of metropolitan agriculture (6.4), as also discussed in Chapter 7. The case studies show that grassroots initiatives are already generating experiences and knowledge that could be fruitfully used to inform higher-level policy development.

Finally, the chapter will discuss the nature of metropolitan agriculture in the context of spatial diversity (6.5). It should be noted that the process of spatial restructuring can both provoke the migration of rural social actors to urban-industrial sectors and also increase the resilience of a group that creates strategies - such as diversity in production and market mechanisms, diversity of knowledge, sources of information and communication, diversity in building alliances and in relationships between community members and beyond. The chapter concludes that systematic change requires more critical reflection on conventional wisdoms and approaches, and openness to ideas and practices from outside the mainstream.

6.2 From a land-intensive productive system to nurturing spatial diversity

As Chapter 4 highlighted, Brazilian farming systems face a range of social, environmental, economic and political disturbances and changes, such as market fluctuations, climate change, new technology and the modification of governance structures, all operating at a range of scales. Brazilian agricultural policies usually focus on making agribusiness systems more robust against short-term shocks. However, a broader view of resilience is needed to ensure a sustainable small-scale agricultural sector in Brazil that can develop farmer capacities, adapt farming systems to changing circumstances, and transform their agricultural models in order to maintain the long-term supply of food and public goods. As Chapter 1 outlined, this study seeks to understand whether governance arrangements and learning capacities are effectively in enhancing the resilience of small-scale farming systems in a metropolitan context.

The intensification of production and the growth of output in some areas mean that other areas, generally those with less favourable production conditions, are being marginalised (Knickel, 1990; Knickel *et al.*, 2009). The concentration of agricultural structures has led to significant problems in both, intensive farming areas and less favoured areas. Farming undertaken in Greater Rio de Janeiro has a long history of producing food for the urban market. As the city of Rio de Janeiro grew in the early 1900s, farm production expanded, mainly vegetables, table fruit, sweet manioc and small animals. Growth of these activities was promoted by federal policies adopted in the 1940s and 1950s (see Plates 6.1 and 6.2) to create a green belt for feeding the then federal capital. Policies included agrarian reform to benefit small family farmers who produced for the Brazilian domestic market (Geiger and Santos, 1954; Galvão, 1959; Musumeci, 1987; Bicalho, 1992).

More recently, national policies to strengthen family farming have the aim of combating rural outmigration and the conversion of rural areas into urban areas. This approach, together with the initiatives undertaken by pro-active and resilient farmers, requires more creative municipal government. The traditionally rural municipalities of the outer metro region have urban, rural and rural-urban transition zones that are not easily modified and require complex political negotiation between farmers organised in social movements and different levels of government. Municipal planners are not unrestricted in how they do zone land and Municipal Development Plans must conform to external political decisions at the federal level. In the case of the federal agrarian reform projects, it is difficult to rezone land as urban, which in this case works in favour of the farmers. The construction of the COMPERJ oil refinery presents a contrasting case, which went against the interests of farmers. The State oil consortium Petrobras exercised major influence over municipal administrations, pressuring them to convert land to industrial use. These problems are all evident in the Municipal Development Plan of the Cachoeiras de Macacu located nearby (Prefeitura Municipal de Cachoeiras de Macacu, 2006, 2011).



Plate 6.1. Newspaper reported the visiting of President Getúlio Vargas (1930-45 and 1951-54) in Papucaia, Cachoeiras de Macacu, an area in Rio's rural periphery planned for land reform project. Source: memoriadecachoeira.wixsite.com



Plate 6.2. Land reform projects were also set up and the oldest is Papucaia, which dates from the 1950s. A number of other projects were set up afterward during the 1960s, 1980s and 1990s. In fact, Cachoeiras de Macacu was one area which most benefited from land reform projects in Rio's peripheral countryside. Source: memoriadecachoeira.wixsite.com

Farmers' associations allow the construction of both individualised knowledge and community knowledge. The associations represent an important social group in this context of rural-urban interaction. Some demands are economic and commercial, focusing on strategies for commercialisation of production. Other demands can come from the challenges of adapting agriculture, for example in the recognition of the rural area into the territorial planning in the context of promoting allotments and the opening of pastures with less intensive land use and sale of land for urban use. In this sense, the activities of associations are part of relational processes and interactions with other institutions (see Plate 6.3). The relationship between the farmers' association and the local Department of Agriculture is fundamental for a greater representativeness in decision-making and territorial planning (Farmers 6, 12, 40 and Policymakers 3, 5, 11 and 14). The relationship with agricultural extension institutions also becomes an important ingredient in rural change and the adaptation of agriculture to the challenge of reconciling and accommodating demands from different actors and social groups.



Plate 6.3. Farmer's associations enable the community to maintain local capacity for social organisation, engaging with various institutions and building important cross-scale linkages. Farmers' associations also allow the construction of both individualised knowledge and community knowledge. The associations represent the social group in this context of rural-urban interaction and the importance of farmers being open to change, which also contributes to the complex outcomes discussed here. (Source: Author, 2017)

In addition to the production of fruit discussed in Chapter 5, the rural periphery of Rio de Janeiro Metropolitan Region preserves agricultural crops for domestic and small commercial scale, e.g. Farmers 6, 13, 15 and 30. I observed and participated in interviews with farmers preparing pigeon pea beans, a legume species renowned for fixing nitrogen in the soil (see Plate 6.4). Farmers grow the main commercial crop and pigeon pea beans associated, offering more balance to the soil. The local and regional markets have demanded more diversity on agricultural products, offering great price to domestic products such as pigeon pea beans. Another issue observed is the preservation of traditional fruit species in the properties visited (e.g. Farmers 1, 6, 12, 17, 30, 36 and 43). Farmers create commercial production areas and preserve an area on the property with non-commercial fruit crops that do not have enough production capacity for commercialisation (see Plate 6.5).



Plate 6.4. The pigeon pea is associated with nitrogen fixation in the soil. In addition to protecting soil, it gives support to orange trees. (Source: Author, 2017)



Plate 6.5. Non-commercial fruit crops such as jubuticaba (*Plinia cauliflora*) and some little-known Brazilian fruits have been preserved and cultivated in the metropolitan countryside of Rio de Janeiro. (Source: Author, 2017)

Besides commercial and non-commercial fruits, the Orange Circuit, a programme promoted by the tourism department of the municipality along with tourism agencies in Rio de Janeiro, allows residents of the Rio Metropolitan Region to get to know the rural area of Tanguá and the history of citrus farming. In addition to visiting three orange farms, tourists can harvest and taste the quality of cultivated oranges. Rural tourism programmes allow greater rural-urban interaction by bringing urban consumers closer to the rural space and orange production for urban markets (see Plates 6.6 and 6.7). In two properties visited (Farmers 6 and 17), there is the participation of the younger generation, who show visitors the locality and orange cultivation (Farmer 8 is the daughter of Farmer 6). The programme is stimulated by the public tourism sector of the municipality and has increased the demand for tourism agencies but is still limited as a programme to stimulate rural development when only small numbers of local farmers are involved (Farmers 6 and 17). The following extracts from two policymaker's interviews demonstrates these interactions between farmers and public polices to encourage rural tourism:

‘The first script took place in August 2010 only among residents of the municipality and city officials. The increase in the number of participants in the itinerary of citrus farming tourism was from 2011 when we started to participate in events of tourism fair in Paraty, Rio de Janeiro. There were agencies and travel guides from Rio and São Paulo. In 2013 and 2014, the fair moved to Píer Mauá, in the centre of Rio City, and on the Copacabana beach. We also participated in events during the World Olympic Games in Rio and World Youth Journey, two events that took place in Rio over the past few years. The main objective was to present the itinerary of rural tourism on citrus farming to travel guides. On August 23, 2017, we participated in a meeting in Itaguaí, the day of the travel guide. There were more than 1500 tour guides and travel agencies attending this event’ (Policymaker 9, local Department of Tourism and Culture, Tanguá, female).

‘Small-scale farmers produce orange, pigeon pea, okra, and gherkin. Orange and cassava are the most traditional crops in the area, but farmers also produce a number of other agricultural products for complementing the family income and diversifying agricultural land. The orange circuit involves tourism in the rural area, for instance. A group of few farmers takes this opportunity to sell their agricultural production in partnership with the local Department of Tourism, bringing urban people from Rio City to the countryside’ (Policymaker 1, rural extension officer, EMATER-Rio, Tanguá, male).



Plates 6.6 and 6.7. The Orange Circuit allows urban residents of the Rio Metropolitan Region to get to know the rural area of Tanguá visiting citrus farms. (Source: Author, 2017)

This reveals that rural areas can possess a greater diversity of cultures when analysed beyond productivist economic lenses to recognise other dimensions and spatial relations in the diversity of agriculture of the metropolitan countryside. Two rural extension officers referred to agricultural practices and tensions between productivist views and non-productivist symbolic meanings (see Plates 6.8 and 6.9) when a farmer preserved an old tree planted by his father a long time ago:

‘Many people were leaving the rural area in the last few years, especially the young people. The current debate on high-productive seedlings from São Paulo has indicated that citrus farming is renewing. However, some farmers, for example, Farmer 9 has 60-year-old orange trees on his land. Sometimes they want to preserve old trees just because they were cultivated by the past generation. Most of them [farmers] are too much resistant for any new project for agricultural development that we [rural extension officers] recommended’ (Policymaker 2, rural extension officer, EMATER-Rio, Tanguá, female).

Likewise, a second rural extension officer explained:

‘The orange varieties produced are the same as they have produced over the past 50 years. Even though EMATER [rural extension company] has done a lot of work, farming traditional knowledge did not let them change. Local farmers do not easily accept new citrus varieties and instruction from us [rural extension officer]’ (Policymaker 1, rural extension officer, EMATER-Rio, Tanguá, male).



Plate 6.8. During an ad hoc interviews 'on the go' with Policymaker 2, when I asked her to photograph a positive indicator of agriculture in the rural community of Posse dos Coutinhos (Tanguá), she decided to photograph an orchard planted with new seedlings, indicating processes of restructuring of citrus farming in the area. (Source: Photo elicitation, Rural extension officer 2, Tanguá, 2017)



Plate 6.9. Policymaker 2 also photographed this image of orange seedlings from São Paulo as another positive indicator. She highlighted the good appearance of these young seedlings, which, according to her, present a great development and guarantee the productivity in the following years. (Source: Photo elicitation, Rural extension officer 2, Tanguá, 2017)

Wilson (2010) proposed a conceptual framework, based on the economic, social and environmental resilience of rural areas as a way of understanding different trajectories of rural communities. He referred to the ‘productivist trough’ with its characteristically low community resilience and the need to help rural diversification pathways away from agricultural over-dependence. To achieve sustainable development, it is important to consider the multiple realities of society, as well as the diversity of cultural values, environments and economic conjunctures. For this reason, understanding the multidimensional agricultural production and associated knowledges in the peripheral countryside is essential to protect spatial diversity in a multifunctional context. The next section now discusses how farmers have created strategies to integrate agriculture into markets at rural-urban interface.

6.3 Diversity of strategies for integration with agricultural and non-agricultural markets

In the 1970s, the urban supply policy was redirected from production to commercialisation, with the constitution of the National Supply System and the creation of Supply Centres - CEASA - organising the wholesale and retail sector of food marketing in the cities. Today, the national system is reformulated and executed by the National Supply Company - CONAB - which is integrated into the National Food Plan with social programmes and support to family agriculture, articulating in these cases with CEASAs.

In addition to its basic function, CEASAs have assumed other functions in the commercialisation chain between farmer and retailer. In the case of farmers, these were influenced by the standardisation of production, product packaging, sanitation, etc. In the mid-1980s, there was a reform of the sector and the CEASAs were passed on to the regional states, and since then they have become convergent points for training programmes, intervention to regularise the productive sector, implementing production standards, and the role of intermediary policies of the National Food Plan, mainly to farmers of fruits and vegetables, typical of the surroundings of the cities.

In Rio de Janeiro state, Pavilion 30 (as it is popularly named) stands out in CEASA as an exclusive place of direct commercialisation for small-farm associations, which continues to contribute to small-scale production. The Food Supply Centres are part of family agriculture and food and nutrition policies, which emphasise the participation of farmers in-group. Thus, there is a current tendency of the various spheres of government to direct their actions to farmers' associations.

However, the response of these organisations to the programmes associated with policies that directly or indirectly affect the sector is not always positive. Even so, the farmers' association movement, stimulated by both governmental and non-governmental organisations, is distinctive, and the number of associations and cooperatives of small-scale farmers seeking to benefit from public policies has grown significantly, especially since the mid-1980s. The National Programme for the Strengthening of Family Agriculture (PRONAF) has contributed to this growth, since several of its activities are directed at the farmers' groups, favouring a pattern of collective social organisation

among the rural population and its integration with institutions participating in the National Food Plan (BRASIL, 2009; Sonnino *et al.*, 2014).

During interviews Farmers 6, 17, 36, 40 and 41 explained that most of the investment resources used to run farm operations in the outer metro zone come from self-financing, though national programmes supporting small family farmers like PRONAF and the state credit programme PROSPERAR also contribute. However, not all farmers have accessed these programmes. Pro-active farmers undertake most initiatives even when they make use of government programmes. Consequently, farmers are the principal actors leading change and are responsible for maintaining the ‘rural’ in the metropolitan region. The National Programme for Public School Meals (PNAE), which permits family farmers to sell produce at premium prices, gives local producers an important boost and represents a positive element of rural-urban interactions in metropolitan areas characterised by small parcel land ownership. The following excerpt from a farmer’s interview demonstrates this process:

‘We [family farm] have 19ha of land, producing 3000 guava trees. We [family farm] have a very high production compared to other areas due to the environmental conditions of the region that are great for guava cultivation. We [family farm] opted for this fruit crop, but we knew we had to invest in long-term. For instance, my daughter already bought a truck with her husband to market the guava at CEASA-Rio [Greater Rio de Janeiro Supply Centre]. The truck was financed by the PRONAF [National Programme for the Strengthening of Family Farming]. Today our product has an even more aggregated value with the label that is produced by family farmers. Through the publicity fairs promoted by the state government of Rio de Janeiro, I can further promote our product. Therefore, the family are participating in all stages of guava farming chain’ (Farmer 40 owns a 19 hectares’ farm with 3000 guavas trees, Cachoeiras de Macacu, male).

Another interesting innovation involved setting up a small sweet factory with the help of the Rio de Janeiro state programme PROSPERAR that provides credit to small-scale farmers. Not only was value added to the guavas grown but the farmer was able use a large amount of fruit which would have been discarded. This case underlines the importance of being an officially recognised farmer in a metropolitan region in order to qualify for governmental assistance. Even without special credit to set up a factory, it is common for other guava farmers to transform their fruit into paste to aggregate value even on an artisanal scale (see Plate 6.10). In fact, discerning consumers pay a premium for craft guava paste, which is made with more fruit and has a better taste than guava paste offered by large manufacturers (Farmers 40 and 41).



Plate 6.10. A family farm (Farmers 40 and 41) in Cachoeiras de Macacu produces craft guava paste. Source: Author (2013)

One agricultural niche in farmers' new portfolios throughout the case studies was the 'environmental product', such as organic produce. They are examples of products that respond to emerging consumer preferences, policy shifts, and threatening geophysical changes such as climate change and land degradation. Some farmers have opted for outright organic agriculture that also commands higher prices (e.g. Farmers 12, 13, 31 and 44), while both conventional and organic vegetables are grown for local urban markets and Rio de Janeiro state. When reflecting on agricultural diversification, Farmer 12 commented:

'My father grew orange, beef cattle, and few another crops. Today I cultivate several fruit trees and I want to expand with more diversity. Among the orange trees, I have planted corn and beans. I have an area reserved for forest preservation as well.

[...]

Farmers need to get out of the monoculture framework. Farmers cannot have only orange production. We [farmers] need to diversify with other fruits. Also, diversify with more than one variety of orange. Combine citrus farming with other fruit crops. This will open new markets. This will contribute to the farm's degree of integration and farm household income. They will have income for whole year. In addition, diversity of crops will improve the soil' (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female).

The production of guavas is one of the most innovative activities as it involves new farm practices and marketing innovation in the form of packaging and select brand names to preserve the reputation of the product. This guarantees price stability, promotes customer loyalty and prices can be over twice that of common guavas. Selected specialty fruit goes to Rio and even to São Paulo (Machado, 2013). The case illustrates how technical knowledge is gained over time in the transition towards quality production in the small-scale fruit sector and the importance of on-farm experimentation in the learning process. Setting up small-scale sweet factories is another way to add value to guava production while enabling farmers use fruit which would have been discarded. One of the most dynamic producers has a farm with only 8.5 hectares but annually markets over 300 tonnes of a select branded guava, registered with the National Association of Industrial and Intellectual Property (ANPII). The following extract illustrates this process:

‘The main product on this farm is guava. Alternatively, I also cultivate passion fruit, lemon, and vegetables.

[...]

I have adopted a high-quality guava production system. We [small-scale farmers] have to adjust according to the market. I have used a bar code that permits the customer to know what product is which. It is for the customer to know that this product has quality and its origin’ (Farmer 36, owns a farm with 8.5 hectares and annually markets 300 tonnes of a selected branded guava, Cachoeiras de Macacu, male).

Marketing has also witnessed considerable change as long market chains are replaced by more direct forms of selling, which reduces the number of intermediaries and has lowered transaction costs. With closer contact with final consumers, farmers have learned how to cater for preferences, habits, values and images of the product offered. This is particularly evident in organic and fruit farming in which production is adjusted to consumer demand and not vice versa. Farmers 12 and 36 reflected on this issue during interviews: ‘If everyone present a product with more quality, even being a small-scale farm, would have great visibility’. (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female). ‘There are several issues that we have to observe, what the customer wants, and the quality of the product’ (Farmer 36, Cachoeiras de Macacu, male).

However, not all farmers have been able to seize new market opportunities. Farmers who have good soils and acquired some capital over time have been able to make the transition

but farmers who have poor land or land subject to flooding did not. Narratives of some farmers reveal attitudes towards the transition of the agricultural production system (see Box 6.1 below). The following extract from Farmer 12's interview elaborates these challenges:

FSM: 'How do you observe the transition from conventional agriculture to diversity and alternative farming systems?'

Farmer 12: 'This process could be accelerated, but for that, we [members of the rural community] need more people in action. That is why I have seen this process of transition in a long-term. Linkages with the university is very important, for example. I think academic projects need to come more often to the rural area. Go out, do demonstrations in field. In addition, farmers need to be more open and integrated as well, do not have to keep their head down. One day small-scale farmers will know how powerful they are' (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female).

Box 6.1. Field diary, October 19, 2017.

During the field day on Farmer 12's land, I observed practices for making young orange trees more resilient by leaving. The grass grows around the orange tree. After weeding, the tree is apparently weak because it needed competitive conditions. Over time, it gains more resistance.

Farmer 12 criticises the idea of bringing seedlings from São Paulo. Therefore, she suggests the formation of local nurseries with local knowledge and production of seedlings adapted to the local environment of Tanguá. She advocates the reproduction of seedlings that are more resistant to water stress caused by frequent droughts in the area.

In addition to the individual character of knowledge, there is knowledge built into community organisation that involves common issues and elaborates knowledge in association with internal actors and connections with public technical support institutions (Ingram *et al.*, 2015; IPES-Food, 2016; Ingram, 2018). The relationship can benefit both the community with the exchange of scientific knowledge and practices, as well as research

and extension institutions that value grassroots rural development strategies and seek to understand challenges raised by the community organisation. The next section will argue that this relationship establishes knowledge exchange as a way of formalising practical farming knowledge (Fonte, 2008; Dargan and Harris, 2010; Lyon *et al.*, 2011).

6.4 The diversity of knowledge and information sources: creating synergies between farming development, communities and cross-scale linkages

Agricultural sustainability has been linked with the concept of resilience, which emphasises dynamics, disequilibrium, and unpredictability in agricultural development. Resilience refers to the capacities of an agricultural system to adapt and transform itself so that it can persist in the long term. Learning to live with change and uncertainty, and combining different types of knowledge appear critical for building resilience (Folke *et al.*, 2003). Among the diverse knowledge sources and learning forms farmers use, Darnhofer *et al.* (2016) have pointed to the particular role of farmers' experiential learning and networking in increasing the resilience of small-scale farms. In this case study, the concept of resilience challenges dichotomous urban-rural approaches and replace more traditional urban-rural attitudes to land use in urban peripheries in which agriculture is commonly viewed as simply being replaced by urban sprawl. Resilience as a concept provides in-depth insights on how small-scale farmers are coping with pressures and opportunities created by urbanisation and industrialisation.

Agriculture in urban areas and peri-urban hinterlands is an integral part of composite landscapes and stimulates local production and consumption of quality food that contributes to the development of dynamic farming systems. In opposition to regional and local policy, which does not fully recognise the diversity of agricultural environments and the potential of agriculture in the Metropolitan Region of Rio de Janeiro, this study identifies farming systems undergoing processes of adaptation. Farmers have adopted technical innovation and have created new strategies of marketing and distribution of produce which demonstrate that rural-urban interaction does not have to be unfavourable to agriculture. When reflecting on the differential agricultural policies and economies in Brazil, Farmer 36 commented:

'Rio de Janeiro state is seen as a tourist state and oil-petrol producer in Brazil. Its agriculture is forgotten. I try to follow the agricultural innovation from São Paulo state. They are more developed than us. I have colleagues [Japanese descendants] there; I go there to visit the municipal market in downtown São Paulo, searching for innovation on fruit farming. I have been to Petrolina and Juazeiro (Northeast Brazil) as well. I have already seen the production of grapes and melons in the Northeast for export We are looking for technologies used at this moment' (Farmer 36, Cachoeiras de Macacu, male).

Farmers are in constant mobility and circulate between the rural areas and Rio City, and some have already been at the centre of commercialising agricultural products in Rio and beyond or have already had direct contact with the urban market and customers. Other farmers have established direct contacts and partnerships with the public sector responsible for policies and research for rural development and environmental issues, some with offices in the cities of Rio de Janeiro and Niterói. Knowledge and information in rural areas in the metropolitan context is a result of multiple interactions.

The circulation of multiple knowledge and mobility between rural areas and urban centres also allows the diversification of the commercialisation channels of agricultural production, resulting in different strategies of the farmer community in the urban sectors of Rio de Janeiro, the second largest metropolitan market in Brazil. Although proximity reduces transport costs, it becomes increasingly necessary to create strategies within the framework of competitiveness with other agricultural areas of Brazil, usually more productive, offering greater volume for the large metropolitan market. A rural extension officer referred to this process:

‘I gave a talk and said you guys [farmers] are very close to Rio. Those [farmers] who can adapt will have a great market in Rio [...] Look! There is a change in progress here. This was an old orchard. The farmer replanted the old orchard with new seedlings. I have been here since 2011 and have seen many changes on citrus farming’ (Policymaker 2, rural extension officer, EMATER-Rio, Tanguá, female).

Small-scale farmers in the metropolitan periphery develop commercial strategies for better insertion in the local and regional markets and the creation of individual and collective strategies for the strengthening of family agriculture of the Metropolitan Region of Rio de Janeiro in the competitive market of agricultural products. One strategy has been to seek the differentiation of the local product from those produced on a large commercial scale and distant from the metropolitan context and Rio de Janeiro state. The following extracts from Farmer 12’s interview demonstrates this process:

‘The quality of the orange here and the taste is related to the soil and the morphology of the terrain. [...] I have cultivated orange trees on the hill; in a topography very diversified, where I can get different quality fruit. In São Paulo they [farmers] think different, they prefer the lowlands.

[...]

São Paulo is more business oriented. They started turning citrus farming into a business. Here the social structure is different. São Paulo seeks large-scale production. Here we [farmers in Rio’s rural periphery] could seek quality. Rio de Janeiro state could be differentiated by quality, by small-scale farming skills. People in the city want quality. If you present quality, consumer will prefer your product.

Even with agrochemicals, our orange is better than São Paulo. The quality is in the soil - ‘areola’ that has also been used for urban construction. There is sale of this soil for stores of building materials. They have already sold all the good soil for agriculture in Itaboraí. Here I have been in conflict with the company that would come in the context of COMPERJ [Oil-petrol complex]. They want to sell our soil. Our best soil for citrus has been sold for urban construction’ (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female) (see Plate 6.11).

Likewise, an agricultural extension officer explained:

‘The local climate and the presence of potassium in the soil are essential for the quality of orange produced here. The fruit becomes sweeter’ (Policymaker 1, rural extension officer, EMATER-Rio, Tanguá, male).



Plate 6.11. Construction managers have been in the rural area looking for land to rent for the extraction of ‘areola’, one of the components of the region’s soil that has attracted extractive engineering companies. (Source: Author, 2017)

Griffin and Chatan (1958b) discussed the impact of urban expansion on mainly agricultural areas of the United States, explaining how expansion occurs precisely on the best land. The authors argued that the factors that cause the transformation of areas are linked to population growth, lack of planning policy and problems of the regional agricultural economy. With the increasing conflict of land use, farmers started to sell their land. They highlighted the challenges and problematic issues that constitute urban settlement on first-class agricultural land by suggesting a series of measures to control the situation, common in 1950s in the US, for example, the demarcation and protection of agricultural land use in certain areas. Surprisingly, ‘Population: a challenge to California’s changing citrus industry’ by Griffin and Chatan (1958a) and ‘Urban impact on agriculture in Santa Clara County, California’ (Griffin and Chatan, 1958b) discussed the rapid growth of population to increasing demands for land for residential purposes and in turn to a reduction in the acreages of citrus fruits in and around the metropolitan areas of the Central Valley, US.

Box 6.2. Field diary, September 8, 2017.

As I took the bus to Posse dos Coutinhos, I met Farmer 28, who lives on a farm near by the horse farm. He lives with his wife and aunt. The farmer uncle died, so he decided to leave his work in a tin lithography industry in Itaboraí to maintain the agricultural activities on the farm with approximately 600 orange trees. He sells the product to two intermediaries from the locality that sell the fruits to Rio City and Itaboraí. Each buys eight boxes of oranges per week. He says agriculture is a new activity in his life. He has attended the meetings on Wednesdays at the local farmers' association, seeking new knowledge and building a social network. He said that he has preferred the everyday life in Posse dos Coutinhos [in the rural area]. He used to work at night and had direct contact with chemicals in the industrial sector.

Spatial diversity is also reflected in the multiple relationships of farmers with social actors from both the rural space and rural-urban interactions. There are different life pathways in this metropolitan scenario. There are farmers who have lived and worked in the urban-industrial sector (see Box 6.2 on the left and Plate 6.12) and have returned to farming, others have chosen to settle in rural areas and combine urban income and agricultural activities. 'There are those who are leaving, those who are coming back, there are those who want to stay' (Farmer 12 owns a medium-sized organic farm and local leadership on environmental issues, Tanguá, female). In these multiple and complex paths, social actors create different relationships and establish contacts with different people, allowing the exchange of knowledge and the elaboration of translocal networks.

In a broader knowledge exchange context, the concepts of regional collective learning and

regional innovation systems have addressed the role of public or non-firm institutions in facilitating innovation capacity (Knickel *et al.*, 2009; Marsden *et al.*, 2010; Horlings and Marsden, 2014). Within the rural context, studies have examined the relationship between public and private actors through the roles of governance, collective action and public actor initiatives (Winter, 1997; Tilzey and Potter, 2008; Marsden and Morely, 2014; Sonnino *et al.*, 2014). It is argued that institutional actors should play a supportive role by building up the networking capacities of rural economic actors and communities (Ingram, 2008; Wilson, 2010; Ingram *et al.*, 2015). In this regard, institutional actors should consider how relational assets such as social capital, trust relations, reciprocity, and learning capacities may be best leveraged to improve network outcomes and, in turn, local economic development.



Plate 6.12. Farmer 28 decided to leave his work in a tin lithography industry in Itaboraí to maintain the agricultural activities on the farm with approximately 600 orange trees. His land presents accelerated erosion that has caused significant financial loss. (Source: Author, 2017)

Dolinska and Aquino (2016) examined the role that farmers' communities of practice play in the innovation process. The Agricultural Innovation Systems approach focuses mainly on interactions and learning between farmers and other actors but less on collective processes occurring between farmers. In communities of practices, farmers not only collectively construct knowledge, but also produce and reproduce discourses and norms, providing frameworks for individual actions that can both hamper or support innovation. Learning in peer groups means a community of practice in an informal learning community characterised by a shared repertoire of communal resources that members have developed over time (Lave and Wenger, 1991). According to Wenger (2000), communities of practice are essential for social learning systems, as they are social containers of competences.

Communities of practice are associated with the type of learning process that can be described as social construction and knowledge sharing, rather than knowledge transfer (Wenger, 2000; Morgan, 2011). In communities of practice, knowledge is an emergent property of social interaction and not a commodity. It is practice that creates circumstances for knowledge creation and makes it possible to mobilise tacit knowledge (Dugrid, 2005). This is important in the context of farming – a lot of farmers' knowledge has a tacit character that cannot be captured fully in discussion.

The knowledge of agriculture in rural-urban interaction also promotes dialogue between rural and urban social actors in rural development, generating a relational agriculture and an environment of knowledge exchange from different types of information and sharing in various social networks. The farmer, as part of this dynamic, receives influence and produces knowledge and ideas from experiences both in rural and urban areas (see Plates 6.13-6.16). Experience in a non-farm employment can bring external expertise that is readapted to agricultural context. The experience of working in the urban-industrial sector for years may reinforce ambitions to return to agriculture with innovative ideas and knowledge acquired during other experiences. The following extract from Farmer 36's interview demonstrates this:

‘In 1972, a Japanese company called me to work as an interpreter. A communication company. At the time, the DDI [Direct Dialling Inward] was being implemented in Brazil. I started to travel all over Brazil. However, I have never forgotten my experience in agriculture. After three years, I decided to return to home and I thought - how about a change? Instead of just producing temporary crop [tomato], our family started to produce fruit growing. First, it was passion fruit. Later, our neighbour, a pioneer of guava in the area, suggested us to cultivate guava trees. Introducing a new crop needs time for adaptation. It was a challenge. We had some contact with other farmers in São Paulo and Rio, then, we exchanged practical knowledge among farmers from different rural areas in Rio de Janeiro state. We started to innovate on guava techniques and varieties. We [Japanese descendants] have this tradition of analysing very well the crop that we are cultivating. We observe, firstly. Then, we see the most productive plants varieties, more tolerant for pests and diseases. We always exchange experiences’ (Farmer 36, Cachoeiras de Macacu, male).



Plates 6.13 and 6.14. A farmer worked between 1972 and 1975 in a telecommunication company as a bilingual translator - Portuguese and Japanese. After this external experience, he decided to return to the farm inherited from his father and began a process of transition from vegetable production to fruit growing, reaching in the last years greater quality of guava production. (Source: Farmers' archives and Author, 2017).



Plates 6.15 and 6.16. Various types of technical knowledge gained during the transition towards quality production in the small-scale fruit sector and the role of on-farm experimentation in the learning processes. (Source: Farmers' archives and Author, 2017)

The Japanese community in Cachoeiras de Macacu also exemplifies links between community and sharing knowledge. They maintain a head office in Papucaia, where they hold meetings and festive celebrations organised by Japanese descendants. If previously they were mostly integrated into agriculture, nowadays the group operates in different socioeconomic sectors in the countryside in the Metropolitan Region (see Plates 6.17 and 6.18). As Chapter 5 highlighted, it is important to emphasise the role of this community in developing agriculture and pioneering agricultural techniques, such as the introduction, improvement and adaptation of guava varieties through techniques that combine knowledge of Japanese agriculture and Brazilian agricultural conditions. Most of Farmer 36's family, based in Cachoeiras de Macacu, came from Okinawa, Southern Japan, where they were already fruit farmers, cultivating peach and persimmon. Pruning techniques from Japanese agriculture were adapted to the tropical guava culture as Farmer 36 explains:

‘The technique of pruning the guava trees came from peach fruit systems in Japan. I inherited from my father the discipline for agricultural working. Japanese people concentrate on one activity and handle the product to the market very well. Handle the fruit very carefully, with much affection’ (Farmer 36 owns a farm with 8.5 hectares and annually markets 300 tonnes of a selected branded guava, Cachoeiras de Macacu, male).



Plate 6.17. Japanese farmers were given land in agrarian reform projects as part of international agreements between Brazil and Japan between 1950s and 1970s and some of their descendants still grow vegetables and fruits today, Cachoeiras de Macacu, Rio de Janeiro. (Source: Farmer 36's archives)



Plate 6.18. The Japanese community in Cachoeiras de Macacu highlights the importance of strong links of community integration. They maintain a head office in Papucaia which holds meetings and Japanese festive celebrations. (Source: Author, 2017)

Šūmane *et al.* (2018) discussed the diversity of knowledge sources and learning forms that farmers use and the particular role of farmers' experience-based knowledge. Farmers greatly value local experiential knowledge as having practical, personal and local relevance. Given the limitations of more standardised information and knowledge, and the pressures for a transition towards more sustainable and resource-efficient practices, evidence from the investigation indicated that the potential of local farmer knowledge is not being utilised sufficiently and many respondents argued that better integration of different lay expert knowledges is needed (e.g. Farmers 12, 17, 33, 35, 36, 39 and 41). For the individual farmer this can be done by synthesising knowledge from different sources. Others suggested that it can also be done through farmer networking – facilitated by formal agricultural knowledge institutions, through collaboration between farmers and researchers as knowledge co-generators, and through more spontaneous multi-actor knowledge networks that bring together participants from various fields (Farmers 12, 13, 31, 33 and 44).

In these ways, knowledge built by social organisations and farmers' practical experiences can begin to permeate and inform scientific findings while being legitimised by public research institutions. An example of this is the relationships build between banana cultivators in the hills of the Atlantic Forest, public research and extension institutions,

and the Rio Rural project for rural development financed by the World Bank (see Plate 6.19). The relationship and institutionalisation of farmers' associations and external institutions at regional and national level demonstrates that different knowledge in agriculture, when combined, can result in a deeper culture of learning and cross-scale linkages.



Plate 6.19. An association's governance structure and relational networks promotes the integration of experimental knowledge, and connects knowledge and learning to action, improving the quality of banana crops in the Atlantic Forest environment. (Source: Author, 2014)

During the industrialisation of agriculture, the role of farmers' knowledge diminished greatly and much of this knowledge has been lost altogether due to the spread of productivist logic and standardised solutions, and a decline in the size of farming communities and their sense of cohesion (Fonte, 2008). However, in the face of contemporary challenges facing agriculture, there is an emerging recognition that farmers' and local knowledge is a valuable resource that can reorient modern agriculture towards more sustainable and resilient development pathways (Darnhofer *et al.*, 2016; Šūmane *et al.*, 2018). These challenges should lead to explore different forms of farming and, by extension, farming regions that have maintained their informal knowledge and learning. Considerable potential nevertheless remains to make greater use of these knowledges in the study region and other regions.

Local knowledge encompasses dynamic and complex bodies of expertise, practices and skills, developed and sustained over time based on local people's experiences in their environmental and socio-economic realities (Beckford and Barker, 2007). Farmers' knowledge is a sub-set of wider local knowledge that enables them to farm in specific local conditions. It is based on practical experience and often linked to a practical skill. As agriculture is highly dependent on the local environment, local farmers' knowledge is of particular importance as it contains an intimate understanding of the particular set of local cultural and natural resources. When reflecting on farming knowledge in the context of environmental challenge, a farmer commented:

‘I do not believe in plagues and diseases. I believe in imbalance. Because when the plant starts to show signs of any diseases, actually, they are showing an environmental problem’ (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female).

The proximity of the consumer market and the production distribution chain also allows some farmers or family members to specialise in the commercialisation of production, distancing themselves from the practice of agriculture, but allowing greater contact, understanding and experience in interactions between the production, marketing and distribution of agricultural products (Farmers 6, 8, 17, 33, 35, 40 and 41). In the context of pluriactivity and strategies for diversifying family income, several respondents mentioned that it is common for some family members not to get involved in agriculture, but instead to seek employment outside the rural locality or engaging in community marketing strategies, e.g. Farmers 5, 9, 36 and 43.

In some cases, another response to income diversification is how land is distributed between family members (e.g. Farmers 3, 10, 30 and 32). The division of the land between family members could generate land fragmentation, and low agricultural productivity and income, e.g. Farmers 15, 26, 30, 37 and 43. To avoid this, some family members choose to engage with urban-industrial or service sectors, while some remain cultivating land and the family property as partners alongside other family members (e.g. Farmers 2, 15, 30, 46 and 47). This interaction between sectors within the family adds further dynamics to agricultural land and rural-urban interactions.

The proximity to industry and urban services of the metropolitan region of Rio de Janeiro again allows the exchange and transposition of knowledges that can generate innovation

processes for the agricultural production system, such as the processing of juice pulp and guava marmalade (Farmers 40 and 41). In the case of the family farmers interviewed, the son's work experience on the production line at a drinks factory near the farm brought the idea of processing part of the production of guava that was discarded during harvest season. Farmer 41 suggested to his family that they begin a small-scale agro-industrial process using a machine purchased from a friend. The experiment led to the family farmer becoming involved in a Rio de Janeiro state government programme to purchase machinery and other structures for factory involved in small-scale agro-industrial production and processing to guarantee higher income and more use of product that had previously been treated as surplus. The following narrative reveals some attitudes towards transition on the agricultural production system:

‘I decided to come back to my family’s farm after a working experience in the soft drink and beer factory. I returned and graduated as an environmental technician. When I came back, I saw that my father was throwing a lot of guavas away. At the time of the harvest, there is much supply in this area, the market becomes saturated. There was not any local agroindustry to use the fruit. Therefore, I recommended processing part of the production and we [family farm] started building a small factory. I bought a used machine from a friend of mine. Today we have produced fruit pulp and marmalade that have been well accepted by the regional market’ (Farmer 41 is Farmer 40’s son, owns 19 hectares with 3000 guavas trees, Cachoeiras de Macacu, male).

Some farmers include a further stage of production and processing of the agricultural product, seeking local opportunities to add value. The transformation from fresh fruit to agroindustrial product adds value and quality to the final product. In addition to better market prices, the farmer is able to improve production management, making it possible to reuse products with non-commercial characteristics that would otherwise be discarded from the distribution and marketing chain. The research identified farmers who, through access to rural credit from PROSPERAR, Rio de Janeiro state government investment and funding programme for family farmers, FUNDES (Economic and Social Development Fund), and PRONAF Agroindústria, financed by Banco do Brasil, created an small-scale agribusiness processing of guava and fruit pulp (Farmers 40 and 41). Prior to the establishment of the guava processing industry, an average of 200 cartons per crop, equivalent to 16,000 fruits, were discarded prior to distribution.

The contact with Farmers 36, 40 and 41 was established prior to field research conducted in 2017. The first interviews were conducted in 2012 for my master's research. After this first contact, there were a series of visits that involved the production of an audio-visual documentary about metropolitan agriculture in Rio de Janeiro and a visit by high school students from the Laboratory School of Federal University of Rio de Janeiro (CAp UFRJ) to the rural area of Cachoeiras de Macacu in November 2014. The engagement of Farmers 36, 40 and 41 with the research process was, thus, broader than just an interview, indicating cooperation and participation of farmers in projects involving external actors, including young residents of Rio City who have little experience with agriculture and rural landscapes (see Plates 6.20-6.23). Farmers 36, 40 and 41, allowed access for more than 60 students and teaching staffs, demonstrating interest for integration and greater social participation beyond agricultural production.



Plate 6.20. Farmer 36 explains the agricultural system adopted for young students of Rio de Janeiro City, Cachoeiras de Macacu, Rio de Janeiro. (Source: CAp UFRJ student, 2014)



Plate 6.21. Farmer 36 shows his guava orchard and the technique of pruning used, Cachoeiras de Macacu, Rio de Janeiro. (Source: CAP UFRJ student, 2014)



Plate 6.22. Farmer 40 narrates productive and commercial strategies of a small-scale family farm for young students of Rio de Janeiro City, Cachoeiras de Macacu, Rio de Janeiro. (Source: Author, 2014)



Plate 6.23. Another interesting innovation involved setting up a small sweet factory with the help of the Rio de Janeiro state programme PROSPERAR which provides credit to small-scale farmers. Not only was value added to the guavas grown but the farmer was able to make use of a large amount of fruit which would have been discarded. Farmer 40 shows the group of young students how his family produces craft guava paste which is made with more fruit and has a better taste than the bland soft guava paste offered by large manufacturers, Cachoeiras de Macacu, Rio de Janeiro. (Source: CAP UFRJ student, 2014)

The critical lesson is that learning and knowledge creation and dissemination aimed at enhancing sustainable agricultural development often happen through informal, rather than formal, mechanisms (Curry and Kirwan, 2014). While formal knowledge institutes do contribute to sustainable agriculture, the evidence from this study indicates a continuing tendency to utilise ‘conventional’ modes of thinking about agriculture that remain heavily influenced by productivist mindsets and practices. In contrast, alternative initiatives for sustainable agriculture show more evidence of being advanced by networks, through co-learning, mutual support and other informal mechanisms (McKenzie, 2013; Curry and Kirwan, 2014). These knowledges and learning processes are embedded in relational structures, which are largely self-organised, personalised and local.

6.5 Conclusion

The research on peripheral municipalities of the Rio de Janeiro Metropolitan Region identified a group of farmers who have adopted flexible strategies that are adapted to their available financial and human resources. Different types of knowledge, organisation, innovation and cross-scale linkages are part of this process in which farmers have been proactive in the face of rural change. This is often made possible by the difference between rural-urban interactions in Brazilian metropolitan regions and their countryside in contrast to those encountered in essentially agricultural regions, distant from and less affected by large urban centres.

Taking into account the basic tensions that arise when urban forces bear on agriculture in the city's countryside, proximity to urban areas heightens demand and competition for land and labour but it also increases demand for high-value products that promote agricultural development. However, the opportunities have to be perceived by farmers and to be taken up by entrepreneurs and other forms of innovator. The research in the peripheral countryside of Rio de Janeiro Metropolitan Region provides strong evidence of these diverse forms of innovation, knowledge sharing, and more and less formal farmer organisations.

The case studies demonstrated that the incorporation of rural areas into a metropolitan context can boost the search for innovations and cross-scale linkages. The rural-urban interaction opens new ways to develop different types of knowledge that allow farmers to create strategies of adaptation and resilience in an environment of spatial restructuring. Farmers are active actors who make rural space dynamic and are not passive or conservative as they are sometimes portrayed. Intensive contact and interaction of rural and urban processes can cause dynamic, unexpected and positive outcomes in farming systems.

Lamine (2015) emphasised the possible reconnections between agricultural, food and environmental issues from a territorial agri-food systems perspective. In doing so, she goes beyond the prevailing sustainable development paradigm, which focuses on the interaction between agriculture and the environment. She emphasises the importance of re-localisation and transition pathways and the diversity of actors and institutions involved in agri-food systems.

Farmers have long played a significant role in shaping and maintaining rural landscapes, and their embodied practices and experimental knowledges create a very particular relationship between themselves and the land. Fruit trees both performed and enunciated a permanent change in the metropolitan countryside of Rio de Janeiro. Once a tree is planted, the land is in agricultural use. Orange, banana and guava trees in Rio's rural periphery thus make things happen – they re-shape social relations and transform the rural economy in the context of multifunctionality.

In summary, the research has explored a number of farming mechanisms that contribute to flexibility and adaptiveness in agriculture in Greater Rio de Janeiro. This study has demonstrated that resilience is gained through identifying and exploiting opportunities for sharing and adapting resources to promote multifunctionality in agricultural activities and the rural-urban relationship. These results provide useful insights for understanding the nature of rural-urban interactions in peripheral areas of metropolitan regions that might in turn inform policies for promoting local and regional quality food systems, small-scale farming strategies, and resilient rural futures. In particular, the research provides new and rich perspectives on how small-scale farmers in the metropolitan countryside of Rio de Janeiro are responding, and might respond, to pressures and opportunities created by urbanisation and industrialisation.

Chapter 7 Farming knowledge sharing and learning environments in the metropolitan countryside of Rio de Janeiro

7.1 Introduction

The transformations in farming practices during recent decades across many parts of Brazil – increased capital intensity, scale enlargement, specialisation, intensification and mechanisation – have been accompanied by a dramatic shift towards more standardised agricultural information and knowledge (Bernardes and Freire Filho, 2005; Bernardes, 2015; Hosono *et al.*, 2016, Ioris, 2016). Researchers have revealed that transitions towards more sustainable agriculture requires a new knowledge base, with new content, new forms of knowledge and new learning processes (Fonte, 2008; Lyon *et al.*, 2011; Šūmane *et al.*, 2018).

Studies have highlighted that the current agricultural knowledge and innovation system in Brazil, particularly national level agricultural institutions, including higher education, is deeply attached to technologically-driven agricultural industrialisation (Silva, 1997; Gutberlet, 1999; Ricardio, 2011). Borne (2010) argued that transdisciplinary research on alternative modernisation trajectories and pathways that enhance resilience receives insufficient funding. Pretty (1995) noted that this is particularly the case in countries with resource-intensive agriculture and regions where production is concentrated and specialised. In this context, Darnhofer *et al.* (2016) advocate a relational perspective that highlights the importance of open-ended learning and taking advantage of unexpected outcomes.

Chapter 7 will discuss the resilience process through farming knowledge in the metropolitan countryside of Rio de Janeiro, where social actors are combining different types of knowledges and creating an environment of learning exchange and experience sharing. Section 7.2 will demonstrate how knowledge and scientific information, combined with local farming practices, can build hybrid knowledge and empower farmers to share experiences and build community resilience. Section (7.3) presents farmers' narratives that show how they combine different types of information and knowledge and share in networks beyond the local level, articulating and bringing together rural-urban interactions between the Rio de Janeiro metropolis and its countryside. Section 7.3 will focus on the proactive nature of farmers in articulations with the farming community,

informal knowledge and experiences, and the transfer of knowledge that may or may not be supported by official agricultural extension companies and rural research institutions.

After emphasising the importance of recognising local experiences and agricultural practices and the proactive capacity of farmers faced with rural change, the chapter will discuss different actors, institutions and sectors with different objectives and functions in terms of knowledge and agro-ecological experiences (7.4). Finally, Section 7.5 provides conclusions about the debate on the diversity of knowledge that characterise agriculture at the rural-urban interface and the different meanings circulating in the construction of hybrid knowledges for contemporary rural development.

Chapter 7 argues that the changing nature of agriculture and its links to other rural sectors requires the development of mixed knowledge and learning networks that include both agricultural and non-agricultural stakeholders. In some cases, the study found that such mixed knowledge networks are operating, but in other cases, there are structural barriers to initiating and making them operational. These obstacles also point to the changes needed in agricultural research policy and rural extension services to respond better to farmers' learning and innovation needs (Chambers *et al.*, 1989; Cash, 2001; Meek, 2019). The dynamic contexts and local specificity of the challenges facing agriculture require more inclusive and participatory modes of governing the generation, integration and sharing of knowledge.

7.2 Combining different types of information and the ability to share insights in various networks

Combining different types of knowledge is related to the ability to combine scientific information with traditional knowledge, and the ability to share insights, to bring together parties with different knowledge and backgrounds to create learning environments (Berkes, 2007). At the farm level, this leaning be found in the variety of information sources that farmers use to make decisions, in the variety of networks in which they are involved and in their ability to build on experiences and traditions.

The farmers in the case studies noted that more challenging than issues related to technical knowledge on crop production is information related to social competencies (Farmers 12, 36 and 43). Indeed, information about how to achieve open communication between partners, how to provide reflexive feedback and how to ensure constructive conflict

management and an understanding of group dynamics are key factors to ensure smooth development of the extended farm household, business partnerships, and the rural community. Farmers thus see combining different types of information and information sharing in networks as important ingredients, not only at farm level but also at the community level, which are intimately linked (Farmers 6, 12, 18, 28, 30, 33, 34, 40 and 43).

The rural-urban interaction environment allows a dynamic process of learning and information exchange. Hybrid information results in a hybrid rural space in contact with the metropolitan dynamic of urban Rio de Janeiro. In addition to market issues and proximity to the urban market, the relatively short distance between the rural area and Rio metropolis is related with the dynamism of agriculture and strategies created to promote farming resilience. Rural actors circulate through different spaces and are in contact with actors from different backgrounds.

Agriculture is the result of knowledge and exchange of information from different times. Homogenous ideas about farmers and the farming community are common. However, empirical research out at farm and community level reveals the diversity of rural practices and knowledge. Regarding the processes involved in knowledge building in agriculture, diversity and multidimensionality can also be observed. There are differences in the legitimacy of the knowledge and practices adopted and those that effectively form part of an agenda for rural development. There are tensions in understanding what is formal and informal knowledge and practice. In short, to legitimise knowledge in agriculture involves a complex dialogue between official institutions and farmers and the research involved contact with different actors and institutions to understand the multiple meanings and negotiations of knowledge(s).

The modernisation of agriculture in recent decades has brought to prominence the idea of productivity associated with new techniques, scientific knowledge, state interests, and the accumulation of capital. Knowledge about agriculture is no longer controlled only by those who practice it, but also by external institutions that legitimise it. An agricultural researcher officer (Policymaker 1, Tanguá, male) repeatedly referred to agricultural challenges: 'The trend of agriculture is technological evolution, a more modern agriculture. Those farmers who do not modernise will not survive'. Today one question is how to adapt and apply knowledges and practices to local characteristics and demands.

It is noteworthy that traditional knowledge has often been juxtaposed with and resisted modernisation practices in recent decades. The result is hybrid knowledges that, to be fully understood needs to be analysed at different scales while recognising the importance of local processes.

Wilson (2012) analysed how social memory can be positive for community resilience. Social memory can also be associated with negative environmental trajectories at community level, specifically on the issue of ‘exported’ social memory in settler societies and what impacts this has had on environmental practices at community level. Social memory can work both ways for the resilience of communities: as a good thing, related to social learning and traditions associated with environmentally beneficial practices, or as a bad thing related to environmentally damaging and anachronistic traditions.

Historical information about locality, memory, and perceptions about farming changes are critical to understanding a range of information and knowledge. The practice of agriculture involves acquired knowledges, preservation of values or the need to break with the reconstruction of formal practices. Farmers combine their personal experiences and those recognised by the community in the process of sharing ideas (Farmers 6, 12, 15, 18, 30, 33, 34, 40 and 43). In the context of spatial diversity in the metropolitan countryside of Rio de Janeiro, incorporation into the Metropolitan Region results in an environment of multiple and hybrid characteristics. Different social groups also influence these ‘occupation’ processes.

In the case of guava, there was a process of associating knowledge from different origins to adapt cultural attitudes in the region (see Chapter 6). The fruit is adapted to tropical climates and low areas. In order to acquire more productive and intensive characteristics it was necessary to innovate and construct knowledge from experiences that surpassed the locality. For example, pruning practices and selecting varieties of the species have resulted in the current characteristics of guava production (e.g. Farmers 36, 39, 40 and 41). The adaptation process has combined with practices from Japanese agriculture, farming knowledges from local experiences, and technical interventions by public institutions for agricultural development (see Plate 7.1). The first experiments were carried out with a small group of farmers and agricultural officers. When the process demonstrates positive results in production, a process of wider sharing good practices takes place across the region. The result is knowledge construction based on the

relationship between farmers and public rural research and extension institutions. When reflecting on the farming knowledge on guava production, Farmer 40 commented:

‘The Japanese culture brought some techniques on guava culture. Then they passed this knowledge on over the years. With this vision, 28 farmers came together to establish the farmers’ association. We share information and community ideas to better develop our agriculture’. (Farmer 40 owns a 19 hectares’ farm with 3000 guavas trees, Cachoeiras de Macacu, male)



Plate 7.1. Two news items from national magazines related to technical information in agriculture reported a family of Japanese-descendant farmers in Seropédica, in the West side of the Rio de Janeiro Metropolitan Region, who developed a variety of guava that

received the family's surname - *Ogawa*. Today the variety is recognised throughout Brazil, being referenced in agronomy studies and technical books on guava production (Sousa *et al.*, 2000; Lorenzi *et al.*, 2015). Farmer 36 grows the variety of *Ogawa* guava on his farm in Cachoeiras de Macacu. During the fieldwork, I tried to interview the farmer who created this variety from Rio de Janeiro. He passed away years ago, so I conducted a telephone interview with one of his daughters who is dedicated to the knowledge and legacy left by her father. She studied Agronomy at the Federal Rural University of Rio de Janeiro and has conducted experiments with fruit varieties on the property. She offered me a copy of the news above. (Source: Farmers' archives)

Past knowledge in orange cultivation does not only represent positive values. The maintenance of knowledge about past planting techniques for sugarcane, for example, is still observed in the landscape, usually associated with soil erosion from the loss of vegetation associated with orange cultivation, including large gullies (Farmers 5, 11, 45) (see Plate 7.2). To address weeds, synthetic herbicides are used (see Plate 7.3). These problems are caused by knowledge of agricultural techniques from the colonial past combined with the use of agricultural inputs of modernisation. In another way, alternative farming systems consider soil conservation as a critical issues (see Plate 7.4). When reflecting on this, Farmer 40 commented:

'The system is still conventional. However, we are already aware that organic production is the future of agriculture and environment. For that reason, we have used agrochemicals with some criteria and have already produced our own seedlings. We have already started to develop an agricultural system that uses less resources from outside'. (Farmer 40 owns a 19 hectares' farm with 3000 guavas trees, Cachoeiras de Macacu, male)



Plate 7.2. Accelerated erosion in agricultural areas of Rio de Janeiro has caused significant environmental degradation and financial loss. Consequently, analysing soil

erosion under different agricultural systems in the region is essential for the adoption of specific and effective soil conservation practices. (Source: Author, 2017)



Plate 7.3. The photograph illustrates soil degradation and erosion in conventional citrus farming in Tanguá, Rio de Janeiro. (Source: Author, 2017)



Plate 7.4. Farmer 12 presented this photograph of the early stage of the transition from the conventional system to organic citrus farming. One of the critical issues of the alternative farming system is soil conservation, thus citrus trees are grown according to the morphology of the land and the morphological characteristics of the soil. Farmer 12, who is a pioneer of organic systems in the area, has transformed the landscape of her medium-sized rural property, reflecting the differences between the alternative system and the conventional citrus system in relation to soil conservation practices. (Source: Farmers' archives)

The cultivation of citrus in the metropolitan countryside of Rio de Janeiro already involves different generations, creating an environment of exchanges, experiences and local knowledges. In an informal way, the farming community recognises that some farmers are specialists in producing good orange seedlings, who have ‘good hands’ for seedling grafting to juxtapose plant varieties (Farmers 1, 6, 15, 16 and 18). In this way, this environment has created a genetic reservoir of citrus varieties that reflects the diversity of the crop beyond market demands (see Plate 7.5). There are farmers who preserve old orange trees, even though they are not highly productive, because they carry the symbolism of having been planted by the previous generation, e.g. Farmers 6 and 9 (see Plate 7.6). There is a cultural character to the preservation of genetic varieties. Some farmers, while preserving old orange trees, are also resisting the productivist system that defines a time limit of production of the fruit tree. Using an assemblage approach to understand long-term perspectives on small-scale fruit farming in Rio, I found relevant historical materials in surprising places such as Sicily (Italy) and California that have offered valuable additional contextual insights (see Plates 7.8-7.12).



Plate 7.5. Farmer 18 presents Galician lemon seeds that are used in the graft technique for local production of orange seedlings. The technique and knowledge gained from producing local seedlings has been developed since the introduction of citrus in the region and has been passed on through generations of local farmers. (Source: Author, 2017)



Plate 7.6. Farmer 6 (63 years old) has preserved an orange tree that was cultivated by his father. According to him, the tree is more than 40 year old and still producing fruits. (Source: Author, 2017)



Plate 7.7. During a research visit to Sicily, while exploring the street markets of Palermo, I found a wide variety of fruits. For example, one of the main commercial varieties of orange called '*Brasiliani*' has interesting historical connections with varieties produced in Rio de Janeiro's peripheral countryside. (Source: Author, 2017)

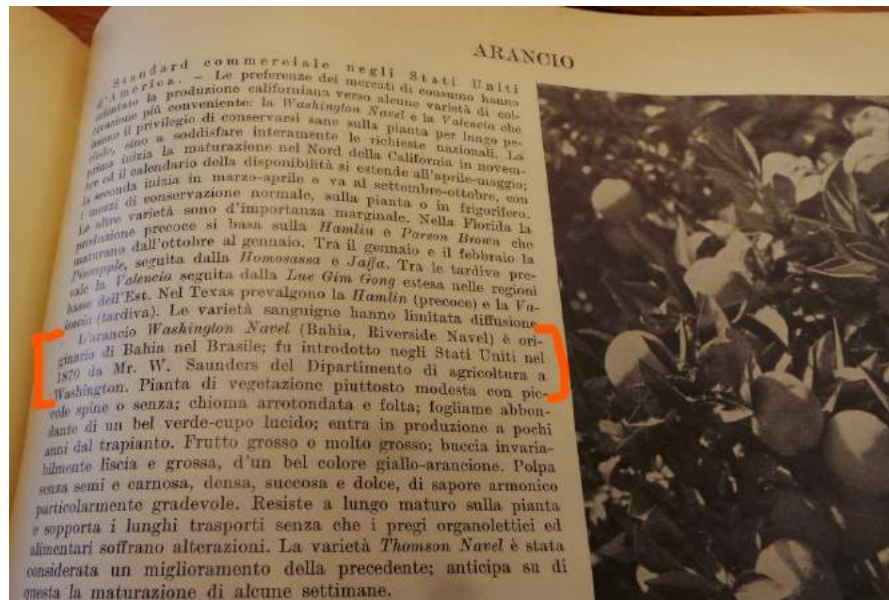


Plate 7.8. An Italian book found in the public library of Palermo (Sicily) indicates that Washington navel orange (called 'Brasiliiani' in Sicily) was imported from Brazil to the United States in 1870. Although its origins are uncertain, it is believed to come from a bud sport found in an orange tree in the early 1800s. Upon its arrival at the US Department of Agriculture in Washington, D.C., it was propagated and trees were sent to California and Florida. (Source: Author, 2017)

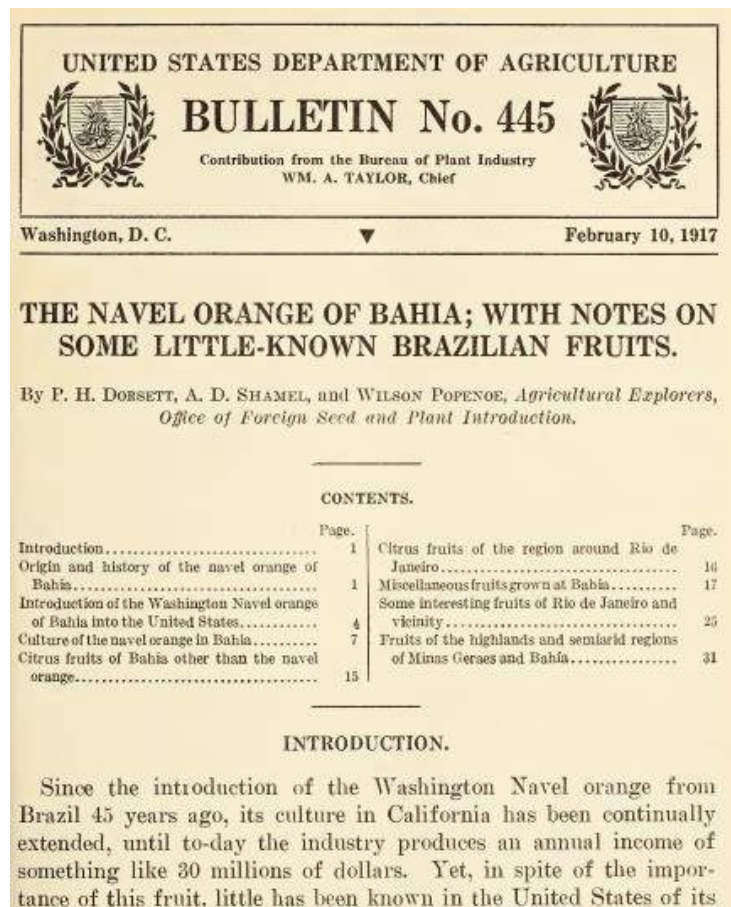


Plate 7.9. A scientific paper from the United States Department of Agriculture (Bulletin n°445, February 10, 1917) found at the University of California, Berkeley indicates a link

between the peripheral countryside of Rio de Janeiro and researchers from the US who visited Brazil for an investigation on local knowledge of little known fruit varieties. The document entitled 'The Orange Navel of Bahia; with notes on some little-known Brazilian fruits' was written by Dorsett *et al.* (1917) who are recognised as agricultural explorers of the office of foreign seed and plant introduction. It presents a session dedicated to rural periphery of Rio de Janeiro ('Some interesting fruits of Rio de Janeiro and vicinity', p. 25).



Plate 7.10. The United States Department of Agriculture (Bulletin n°445, February 10) shows (Dorsett *et al.*, 1917, Plate 7) that 'A large part of the orange sold in Rio de Janeiro are grown in the vicinity of Maxambomba, about 29 miles inland. The soil here is a clay loam, apparently well adapted to citrus culture. The 4-year-old orchard shown in the illustration is planted with the Pera variety, which is the principal one grown in this region'. The photograph was taken in 19 March 1914.

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PROFESSIONAL PAPER

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**CITRUS-FRUIT IMPROVEMENT
 A STUDY OF BUD VARIATION IN THE
 WASHINGTON NAVEL ORANGE**

By

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WASHINGTON
 GOVERNMENT PRINTING OFFICE
 1918

Plate 7.11. Another document from the United States Department of Agriculture (Bulletin n° 623 by Shamel *et al.*, 1918) from 22 July 1918 entitled ‘Citrus-fruit improvement: a study of bud variation in the Washington Navel Orange’ reveals that since the introduction of the Washington Navel orange from Brazil in 1870, its culture in California has been continually extended. This industry produced an annual income of something like 30 millions of dollars in 1917.

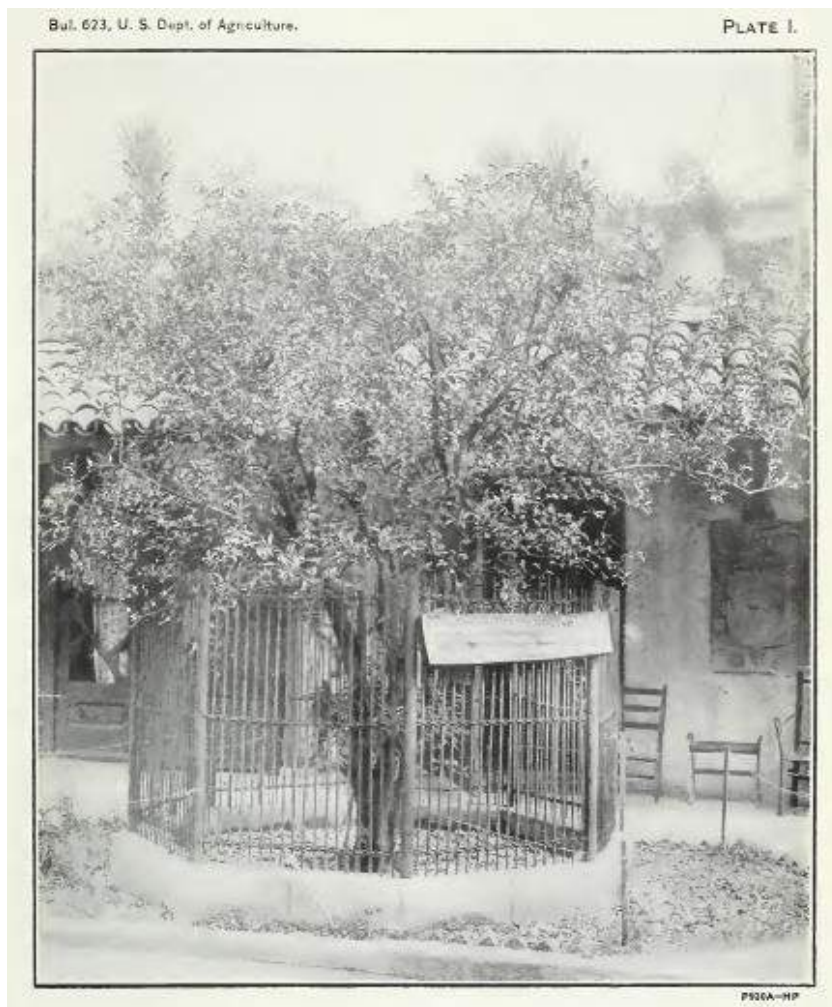


Plate 7.12. The picture photographed in March 1916 illustrates one of the two Washington Navel Orange trees at Riverside, California. Grown from buds from trees imported from Brazil in 1870. 'From this tree and its companion the navel-orange industry of California has been developed within the past 45 years' (Shamel *et al.*, 1918). Source: United States Department of Agriculture, Bulletin n° 623, Plate 1.

The Plates above and discussions about formal and informal knowledges reveal connections between the citrus farming and the historically embedded global networks and hybridities that have shape land use in the rural periphery of Rio de Janeiro. The emphasis on relational rural geography in this thesis – rather than the traditionally emphasised sectorial dimension – has brought to attention the plurality of agriculture in the peripheral countryside of Greater Rio de Janeiro in an era of globalisation. Reflecting the importance of the translocal that is often neglected in the regional and rural studies literature in Brazil, this study supports its value and claims for relational rural geographies. Woods (2018) contended that globalisation progresses through interactions between places and other translocal assemblages that introduce, remove, capture or recode components in the rural assemblage, stretch or contract its social or spatial territorialisation, and create or cut its external connections and relations. In these ways,

‘the assemblage approach directs us to examine the micro-politics of the interactions that constitute globalisation, and their effects on the material and expressive composition’ (Woods, 2018, p. 16) of rural space.

During the fieldwork, I was also in contact with officers from public extension services (EMATER-Rio) (Policymakers 1, 2, 13, 15 and 16). Traveling through the area with the group and visiting farms. In my field diary, I noticed changes in the approach to more ‘bottom-up’ initiatives. Moreover, it is possible to recognise the character of prescriptive techniques used by rural extension officers. Agricultural modernisation in Brazil is an ongoing process, and the productivist model promoted in universities and agricultural technical schools influences agricultural experts (Policymakers 15 and 16; Farmer 12). In the case of the orange crop, there are centres specialising in citrus research in São Paulo (e.g. Agronomic Institute of Campinas – IAC and Citrus Agribusiness Advanced Technology Research Centre Sylvio Moreira - APTA Citros Sylvio Moreira). Some of the knowledge generated by these public and private agricultural research institutions reinforces agricultural practices of orange cultivation in São Paulo, which exerts spatial centrality in the areas of peripheral citrus production in Brazil. The following extract from a rural extension officer demonstrates this process:

‘We gave a series of lectures to farmers. There were 15 lectures. What were the diseases we discussed here? [Farmers cite each one of them] A subject that we discuss a lot here: grafting of seedlings. The first lecture was about what disrupts the development of citrus. We talk about soil, limestone, fertiliser. Various types of limestone, the importance of the quality of the material. So we do this series of lectures to teach [farmers] and to know something else that [farmers] do not know. Many have been working with citrus for years. They [farmers] know many things, but there are many others [farmers] do not know. This information is to improve their knowledge about citrus farming’. (Policymaker 1, rural extension officer, EMATER-Rio, Tanguá, male)

Some meetings with farmers’ associations involved lectures by extension officers (Policymakers 1, 2, 4 and 7) that emphasised ideas from citrus research centres of São Paulo, for example, for recognising pests and diseases on orange trees. In some meetings, there were moments of confrontation between ideas. The farmer leader of the agro-ecological movement was one who opposed ideas mentioned (Farmer 12). In another instance, there was a day with lectures on the trends and potential of fruit growing in Rio de Janeiro state (First Meeting of Small-Scale Fruit Farming held on September 30, 2017). One speaker at the event was a nursery owner from São Paulo state who cultivates

seedlings and registered an interest in expanding the market in Rio de Janeiro (Responder 53).

During recent decades, there have been exchanges of experiences and knowledge among the areas of orange production in São Paulo and Rio de Janeiro (Policymakers 1, 3, 4 and 17). Initially, when Rio was the centre of production, part of the knowledge was established from local and regional techniques in Rio de Janeiro's lowland with its complex geomorphology. The national and international centrality exerted by São Paulo brings to the rural areas a diverse productivist character based on agricultural modernisation and productive globalisation. The following extract from an agricultural researcher officer's interview demonstrates new regulations concerning citrus seedlings and the centralisation of agricultural knowledge in São Paulo:

‘Today the best seedlings are produced in São Paulo. I recommend them [farmers] because they are healthier seedlings. It is necessary to have an inspection so the farmers do not make their own material. This is a key factor for a great development of the orchard. It must be certified plants from official seedlings. (Policymaker 17, agricultural researcher officer, PESAGRO-Rio [Agricultural Research Company of Rio de Janeiro state], Macaé, Rio de Janeiro, male)

The conventional mode of agricultural research is to experiment under controlled conditions in research stations, with the resulting technologies passed on to farmers (Policymaker 17). In this process, farmers have little control, and many technologies do not suit them and reduce the credibility of research systems. Farmers' organisations can, however, make a difference. They help research institutions to become more responsive to local needs and can create extra local value by working on technology generation and adaptation (Farmers 17, 33, 36, 43). Self-learning is vital for sustainability and, by experimenting themselves, farmers increase their own awareness of what does and does not work.

Unfortunately, rural extension services in Brazil no longer emphasise technical assistance but, instead, governance-related issues through: community and group organisation and the relationship with government institutions (Farmers 12, Policymakers 15 and 18). This shift in the focus of rural extension was meant to promote farmer participation and diminish dependency on top-down decision making. This strategy is fine for receiving community benefits like electricity and water, but technical assistance cannot be reduced

to group organisation and community development. Some technical and farm management issues can be solved collectively but not all. Land varies from farm to farm and even from plot to plot. As a social group, farmers can have common interests but this does not mean that land resources and soil quality are identical and, in many cases, there is a need for farm-level assistance.

Science deals with universal and general knowledge while local realities are heterogeneous so that a process of translation is necessary to apply general processes to specific environmental and socio-economic realities. To do this, external and local actors have to interact successfully and reflect on how to maintain fertility and health soil using environmentally appropriate agriculture, which includes mobilising farmer knowledge in a more holistic approach to sustainable agriculture, e.g. linkages between the EMBRAPA (Brazilian Agricultural Research Corporation) and Farmers 43, 48 and 49.

Unfortunately, this is not what usually happens in Brazilian rural development practice. Communicative and cognitive dissonance exists between farmers and agricultural scientists concerning soil quality and sustainable agriculture and this is a global problem rooted in epistemological differences in worldview and the perceived authority of science over rural people's knowledge (Chambers, 2005). Conventional agricultural scientists often disqualify farmer practice and knowledge because the former lack knowledge of the ecosystem functions and processes which determine what is observed in landscapes (Morgan and Murdoch, 2000).

However, this top-down approach has been criticised in the international development literature because of the risk of introducing socially and environmentally inappropriate farming methods. Farmers work specific landscapes first hand and understand the intricacies of local environments, and ignoring this experience has been a major and multi-decadal flaw in development strategies. Agriculture is highly dependent on natural processes and local environments are not blank slates on which a general technology can be transcribed without local feedback from farmers (Chambers, 1983, 2005; Scoones and Thompson, 1994).

The lack of connection between modern agricultural science and poor rural people gave rise to alternative approaches to rural development that stressed environmentally and socially appropriate farming methods. Previous strategies were replaced by bottom-up

farmer-first approaches that highlighted local innovation rooted in an active role for local farmers or even farmer-led rural extension (Richards, 1985; Chambers *et al.*, 1989; Cash, 2001; Meek, 2019). When this approach proved to be too specific and particular, a middle-scale, beyond-farmer-first approach was proposed involving participatory strategies, in which the contribution of both local and scientific knowledge is necessary and dialogue between farmers and agricultural scientists is fundamental (Scoones and Thompson, 1994; Chambers, 2005). However, real dialogue is still elusive due to fundamental differences in farmer and scientific worldviews.

There is a tension between the productivist logic on introducing new varieties of orange with high productive potential, developed by nurserymen from São Paulo state, and the existence of local varieties already adapted and resistant to heat stress and drought periods. Local leaders and part of the community have been opposed to the introduction of varieties of orange trees sold by technicians from São Paulo. However, the regional rural extension institution - Technical Assistance and Rural Extension Company of Rio de Janeiro state (EMATER-Rio) has sought to connect Rio de Janeiro and São Paulo and transferred genetic material for the purpose of increasing productivity and rebuilding orange production for the large metropolitan market of Rio de Janeiro. In this process, it is possible to observe the tensions and disagreements between some local farmers (Farmers 6, 12, 15, 18 and 30) and the rural extension institution that is still influenced by the presuppositions of agricultural modernisation.

During the fieldwork, the relationship between local and regional institutions for the development of agriculture and entrepreneurs from São Paulo seeking to introduce new orange trees in rural areas of Rio de Janeiro state was observed. During a meeting organised by EMATER-Rio and the Secretary of Agriculture of the Municipality of Tanguá, an agronomist and entrepreneur of citrus seedlings in São Paulo visited the farmers' association to present national and international regulations of the citrus sector concerning pest control and diseases. The presentation was directed to assert the leadership and political power of São Paulo state on citrus fruit production, the technical characteristics of agribusiness, and the production of healthy seedlings cultivated in accordance with current national regulations, which make it mandatory for farmers to acquire seedlings from accredited nurseries. In the absence of a regularised nursery in Rio de Janeiro state, groups from São Paulo see an opportunity to exploit the Rio orange market.

This issue also involves tension between farmers who defend local nurseries and the agricultural extension company that supports those farmers who have acquired external and certified seedlings of citrus trees from São Paulo. This tension also reveals resistance and knowledge sharing about agricultural learning processes. Farmer 15, besides cultivating orange, is recognised as one of the best nurserymen in the locality. One of the controversial issues at the First Meeting of Small-Scale Fruit Farming was the invitation, through the local rural extension company, of a speaker from São Paulo state who produces and sells certified seedlings following regulations from the Ministry of Agriculture of Brazil. In the speech, he defended the need for better orange seedlings in Tanguá, which, because it is located near Rio de Janeiro and has a large consumer market (see Plates 7.13 and 7.14). In this way, he advocated the introduction of seedlings produced in nurseries around São Paulo, guaranteeing the quality of production for several years. For example, the following extract told by the seller of certified seedlings illustrates this idea:

‘The same seedlings that I have sold in São Paulo, I am selling here. You [Farmers] have everything to produce well here, with Rio’s market nearby. You [Farmers] just have to do everything correctly. I commercialise 36 certified varieties of citrus in greenhouses for the market of São Paulo and beyond’. (Responder 53 is a seller of certified seedlings, following regulations of the Ministry of Agriculture of Brazil, São Paulo, male)

The introduction of these seedlings has provoked disagreements in the farming community, where one group of farmers has followed recommendations by the local EMATER-Rio and introduced seedlings produced in São Paulo, while another group argued that this created dependence between the Tanguá farmers’ community and São Paulo nurserymen, disconnected from the local reality of the community. The following extracts from a rural extension officer, an agricultural researcher officer, and a farmer demonstrate disagreements on the issue related to externally certified seedlings:

‘They [nurserymen from São Paulo] are looking for new markets. They have a sophisticated infrastructure that is becoming idle. With this technology from São Paulo, they [local farmers] can benefit Rio de Janeiro orange production by providing seedlings produced with sophisticated production methods that involve disease control and better genetic material’. (Policymaker 4, rural extension officer, local Department of Agriculture, Tanguá, male)

Likewise, an agricultural researcher officer explained:

‘We [Agricultural Research Company of Rio de Janeiro state] are conducting research financed by FAPESP [Foundation for Research Support of São Paulo state] with IAC [Agronomic Institute of Campinas, SP] and EMBRAPA [Brazilian Agricultural Research Corporation] in Corderópolis, near Limeira. We are testing about 100 varieties of citrus fruit to understand advantages and disadvantages. We have a research field area in Silva Jardim, Rio de Janeiro’. (Policymaker 17, agricultural researcher officer, PESAGRO-Rio [Agricultural Research Company of Rio de Janeiro state], Macaé, male)

However not all farmers agreed with this logic.

‘These seedlings from São Paulo will only survive here with an excessive amount of water. We have to work our system and protect ourselves from this project from São Paulo. We cannot be dependent on seedlings from outside. We want to reduce pesticides, external dependencies. For this, we need soil recovery and have our own seedlings.

[...]

The soil here is fundamental for the quality of the orange. We must now also protect it and the genetic material we have accumulated over the years, avoiding the entry of seedlings of plants from other localities, from nurseries of São Paulo, seedlings produced through technology not necessarily appropriate to the natural conditions of Rio de Janeiro. The seedling produced by them requires irrigation and synthetic chemicals. Everything we do not want to do’. (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female)



Plate 7.13. A citrus nurseryman from São Paulo presents to farmers in the rural locality of Posse dos Coutinhos the new regulations of the Ministry of Agriculture of Brazil that require the cultivation of seedlings from certified nurseries that guarantee the plant's

immunity to common diseases of large-scale citrus production systems, Tanguá, Rio de Janeiro. (Source: Author, 2017)

These issues again indicate tensions between the productivism of agricultural modernisation, with the introduction of external resources to increase production, and a group of farmers who defend internal elements already built up through knowledge sharing and learning processes.

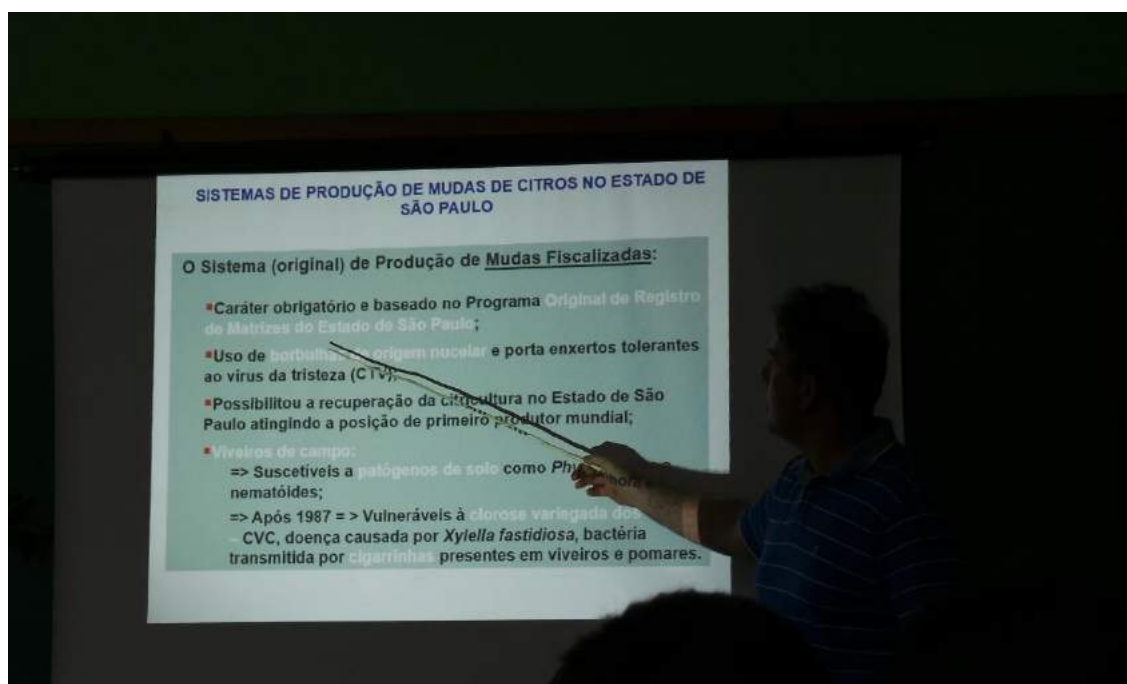


Plate 7.14. Citrus nurseryman explains production of certified seedlings in São Paulo state at the ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá). (Source: Author, 2017)

In December 2018, I re-visited Tanguá and had contact with some of the local government officials and farmers. In the interviews, I was looking for information about changes and the main events of the year in the locality, and discovered that there is a group of farmers (Farmers 17 and 33) who still buy and acquire the seedlings from São Paulo. The following extract from an agricultural extension officer walking interview demonstrates this process of change:

‘Those orange trees come from São Paulo. The farmer did something just like we [rural extension officers] said. All trees look great. The seedlings were produced by the young man who gave the lecture. [...] The change has to be conducted from the beginning. The orange seedling needs to be protected from the beginning’. (Policymaker 2, Rural extension officer, EMATER-Rio, Tanguá, female)

Most farmers have maintained the production of seedlings at local level, seeking greater technical improvement, including the installation of nurseries for seedling production by local farmers, as observed in the field in November 2017, during the construction of a nursery (see Plate 7.15). According to Policymaker 7, there is a new project by the local Department of Agriculture for installing a nursery for reproducing seedlings following national regulations that maintains the diversity of local varieties of citrus originated in Tanguá.



Plate 7.15. Young local Farmer 52 starts construction of a small seedling nursery in November 2017, Tanguá. (Source: Author, 2017)

Further information in my last visit to Tanguá which illustrated the resumption and strengthening of the association is the appearance of a movement to make oranges from the locality of Posse dos Coutinhos and adjacent areas (Tanguá's orange) as an agricultural product recognised with the Geographical Indication (GI) label. The process progressed in 2018, according to the local Department of Agriculture's website and was confirmed in an interview with Farmer 12 (Farmer owns a medium-sized organic citrus farm, Tanguá, female), who defended the need to recognise the quality and specificities of the local product through a process of institutionalisation. This involves a series of institutions and inter-institutional articulation which has already involved EMBRAPA (Brazilian Agricultural Research Corporation), EMATER-Rio (Company of Technical Assistance and Rural Extension Company of Rio de Janeiro state), the Department of Agriculture (local and regional), SEBRAE (Brazilian Service to Support Micro and Small

Enterprises), the Ministry of Agriculture of Brazil, and the farmers' association. The following extracts from a rural extension official's interview illustrate the farming networks between farmers and institutions:

‘There are more young people joining the farmers' association. Farmer 33's daughter and her husband who already adopt the TOMATEC, for example. Because they are young and have knowledge of sales, they are helping other farmers. Also helping to sell orange to supermarkets in the Southern Zone of Rio de Janeiro City, a niche market.

[...]

EMBRAPA Solos [Brazilian Agricultural Research Corporation] is responsible for soil diagnosis. The UERJ [University of the Rio de Janeiro state] will prepare a report on climatic characteristics as they already have meteorological stations all over the Rio de Janeiro state. SEBRAE [Brazilian Service to Support Micro and Small Enterprises] will elaborate the label, offering courses for commercialisation, management, and logistics. It is a networked movement, with several articulated institutions. For the Geographical Indication, there is a regulation that must be followed. Only the seal will be able to meet the standards defined by the farmers themselves who must follow this standardisation.

[...]

What the institutions are doing is providing support to farmers. Even farmers who did not attend the meetings are attending in recent months. It was the great movement of the year 2018. Very productive. The issue [related to the Geographical Indication] has lain dormant in recent years over political and party issues. At the moment the movement is starting from the farmers who are integrated with different institutions'. (Policymaker 7, rural extension officer, SEAPEC-RJ, Animal Health, Plant Protection and Inspection, Tanguá, female)

In many respects, this discussion continues work by Murdoch (2000) in the UK, which showed that promotion of local quality production has assumed a renewed profile in recent rural development strategies, as it promises a means of strengthening the position of traditional producers and products. Production profiles and generalised patterns are replaced by a kaleidoscopic representation: ‘multiplicity of technological and organisational productive systems can co-exist. There is thus no longer a model of rural development but many possible trajectories’ (Murdoch, 2000, p. 413).

In 2018, the debate on the Geographical Indication of orange was one of the main issues on the agenda of the association and institutions involved with the farmers' community. The Second Meeting of Small-Scale Fruit Farming held on July 31, 2018, had as its theme

the process of Geographical Indication of Tanguá Orange (see Plate 7.16), organised by the Department of Agriculture, EMBRAPA, EMATER-Rio, Ministry of Agriculture, and the ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá), a process that involves a range of institutions at different governance levels. When reflecting on agricultural transitions related to Tanguá Orange, a regional coordinator from SEBRAE (Brazilian Service to Support Micro and Small Enterprises) commented:

‘Today we [SEBRAE] will present the diagnosis of Tanguá’s orange production. The orange from here is different. The market also has this perception. However, a technical validation of the hypothesis was necessary. The diagnosis confirms the particular characteristics of the product and we will be able to follow the rigorous process of GI [Geographical Indication] to be able to differentiate the orange in the market in a way that can add value and quality, representing the municipality and improving the development of Tanguá’. (Policymaker 19, regional coordinator of SEBRAE [Brazilian Service to Support Micro and Small Enterprises] in the East Rio de Janeiro, male)



Plate 7.16. Call for the Second Meeting of Fruticulture which discussed the formal institutionalisation of the Geographical Indication (GI) for the Tanguá Orange. (Source: Prefeitura de Tanguá, 2018)

Development is closely linked to the infrastructural networks for research and development, where a presence in the region or in situ is a definite advantage. A scenario was played out where bottom-up potential is in the making (Scoones and Thompson, 1994; Chambers, 2005; Ingram 2018). Tradition and convention are replaced by new

knowledge and competence, but to implement the restructuring strategies poses challenges to both the farmers and the agricultural extension services.

One of the later fieldwork interviews was in Itaboraí, near Tanguá and Cachoeiras de Macacu, with a project facilitator from Rio de Janeiro state. Her work was carried out through the Ministry of Agrarian Development and aimed to link rural communities in small municipalities in Rio de Janeiro state and political projects for territorial development at federal and regional levels (see Plates 7.17 and 7.18). These multifunctional characteristics of Rio de Janeiro state challenge territorial development policy since it needs to reconcile different uses and diverse socioeconomic characteristics. Therefore, Policymaker 18 worked with a number of associations in Rio de Janeiro state seeking to recognise the spatial diversity of the rural area and the challenges of territorial development, and to strengthen the link between farmers' associations and other institutions. The following extract by Policymaker 18 illustrates this process:

‘Civil society has been more articulate. I had the opportunity to visit 27 municipalities in Rio de Janeiro state. Each with at least 15 associations. My job was to organise meetings. Meet the mayor of the municipality and local community in the same room together’. (Policymaker 18, Regional articulator of the Ministry of Agrarian Development – MDA, Itaboraí, female)

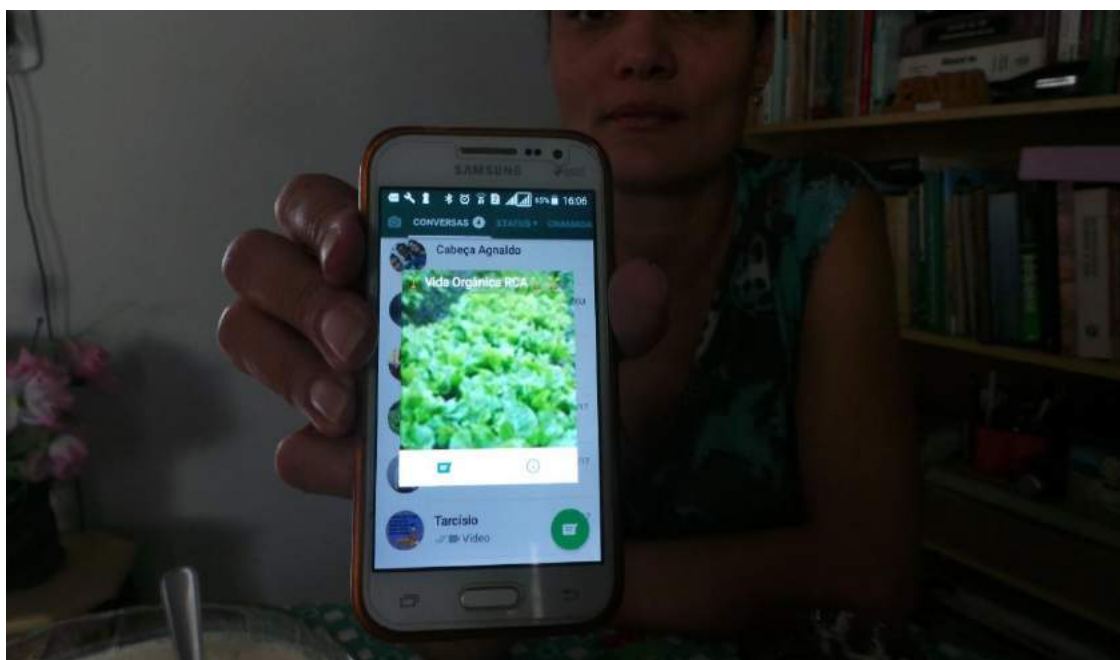


Plate 7.17. A regional articulator (Policymaker 18) of the Ministry of Agrarian Development using groups on WhatsApp for promoting discussions related to social organisation, inter-institutional articulation, and rural issues in Rio de Janeiro state. Itaboraí, Rio de Janeiro. (Source: Author, 2017)



Plate 7.18. A regional articulator (Policymaker 18) who had the opportunity to visit 27 municipalities in Rio de Janeiro state, looking for improving integration between social organisations and institutions, each with at least 15 social groups. Itaboraí, Rio de Janeiro. (Source: Author, 2017)

Pretty (2002) centred on the need to develop social learning systems to increase ecological literacy. Knowledge of nature and the land usually accrues slowly and cannot easily be transferred. If an agriculture dependent upon detailed ecological understanding is to emerge, then social learning and participatory systems are a prerequisite. These develop trust, reciprocal mechanisms, common rules and norms, and new forms of connectedness institutionalised in social groups. These collective systems, involving the emergence of some groups over just a decade, can also provoke significant personal changes (Wilson, 2004). According to Pretty (2002), despite technological advances in agriculture, the value of knowledge and practices of local communities is only slowly being acknowledged.

What is required is a fundamentally different model of agriculture based on diversifying farms and farming landscapes, replacing chemical inputs, optimising biodiversity and stimulating interactions between different species, as part of holistic strategies to build long-term fertility, healthy agro-ecosystems and secure livelihoods. The next section will focus on the proactive nature of farmers in interactions with the farming community, informal knowledge and experiences, and the transfer of knowledge that may or may not be supported by official agricultural extension services and rural research institutions.

7.3 The role of farmer-led networks, informal knowledges, and knowledge transfer and the way they are supported (or not) by formal institutions

This study confirms that informal knowledge generated in local contexts tends to be holistic in the sense of considering the situations in which farms operate, integrating environmental, economic, social, financial, technical and other considerations. The diverse and dynamic strategies of smallholders in the rural periphery of Greater Rio de Janeiro illustrate how farmers adapt their farms to suit their personal interests, family situation, understandings and knowledge of the farm's agro-environmental conditions, regional traditions, market opportunities, available technical and financial resources, labour and public support (Tisenkopfs *et al.*, 2015). Informal local knowledge reflects the interconnectivity between dynamic local conditions and allows farmers to respond and adapt to them. A farmer reflected on this issue throughout an interview that explored changes at regional and local levels:

‘We [farmers] need to work and improve the soil. Soil improvement, decrease agrochemicals, treat water, protect sources of rivers, and diversify agriculture. We have the best oranges in terms of quality. It is a tradition here. However, farmers need to diversify the agriculture. The group has a good understanding that if it mistreated the soil much. It is necessary to recover the soil and protect the water. What is lacking is knowledge. A new knowledge’. (Farmer 12, Tanguá, female)

The importance of integrating different sources and forms of knowledge sources for adapting, developing and prospering in modern agriculture is particularly true for those seeking to depart from established practices. In line with previous research (Ingram, 2008; Fonte, 2008; Lyon *et al.*, 2011; Lehébel-Péron *et al.*, 2016), the findings from this study indicate that knowledge from various sources can be complementary and, when optimally combined, create sustainable solutions. However, scholars have discovered that knowledge originating from different sources, as well as informal and formal knowledge structures, can be also be conflicting and impede some development paths.

Personal curiosity and willingness to learn, together with social networking, farmers' organisations, and supportive formal knowledge and governance structures, are central elements for successful learning, integrating knowledge and innovating for sustainability. Both formal and informal sources of knowledge have their strengths, yet networking and knowledge exchange make knowledge flexible and enhance sustainability and resilience. The particular role of informal knowledge in these processes is due to knowledge transfer

and adaptation being mediated by farmers' own and local knowledge. When reflecting on farming knowledge in the context of environmental challenge, Farmer 12 commented:

'I do experiments on the farm. An orange tree is extremely resistant and well adapted here. People do not think so. However, you [farmer] must have good soil. If you [farmer] have a good soil, the plant will develop very well'. (Farmer 12, Tanguá, female)

Similarly, farmers' confidence and capacity to act is increased through informal knowledge networking with other farmers, which is especially valuable in times of change. Informal learning networks ease innovation diffusion, as farmers more readily adopt practices utilised by their peers. Importantly, knowledge obtained from family or neighbouring farmers is often the initial motivator and guide into agriculture for young and new farmers (e.g. Farmers 8, 20, 28, 34, 39 and 41). Experience, knowledge and skills acquired on-farm in early years are crucial when making the choice, later in life, to go into farming. Informal farmers' knowledge continues to serve as a valuable support and source of inspiration and innovation among experienced farmers. When reflecting on farming knowledge about guava production, Farmer 36 commented:

'My daughter [Farmer 39] is helping me as well. She studied Agricultural Engineering at the Federal University Fluminense (UFF), Rio de Janeiro. She does several academic projects at university. Now she is doing a masters, studying guava farming. Through my practical knowledge and the theory that she has acquired at university, we have combined her academic knowledge and my practice.' (Farmer 36 owns a farm with 8.5 hectares and annually markets over 300 tonnes of a selected branded guava, Cachoeiras de Macacu, male)

Informal knowledge and the social mechanisms through which it is acquired and disseminated can complement and compensate for the shortcomings of formal knowledge systems, and make positive contributions to the resilience of agriculture, including to farmers' identities, communities and environments (see Plate 7.19). This stems from the more spatially holistic and embedded nature of informal knowledge. The following extract told by Farmer 36 illustrates this process:

‘I conducted an experiment with passion fruit, using three varieties. I concluded that one of them developed very well in this region. I did this experimentation with PESAGRO-Rio [Agricultural Research Company of Rio de Janeiro state] five years ago. Firstly, I did the investigation and then other farmers started to introduce the passion fruit crop in the area’. (Farmer 36, Cachoeiras de Macacu, male)



Plate 7.19. Farmer 36 shows a variety of passion fruit selected after an experiment with the Agricultural Research Company of Rio de Janeiro state (PESAGRO-Rio) on his farm in Cachoeiras de Macacu. (Source: Author, 2017)

Besides the knowledge built into the relationship between farmers and institutions, there are knowledges that are elaborated from a break with dominant practices, especially when the farmer chooses paths associated with ideas of transition and change. In the case of the agro-ecological system, it is noted that the farmer decides to re-establish agriculture from another paradigm, combining criticism of modernisation methods adopted in recent years and the need to restructure agricultural practices to meet current environmental challenges (e.g. Farmers 12, 13, 31 and 44). The decision to change can be influenced by a debate outside the locality, but the practice is established from local knowledge about local environment. Wilson (2013b, p. 11) argued that path dependency at local community level is associated with political lock-in mechanisms. ‘Closely related to macro-structural path dependencies, the political orientation of a community may either stifle or improve community resilience’.

An example of a locally-driven shift of pathway is the farmer who decides to convert an inherited rural property by combining the orange culture tradition with ecological practices aimed at restructuring and restoring the soil and water sources (Farmer 12). In the process of transition from a conventional to an agro-ecological system, knowledge is combined here based on criticism of past methods and adaptation of agriculture to techniques associated with the ecological paradigm. In this example, Farmer 12 combines locally acquired knowledge in citrus production academic and non-academic knowledge exchanges with individuals from outside the rural locality. The relationships with environmental activism in Rio de Janeiro metropolis and with civil society organisations for agro-ecological production in Rio de Janeiro state are, thus, fundamental for decision-making, technical support and knowledge exchange in the process of converting conventional agricultural system to agro-ecological systems.

The relationship between farmers and associations with public partner institutions for rural development is complex and sometimes divergent. Thus, some farmers are more critical of the institutions and dispute ideas for rural development (e.g. Farmers 12, 30, 31 and 44). Some have created alternative ways to discuss and practice other production systems (e.g. Farmers 12, 13, 31 and 44). In the case of agro-ecological systems, the independent civil society has been associated with institutions that are not necessarily local. The knowledge constructed is the result of a social network that surpasses the locality and connect to different scales. The existence of conflicting knowledge can both close down and open up the space for innovation, especially since farmers need flexibility in order to find solutions.

The exchange of knowledge can take place in meetings in Rio de Janeiro state and through the association of organic farmers based in Rio City. Farmers can maintain community relationships with the locality regarding local challenges and contact a farmers' network, which shares knowledge and experience of ecological agricultural systems. The representation of an ecological agenda may conflict with the local public institutions for rural development associated with the productivist model. Thus, the knowledge and experiences of the agro-ecological system can be delegitimised by the community and local institutions while being recognised and legitimised by external groups (see Plate 7.20).



Plate 7.20. Agro-ecological farmer shows a gift that she received from a committee of Chinese researchers who visited her farm dedicated to citrus production in the agro-ecological system. (Source: Author, 2017)

Farmer 12 recognises herself as a leader of the agro-ecological movement in the locality and said that her father had a farm with conventional orange production in the past. When he retired, he offered the property and its production to his daughter who started converting to an agro-ecological system (see Plate 7.21). The change reveals the construction of knowledge about alternative systems of citrus cultivation based on local characteristics. As Farmer 12 is a pioneer in the alternative production model, general knowledge about agro-ecological practices was built based on the contact with civil society movements and interaction with actors in the cities of Rio de Janeiro and Niterói combined with experience in the production of citrus (see Plate 7.22). Currently, Farmer 12 is a leader of the small group of organic farmers through PGS – Participatory Guarantee System, which according to Bicalho and Feres (2014) is an instrument for the empowerment of the small organic farmer in Brazil.



Plate 7.21. Switching from a productivist to an agro-ecological system with recovery of forest areas. Farmer 12 is a local leader on environmental issues and a voice of resistance to the process of urbanisation. As she is involved in the Rural Development Council, she challenges local policy that does not recognise the complexity and diversity of rural areas. Farmers who have good soils and acquired some capital over time have been able to make the transition to organic system but farmers who have poor land and low income have not. (Source: Author, 2017)

Bicalho and Feres (2014) discussed how Brazilian organic farmers have developed participatory guarantee systems in order to retain control over their farming practice and the marketing of labelled organic goods which are threatened by large national and transnational firms. New strategies for regulating organic products through participatory guarantee systems (PGSs) are shown to be an effective way for organic farmers to resist third-party certification so that farmers continue being directly responsible for guaranteeing product quality. These strategies arose in reaction to new agents and interest groups in the organic production chain, who sought to institutionalise a third-party regulatory system under by alleging production for distant markets involving anonymous consumers required technical regulations defining organic product quality through independent certification (Farmers 12, 13, 31, 44).



Plate 7.22. Farmer 12 has a background that brings agricultural experience to the association comprising ex-urban farmers or city residents with second homes in the countryside. (Source: Author, 2017)

Participatory guarantee systems (PGSs) represent a victory in rebalancing power relations and Brazil was the first country to officially recognise this kind of system (Meirelles, 2010). However, PGSs do not involve the farmers simply attesting to organic quality. In Brazil, a PGS must conform to strict norms for incorporating farmers' organisations in the certification process. This involves a good deal of community mobilisation.

As a PGS requires grass roots organisation to develop a collective strategy, the question arises how small-scale farmers, as individuals and groups, guarantee the quality of organic products and how social networks negotiate with the regulatory and marketing sectors. For instance, the Association of Biological Farmers for Rio de Janeiro state (ABIO) was founded in 1984 and is the oldest organic farmer association in Brazil. Over the years, its objectives have been to bring dispersed organic farmers in the state into a collective group for developing organic methods, improving product quality, creating marketing channels and developing organic standards following IFOAM guidelines.

There are three kinds of members in the association: 1) rural producers with farming background who bring agricultural expertise (e.g. Farmers 12 and 44); 2) ex-urban farmers who have technical and managerial experience as well as contacts with governmental agencies (e.g. Farmers 13 and 31); and 3) city residents with second houses in the countryside who participate and encourage local organic production (e.g. Responders 50 and 51).

These different backgrounds produced a fusion of interest and experiences within a network, which created considerable cross-scale linkages. Together the members developed knowledge and skills for organic production and accessing external governmental and non-governmental organisations to achieve their aims. Through this network, the association has been able to mobilise three of the four types of knowledge cited by Morgan and Murdoch (2000) as fundamental for innovation: know what (information), know how (technical skills) and know who (social skills). Social skills are particularly important for gaining access to information about who knows what and who knows how.

Another reason why farmers rely on informal learning networks and their own experimentation is the volume of uncertainty and changes in policies, changes of government, prices, technologies, quality demands, that all require rapid adaptation (Darnhofer *et al.*, 2010). This adaptation is better addressed through farmers' networks which can stimulate ongoing social learning (Kroma, 2006; Schneider and Niederle, 2010; Oreszczyn *et al.*, 2010). Such 'social' processes usually generate more sustainable outcomes than 'rational' top-down planning, especially in situations when a collective takes a decision on a complex issue, often pertaining to natural resource management (Pahl-Wostl and Hare, 2004). Thus, rather than having a set of tools and techniques to manage sustainable agriculture, the challenge is to have the necessary attitudes and abilities to overcome problems, and to integrate different knowledge bases and generate learning in the countryside at the rural-urban interface.

After emphasising the importance of recognising the local experiences of agricultural practices and the proactive capacity of farmers to effect and adapt to rural change, the next section discusses different actors, institutions and sectors with different objectives and functions in terms of knowledge and agro-ecological experiences.

7.4 Bringing together parties with different knowledges and backgrounds and creating learning environments

It is essential to recognise future challenges and to include the diversity of trends and the complexity of rural areas in bottom-up territorial development projects that give greater visibility and voice to different agricultural knowledges and experiences (Chambers *et al.*, 1989; Fonte, 2008; Šūmane *et al.*, 2018). One such challenge is to reconcile productivist models with the environmental stresses that challenges relationships between agriculture and nature. Institutions responsible for rural development policy programmes need to recognise the importance of the cultural dimension of agriculture and the experimental knowledge already gained about agriculture when restructuring the relationship between society and nature (Cash, 2001; Ingram, 2018; Meek, 2019). For this, the idea on the construction of knowledge needs to be understood in more egalitarian terms to strengthen its legitimacy and participatory decision making in rural development (see Plate 7.23).



Plate 7.23. Events organised and material produced by researchers and farmers' association: different types of knowledge, rural innovations and cross-scale linkages are part of this process of social resilience of small-scale farming systems. This is about the ability to combine scientific information with farming traditional knowledge. (Source: Author, 2017)

Agro-ecology implies definition of sustainability based around an ecologically, rather than an industrially, oriented discourse. A central concept is 'co-evolution'. Unlike 'symmetry', as proposed by social constructivist thought, agro-ecology refers to the

reliant co-development of society and natural factors (Norgaard, 1994). It is recognised that farming systems essentially result out of co-production, the ongoing interaction, mutual transformation and dependency between humans and nature, between the social and the natural. The agro-industrial model has changed the nature of co-production and disrupted many interdependencies between the natural and the social, reducing the recuperative capacity of both (Altieri, 1995; Pretty, 2002; Rosset and Altieri, 2017).

All agro-social systems have their own endogenous potential; however, the crucial issue how are articulated and valorised through social and political processes and how they are actually practised. The social dimension of endogenous potential refers to local knowledge systems, but also to struggles by local groups to resist, propose and actively construct alternatives to industrial modernisation and to their capacity to develop social networks to enable these. The ecological dimensions are found in promoting diversity in agro-ecological systems and a strengthening and valorisation of local ecological specificity. When reflected on the challenges in the context of rural change in Rio, a policymaker involved in a project for improving dialogue between governmental policies and civil society represented by social organisations and associations commented:

‘Rio de Janeiro state is very mountainous and the soil is poor. Because we have poor soils, we have to recover the soil. We will increase production, volume and recover the soil. Primavesi [Ana Primavesi is a Brazilian soil scientist who has authored several key books, including ‘Manejo ecológico do solo’ (1984) [Ecological Soil Management] that discusses the tropical ecological agriculture in Latin America] said that when the soil is sick, food becomes sick, consequently, the consumer can be sick also. We explored the soil through cane and citrus farming over the last centuries. Years of burning, machines, agrochemicals. Soils are impoverished, unstructured, disaggregated. We need to recover and produce sustainably. Therefore, we will increase agricultural productivity’. (Policymaker 18, Regional articulator of the Ministry of Agrarian Development – MDA, Itaboraí, female)

Ideas championing the use and value of local knowledge in integrating human and biophysical dimensions of the environment are not new. Environmental impact assessment proponents and those involved in socio-economic development in developing countries have long argued for the need to integrate the knowledge of local populations, through public participation, into the planning and assessment of development projects (Delgado, 2008; Altieri and Toledo, 2011; Meek, 2019). However, at least in developed countries, environmental impact assessment has become a more formalised procedure, dealing primarily with larger projects, as well as national and provincial/state

programmes and policies (DEFRA, 2018; Ingram, 2018; OECD, 2019). When it comes to local and regional planning in urban or more peripheral rural regions, environmental issues are only integrated as far as the local and regional actors involved in the processes have accepted the values involved. National and provincial/state standards for land use planning can frequently be sidestepped, and many issues that involve the biophysical environment do not get adequate attention (e.g. the cumulative negative effects of certain types of agricultural management practice).

Effectively integrating environmental values and knowledge held by local populations and actors does not necessarily come naturally. It depends upon the ‘culture’ of the locality. Ensuring the effective integration of these values and knowledge of the local and regional biophysical environment can be constructed, however. The evidences presented here, therefore, suggests that it requires action.

It is not possible to distinguish the higher quality of organic products just by their aesthetic appearance compared with products from conventional agriculture where chemically synthesised products are used. This makes the organic quality cue a credence attribute for which the market success relies on the trust between farmers and costumers. Brazil, thus, created three forms of guarantee systems for organic quality assurance: 1) Third-party certification, operated by an independent company, subject to Conformity Assessment Bodies; 2) Participatory Guarantee Systems, operated by a Participatory Body for Conformity Assessment (see Plate 7.24); and 3) Social Control Organisations, operated by local organisations, intended to be used only to sell products according to direct marketing strategies (BRASIL, 2002, 2009).



Plate 7.24. This photo shows the role of farmer-led networks in agro-ecological system, informal knowledge and knowledge transfer and the way they are supported (or not) by formal institutions. Participatory certification involves the shared learning between its members, as well as a specific inspection by cross monitoring. This method of cross monitoring can be particularly effective for organic production and trade, as it stimulates the exchange of knowledges, seeds, and other elements that make up its organisational values. (Source: Author, 2017)

Each accredited guarantee system enables the trade of produce across different regions. However, third party certification permits use of the Brazilian System for the Evaluation of Organic Compliance label, enabling the international sale of the produce because it conforms to international rules. Participatory Guarantee Systems also allow such labels for sales within Brazil. Accreditation by a Social Control Organisation can only be used by family farmers and only permits them to sell directly at local consumption points.

Participatory certification involves the exchange of knowledge and shared learning between members, as well as inspection through monitoring, whereby farmers within the same network or organisation, but from different groups, visit and monitor other farmers to check for non-compliance (e.g. Farmers 12, 13, 31 and 44). This method of monitoring can be particularly effective for organic production and trade, as it further stimulates the exchange of knowledges and practices.

7.5 Conclusions

Knowledge politics, or struggles around the production, circulation and consumption of knowledge, have become an important theme in agro- food studies. Revealing where and how certified social-scientific expertise frames agro- food governance, in comparison with the non- certified knowledges, has been a major concern (Goodman and Dupuis, 2002; Buller and Morris, 2004; Eden *et al.*, 2008; Tovey, 2008). One key point arising from this study is the importance of farmers being open to change. I have tried to show how many farmers in the Rio de Janeiro metropolitan countryside adopt different methods and combine agricultural and non-agricultural skills creatively in order to adapt to new scenarios of regional change.

Recent research confirms that resilient agriculture is best advanced by multi-actor knowledge networks where different stakeholders with their various kinds of knowledge meet and negotiate new meanings and farming practices (Knickel *et al.*, 2009; De los Ríos *et al.*, 2011; Tisenkopfs *et al.*, 2014; Moschitz *et al.*, 2015). Knowledge networks make explicit the interactive and participatory character of knowledge generation and learning with the farmers being active partners and knowledge co-producers rather than passive receivers. In reality, 'local farmers' knowledge' is often an amalgamation of different knowledge sources (Beckford and Barker, 2007). This interpretation re-emphasises farmers' active role in knowledge generation and, in particular, in assuring its practical applicability.

Brazilian regional development policy appears to move increasingly toward knowledge and innovation policy. In recent years, it is also demonstrating that leadership and institutional qualities have a great impact on regional welfare, in particular when the role of leadership is aligned with innovation and knowledge creation (Knickel *et al.*, 2009; Maye, 2016; Ingram, 2018). Studies on regional leadership are rare, but this is a promising and important new field of research. A policymaker (Policymaker 18, Regional articulator of the Ministry of Agrarian Development – MDA, Itaboraí, female) involved in projects for improving the relationship between governmental policies and civil society represented by social organisations and associations commented: 'The State is unprepared. It has not followed the intellectual development and the recent dynamics of civil society'.

The changing nature of agriculture and its links to other rural sectors in Rio de Janeiro require the development of mixed knowledge and learning networks that include both agricultural and non-agricultural stakeholders. In some cases, mixed knowledge networks are operating, but in other cases, there are cognitive, structural or organisational barriers to initiating and making them operational. These obstacles also point to the need for changes in agricultural research policy and rural extension services in the region to respond better to farmers' learning and innovation needs.

This study argues that there is an important knowledge base that is often not tapped into in the planning and management of community and regional development. The knowledge may often be held by social actors who are generally poorly integrated, if at all, into the processes of planning and management of the community and locality, because they lack connections or do not recognise that their knowledge is significant. This chapter has shown that farmers have long played a significant role in shaping and maintaining rural landscapes in the region, and their embodied practices and experimental knowledges create a distinctive relationships between themselves and the land.

The dynamic contexts in the metropolitan countryside of Rio de Janeiro and the local specificity of the current challenges facing agriculture and the many roles it is being asked to fulfil require more inclusive and participatory modes of governing the generation, integration and sharing of knowledge. All stakeholders need to be recognised as equal co-authors of knowledge, and all kinds of knowledge need be enhanced and brought together in innovation processes.

The next chapter discusses the ability of farmers to maintain local capacity for social organisation and governance. As discussed in Chapter 7, interactions and exchanges of knowledge with external actors and institutions are established beyond the local scale, allowing individual farmers and farmers' associations to interact on different scalar levels.

Chapter 8 Social organisation, cross-scale linkages, and strategies to strengthen farming resilience in the metropolitan countryside of Rio de Janeiro

8.1 Introduction

A relational perspective on the resilience of farms can contribute to overcoming the conceptual distinction between the actor and his/her activity, structure and agency, and the social and ecological. It focuses on relations – rather than entities and allows for a symmetric treatment and enhanced integration. Indeed, relational theorists reject the notion that there are discrete, pre-given units that can be used as a starting point of analysis (Emirbayer, 1997). According to Darnhofer *et al.* (2016), in a relational perspective, farmers are understood as inseparable from the spatial and temporal contexts within which they are embedded. Chapter 8 discusses the social organisation capacity of farmers in the context of rural-urban interactions in the metropolitan countryside of Rio de Janeiro in which organisational strategy becomes a critical issue for strengthening resilience processes. One of the trajectories observed has been the articulation of farmer communities with external actors and public institutions through processes of interaction and cooperation at multiple scales.

The chapter discuss the ability of farmers and their strategies to maintain local capacity for social organisation and governance within these interactions (8.2). In the processes of dialogue with external actors and formal institutions, interactions and knowledge exchanges have been established beyond the local scale, allowing community members and farmers' associations to interact with external actors and organisations on different scalar levels (8.3, see also Chapter 7). Such interactions can create links that involve other formal institutions and social organisations from different rural locations that are part of the same regional context. This environment of learning, knowledge exchange and cooperation enables processes of innovation that go beyond individualised knowledge and practice. This wider network of social organisation has given rise to diversity of ideas and voices that reveal the challenges of agriculture in the context of multifunctionality and multifaceted interaction.

The relationship between formal institutions and farmers can result in interactions for building governance processes. These interactions can also create spaces of challenge and political engagement for voices that oppose productivist agriculture by promoting alternative discourses within the social organisation that becomes more diverse and

multidirectional (8.4). Finally, the chapter will provide conclusions about the debate on social organisation by farming community as part of their strategies to strengthen farming resilience in the metropolitan countryside of Rio de Janeiro.

8.2 Ability of farmers to maintain the local capacity for social organisation

Associations of small farmers in Brazil have grown in number since the 1980s, stimulated by national policies that recognise, on the one hand, that agricultural policies are more effective when managed collectively and, on the other, that formalise participatory action by local actors (Caldeira, 2008; Bicalho, 2009; Schneider *et al.*, 2010). The peripheral countryside of Rio de Janeiro Metropolitan Region is characterised by small, predominantly family farms, and there is a history of social organisation since the 1960s. The chapter evaluates the role of farmers' associations in establishing strategies to support small-scale farmers in the area and evaluates their relations with external institutions and cross-scale policies.

As mentioned in earlier chapters, agricultural policy in Brazil has mainly involved processes of agricultural modernisation that stimulated and strengthened large capital-intensive farms. In sporadic and localised cases, small-scale farmers were included in agricultural development programmes, such as irrigation projects in Northeast Brazil (Bicalho and Hoefle, 1990). The management of these government projects often imposed a cooperative model by forming an economic institution under the tutelage of rural extension officers from federal agencies, who directly administered production by the families involved. The cooperative model has not always produced its desired outcomes or commitment by participating farmers unless they were kept under the authoritarian control of the centralising administration.

This process of authoritarian control and the formation of small-scale farmers' cooperatives followed the modernisation ethos in Brazilian agriculture, underpinned by an ideology that economic efficiency and return on the capital investments would be obtained through economies of scale. In the case of small-scale farmers, this was pursued by grouping farmers into collective organisation, preferably a cooperative with equity guarantees and legal status that enabled it to operate in the commercial area. This model was mostly alien from its members and did not flourish as intended (Delgado, 1985; Rocha, 1999).

Collective organisation is nevertheless still seen by many in governing bodies as the most efficient way for diffusing modern techniques. Farmers' experiences and knowledges were not valued and utilised and were seen as in need of replacement by new processes and production systems based around high investments in capital inputs. In addition to the high costs to the farmers and the disregard for their agricultural practices, the closed technological package of modern agriculture made it impossible to include smallholders in agricultural proposals and policies (Chambers, 1983; Shiva, 1991; van der Ploeg, 2009).

However, faced with state direct intervention policies, many small-scale farmers establishing their own strategies that adjusted these new techniques and inputs to their resources and interests, combining old and new technologies from their experiences and knowledge (Bicalho, 1999; Ricardio, 2011). The strengthening of the group came about through endogenous social organisation in production and marketing cooperatives, or associations of residents and farmers with mixed social and economic objectives based on local needs. In this way, an endogenous movement was established, based on the demands and characteristics of the social group.

Greater approximation of agricultural policy with the realities of small-scale farming can be identified at the outset of the 1980s with the adoption of new approaches to promoting modernisation via an integrated development model that articulated local techniques, communities, and natural resources (Chambers, 1983; Richards, 1985; Chambers *et al.*, 1989). The transfer of modern technologies to farmers was maintained, but with better management of natural resources like soil and water. For example, Farmer 43 reported about 'Rio de Janeiro Sustainable Rural Development Project – Rio Rural' funded by the World Bank and the United Nations Food and Agriculture Organisation (FAO) which has offered subsidies to the rural community of Faraó, Cachoeiras de Macacu.

Agricultural policy nevertheless remained centred on achieving modern agricultural standards in Brazil. The implementation of integrated planning in micro-basins was strongly technocratic and assumed that communities were defined by the basin and the research and extension services would correspond to the farmers. Social dynamics were mostly ignored by discourse and environmental determinism focused on the dynamics of river basins. For example, Faraó in Cachoeiras de Macacu is situated on the escarpment

of the Serra do Mar coastal mountains in a buffer zone of the Three Peaks State Park, an important conservation unit of the Atlantic Forest biome.

A recurring problem has therefore been ‘top-down’ action and the imposition of decisions and plans that were often inadequate for the social and economic dynamics of areas or regions. If inappropriate to a farmer and brought from above, knowledge and learning are not built and the inherent capacities of building networks, local actors, and external agents are not promoted (see Chapter 7). Two priorities stand out to change this picture. One of these is the reorientation of agricultural policy affecting small-scale farmers, focusing on the social, economic and locational distinctiveness of family agriculture and the development of alternatives to the simple transfer of modern technology. Technology has instead to reflect the specific characteristics of farmers, taking into account labour relations, its capacity of economic response to the investments, the type and potential of natural resources, and commercial strategies, among other things.

Second, keeping the perspective that social organisations has broader effects, this policy in Rio de Janeiro state and other Brazilian states has emphasised programmes directed at associations and cooperatives of small-scale farmers. The main difference from previous arrangements is that policy could be directed to social organisations which met certain criteria. International organisations with a new focus on environmental issues are also participate, such as The World Bank, reinforcing the integration of environmental policies with local communities and the use of participatory governance processes. Therefore, agricultural policies combined with environmental conservation are in place, which will benefit real integration with farmers, preferably with farmers working in social organisations.

Other programmes like the National School Meal Programme (PNAE) are not directly aimed at promoting the agricultural sector but had repercussions on production and on small farmers in the case study areas, once dependent on food production. These include the different food and nutrition policy programmes for low-income populations and policies for supplying large urban centres. Policies on school meals for low-income households were first formulated in the 1930s, recognising the problem of malnutrition as a national issue (Prado Júnior, 1942; de Castro, 1946), but programmes of this nature are still operating (BRASIL, 2009; Sonnino *et al.*, 2014; Kleine and Brightwell, 2015). In contrast to the past, the management of programmes are now decentralised, having

been assumed by the state and municipal governments. In the case of school meals, the policy recently innovated with the formalisation of its relationship with family farming (Policymakers 3, 5, 8, 11, 14 and 18, Farmers 6, 40, 41 and 43). The association of nutrition policy with family farming policy has markedly benefitted the production on small-scale farms. Since this privileges socially organised farmers, it stimulates the formation and strengthening of small-scale farmers' associations.

I participated in a series of meetings between August and December 2017 with farmers, rural extension company and the Department of Agriculture of Tanguá at the ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá). The meetings discuss different themes to promote improvements in agriculture in Posse dos Coutinhos and surrounding areas, integrating family farmers with local and regional public institutions responsible for rural development. More than a place for technical discussions and knowledge sharing, the association's head office becomes centre of social organisation in the community (see Plates 8.1 and 8.2).



Plate 8.1. Farmers share information and knowledges at the farmers' association head office, Tanguá. (Source: Author, 2017)



Plate 8.2. A rural extension official prepares the session room at the farmers' association head office, which holds meetings between farmers and institutions every Wednesday in Posse dos Coutinhos, Tanguá. (Source: Author, 2017)

The revival of the farmers' association in Posse de Coutinhos, Tanguá reveals processes of resilience among the group of farmers. The area has undergone spatial changes resulting from its new positioning in the context of urban expansion and industrialisation in the metropolitan periphery of Rio de Janeiro (see Chapter 4). Although it remains rural in character and most land is used for agricultural purposes, there are trends towards the expansion of housing plots and the conversion of land to pasture, which favours subdivisions and housing plots. The permanence of the orange crop is an indicator of resistance and adaptation in the context of conflict of land use. Therefore, the farmers' association in the rural locality of Posse dos Coutinhos, Tanguá seeks to strengthen citrus farming through social organisation (see Plates 8.3 and 8.4).



Plate 8.3. ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá), Posse dos Coutinhos, Tanguá. (Source: Author, 2017)



Plate 8.4. More than a place for agricultural technical discussions and knowledge sharing, the association's office has become one of the core places for social organisation and mobilisation in the community of Posse dos Coutinhos, Tanguá. (Source: Author, 2017)

In addition to urban land use pressures resulting from the new positioning of the rural locality in the metropolitan region, there are also rural land use pressures linked to absentee owners and real estate speculators (see Plates 8.5 and 8.6). In both Posse dos Coutinhos and Faraó, farms are being established for equine breeding that occupy great

extensions of land previously dedicated to temporary crops in Faraó and citrus in Tanguá. There are cases of real estate agents already owning other properties with the same purpose in municipalities in the East Metropolitan Region. Similarly, Elgåker (2012) discussed how the equine sector is increasingly influencing land use in Europe. The sector influences traditional farming, land use and social and economic development, illustrating critical planning issues for managing peri-urban areas.



Plate 8.5. Equine farm of absentee owners in Posse dos Coutinhos, Tanguá. (Source: Author, 2017)



Plate 8.6 Equine farms occupy great areas of land, previously dedicated to agricultural crops in Posse dos Coutinhos, Tanguá. (Source: Author, 2017)

One group of small-scale farmers has developed strategies to strengthen social organisation and improve the fruit productivity through the organisation of ‘multirão’¹ to promote mutual aid among participants (see Plate 8.7). This group meets weekly as a mechanism for overcoming labour shortages and more general to promote cooperation among members of the farming community. Another example of cooperation was observed between Farmers 18 and 30 who are also part of a multi-stakeholder movement. The two farmers leased a small area near the source of the river, allowing irrigation for passion fruit cultivation on a small piece of land. Although the production area is small, passion fruit guarantees higher income and better value in agricultural markets in summer time.



Plate 8.7. The ‘multirão’ is a group of farmers, offering mutual aid for cultivation of fruits, Tanguá. (Source: Author, 2017)

One of my first contacts in Posse dos Coutinhos was Farmer 18, who grows citrus and passion fruit on leased land. Farmer 18 has a strong sense of cooperation with the local community and for promoting bonds of sociability with other farmers (see Plates 8.8 and 8.9). The ‘multirão’, which has been taken over from his initiative, is an example of a close link between farmers and multifunctional agriculture going beyond productivism logic. Lamine (2012) indicated that farmers belonged to several, partially intersecting,

¹ According to the ‘Historical Dictionary of Brazil’ by Levine (1979), multirão is community efforts to help an individual or family, usually in the construction of a house, corral, or in the field in the case of hardship.

informal networks in which they shared equipment, sometimes worked together, and in most cases collaborated over logistics involved in commercialisation.



Plate 8.8. Farmer 18 does not own his land. He leases a small citrus farm as his father and all past generations of his family had done before him, Tanguá. (Source: Author, 2017)



Plate 8.9. Farmer 18 and his wife (Farmer 19) in front of their house, Tanguá. (Source: Author, 2017)

After the interview, I was invited to visit a cousin who lives in nearby Tomascar. We went by car with Farmer 30, who has also been part of the network for sharing production of passion fruit (see Plates 8.10 and 8.11). We visited the area, where they showed me the land, which has a water source which allows them to irrigate the passion fruit to improve productivity. Although the production in partnership is small-scale commercial, the favourable price of passion fruit in Rio's market allows complementing the income of small-scale farmers with low income. Darnhofer *et al.* (2016, p. 116) argued that 'farmers may engage in experiments alone or collectively. Indeed, farmers are embedded in a wider social context, highlighting the role of networks'.



Plate 8.10. Farmers 18 and 30 showing a passion fruit cultivation in a partnership system between him and two more farmers, Tanguá. (Source: Author, 2017)



Plate 8.11. Three farmers in a partnership system cultivate 240 passion fruit plants on a small piece of land (150mx50m), Tanguá. (Source: Author, 2017)

Farmer 18 and his cousin are retirees and receive a minimum wage. Farmer 18's wife is also retired. His cousin's house is a traditional rural dwelling in the countryside and is characteristic for small-scale, low-income farmers in the countryside in the Metropolitan Region of Rio de Janeiro (see Plates 8.12 and 8.13).



Plate 8.12. A traditional rural dwelling in Tomascar, Tanguá. (Source: Author, 2017)



Plate 8.13. Family farmers and the interior of a traditional rural dwelling in Tomascar, Tanguá. (Source: Author, 2017)

Another aspect that the contact with Farmer 18 revealed was the integration of rural youth in agricultural systems. I had conversations with his wife, who related the family life history and their income generation strategies through cultivation of fruits. In addition, it allowed me to contact one of his grandsons who helps him to harvest orange and prepare fruit for sale. Farmer 18 sells his production to intermediaries, who sell the products at CEASA-Rio and in Niterói. His grandson would like to remain in Posse dos Coutinhos and to maintain the family orange cultivation (see Plate 8.14). Like other young people (Farmers 8, 34 and 39), Farmer 18's grandson (Farmer 20) is interested in seeking new channels for commercialising agricultural production. He reported that he already has some experience with CEASA-Rio. However, the family's strategies are still linked to conventional production and marketing.



Plate 8.14. Farmer 18 and his grandson (Farmer 20). It is common to find young members of the rural community who are the son/daughter and grandson/granddaughter of a former farmer, suggesting strong family networks, Tanguá. (Source: Author, 2017)

Farmer 18 and his family do not focus on niche markets or strategies for direct sale to the consumer. The family, for generations, has been dependent on relations with local tenants and intermediaries to commercialise agricultural production. Through agriculture and its multiple income supplementation strategies, this family has survived for generations going along with spatial changes in Posse dos Coutinhos.

Social factors include levels of interaction between community members, such as trust, relationships, conflict resolution processes, engagement of young and old people, learning and communication pathways, cooperation, strength of networks, bonding and bridging capitals, as well as community ‘cohesiveness’ (Cutter *et al.*, 2008; Wilson, 2010, 2012).

The local farmers’ market in Tanguá also involves a narrative of resistance. The project was developed by a group of farmers and the Department of Agriculture in Tanguá. It is public space that allows local farmers to market agricultural production directly at the edge of the BR-101, one of the main highways in Rio de Janeiro and Brazil. Legal issues over the land where the project was designed, and the withholding of public resources, have impeded the implementation of the project (see Plates 8.15 and 8.16). During many years of waiting, Farmer 6 and his wife have maintained a tent near the place where they

sell oranges and other agricultural products. Farmer 6 also seeks other marketing channels for his product. Because he is well networked with the community, rural extension staff and local public institutions, he has taken part in the supply of food to local schools and has participated in public calls for low-cost financing to improve agricultural production and property infrastructure.



Plate 8.15. A sign indicating the local farmer's market located at the edge of the BR-101, one of the main highways of Brazil. The formal farmer's market is a project that has not yet been implemented, Tanguá. (Source: Author, 2017)



Plate 8.16. Farmer 6 and his wife maintain a fruit stall around the area where they sell orange and agricultural products from their small farm. (Source: Author, 2017)

Davoudi *et al.* (2013, p. 311) suggested that social-ecological systems ‘become more or less resilient depending on their social learning capacity’. Beekeeping also reveals partnerships between two or more farmers. Farmer 10, for example, uses Farmer 12’s land to keep beehives, a partnership that guarantees honey production and better orange tree pollination (see Plate 8.17). As bee populations have declined as a result of excessive use of pesticides and synthetic chemicals (Gifford, 2011; Henry *et al.*, 2012; Whitehorn *et al.*, 2012; Williamson and Wright, 2013), the relationship between beekeeping and agricultural systems has become essential. It improves income for small-scale farmers, partnerships and cooperation, improvements in the symbiosis between bees and natural fruit pollination, and environmental sustainability. Šūmane *et al.* (2018, p. 232) highlighted that ‘in the face of the many contemporary challenges facing agriculture: climate change, food security and resource depletion, to name but a few, there is an emerging recognition that farmers’ and local knowledge is a valuable resource that can reorient modern agriculture towards more sustainable and resilient paths of development’.



Plate 8.17. Farmers 10 and 12 established links between beekeeping production systems and agro-ecological citrus farming. Farmer 10 (owns 50 bees box, 1500-2000l of honey per year, male) uses part of Farmer 12’s land for beehives that bring improvement for the production of oranges through natural pollination, Tanguá. (Source: Author, 2017)

Besides the farmers' association being a place of integration among farmers, members of farmers' families are also integrated within activities at the association's head office. Farmer 15's sister, for example, was the organiser of the community lunch held at First Meeting of Fruticulture (see Plates 8.18 and 8.19). The event received a significant number of farmers from Posse dos Coutinhos and adjacent areas, rural extension staff and members of the local government, in addition to speakers who gave talks about the importance of fruit growing for rural development in the locality. Farmer 15's sister of works in the local town, but lives in the countryside, maintaining important ties with the farming community.



Plate 8.18. Call for the First Meeting of Fruticulture, Tanguá. (Source: Author, 2017)



Plate 8.19. Farmer 15's sister preparing the lunch for attendants at the First Meeting of Fruticulture, Tanguá. (Source: Author, 2017)

During the fieldwork, there were two cultural local events that made reference to agricultural products (see Plate 8.20). A corn festival and a potato festival. Both were organised by neo-Pentecostal churches, which reveals a recent cultural process of centralisation of events by Protestant churches when, traditionally, festivals in the Brazilian countryside were supported by the local Catholic Church. Farmer 43 explained that local farmers and the rural community built alliances with secular and religious non-governmental organisations to improve local infrastructure. Decades later, the community became a farmers' association and started to focus on agricultural issues such as improving farming methods, forms of marketing and inter-institutional linkages. The field notes below (see Box 8.1) describe a walk and what was encountered along the way.

Box. 8.1. Field diary, September 7, 2017.

After a day of interviews in Posse dos Coutinhos, when returning to the centre of Tanguá, I photographed traditional rural houses. In the centre of the rural locality of Posse, I observed a new horse farm with a mansion on the top of the hill and pastures with horses, suggesting a landscape representing land speculation for future housing plots. I decided to walk to the corn festival that was being held at a local Protestant Church, another element of change. Before this, the Catholic Church was the centre of community organisation and local festive traditions, but protestantism and neo-liberal ideology in rural areas have become more popular in the Brazilian countryside.

On my way back, when I was waiting for the Itaboraí-Tanguá bus, I met Farmer 54 riding a motorcycle. He commented on the expansion of housing plots and the urban way of life in Posse dos Coutinhos. He said he will offer me a ride on the motorcycle next time. He said that tomorrow there will be 'mutirão' (voluntary work among members of the community of farmers) on his farm.



Plate 8.20. A sign calling the community to the 7th Potato Festival held in Posse dos Coutinhos, Tanguá, Rio de Janeiro. (Source: Author, 2017)

In addition to cultural events organised by the farmers' association, infrastructure for local improvement can be promoted through the association or through a member of the community. In Posse dos Coutinhos, the first schools were established by members of the community, for example the construction of the municipal school Claudionor José da Rosa in Tomascar in the 1970s on land donated to the municipality (see Plate 8.21).

Farmer 12 showed photographs of the construction of a bridge on the Tomascar River, a work promoted by his father to improve access to their property, but which benefited other residents (see Plate 8.22).



Plate 8.21. Community building a public school in an area donated by a resident in the 1970s, Tanguá. (Source: Author, 2017)



Plate 8.22. Farmer 12's father promoted the building of a bridge in Tomascar, benefiting himself and the local community. (Source: Author, 2017)

Individual and collective approaches for farmers do not operate in a vacuum. Capacities for resilience cannot be developed by farmers alone but depend on the collective activities of those collaborating with farmers, such as suppliers, customers, service providers, financial institutions, public administrations. Each farming system provides distinctive opportunities to enhance resilience, depending on the interdependence between actors in the farming system. Wilson (2010), Darnhofer *et al.* (2016) and Ingram (2018) have pointed to the particular role of farmers' networking in increasing the resilience of small-scale farming and sustainability of agricultural systems. A critical challenge for policy, therefore, is to ensure public policies support the development of collective capacities to promote cross-scale linkages and learning environment.

8.3 Inter-institutional dialogue, cross-scale linkages, and learning environments

In addition to the diversity of agricultural knowledge and information exchange between actors and institutions (see in Chapter 7), the social organisation of farmers and the community provides greater legitimacy in their interactions with public institutions. The following examples show relationships between the farmers' community in the rural periphery of Greater Rio de Janeiro and public institutions such as EMATER-Rio, a regional rural extension company, and EMBRAPA, the national agricultural research company (see Plate 8.23). In recent years, there have been rural development and integration projects between the community and representatives of these public enterprises. EMATER-Rio has played a key role in linking the community of farmers with public incentives for agricultural production and rural development. In recent years, the strengthening of public policies for family agriculture, nationally and regionally, has promoted dialogue between public institutions with the rural community and its leaders.



Plate 8.23. Field research organised by EMBRAPA-Solos (Brazilian Agricultural Research Corporation) involved in direct contact with farmers and the use of qualitative methods in research on environment perception and farming systems, Cachoeiras de Macacu. (Source: Author, 2014)

Most farmers in Posse dos Coutinhos do not own agricultural machinery. One service offered by the local Department of Agriculture is low-cost equipment rental. For this, the farmer needs to request machinery from a list organised by the Department of Agriculture. The service is important for soil maintenance and preparation for cultivation and the machinery is also essential for road maintenance in rural areas. The headquarters of the farmers' association is the storage centre for machinery and agricultural implements for use by those who request it from the Department of Agriculture (see Plate 8.24).



Plate 8.24. Public agricultural machinery at the ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá). (Source: Author, 2017)

In the first meeting at the ACIPTA, there was participation from farmers, EMATER-Rio, and the Department of Agriculture. Although contact with the small-scale agro-industry did not result in commercial agreements between the business group and the farmers' association, it established the supply of natural fruit waste from the agro-industry for the production of compost for soil fertilisation (see Plate 8.25). In addition to trade issues, linkages between farmers and external sectors can also represent exchanges of knowledge and learning (Darnhofer, 2010; Ingram, 2018; Šūmane *et al.*, 2018). The participation in the meetings of the farmers' association was fundamental for integration within the farming community and building a network that linked the local group and institutions involved in the rural development agenda (see Plate 8.26).



Plate 8.25. Farmers present oranges grown in Tanguá and discuss different quality of local fruit with the owner of a small-scale fruit juice factory. (Source: Author, 2017)

Through association and social relations with other members of the community, farmers articulate and build relationships with officers from rural development institutions (Hinrichs, 2003; Martiskainen, 2017) to share agricultural knowledge and practices and produce positive local developments (see Chapter 7). During the fieldwork, I interviewed an official from the public rural extension company of Tanguá that provides technical assistance to improve agricultural production. In addition to technical issues, EMATER-Rio is responsible for registering farmers in federal and regional public policies to support family farming. Thus, through the association and relationship with rural extension officers, farmers are able to participate in policies such as the National Program for Strengthening Family Agriculture (PRONAF).



Plate 8.26. Farmers and their associations in Rio de Janeiro Metropolitan Region were the main audiences for discussion of rural change and overview of major changes in agriculture, Tanguá. (Source: Author, 2017)

Although a specific group of well-networked farmers (Farmers 6, 12, 17, 30, 33, 36, 40, 41 and 43) has access to public subsidies, other farmers do not participate in discussions between community and institutions, and end up being excluded from government projects of support to family and small-scale farmers. This is the case for Farmer 45 who, in an interview, argued that he never received any support from public institutions (see Plate 8.27) for growing oranges in a conventional production system. His brother passed away years ago after he acquired a neurological disease that may have been caused by pesticides which he had responsibility for preparing. Without technical support and instruction about the correct handling of synthetic chemicals, he had direct contact with chemicals used in a conventional citrus system, which in recent years has been demanding the use of agrochemicals due to excessive use of soil and increases in pest and diseases (see Plates 8.28 and 8.29). Most of the citrus farmers interviewed still use pesticides.



Plate 8.27. Farmer 45 has never received support from public institutions. (Source: Author, 2017)



Plates 8.28 and 8.29. Farmers show diseases and pests affecting citrus in Rio in recent years. Major agricultural diseases and pests generally begin in areas of intensive-scale production, and then spread to other agricultural areas. (Source: Author, 2017)

The connections of farmers with external institutions or other farmers' groups are also important for knowledge and information sharing, as discussed in Chapter 7. In the case of Farmer 30, his integration with other social actors, both in and outside Posse dos Coutinhos, allows him to diversify his agricultural production, growing oranges and other agricultural products such as banana, squash, manioc and eggs. Small-scale poultry farming was introduced on his farm through the Rio Rural Programme, a policy focused on rural development in Rio de Janeiro state with funding from the World Bank and Food and United Nations Agriculture Organisation of the United Nations (FAO).

Farmer 30 owns a rural property inherited from his father that was parcelled up between the family. As some siblings left the area to work elsewhere, Farmer 30 leases other parcels of land to maintain production. In the photograph below, he shows a variety of banana tree suitable for the terrain. The plant was offered by another farmer from Cachoeiras de Macacu (see Plate 8.30). Complementary income in general promotes more diversification (Fuller, 1990; Evans and Ilbery, 1993; Hoggart *et al.*, 1995). The survival of small farms is based on part-time farming and innovative complementary efforts. ‘It is also within the small-scale farming framework that the new age of production of more exclusive food has appeared’ (Murdoch, 2000, p. 411).



Plate 8.30. Farmer 30 owns 1,5 ha of citrus fruit, fruits and vegetables and leases more than three hectares of his two siblings’ land. He shows a variety of banana that was offered by another farmer from Cachoeiras de Macacu. (Source: Author, 2017)

With the strengthening of the farmers’ association and greater participation by the community in the meetings, the association’s head office also becomes a political space with the presence of local councillors and politicians, who are sometimes present at meetings to justify the absence of public power regarding some issues that arise in Posse dos Coutinhos area. Plate 8.31 shows the president of the Common Hall at the farmers’ association explaining that he received a judicial complaint from Farmer 12, who has represented the group in the Rural Development Council of the Municipality, in a conflict that involves the territorial delimitation of Posse dos Coutinhos and its classification as a rural-urban periphery, which would allow an increase of housing plots and urban density

(see Plate 8.31). A letter written by the farmers' association in 2013 presented the position of the group to these pressures (see Plate 8.32 and Box 8.2). When reflecting on these challenges, Farmer 12 has become involved in a political debate for territorial planning, criticising housing plots in the area:

‘We are small-scale farmers. In Itaboraí [Rio de Janeiro Oil-petrochemical Complex COMPERJ is located in this municipality] has already begun the process of urban expansion, investing in housing plots. Our rural landscape and farming systems have positive values. However, this narrative about housing development is coming here as well.

[...]

There are external forces that block rural development. When local and urban politicians come to the farmers' association to give explanations, it is because something that is not good is coming'. (Farmer 12 owns a medium-sized organic citrus farm, Tanguá, female)



Plate 8.31. Farmers listen to an explanation by a local politician. Farmer 12 is a local leader on environmental issues and voice of resistance against urbanisation. As she is involved in the Rural Development Council, she is in a position to challenge local policy that does not recognise the complexity and diversity of rural areas. (Source: Author, 2017)

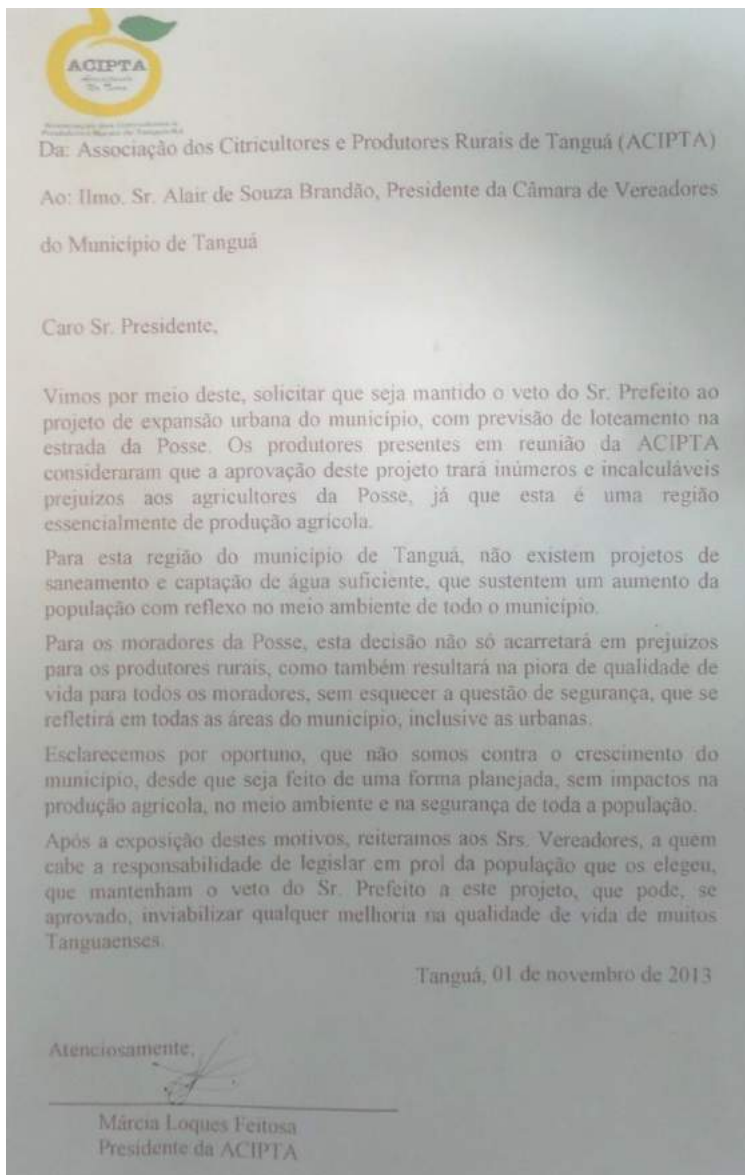


Plate 8.32. Letter from the Tanguá Citrus Fruit Growers Association in 2013, requesting the attention of the local authorities in the expansion of housing plots in Tanguá. (Source: Author, 2017)

Box 8.2. Letter written by the Tanguá Citrus Fruit Growers Association in 2013

From the Association of Citrus Growers and Rural Producers of Tanguá (ACIPTA)

To the President of the Common Hall of Tanguá

Sir President of the Common Hall of Tanguá,

We hereby request that Sir Mayor's veto to the urban expansion project of the municipality, with the provision of the land subdivision and expansion of housing plots in the rural locality of Posse dos Coutinhos should be maintained. The farmers attended the ACIPTA meeting consider that the approval of this project will bring incalculable losses to the farmers of Posse, as this is an essentially agricultural area.

For this area of the municipality of Tanguá there are insufficient sanitation and water abstraction plans to support an increase in the population that reflects on the environment over the municipality.

For the residents of Posse, this decision will not only cause damage to farmers but will also result in a worse quality of life for all residents, without forgetting the safety issue, which will be reflected in all areas of the municipality, including the urban areas.

We would like to clarify that we are not against the development of the municipality as long as it is done in a planned manner, without impacts on agricultural production, the environment and the safety of the entire population.

For these reasons, we reiterate to the local authorities, who are responsible for legislating in favour of the population that elected them, to maintain Sir Mayor's veto of this project.

Tanguá, November 01, 2013.

Farmer 12 is one of the local leaders and seeks the strengthening of the association and its reorganisation (see Plates 8.33 and 8.34). Over the past few years, the social group was weakened by the excessive control of accounts by management members and a lack of transparency and communication, which triggered a significant loss of membership. According to Farmer 12, it is urgent to combine efforts to re-establish and strengthen the Tanguá Citrus Fruit Growers Association (ACIPTA) to better represent the group in the context of rural change and challenges for rural development.



Plate 8.33. Farmer's associations enable the farm community to maintain local capacity for social organisation, engaging with various institutions and building important cross-scale linkages. The associations represent the social group in the context of rural-urban interaction and the importance of farmers being open to change, which also contributes to complex outcomes. (Source: Author, 2017)

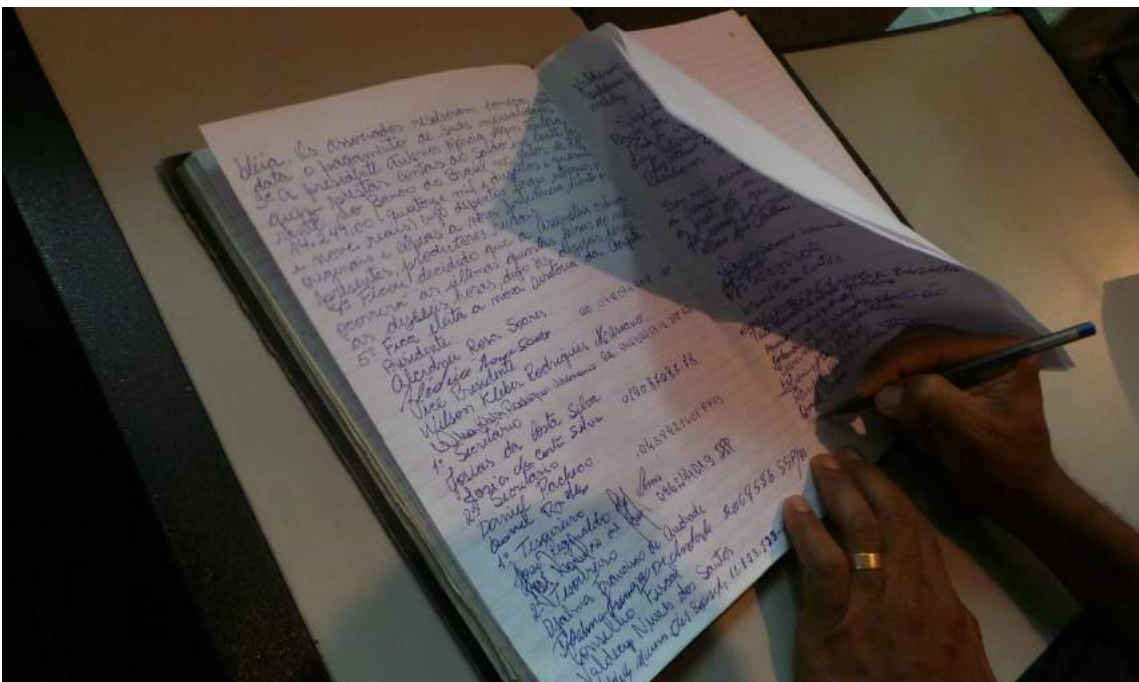


Plate 8.34. Farmer signs minutes of a meeting at the head office of the farmers' association, Tanguá. (Source: Author, 2017)

The relational approach emphasises that there are always more possibilities, as exemplified by different ‘styles of farming’ or the coexistence of organic and conventional farms in regions. A relational approach also highlights that farming is an on-going process of ‘becoming’: not only do relations change within a specific path; there is also path creation through bifurcation. Resilience is thus dependent on material and value relations on- and off-farm that are provisional, enacted, contingent, and always under construction (Wilson 2010, 2012; McManus *et al.*, 2012; Darnhofer *et al.*, 2016; Wilson *et al.*, 2016).

8.4 Political engagement, emancipatory voices, and challenges to the management of multidimensional social processes in the context of rural change

Goals 9 and 15 of the UN’s Sustainable Development Goals (2015) indicate that actions are needed to ‘protect, restore and promote the sustainable use of terrestrial ecosystems’ and to ‘build resilient infrastructures, promote inclusive and sustainable [activity] and foster innovation’. Comparative studies have shown that the productivity of new production systems are equal to or greater than conventional systems. Frison (2016), for example, showed that organic agriculture in developing countries is on average 80% more productive than conventional agriculture. In developed countries, comparatively, the index is lower, 8%, but agriculture with conservation practices of natural resources reaches a productivity average of 79% over conventional agriculture.

In Brazil, EMBRAPA research has studied the efficiency of organic farming and ‘good agricultural practices’ in soil conservation, pest control and animal husbandry, ensuring good levels and increasing productivity in the institution's experimental fields in different regions of the country (EMBRAPA, 2004; Peixoto *et al.*, 2008). These new production systems are innovative and require new knowledges, skills, and capabilities on the relationship of production with in-situ resources. They involve exchanging knowledge based on experience between farmers and researchers. They are dynamic and diversified because they are related to local productive resources (Marsden and Morely, 2014; IPES-FOOD, 2016). In Brazil, there is a growing interest in alternative and sustainable food systems, notably organic and agro-ecological systems, regulated by Law 10,831 of 2003 and Decree 7,794, of August 20, 2012, with consequent standardisation of types of practice (BRASIL, 2003, 2012).

The method of cross-monitoring, discussed in Chapter 7, can be particularly effective for organic production and trade, as it stimulates exchanges of knowledge, seeds (see Plate 8.35), and other elements that make up its organisational capital. Frison and Rover (2014) show how expertise and experiences are exchanged within each group and among different groups in handling techniques, control methods, and general knowledge of organic production. There is also a broader awareness among Brazilian legislative bodies of efficiency of this certification method. Participatory Guarantee Systems, such as that promoted by Farmers 12, 13, 31 and 44, can be regarded as a form of social innovation, as they promote changes in attitudes, behaviour, and perceptions among its participants in Cachoeiras de Macacu and Tanguá (see Plates 8.36 and 8.37) to create new consolidated paths of collective action and a new model for agro-ecological systems.



Plate 8.35. Agro-ecological farmer shows seeds of a leguminous plant for better fixation of nitrogen in the soil, Tanguá. (Source: Author, 2017)



Plate 8.36. Organic farmers of Tanguá adopting the method of cross-monitoring. (Source: Author, 2017)



Plate 8.37. Monthly meeting of the organic farming community of Cachoeiras de Macacu. (Source: Author, 2017)

The agro-ecology movement reveals specific relationships among members of the farming community who seek to link agriculture and environmental issues. Members of the group participate in meetings of both farmers' associations and participatory certification systems, a movement organised by farmers and non-governmental organisations to guarantee the production and marketing of agro-ecological products in Rio de Janeiro state. In addition to certification guaranteed by the group, the movement

has provided partnerships among members, knowledge sharing, a higher level of governance for strengthening of agro-ecological systems in the metropolitan context, and the introduction of alternatives to dominant conventional systems still promoted by rural extension agencies and local and regional policies for rural development.

This public spirit creates new opportunities to produce and distribute organic products (see Plates 8.38-8.41). In addition, organic production generates environmental services and public goods (e.g. biodiversity conservation, climate change mitigation, maintaining soil functionality, agricultural and rural landscape, and rural vitality). Therefore, building actions and policies to favour the production, distribution, and consumption of organic food is of major importance, particularly when promoted by the citizens themselves (Bicalho and Feres, 2014; Marsden and Morely, 2014). The groups of Participatory Guarantee Systems of Cachoeiras de Macacu and Tanguá provide essential social innovation, which helps in the planning of other social and political initiatives, as well as public policies to promote food democracy.



Plates 8.38, 8.39 and 8.40. Farmers bring local agro-ecological products, books, and brochures on agro-ecological systems to a meeting in Cachoeiras de Macacu. (Source: Author, 2017)



Plate 8.41. Sign indicating that a farm is certified by the Association of Organic Farmers of Rio de Janeiro state - ABIO-Rio, Cachoeiras de Macacu. (Source: Author, 2012)

Specialised industrial agriculture and diversified agro-ecological farming stand at two ends of a spectrum. Agro-ecology is not a niche for small-scale artisanal farmers in given sectors, nor is it a label to be attained on the basis of specific practices. It is a broader logic for redesigning agricultural systems in ways that maximise biodiversity and stimulate interactions between different plants and species, as part of holistic strategies to build long-term fertility, healthy agro-ecosystems and secure livelihoods (Altieri, 1995; Pretty, 1995, 2002; Rosset and Altieri, 2017).

Large-scale commercial citrus growing in the world has spawned a host of diseases and pests that require intensive use of synthetic chemicals. Posse de Coutinhos, although an area of small-scale production when compared to superproductivist systems in São Paulo state, has the majority of farmers practicing conventional farming systems with fertilisers and synthetic agricultural pesticides. The environmental impacts of intensive land use by conventional agriculture are evident. Farmer 12 is one of the few who, since the 1980s, has been conducting the conversion of the system from conventional citrus production to

an agro-ecological system, combining several varieties of citrus with regeneration of the Atlantic Forest and water resources (see Plates 8.42-8.44).



Plate 8.42. I gave participants a camera and asked them to identify the values and perspectives they were trying to communicate with their landscape scenes. I also used the interviews to identify and explore farmers and rural extension officials' diagnostic assessments of the landscape. This photo shows Farmer 12 taking a picture of the source of the river on her farm. According to her, the water volume has increased with forest regeneration. (Source: Author, 2017)



Plates 8.43 and 8.44. When I asked Farmer 12 to take a photo representing her farm, she photographed the source of the river. It is about values of agriculture in the context of spatial diversity and global challenges. (Source: Author, 2017 and photo elicitation, Farmer 12, 2017)

As Knickel *et al.* (2018, p. 209) highlighted, ‘in order to achieve systemic change we need to more critically reflect on conventional wisdom and approaches and be open to ideas and practices that lay outside the well-worn paths of the mainstream’. The groups involved in the Cachoeiras de Macacu and Tanguá Participatory Guarantee Systems have become multiplier agents for knowledges in the locality and resistance to the dominant conventional production system (see Chapter 7), and their participation in local farmers’ associations has been essential in disseminating agro-ecological knowledges and practices. Plate 8.45 shows Farmer 12 in a local farmers’ meeting (first from left)

discussing with other farmers a weed that appears in their area as an indicator for alternative agricultural management practices through the natural use of other plant species, diverging from technical recommendations by EMATER-Rio. This example demonstrates Farmer 12's strategies of expanding and sharing her alternative knowledges and amplifying the influence of agro-ecological practices.



Plate 8.45. An intervention by an agro-ecological farmer (Farmer 12) during a meeting at ACIPTA (Association of Citrus Growers and Rural Producers of Tanguá). Most farmers in the locality are still using conventional agricultural methods supported by the rural extension company. (Source: Author, 2017)

Darnhofer *et al.*, (2016, p. 120) argued that ‘different relationalities will offer different opportunities and constraints and thus different levels of flexibility to engage with change, and to shape change’. The following reflection indicates the coexistence and conflicts between the agro-ecological system and conventional farms and rural extension services: ‘Why not regenerate and improve the soil? They [rural extension officials] should try to introduce alternative methods to conventional farmers. However, chemicals and synthetic products have had more power here at this moment’. (Farmer, Tanguá, female)

The key point here is the importance for promoting resilience of establishing political priorities to support the emergence of alternative systems based around fundamentally different logics, and which, over time, generate different and more equitable power relations. Incremental change must not be allowed to divert political attention and

political capital away from more fundamental shifts in thinking and practice, where these are needed to shift from a narrow and apparently efficient but in many ways vulnerable industrial agriculture to more diversified and robust agro-ecological systems (Shiva, 1993; Rosset and Altieri, 1997, 2017; Altieri and Toledo, 2011).

This section has discussed political engagement by voices opposed to certain government practices and the challenges to management of multidimensional social processes in the context of rural change. The top-down approach has long been criticised in the international development literature because of the risk of introducing socially and environmentally inappropriate farm methods. Farmers are the ones who work specific landscapes first-hand and understand the intricacies of their local environments and, therefore, engaging narratives of emancipation and possibilities has become essential for understanding the multidirectional and multidimensional processes of farming resilience.

8.5 Conclusions

This chapter has discussed the complexity of spatial restructuring in the Rio de Janeiro Metropolitan Region in an attempt to better understand rural change by going beyond the view of inert rural spaces subject to external linear urban forces. This study used a multidimensional approach to analyse agriculture practised at the rural-urban interface of a metropolitan area by examining the interaction of both urban expansion and the historical agrarian context.

Recent urban growth in the metropolitan region has been more in line with converting land into commercial, industrial and residential areas associated with renewed manufacturing activities and logistics development and not hollow real estate speculation like in the past. The expansion of the metropolitan region moves along two axes spatially projected further outward from the cities of Rio de Janeiro and Niterói (see Figure 3.1). This notwithstanding, there are inherent forces within rural areas which frame specific processes. Land tenure and social formation are results of past agrarian history and influence the course of converting farmland into other uses as well as resistance or dynamic adaptation in rural-urban interactions. The presence of smallholders is a force in itself that should not be underestimated. These farmers resist leaving the countryside by using the political force of their social movements to demand agrarian reform in the past and inclusion in agrarian policy today.

National policies to strengthen family farming have the aim of combating rural outmigration and are opposed to converting rural areas into urban areas. Achieving this goal, together with the initiatives undertaken by pro-active and resilient farmers, requires more creative municipal government. The traditional rural municipalities of the outer metro region have urban, rural and rural-urban transition zones that are not so easily modified and require complex political negotiation between farmers organised in social movements and different levels of government. The construction of the COMPERJ oil refinery presents a contrasting case. The State oil project exercised great influence over municipal administrations pressuring them to convert land to urban and industrial uses.

Contradictions and tensions in government policy are more difficult to overcome. This is not a simple task because it involves tackling institutionally rooted mind-sets that view metropolitan farming as an impediment to urban development. Planners and government officials from urban areas sometimes show ignorance or disregard for rurality and ban some activities, which might alter an imaginary 'traditional' land use system even when the innovations can actually be environmentally benign.

In contrast with this is the organic agriculture and agro-ecological systems with farmers integrated into the Association of Organic Farmers – ABIO-Rio. This association, unlike others, does not act directly in commercialisation. The major objective is the management of organic production through exchange of knowledge among members. The association constitutes and articulates a system of participatory certification of the organic system. These examples made it possible to observe the trend towards the organisation of farmers' associations, based on the needs of each group and in response to current policies.

The variety of farmers' articulations and their strategies expresses the diversity of agricultural production, markets and types of farmers present in the rural periphery of Greater Rio de Janeiro, reflecting the variety and complexity of rural areas in metropolitan regions (Bicalho, 1992; Bicalho and Machado, 2013). Emancipatory rural-urban landscapes emerge, where alliances are forged between increasingly better-informed consumers and farmers who offer quality-food products through alternative distribution networks and so act as an environmental and social counter-force to intensive global food systems (Goodman *et al.*, 2011; Marsden and Morely, 2014).

The relational approach raises innovative methodological challenges and its application has shown ‘how the ‘vibrancy’ of matter and the interaction can be effectively captured’ (Darnhofer *et al.* 2016, p. 120). The case studies showed that social and organisational innovation play a vital role in renewal at farm level and in rural economies at the rural-urban interface. This chapter discussed how farmers in the Rio de Janeiro Metropolitan Region combine social strategies creatively to adapt to spatial change and to strengthen resilience.

Chapter 9 Conclusions

9.1 Introduction

This thesis contributes to current gaps in knowledge about farming resilience in the metropolitan and global countryside, especially linked to limited work on rural studies at farm level and at the rural-urban interface. It contributed to knowledge in relation to the issue of how especially small-scale farmers develop adaptive capacity and find and grow the resilience in the face of the pressure of globalisation-driving urbanisation which is being played out all over the world in developing, transition and developed countries. The study highlighted patterns of small-scale fruit farming within the tensile relationship between urban, industrial and global forces and the viability of emancipatory rural landscapes in a metropolitan region in Brazil. Theoretical and conceptual issues linked to these questions will be discussed in the following sections (9.2-9.3), while Sections 9.4 and 9.5 will conclude this thesis by discussing opportunities for future research on rural studies.

Rural-urban complexity is observed across Rio de Janeiro Metropolitan Region where land use, economic and environmental policies have generated a variety of conflicts (Chapters 4-8). From the 1970s onwards, urban land speculation in the Rio suburbs and neighbouring municipalities prompted increasing competition between industrial, residential and conservation land uses and their general advance against agricultural land uses. These pressures have created a highly multifunctional countryside in which agriculture has become juxtaposed with other functions and interests as part of a mosaic of diversified land uses in both the inner and outer metropolitan space. However, the findings of this study indicate how the resilience and adaptive capacity of farmers have challenged dichotomous urban-rural approaches to land use in the metropolitan countryside in which agriculture and localised food systems are simply replaced by urban sprawl and global pressures.

The thesis was based on primary research undertaken over the last years. During this period, many of the places and farms were researched several times to detect change. Analysis of the nature of the place was obtained through bottom-up information flows and qualitative investigations. To understand the complexity of farming at the rural-urban interface, this research assumed that rural studies should apply a relational perspective

and multi-method approach that enable researchers to engage more closely with farmers' life histories, farm trajectories, transitions and development pathways.

9.2 Research question revisited

This thesis has taken a relational perspective to investigate the complexity of farming at the rural-urban interface of the metropolitan countryside of Rio de Janeiro. It has built on work by Bryant *et al.* (1982); Lawrence (1988); Bryant and Johnston (1992); Marsden *et al.* (1993); Cloke *et al.* (2006); Halfacree (2006); Wilson (2007, 2010); Woods (2007, 2011); Darnhofer (2010); Heley and Jones (2012); Welsh (2014); Darnhofer *et al.* (2016); Šūmane *et al.* (2018) and Knickel *et al.* (2018). This approach was achieved through the analysis of interviews with farmers and policymakers as well as participant observations conducted in three farming communities in the metropolitan countryside of Rio de Janeiro. The fieldwork was supplemented by archival research in public institutions in Rio de Janeiro state, Europe and the United States. Contextual and background information was also obtained through a long-term and longitudinal research that included the previous study conducted by the author (Machado, 2013).

As discussed at the end of this section, the key contribution of the research has been to build upon academic knowledge of the complexity of farming in the countryside of a metropolitan region, understanding the factors that enable farming communities to develop resilience and adaptive capacity in the face of major changes to rural areas caused by the forces of globalisation and urbanisation. The inclusion of the voices of small-scale farmers and their associations allowed for an understanding of the relational agricultural systems that are formed between rural and urban interactions and to demonstrate how these are dynamic and changing. It also revealed one of the most prominent features of contemporary rural localities in the way in which traditional rural economies have become woven into translocal networks of production and consumption. These entanglements have implicitly forged new connections, interdependencies and affinities between rural places and other rural and urban localities (Jones *et al.*, 2018).

The global food system is coming under increasing strain in the face of urban population growth. For the first time in history, the majority of the global population is urban, with the bulk of urban growth occurring in smaller-tiered cities and urban peripheries, or peri-urban areas of the developing world (Revision of World Urbanisation Prospects,

Population Division of the UN Department of Economic and Social Affairs, UN DESA, 2018 and United Nations Human Settlements Programme, UN-Habitat, 2018). These projections have shown that urbanisation combined with the overall growth of the world's population could add another 2.5 billion people to urban areas by 2050, with close to 90% of this increase taking place in developing countries, according to the United Nations (2018).

Lerner and Eakin (2011) discussed the emerging spaces that incorporate a mosaic of urban and rural worlds, and reviewed the implications of these spaces for livelihoods and food production. This study has contributed to understandings of a relatively 'invisible' and under-researched farmers' community in a metropolitan countryside in Brazil. It has attempted to deconstruct previously made assumptions that the rural space is only subject to external interferences and actions. This study has argued that the rural space should also be seen to possess its own dynamics and resilience that contribute to complex outcomes in which the leadership of social actors creates new forms of spatial ordering and to adapt to scenarios of regional change. These contributions will be explained in more detail in the following section, where the research questions set out in Chapter 1 are revisited. After this discussion, Section 9.4 makes recommendations for further research.

The densification of cities is presently one of the dominant strategies for urbanisation globally. However, how the densification of cities is linked to processes in the peri-urban landscapes is rather unknown (Hedblom *et al*, 2017). The research started with the hypothesis that globalisation has changed rural space and reshaped farming resilience in the metropolitan countryside of Rio de Janeiro, an area in Southeast Brazil deeply affected by global geographical processes such as urbanisation, industrialisation, and environmental pressures. Therefore, the research provided a deep analysis of the resilience of farming communities in the rural periphery of Greater Rio de Janeiro that have been affected by their incorporation into metropolitan dynamics. The study had the following four objectives:

1. To analyse how globalisation has affected the farming communities in the metropolitan countryside¹ of Rio de Janeiro since the 1970s.
2. To assess how globalisation has affected the practices and spatiality of farming in the metropolitan countryside of Rio de Janeiro by investigating the complexity of small-scale fruit farming at farm-level and in farmers' associations.
3. To analyse the resilience of small-scale fruit farming systems affected by urbanisation and industrialisation in this metropolitan countryside.
4. To discuss how urbanisation and industrialisation have affected small-scale farming pathways in the Brazilian metropolitan countryside and to discuss policy implications and wider theoretical understandings of relational rural geographies and farming resilience in a global era.

In this section, these objectives are revisited to highlight the key findings of the research.

9.2.1 Objective 1: How has globalisation affected farming communities in the metropolitan countryside of Rio de Janeiro?

The first research question was largely addressed in Chapter 4, although empirical findings in the following Chapters also contributed to answering this question. The research has found that rural dynamics in the Metropolitan Region of Rio de Janeiro have long been characterised by fragmented land ownership, land-intensive productive systems, and direct forms of marketing to consumers that are made possible by proximity to urban markets. Pressured by urban expansion and economic globalisation, rural activities have diminished in the metro region over recent decades but have not disappeared. A 'rural Rio' still exists where, depending on the relative distance from the

¹ This term was used in the thesis to describe geographical spaces where agricultural land, rural-urban landscapes, and nature have become entwined in the dynamics of metropolitan areas as a result of geographical and/or functional proximity. The concept of metropolitan countryside invites investigation of the effects of these entwinements, the possibilities of bringing the rural space and the metropolitan space together, and questioning of the potentials of agriculture and rural-urban landscapes in the contemporary metropolitan and global context. The metropolis and the countryside are typically understood as relatively distinct and incongruent forms of geographical space. However, the case of Greater Rio de Janeiro offers rich evidence of affinities between them as observed in this thesis. The thesis thus used the idea of the metropolitan countryside to explore farming systems and socio-ecological landscapes at the rural-urban interface as integral parts of a broad and hybrid rural-urban dimension of the metropolitan context, contributing to the call by Woods (2007) for a 'global countryside' and adding insights to this notion at the rural-urban interface.

built-up metropolitan core, rural actors actively assert, negotiate and practice their position in a multifunctional countryside.

Aguayo (2008, p. 542) presented the impact of globalisation on rural communities as starkly polarised. She distinguished between a few global villages that are ‘active agents in the global world’, able to shape their own engagement with external networks, and many globalised places that ‘have lost control over their own process of global hybridisation and have become victims of all kinds of penetration by which capital, cultural products, and symbols, alter the livelihood and way of life’. Globalisation in a rural context has commonly focused on large-scale structural changes, transnational commodity chains, or dramatic examples of rapid transformations. This research challenged this assertion through in-depth exploration of the dynamics of on-going change in the context of the globalisation ‘on the ground’ - perhaps like an ecosystem in which micro- and meso-forms of agency are still practised under the canopy of these meta-globalisation process, not unaffected by it, not isolated from dialogue with it, but equally not dictated or disempowered by it in the ways and to the extent that Aguayo implies.

Conceptualisations of multifunctional agriculture have also focused on macro-scalar policy-based processes. However, Wilson (2007) argued that expression of multifunctionality is most important ‘on the ground’ where it will lead to tangible changes in the farmed landscape and agriculture-community interaction. Bringing the case of the metropolitan countryside of Rio de Janeiro, this thesis highlighted the importance of building upon academic knowledge of the complexity of farming in a metropolitan context. The inclusion of the voices of small-scale farmers and their social organisations allowed for an understanding of the relational agricultural systems that are formed between rural and urban interactions and demonstrate how these are dynamic and changing. Farmers and social organisations have sought to challenge, influence and work within these macro-scale policies. They have also continued to find their practice niches within the wider economic forces of globalisation and urbanisation.

This research has shown that in Rio de Janeiro, new industrial and petroleum complexes were installed in the metropolitan region and further out in the rural periphery from the 1970s onwards (Becker and Egler, 1992; Randolph, 2011). These have benefited public and private energy, housing, transport and telecommunications infrastructure in rural

areas but have also exerted less beneficial impacts. During this period, increasing competition from industrial, residential and environmental functions for land presented both opportunities and conflict for rural activities and so has created a mosaic of diversified land use in both inner and outer metropolitan space (Bicalho, 1992, Silva, 1995; Wilkinson *et al.*, 2011; Bicalho and Machado, 2013).

It is through local actors that new spatial configurations and dynamics are created and adapted to the rural-urban scenario. These dynamics involve strategies beyond urban-industrial expansion from the metropolitan core and new behaviours and values, to an extent, independent of the urban itself. This research has shown how external values absorbed by society that influence and are transmitted largely in rural areas from urban centres reflect agricultural products with value added or with differentiated quality, such as observed on the small-scale fruit farming system in the metropolitan countryside of Rio de Janeiro. The rural-urban interface is also related to the emergence of new agricultural activities and the intensification of agricultural systems because the proximity of rural areas to the metropolitan region allows farmers to benefit from new technologies, infrastructures, and services in the locality of the farm thereby supporting work by Bryant *et al.* (1982); Lawrence (1988); and Bryant and Johnston (1992). Through the new infrastructures, small-scale farmers have the opportunity to increase their participation in the market and to increase its network of consumers.

9.2.2 Objective 2: How has globalisation affected the practices and spatiality of farming in the metropolitan countryside of Rio de Janeiro?

Chapter 5 discussed the issue of learning to live with change and uncertainty and the regional dimension and contemporary challenges to agricultural development in the case studies, addressing Objectives 2 and 3. The focus was on exogenous and endogenous constraints and opportunities and the political economy dimensions of strategies for agricultural development that make certain pathways difficult to implement. However, Chapter 5 also highlighted that some farming communities have created creative forms of spatial ordering to adapt to scenarios of change thereby challenging work by Darnhofer (2010); Darnhofer *et al.* (2016); Šūmane *et al.* (2018) and Knickel *et al.* (2018).

Objective 2 addressed how different degrees of rural-urban interaction in Greater Rio de Janeiro have given rise to multifunctional diversity, farming resilience, and rural

innovation. The Rio de Janeiro Metropolitan Area is located in industrialised Southeast Brazil, which has the second largest metropolitan area in the country (see Figure 3.1 and Table 4.1). In some rural areas, specialised agriculture supplies products to the metropolitan area, taking advantage of accessible markets in a classic way. In other areas, agricultural and non-agricultural activities are combined in creative ways, which defy the linear logic of passive rural change. The complexity of farming systems present in this metropolitan region contributes to better understanding the peripheral countryside, going beyond the view of inert spaces that by and large respond to external influences in a deterministic way (see Plate 9.1). Studies of local and regional economies are not so much concerned with determining boundaries, but rather with how to ‘identify and trace the various connections and articulations which operate within and beyond it’ (Goodwin, 2013, p. 1182). This research supports and extends Goodwin’s argument for an integrated perspective by drawing on relational analysis to focus on the detailed mechanics by which the metropolitan countryside is ‘re-made’ through engagement with globalisation processes, examining the mediating effect of regional context and opportunities for local development.

Global economic and social forces are affecting everyone, everywhere. However, their influence is shaped by local communities’ interpretations of, and responses to, these forces. Social identities provide a guide; they are the product of history, culture, economy, patterns of governance and degree of community cohesion (O’Riordan, 2001). Increasing competition from industry, residential development, tourism and environmental functions have created both opportunity and conflict, which are reflected in distinctive land uses. The research investigated the resilience of agriculture land use within these tense relationship between urban, industrial and global forces on the viability of farming systems and rural landscapes. Spatial restructuring induces rural development and adaptation by some farmers whereby production diversifies in response to demand for quality products. Different types of knowledge, social organisation, innovations of the small-scale fruit farming practices and cross-scale linkages are part of this process in which farmers are proactive in the face of rural change.



Plate 9.1. One of the aims was developing a critical understanding of small-scale farming resilience in the metropolitan countryside of Rio de Janeiro, and to more fully engage with conflicts and contestations surrounding the place of the countryside in a global and urbanised society. (Source: Author, 2017)

Woods (2007, p. 502) argued that globalisation cannot be reduced to the subordination of the local by global forces. ‘Rather, the impact of globalisation in reshaping rural places is manifest through processes of negotiation, manipulation, and hybridisation, contingent on the mobilisation of associational power, and conducted through but not constrained by local micro-politics’. The empirical findings from this thesis support this assertion, and, as a result, the argument in this thesis is that globalisation is not a singular or uncompromising phenomenon or process; it is a complex and multifaceted set of processes that produces highly variable and negotiable relationships and outcomes.

These processes can be divided into globalisation focused around direct processes of global linking, in the first instance through expanding international trade and capital flows and specialisation, and particularly in respect of agriculture, the ongoing expansion of global industrialised agri-businesses, which is evident in Brazil in areas like meat production, biofuels and other agricultural commodities. A second meaning of globalisation used here refers to the secondary effects produced by globalisation processes. These include urban expansion of cities (e.g. Rio de Janeiro City and its metropolitan area) that have become nodes of globally-oriented activities in the Global South, the displacement and/or migration of rural populations to provide labour for urban

employment sectors or as a result of displacement linked to farm consolidations and acquisitions for industrial-scale agri-business. In this context, findings from this thesis support assertions made by Bicalho (1992, 1998) and Bicalho and Machado (2013, 2018) about the effects of urban expansion on the farmers who have held out against displacement or abandonment. Depending on the relative distance from the built-up metropolitan core and local agrarian history, farmers actively contest their permanence in the metropolitan countryside.

Most research (Aguayo, 2008; Delgado, 2012; Bernardes, 2015; Ioris, 2016) analysing the effects of globalisation on agriculture and rural areas in the Global South and developing countries have tended to focus on direct globalisation processes (i.e. agri-business and its corporate control), related either to these phenomena or their effects on small-scale farming. In comparison, analyses of the drivers, processes, effects and responses to secondary globalisation processes (in this thesis, primarily urbanisation process and pressures arising from petro-chemicals complex) remain relatively rare, thus, challenging assertions made by Woods (2007) for a 'global countryside'. However, these are no less significant because they affect a great number of countries and regions in developing countries, not restricted to South America.

This research also provides important insights into how local- and regional-level small-scale farming systems are finding their place in a global world. Empirical findings from this thesis show that farming systems are adapting by identifying and exploiting opportunities created by globalisation-influenced urbanisation (e.g. quality production) and resisting unwelcome outside influences, such as resistance to importing seedling varieties from São Paulo through top-down approaches and productivist perspectives as discussed in Chapters 5 and 7. As a result, this thesis challenges propositions made by Wilson (2005, 2010); Woods (2007); Darnhofer *et al.* (2016) and Knickel *et al.* (2018) in the context of the global and metropolitan countryside.

Chapters 6, 7 and 8 focused on the process of farming resilience and its interlinkages with rural change, addressing Objectives 2, 3 and 4. Among the diverse knowledge sources and learning forms that farmers use, Wilson (2010), Darnhofer *et al.* (2016) and Ingram (2018) have pointed to the particular role of farmers' experiential learning and networking in increasing the resilience of small-scale farming and sustainability of food systems. The Chapters examined the case studies to illustrate how farmer narratives and farm

trajectories have shaped processes of farming resilience. The notions of spatial diversity, sharing and building knowledges, social organisation, and challenging policy norms were analysed through case studies to assess why these notions are important for understanding farming resilience in Brazil in the context of globalisation. Specific issues discussed included multidirectional pathways influenced by the internal decisions of farming communities and external factors, including State, government, and global drivers. Thereby reinforcing these factors as important in building resilience at the local scale.

9.2.3 Objective 3: How resilient are small-scale fruit farming systems affected by urbanisation and industrialisation in this metropolitan countryside?

The rural space is often assumed to be influenced predominantly by external actions, but the reality is that rural areas and agricultural systems possess powerful internal dynamics which enable them to adapt in imaginative and varied ways to changes in the contemporary world. Objective 3 revealed that rural communities possess resilience (see Chapters 5-8), which contributes to complex outcomes in metropolitan regions and their countryside.

Empirical findings from this thesis support the hypothesis that different types of knowledge, organisations, innovations and cross-scale linkages are part of this process in which rural actors are proactive in the face of change (e.g. Wilson, 2008b, 2010; Darnhofer, 2010, 2014; Darnhofer *et al.*, 2016). This resilience is often made possible by differences between rural processes present in Brazilian metropolitan regions and their countryside and those in agricultural regions more distant from, and less affected by, large urban centres. This study used the idea of the metropolitan countryside to explore farming systems and socio-ecological landscapes at the rural-urban interface as integral parts of a broad and hybrid rural-urban dimension of the metropolitan context.

Farmers have adopted innovation systems and have created strategies for marketing and distributing produce, which demonstrates that rural-urban interaction does not have to be unfavourable to agriculture. Market proximity still conveys certain advantages to farmers on the fringes of metropolitan areas. The theme of market influences on agricultural production can be traced from von Thünen's classic work (1842) through various studies of specialised agriculture with land cultivated more intensively near the city, because the more valuable land near the city would demand a high rate of return. This thesis,

therefore, reviews a classic theory of agricultural location contextualising it in the period of economic globalisation and urbanisation.

Taking into account the basic tensions that arise when urban forces come to bear on agriculture in the nearby countryside, proximity to urban areas heightens demand and competition for land and labour but also increases demand for quality products that promote agricultural development. However, results from this thesis suggest that the opportunities have to be perceived and exploited by farmers (Bryant *et al.*, 1982; Bryant and Johnston, 1992; Bicalho, 1998; Machado, 2013), as this study has repeatedly demonstrated.

The case study demonstrated that the incorporation of rural areas into a metropolitan context can boost the search for innovations and cross-scale linkages, supporting work by Darnhofer (2010); Darnhofer *et al.* (2016); Ingram (2018); Šūmane *et al.* (2018) and Knickel *et al.* (2018). The rural-urban interaction opens ways to develop different types of knowledge that allow farmers to create adaptation and resilience strategies in an environment of spatial restructuring. Empirical findings from this thesis show that farmers are active actors who make rural space dynamic and are not as passive as they are commonly portrayed, thereby supporting Wilson's (2010, 2012) call for further research in rural arenas, arguing that processes of resilience should be measured and monitored at the local level. Intensive contact and interaction of rural and urban processes can thus cause positive outcomes in farming. This study, therefore, defends multi-directional and multidimensional interpretations that reveal the complexity of rural change such as argued by Marsden *et al.* (1993); Wilson (2005, 2010); Cloke *et al.* (2006); Halfacree (2006); Woods (2007, 2011); Heley and Jones (2012).

Wilson (2012) discussed the links between resilience and transition theory, how path dependencies affect resilience at community level, and the impacts of globalisation on different community trajectories. In parallel, Welsh (2014) highlighted the importance of critical interrogation of plural resilience theories and contemplated their emancipatory possibilities, calling for a more sustained and critical engagement by human geographers with resilience studies and their effects in the contemporary world. Attending to these calls and critically examining their application, this thesis focused particularly on gaining in-depth insights on how small-scale farmers in the metropolitan countryside of Greater Rio are responding to pressures and opportunities from urbanisation and industrialisation,

using the idea of multidirectional pathways and farmer narratives to understanding the global countryside and farming resilience in a metropolitan context.

The research evaluated a number of farming mechanisms that strengthen the flexibility and adaptiveness of agriculture in rural areas near to urban centres. Supporting work by Wilson (2010); Darnhofer (2010); Darnhofer *et al.* (2016) and Bicalho and Machado (2018), it demonstrated that resilience is gained through seizing opportunities for continuous resource combination and recombination in a multifunctional context. The results can thus be useful for understanding rural-urban interaction in other metropolitan regions so that farm policy can promote local and regional quality food systems, small-scale agricultural strategies, and resilient rural futures.

9.2.4 Objective 4: How have urbanisation and industrialisation affected small-scale farming pathways in the Brazilian metropolitan countryside? What are the policy implications and wider theoretical understandings of relational rural geographies and farming resilience in a global era?

Objective 4 indicated that emphasis on relational rural geographies – rather than its sectorial dimensions – has brought to our attention the plurality and complexity of agriculture in the peripheral countryside of Greater Rio de Janeiro in an era of globalisation. With the importance of the translocal concept still often neglected in the regional and rural studies literature in Brazil, this study supports its value. Woods (2018) contended that globalisation progresses through the interactions between places and other translocal assemblages that introduce, remove, capture or recode components of rural assemblage, stretch or contract its social or spatial territorialisation, and create or cut its external connections and relations. In these ways, the ‘assemblage approach directs us to examine the micro-politics of the interactions that constitute globalisation, and their effects on the material and expressive composition’ (Woods, 2018, p. 16) of the rural space.

The resilience of Brazilian farming systems faces a range of social, environmental, economic and political disturbances and changes, such as market fluctuations, climate change, urbanisation, new technology, modification of governance structures, operating at a range of scales. Brazilian agricultural policies usually focus on making agribusiness-farming systems more robust against shocks in the short term. However, a broader view

of resilience is needed to ensure a sustainable small-scale agricultural sector in Brazil which can develop farmer capacities and adapt farming systems to changing circumstances in order to maintain long-term supply of food and public goods (see Plate 9.2). Policy implications will be reviewed at a slightly later point (9.3).



Plate. 9.2. One of the aims was to design a research method that recognises resilient farming systems while providing insights on farmer's capacity to change conditions and relationships, especially by reconciling community agency and driving forces experienced in the in the countryside of Greater Rio de Janeiro in a global era. (Source: Author, 2017)

Woods (2018, p. 15) argues that 'all rural communities are afforded the potential to negotiate, capture, manipulate, mutate, resist or initiate globalisation effects, however the capacity of individual communities to exercise this potential is not equitable but is shaped and constrained by various structural factors'. Empirical findings from this study in the metropolitan countryside, thus, support Woods' (2018) assertions by arguing that agency is distributed and enacted in each interaction between local and extra-local actors, contributing to the reproduction and shaping of globalisation.

Over recent decades, rural localities have witnessed unprecedented changes and ruptures to local economies, new demands for rural space, and shifting rural politics that have led to a reconstitution of rural populations and the formation of a new set of theoretical approaches in rural studies (Murdoch *et al.*, 2003; Marsden, 2009; Woods, 2005, 2011). Rural geographers have long focused on farming adaptations to changing conditions (see

Plate 9.3). One frame for examining these adaptations attempts to reconcile the conceptual tension between farmers and broader structures, focusing on adjustment strategies on the farm in response to external pressures (Bryant and Johnston, 1992; Wilson, 2008b; Darnhofer, 2010; Darnhofer *et al.*, 2016) such as urbanisation and industrialisation.



Plate 9.3. The PhD research focused on the emergent positioning of farmers within the structural conditions of local and regional development pressures and their resultant ability to adapt in the metropolitan countryside and its future. (Source: Author, 2017)

This research analysed how governance arrangements (Edwards and Woods, 2004; Seymour, 2004; Wilson, 2008b, 2010), farming knowledges (Chambers *et al.*, 1989; Fonte, 2008; Šūmane *et al.*, 2018), and learning capacities (Darnhofer, 2010; Darnhofer *et al.*, 2016; Ingram, 2018) have enhanced the resilience of small-scale fruit farming in the metropolitan countryside. The study highlighted patterns of fruit production and the growth of quality products as an example of the tensile relationship between urban, industrial and global forces that have shaped the viability and nature of farming systems and rural landscapes. Learning practices, knowledge sharing, and cross-scale linkages were part of processes in which farmer-led networks have been proactive in managing rural change.

9.2.5 The contribution of the thesis to the wider literature in rural geography

The study - as the title 'Relational rural geographies, resilience, and narratives of small-scale fruit farming in the metropolitan countryside of Rio de Janeiro, Brazil' emphasises - explored strategies and networks of resilient farmers and highlighted the importance of sharing, building knowledge and learning practices in the rural periphery of Greater Rio de Janeiro in a global era. In this way, the research has contributed to the contemporary theoretical debate on globalisation in the countryside and farming resilience.

In relation to the contribution of the thesis to the wider literature in rural geography, this research investigated the changes of contemporary rural geography in the context of its socio-economic integration into global capitalism by focusing on small-scale farming communities in the metropolitan countryside of Rio de Janeiro in the industrialised South-East Brazil. The case studies were positioned in the context of rural change in the Brazilian metropolitan regions and the challenges for agriculture in the face of urbanisation and spatial multifunctionality, but additionally highlighted the importance of developing specific theoretical-methodological approaches for revealing and understanding rural change in the metropolitan region, the contradictions of its spatial processes, and the relevance of territorial analysis in the framework of relational geographies. Based on the evidence provided from qualitative primary data, the thesis revealed some critical global issues of agriculture in a metropolitan and global context, addressing the theories of the global countryside and social resilience in the rural periphery of Rio Metropolis and other areas.

Drawing extensively on the latest research in rural geography, this study explored the diverse meanings that have been attached to the rural, examining how ideas of the rural have been produced and reproduced, and investigating the influence of different ideas in shaping the social and economic structure of rural localities and the everyday lives of people who live in rural areas (Woods, 2007, 2011). I have built on this approach by visualising the relational geographies of farming case studies based on interviews and ethnographic approaches (see Plates 9.4 and 9.5), similar to methods developed in political ecology and cultural studies (Moore, 1995; Cloke, 1997; Little, 1999; Whatmore, 2006; Peet and Watts, 2011; Doolittle, 2015; Karisson, 2018). Contemporary rural geography has applied multi-methods and relational approaches that enable researchers to engage more closely with farmer's individual multifunctional life histories, farm

trajectories, transitions and development pathways. Based on three approaches (political economy, cultural turn and political ecology), the research highlighted the importance of developing a theoretical-methodological approach that reveals rural change in the metropolitan region and its countryside, the ambiguous relationships of its spatial processes and the relevance of territorial analysis in the framework of relational geographies.

The thesis emphasised the dominant ‘euro-centric’ view of many contemporary debates in rural geography and advocated the need for other relational and hybrid perspectives in emerging countries and transition economies such as Brazil, echoing work by Wilson and Rigg (2003), Rigg (2006), Bryant *et al.* (2008) and Cheshire and Woods (2013). This study also contributed to the wider, non-euro-centric literature in rural geography. The concepts and practices of rural geographers have been found to be bound to a degree to national and linguistic borders, and also by borders between the Global North and South (e.g. Wilson and Rigg, 2003). As a result, this research defended the (re)positioning of rural geography in globalisation from a political economy approach to contemporary debates and the (re)orientation of rural development in a global world, supporting work by Robinson (2004), Woods (2007), Wilson (2008a) and Wilson and Burton (2015). The thesis involved engagements with critical political economy, political ecology, and cultural approaches, which have led to insights and relational perspectives into the assemblages of power, process, practice and change that have (re)produced and (re)encultured rural areas over recent years.

Woods (2011, p. 292-3) highlighted that ‘a relational rural geography will expand the boundaries of rural research and lead rural geographers into new associations [...] in teasing out the messy entanglements of the rural and the urban’. In this thesis, the analysis of the process of social, economic, political and environmental restructuring that are reshaping rural areas in a metropolitan and global context was conducted in a critical political-economic framework; whilst the local micro-politics and the discussion of people’s experiences of rural life owes much to the political ecology and cultural turn approaches.

Bringing in the political ecology on agriculture and farming systems, this thesis contributes to the call by Karisson (2018) for new directions in the anthropology of the environment. He indicated that one challenge for contemporary political ecology ‘would

be to engage complex webs of multispecies interactions along with political ecology's concern with social matters – of power relations, exploration and the unequal exchange of resource under the present conditions of global capitalism' (Karisson, 2018, p. 22). Over recent decades, political ecology has mainly been concerned with analysing environment-related conflicts, usually mapping the different actors that claim rights to nature and resource bases expropriated by interests linked to the State and capital. However, as Karisson (2018, p. 22) argued, 'political ecology approaches tend to reduce to nature a matter of resource – or more precisely, resources for human appropriation – and in so doing, fail to account for the more dynamic and complex aspects of the multitude of life that constitutes nature'.

As the field of political ecology continues to expand, moving into an urban context and engaging with various contemporary issues like food production, this thesis intended to contribute to this approach in the globalisation context. The thesis highlighted patterns of small-scale fruit farming and its resilience within the contradictory relationship between urban, industrial and global forces on the viability of emancipatory landscapes in the peripheral countryside of the second-largest metropolitan area in Brazil. Land tenure and social formation are results of agrarian history and influence conversion of farm-land into other uses as well as resistance or dynamic adaptation at the rural-urban interface.

Farmers have long played a significant role in shaping rural landscapes, and their necessarily embodied practices and experimental knowledges create a particular relationship between themselves and the land. Agency within the place-assemblages of the farming communities is not concentrated with political leaders or entrepreneurial individuals but, rather, is distributed through various human and non-human components. Once a fruit tree is planted, the land is in agricultural use in a metropolitan context. Orange, banana and guava trees make things happen – they re-shape social relations and transform the rural economy in the periphery countryside of Greater Rio de Janeiro.



Plate 9.4. Detailed data on dynamics of agriculture in Rio required fieldwork with farm case studies and ethnographic approaches. (Source: Author, 2017)



Plate 9.5. During this immersion, I took thousands of photos, wrote reflective notes, created sketches, and formulated questions about everyday geographies in the research setting. (Source: Author, 2017)

The study also proposed that resilience thinking does not represent a ‘clean break’ within the rural development literature, rather, opens new perspectives and provides the potential to ‘re-frame’ rural studies at the rural-urban interface. As observed in this thesis, the research focused on the emergent positioning of farmers within the structural conditions of local and regional development pressures and their resultant ability to adapt in the future. An immediate application of this framework would be to better target policies in

the hybrid rural context of Greater Rio and beyond for the purpose of regional food system strategy and community-based agricultural strategies.

Finally, and as Table 9.1 highlights, this thesis sought to connect theoretical perspectives from resilience theory with rural studies approaches, discourses and assessment methodologies, including evaluating the role and application of geographical perspectives and concepts that emphasise and apply resilience thinking in relation to rural geographies in transition economies in the context of globalisation. Meeting these future challenges also means further refinement of methodologies to promote farming resilience in the global countryside. Resilience thinking has much to offer in this regard, particularly through its focus on the dynamic properties of systems and its emphasis on drivers of change. Taking this perspective enables connections to be made between, for example, adaptation strategies and mechanisms, as well as ideas related to community resilience and the continuing importance of local agency. This research explored how resilience thinking can be applied to rural and agricultural contexts using evidence from Rio de Janeiro to explore and illustrate the wider potential of this approach.

Table 9.1. Critical issues on rural/farming resilience and geographical scale analyses (Source: Author)

Critical issues on rural/farming resilience	Learning to live with change and uncertainties Chapter 5	Nurturing diversity in its various forms Chapter 6	Knowledge sharing and combining different types of knowledge Chapter 7	Social organisation and cross-scale linkages Chapter 8
Global perspective	<ul style="list-style-type: none"> • The new demands of complex and uncertain agricultural systems call for a renewed understanding of the approaches used and the concepts that underpin them, in particular those relating to farmer learning. • The spatiality of learning shapes the production of knowledges (Gruenewald, 2003). Although learning happens in place (Thomashow, 2002), geographical dislocation is also an important learning process (Simandan, 2013). • Learning is also intertwined within spatial processes of decolonisation (Israel, 2012; Johnson, 2012; Gruenewald, 2003). Moreover, ‘learning pathways’ are often closely linked to the political domain, although the macro-scalar nature of most political processes means that change 	<ul style="list-style-type: none"> • In a more general way, to navigate long-term social-ecological dynamics, diversification and redundancy seem to be more appropriate than simplification and specialisation. There seems to be a dynamic interplay between diversity and disturbance that is part of resilience and key to sustainable development (Folke <i>et al.</i>, 2003). • Reducing the impacts of change, while at the same time taking advantage of the opportunities created by change, seem to be intricately linked. To achieve sustainable development, it is important to consider the multiple realities of society, as well as the diversity of cultural values, environments and economic conjunctures. 	<ul style="list-style-type: none"> • During the industrialisation of agriculture, the role of farmers’ knowledges has greatly diminished and much of these knowledges have become lost altogether due to the spread of productivist logic and standardised solutions, and a decline in the size of farming communities and their sense of cohesion (Fonte, 2008). • However, in the face of the many contemporary challenges facing agriculture - climate change, food security and resource depletion, to name but a few - there is an emerging recognition that farmers’ local knowledges are valuable resources that can reorient modern agriculture towards more sustainable and resilient paths of development. • Learning to live with change and uncertainty, and combining different types of knowledge appear critical for building 	<ul style="list-style-type: none"> • Interactions between farmers and institutions can create links that involve other formal institutions and social organisations from different rural locations that are part of the same regional context. The environment of learning, exchanges of knowledges and cooperation enables processes of innovation that go beyond individualised knowledge and practices. • Moreover, in the context of social organisation often represented by farmers’ associations, a diversity of ideas and voices often arise that reveals the challenges of agriculture in the context of multifunctionality. • The relationship between formal institutions and farmers can result in interactions for building governance processes. The interaction can also create spaces of challenges and

	<p>at the nation-state level or beyond is usually slower than at community level (Cumming <i>et al.</i>, 2006).</p> <ul style="list-style-type: none"> • Learning benefits from combining different types of knowledge, e.g. experiential and experimental knowledges (Scoones and Thompson, 1994), from expanding from knowledge of structure to knowledge of function, from understanding about the dynamics of complex systems, from understanding the complementarities of different knowledge systems and the significance of people's knowledge. 		<p>resilience (Folke <i>et al.</i>, 2003). Among the diverse knowledge sources and learning forms that farmers use, Darnhofer <i>et al.</i> (2016) have pointed to the particular role of farmers' experiential learning and networking in increasing the resilience of small-scale farms.</p>	<p>political engagement of voices contrary to the clearly defined dimensions of productivist agriculture, promoting alternative discourses within the social organisation that becomes more diverse through multidirectional trajectories.</p>
<p>Brazil in a global context (Case study Level 1)</p>	<ul style="list-style-type: none"> • The spatiality of agriculture plays an important role in the historical construction of the social and physical landscape in Brazil. In opposing ways, the first Green Revolution, and agrarian social movements and more recent agro-ecological revolution structure farming knowledges and spatial imaginaries. 	<ul style="list-style-type: none"> • Brazil is facing multiple processes of change that affect the rural in many ways: demographic evolutions, migration flow, renewed urban-rural relations, the rise and the fall of alternative food networks, the changing power of constituencies of the rural, changing patterns of land use and valorisations of natural resources, rapid technological developments. 	<ul style="list-style-type: none"> • The modernisation of agriculture in Brazil has brought the idea of productivity associated with new techniques based on scientific knowledge, interests of the State and the accumulation of capital. • Knowledge about agriculture is no longer only controlled by those who practice it directly, but is also legitimised by external institutions. Today one question is how to approach the knowledge and practices 	<ul style="list-style-type: none"> • Brazilian rural development cannot be understood as merely consisting of the actions and interventions of the State and international organisations in rural regions. • From 1970-1990 the State had an almost exclusive role in rural development. At that time, rural development programmes, such as the 'Integrated Rural Development Policies' programme (PDRI), were seen as mechanisms capable of creating and providing feasible

		<ul style="list-style-type: none"> • These change processes do not occur in isolation but are embedded in a package of often-interrelated external trends (such as climate change and global markets) that position rural spaces in broader dynamics and result in uneven processes of change. • These uneven processes of rural change are interconnected and multi-level, involving multiple actors and governance approaches. 	<p>according to local characteristics.</p> <ul style="list-style-type: none"> • It is noteworthy that traditional knowledge has been juxtaposed with modern techniques in rural areas and has resisted the process of modernisation in the last decades, as well as practices arising from technological change. • The result is hybrid knowledge that, to be fully understood, needs to be analysed at different scales, which means that the recognition of local processes is fundamental. 	<p>solutions to poverty and the underdevelopment of social groups and regions that were incapable of engaging in the modernisation process (Ellis and Biggs, 2001). This approach promoted compensatory mechanisms intended to provide alternatives for those farmers and rural regions that faced difficulty in developing other economic activities (Schneider <i>et al.</i>, 2010).</p>
<p>The Eastern Greater Rio (Case study Level 2) and farming communities in the municipalities of Cachoeiras de Macacu, Itaboraí and Tanguá (Case study Level 3)</p>	<ul style="list-style-type: none"> • Farming knowledge is gained over time in the transition towards quality production in the small-scale fruit sector and the importance of on-farm experimentation in the learning process. The changing nature of agriculture and its links to other rural sectors requires the development of mixed knowledge and learning networks that more broadly include both agricultural and non-agricultural stakeholders. • Some sections analysed farmers' learning practices 	<ul style="list-style-type: none"> • The process of spatial restructuring can both provoke migration of rural social actors to urban-industrial sectors and increase the resilience of a group that creates strategies - such as diversity in production and market mechanisms, diversity of knowledge, sources of information and communication, diversity in building alliances and in relationships between community members and beyond. 	<ul style="list-style-type: none"> • Historical information about locality, memory, and perceptions about farming changes are critical to understanding a range of information and knowledge. The practice of agriculture involves acquired knowledge, preservation of values or the need to break with the reconstruction of formal practices. • Farmers combine own their experiences and those recognised by the community in the process of sharing ideas. In the context of spatial 	<ul style="list-style-type: none"> • The presence of small-scale farmers is a force in itself and one that should not be underestimated. On the one hand, these farmers resist leaving the countryside by using the political force of their social movements to demand agrarian reform in the past and inclusion in agrarian policy today. Over the years, they built alliances with secular and religious nongovernmental organisations in order to improve farming methods and forms of marketing.

	<p>and how these are related in various networks. It explained why learning matters for sustainable and resilient agriculture in the metropolitan countryside of Rio de Janeiro. It also related the potential of learning and knowledge sharing in improving sustainability and resilience to its embeddedness in the specific social, economic, environmental contexts and its holistic character and dynamics in response to emerging opportunities, uncertainties, and risks.</p>		<p>diversity in the metropolitan countryside of Rio de Janeiro, the framework of incorporation to the Metropolitan Region results in an environment of multiple and hybrid characteristics. Different social groups also influenced its spatial process.</p>	<ul style="list-style-type: none"> • On the other hand, a group of farmers adapt to urban encroachment and global pressures because they are essentially small-scale producers who are able to adjust to situations where land- and labour-farming systems have to be used in a metropolitan context.
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9.3 Policy implications

This study used a multidimensional approach to analyse agriculture at the rural-urban interface of a metropolitan area by examining interactions between urban expansion and the historical agrarian context of different parts of the metropolitan countryside. Recent urban growth in the metropolitan region has been more a function of converting land into commercial, industrial and residential areas associated with manufacturing activities and logistics development and not just real estate speculation like in the past. The expansion of the metropolitan region moves along two axes spatially projected further outward from the cities of Rio de Janeiro and Niterói respectively. This urban growth notwithstanding, there are inherent forces within rural areas which frame specific processes.

The first policy priority is to recognise that small-scale farmers are a force in their own right that, first, should not be underestimated, and, second, that can be harnessed to aid the process of negotiating urban-rural relations and the promotion of resilient and sustainable agriculture. This power is evident in the ways these farmers have resisted leaving the countryside by using the political force of their social movements to demand agrarian reform in the past and inclusion in agrarian policy today. Over the years, they have built alliances with secular and religious nongovernmental organisations in order to improve farming methods and forms of marketing.

It is also evident in how many farmers have adapted well to urban encroachment because they are essentially small-scale producers who are able to adjust more easily to situations where land- and labour-intensive farming systems have to be used in a metropolitan context. This issue highlights the potential value to be gained from developing policy processes that more actively utilise all these qualities, so that small-scale farmers can have a greater voice in decision-making and are, instead, actively encouraged and enabled to spread their ideas and practice to help promote sustainable, resilient farming in urban-rural fringe areas and beyond.

A second priority is the need for greater attention to addressing inconsistencies and contradictions in government agricultural policies. This is not a simple task because it involves tackling institutionally rooted mind-sets that prioritise productivist forms of agribusiness. Contradictory government policy is more difficult to overcome. Some sectors of government want to conserve the presence of metropolitan farmers while others see

them as an impediment to urban development, and the latter view dominates in municipal government. Even potential environmental allies can be problematic. Planners and government officials of urban origin are usually ignorant of rurality and ban innovative activities, which might alter an imaginary 'traditional' land use system even when the innovations can actually be environmentally benign.

Therefore, this research explored the concept of communication and knowledge exchange as part of the processes of understanding innovation (see Plate 9.6) and resilience of spatial actors within the framework of rural development in globalisation. Through the primary data from field research and analytical methods and emerging theoretical perspectives in rural studies, the study formulated an innovative approach to understand the role of local knowledge exchange in small scale agricultural innovation that reveals part of the complexity of contemporary rural space in Brazil.

The research has evaluated formal and informal learning mechanisms of agriculture and examined how they operate to ensure a degree of flexibility and adaptability of agriculture in the metropolitan countryside of Rio de Janeiro. Rural change offers conflicts and opportunities by combining various resources in the multifunctional context. The application of this approach seeks to offer a better understanding of the dynamics of agriculture in the rural periphery of Rio de Janeiro to strengthen regional and local agricultural systems and strategies in the construction of resilient rural spaces.

The production of knowledges within groups of farmers has been an interest for many years amongst sociologists and anthropologists studying the agricultural world. From the 1970s and 1980s, whether in developing or industrialised countries, issues have been raised concerning the capability of farmers to produce knowledges amongst themselves (Chambers *et al.*, 1989). While the processes of modernisation or the green revolution were aided by the development of agricultural science and technology, and innovations developed in research stations, it was shown that farmers were not merely receivers of innovations designed upstream, but rather the producers and holders of knowledge in its own right, and distinct from agronomists and rural extension officers. In the same way, the development from the late 1980s of research conducted in industrialised countries on agricultural systems representing an 'alternative' to intensive agriculture, has contributed to the development of an extensive literature around farmers' knowledges and their local characteristics (McCorkle, 1989).



Plate 9.6. The PhD thesis in the countryside of Rio Metropolis explored the concept of communication and knowledge transfer as part of understanding processes of innovation and capacity building within rural development in the context of globalisation. Appendix 3 illustrates farmers' compilation about major changes in agriculture in the last decades. (Source: Author, 2017)

Goulet (2013) highlighted that health crises, and environmental or social concerns created by the industrialisation of production have resulted in the emergence and development of a multitude of proposals and alternative technical models driven by the agricultural profession alone or in combination with actors in the scientific and industrial worlds. Rural extension in Brazil no longer just emphasises technical assistance but also stresses governance: community and group organisation and the relationship with government institutions. This shift was meant to promote farmer participation and to diminish dependency on top-down decision making. As a social group, farmers can have common interests, but this does not mean that land resources and soil quality are identical and in many cases, there is a need for farm-level assistance.

More recently, public policies in Brazil have shifted to help develop a more participatory system of rural extension. In 2003, the National Policy of Technical Assistance and Rural Extension was created to emphasise sustainable development, supporting the diversity of family farming and considering questions of gender, ethnic identity, and the participation of civil society organisations. It is understood that farmers participate in a system of relations. Resilience capabilities cannot be developed by farmers alone but, rather, depend on collective activities and activities that bring farmers into collaborative relationships with suppliers, consumers, service providers, financial institutions and public

administration. Each farming system offers unique opportunities to increase resilience, depending on the interdependence between actors in the farming system. Therefore, policymakers must ensure that actions support the development of collective capacities.

The changing nature of agriculture in interactions with other rural and urban sectors requires the development of mixed knowledge and learning relationships that more broadly include both stakeholders in agriculture and non-agricultural activities. In some cases, rural-urban interaction contributes to sustainable spatial development, but in other cases, there are structural or organisational barriers. These obstacles point to the necessary changes in rural development policies to address learning processes and innovation needs of agriculture, as also found by Chambers *et al.* (1989); Cash (2001); Fonte (2008); Šūmane *et al.* (2018); and Meek (2019).

One final point to make is the importance of farmers being open to change, which also contributes to the complex outcomes treated here. This study has indicated how many farmers in the rural periphery of Rio de Janeiro Metropolitan Region adopt new methods and strategies and creatively combine agricultural and non-agricultural skills and knowledges in order to adapt to scenarios of spatial change.

9.4 Further research directions

One of this PhD's key contributions to knowledge is that it has included the voices of farmers from the peripheral countryside of a metropolitan region and, in so doing, has provided enriched understandings of the many and imaginative ways that individual farmers, rural communities, and the small-scale agricultural sector more generally negotiate their relationships with urbanisation and the effects of globalisation. While there have been many calls to develop knowledge and understanding of the experiences of farmers in the context of globalisation (Winter, 2005; McManus *et al.*, 2012; Cheshire and Woods, 2013), very little work has incorporated the voices of those at the rural-urban interface in a global era. By doing so, the study has revealed how the concepts of farming resilience and the global countryside are valuable in the study of agriculture and metropolitan regions with an illustration of the metropolitan countryside in Rio de Janeiro.

This research is based on debates concerning rural change with an emphasis on: 1) globalisation in a hybrid rural context; 2) small-scale farming resilience in a metropolitan (and a hybrid rural) context; 3) in-between rural places and ‘invisible’ cultures in the era of an urbanised society; 4) moves from a top-down development to bottom-up and translocal strategies in a global era; and 5) calls for relational rural geographies and new directions in Brazilian rural studies.

To expand this further, future work could incorporate the voices and experiences of ex-farmers who have already left the rural area to understand in better detail the vulnerability of farming systems at the rural-urban interface, i.e. explore the ‘silent’ voices. Based on the heterogeneity of the farming systems in this study alone, further valuable insight could be gained from investigating the experiences of other rural residents. As mentioned in the introductory chapter, farms are transferred from one generation to another, sometimes for several decades. A group of small-scale farmers in the metropolitan countryside of Rio de Janeiro has resisted and survived despite economic and political, technological and social changes that have intensified over the last years in the context of urbanisation and industrialisation in the Eastern Greater Rio region. The complexity and diversity of the metropolitan countryside revealed in this thesis suggests that the future work could explore beyond agricultural stakeholders and also look at the resilience of non-agricultural actors in rural communities.

Another key contribution of this research is that it is one of very few works to expand the knowledge of the farming community in the peripheral countryside of metropolitan areas beyond those moving from urban areas to rural spaces such as back-to-the-land movement in post-industrial countries (Berry, 1976; Halfacree, 1994, 2001; Milbourne, 2007). This study opens up the possibility for comparing farming systems in different locations in metropolitan areas of Brazil and beyond to help understand the contextual variation between the multifunctional geography of agriculture in different metropolitan contexts and in agricultural regions that are distant from and less affected by large urban centres. The qualitative in-depth approach taken meant that detailed accounts of farmers’ lives were gathered and a more intricate picture of their experiences created (see Plates 9.7 and 9.8). Thus, the study allowed for exploration of how the broader social dynamics and processes at work are made real and affect the everyday lives of individuals (Mason, 2002).



Plates 9.7 and 9.8. Rural geographers should apply more qualitative methods that enable researchers to engage more closely with farmers' life histories, farm trajectories, transitions and development pathways. (Source: Author, 2017)

Finally, the insights discussed above have been enabled by the ethnographic approach described in Chapter 3. Although farmers' communities are diverse, dynamic and complex, making it impossible to unearth all their intricacies, the approach went a long way in trying to capture such intricacies (see Plate 9.9). According to O'Riordan (2001), intuitive methodology is a combination of ordered and responsive approaches to soliciting information. The task is to sense the occasion; to be empathetic to the qualities of knowledges and emotion in respondents, and to allow opportunities to be created and seized. Intuitive research demands a sensitive and exploratory process to discovery and

the interpretation of documents as much as it associates through personal contact. However, the formal approach to social science research is still vital.



Plate 9.9. Conducting ad-hoc interviews ‘on the go’. Doing fieldwork research in the countryside of Rio Metropolis through multiple forms of mobility. (Source: Author, 2017)

While the everyday life narrative-style interviews were effective in drawing out the multi-faceted and complex specificities of farming systems, the accompanying observations allowed further layers of meaning that are attached to daily life to emerge, and these observations revealed much about agriculture in the peripheral countryside of Rio de Janeiro Metropolis. Nevertheless, each method added another level of understanding that complemented those derived from others and the triangulation of findings from different sources allowed for a more ‘holistic’ impression of the narratives of small-scale farming resilience in the metropolitan countryside of Rio de Janeiro.

9.5 Final remarks

This thesis explored the diverse meanings that have been attached to rural space, discussing how ideas of the rural are (re)-produced, and analysed the social and economic structure of rural localities at the rural-urban interface and the everyday lives of farming communities who live in rural areas in a metropolitan context. It paid particular attention

to participant observation at the grassroots level, presenting results from place-based research and community-based methods developed at farm level. In so doing, the study offered insights for advancing rural resilience through the analysis of rural restructuring in the face of current global changes ‘on the ground’.

Chapter 3 discussed at length how the research also presented a number of methodological issues, especially in relation to positionality and the negotiation of external researcher status in communities in the peripheral countryside of Greater Rio de Janeiro. Over the course of the fieldwork, as I spent time with farming communities and families, I really felt like I had become a part not only of the farmers’ associations, but also some of the smaller social networks and more intimate communities that exist in the metropolitan countryside of Rio de Janeiro. Therefore, although the study may have come to an end, these friendships and networks will continue, and I hope to remain a part of these communities. Another future step is to develop an equitable academic partnership with farming communities in the metropolitan countryside of Rio de Janeiro.

The main accomplishment of this thesis was collecting qualitative data on the construction of narratives of farming resilience and emancipatory possibilities in the metropolitan countryside. It has also offered theoretical insights, especially in relation to relational rural geographies in Brazil and in developing countries in an urbanised world. These insights will be valuable to researchers in a range of disciplines, from human geography and sociology to anthropology, politics, and psychology. I also hope that the study will encourage readers to think beyond linear representations of rural spaces and farming communities affected by urbanisation and industrialisation and to see more clearly how farmers engage and respond to global connections and the continuing importance of local agency in shaping quality food systems, public goods, and resilient rural futures.

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Appendix 1

Interviews

The objective is to identify major changes in agriculture over the last decades, at various spatial scales and actors, and changes at regional and local levels from semi-structured interview and ethnographic research with farmers and local and regional policymakers.

During the interviews, farmers reflect on how their own farm had changed since the late 1970s (or as far back as they could prefer), and which changes in the social and cultural, economic, political and environmental framework are associated with the change. Reflecting on experiences, the farmers will be asked which attributes they identify as crucial to enable the farm to undergo these changes and to go on adapting in the future. The strategies identified by the farmers, as well as the examples they provide, will be then analysed to assess how they may be related to the plethora of globalisation process impacting on the rural and resilience factors. Building on Folke *et al.* (2003), Berkes (2007) and Darnhofer (2010), four key factors build resilience systems that have been identified at farm level:

- learning to live with change and uncertainty;
- nurturing diversity in its various forms;
- combining different types of knowledge and
- learning and creating opportunity for self-organisation and cross-scale linkages.

For farmers

- 1- Can you please describe your biography (demographic information of family members, relevant changes and so on)?
- 2- If you go back ten years, do you see difference in your life?
- 3- What are the most visible changes in this community in the last years?
- 4- What are the positive and negative changes?
- 5- What do you think is the biggest change that has happened on agricultural production and land of this area in the past decade? What factors have driven this change? Why?
- 6- Have they been good or bad to people involved on agricultural sector?
- 7- What people do you think are “good” farmers? Are you a good farmer? Why?
- 8- Do farmer try new ways of doing things?
- 9- Can the farming community successfully adapt to change (if yes, has this changed over time)?
- 10- Are you participating any social groups? Why do you participate?
- 11- Does the farmer network with other communities elsewhere in the region?
- 12- Does the farmer network with other local communities?
- 13- Are farmer community leaders well networked with external organisations (public bodies, private and voluntary sector organisations)?
- 14- Who makes decisions at the local level about agricultural development?
- 15- Are farmer members satisfied with the way that decision-making is assigned?
- 16- Do farmer members have an opportunity to choose leaders?
- 17- How well is the farming community integrated with institutional structures (policies, directives, and decisions)?
- 18- Are many farming community members involved in groups or social organisations?
- 19- How self-reliant is the farming community in dealing with its problems?

- 20- Is 'expert' knowledge (scientific, technical) available to support local decision-making?
- 21- Are there opportunities for new businesses to be developed (if yes, please give an example of an opportunity that has been established)?
- 22- Who makes the decisions within the farming community about economic activities?
- 23- Have people developed new local products in any sector?
- 24- Can producers sell directly to consumers?
- 25- Have you participated any projects on agricultural production? Which one?
- 26- How do you evaluate the effectiveness of the projects that you have participated?
- 27- What do you think about challenges/opportunities of agriculture of this area?
- 28- What do you think how agriculture will develop in the next 10-20 years? Why?
- 29- In your opinion, what is influencing rural areas in Rio de Janeiro most pronouncedly? Why?
- 30- In the next 10-20 years, what do you think will rural areas become?
- 31- List some plans that you want to execute in the future on the farm.
- 32- Does everyone get involved in planning the use of those resources?
- 33- Have national/regional policies or actions been introduced in the last 20 years as a response to environmental issues in the area?
- 34- Have local policies or actions been introduced in the last 20 years as a response to environmental issues in the farm/farming community?
- 35- Who are the main decision-makers in terms of environmental management?

For local decision-makers, regional decision-makers, conservation officers and professionals, public administration, academics and researchers

- 1- What socio-cultural changes has the municipality/region experienced in recent years?
- 2- What implications of these changes may bring to rural areas?
- 3- Are many farming community members involved in groups or organisations (political, economic, social, and environmental)?
- 4- How self-reliant is the farming community in dealing with its problems?
- 5- Does everyone get involved in planning the use of those resources?
- 6- What do you think about agricultural policies in the past decades? Have they been good or bad to people involved on agricultural sector?
- 7- Who makes decisions at the regional level about agricultural development?
- 8- What policies and project has been implemented on agricultural development in recent years?
- 9- What about the effect of these policies and projects on agricultural development? Why?
- 10- How do these policies and projects implemented?
- 11- How do you evaluate the effectiveness of these policies and projects that you have observed?
- 12- Is 'expert' knowledge (scientific, technical) available to support local decision-making?
- 13- What do you think about the challenges/opportunities of farming community in this municipality/region?
- 14- What is your opinion of agriculture in this municipality/region? Is it still important to rural households? Why?
- 15- What do you think are influencing contemporary agriculture? What is the most pronounced factor? Why?

- 16- In your opinion, what is influencing rural areas in Rio de Janeiro most pronouncedly? Why?
- 17- In your opinion, what is influencing rural areas in Brazil most pronouncedly? Why?
- 18- In the future, what do you think will rural areas become in this region?
- 19- What do you think how agriculture will develop in the future in this region? Why?
- 20- Have national/regional policies or actions been introduced in the last 20 years as a response to environmental issues in the region?
- 21- Have local policies or actions been introduced in the last 20 years as a response to environmental issues in the farm/farming community?
- 22- Who are the main decision-makers in terms of environmental management?

Appendix 2

Farmers interviewed (location, agricultural production and system, gender):

1. Tanguá, citrus farming, male.
2. Tanguá, citrus farming, male.
3. Tanguá, citrus farming, male.
4. Tanguá, citrus farming, male.
5. Tanguá, citrus farming, male.
6. Tanguá, citrus farming, male.
7. Tanguá, citrus farming, male.
8. Tanguá, citrus farming, female.
9. Tanguá, citrus farming, male.
10. Tanguá, beekeeping production systems, male.
11. Tanguá, citrus farming, male.
12. Tanguá, organic citrus farming, female.
13. Tanguá, organic little-known Brazilian fruits, female.
14. Tanguá, citrus farming, female.
15. Tanguá, citrus farming/nurserymen, male.
16. Tanguá, citrus farming, male.
17. Tanguá, citrus farming, male.
18. Tanguá, citrus farming, male.
19. Tanguá, citrus farming, female.
20. Tanguá, citrus farming, male.
21. Tanguá, citrus farming, male.
22. Tanguá, citrus farming, male.
23. Tanguá, citrus farming/second home, female.
24. Tanguá, citrus farming/second home, male.
25. Tanguá, citrus farming, male.
26. Tanguá, citrus farming, male.
27. Tanguá, citrus farming, male.
28. Tanguá, citrus farming, male.
29. Tanguá, citrus farming, female.
30. Tanguá, citrus farming, male.
31. Tanguá, organic farming, male.
32. Tanguá, citrus farming, male.
33. Tanguá, citrus farming and tomato in sustainable cultivation, male.
34. Tanguá, citrus farming and tomato in sustainable cultivation, female.
35. Tanguá, citrus farming, male.
36. Cachoeiras de Macacu, guava and passion-fruit farming, male.
37. Cachoeiras de Macacu, vegetables farming, male.
38. Cachoeiras de Macacu, organic farming, male.
39. Cachoeiras de Macacu, guava and passion-fruit farming, male.
40. Cachoeiras de Macacu, guava farming and craft guava paste, male.
41. Cachoeiras de Macacu, guava farming and craft guava paste, male.
42. Cachoeiras de Macacu, organic farming, female.
43. Cachoeiras de Macacu, banana farming, male.
44. Tanguá, organic farming, male.
45. Tanguá, citrus farming, male.
46. Tanguá, citrus farming, male.

47. Tanguá, citrus farming, male.
48. Cachoeiras de Macacu, banana farming, male.
49. Cachoeiras de Macacu, banana farming, male.
50. Tanguá, organic farming, male.
51. Tanguá, organic farming, female.
52. Tanguá, citrus farming/nurserymen, male.
53. Tanguá, seller of certified seedlings, following regulations of the Ministry of Agriculture of Brazil, São Paulo, male.
54. Tanguá, citrus farming, male.

Policymakers, project influencers and researchers interviewed (location, institution, gender):

1. Tanguá, Corporation of Technical Assistance and Rural Extension - EMATER-Rio, male.
2. Tanguá, Corporation of Technical Assistance and Rural Extension - EMATER-Rio, female.
3. Tanguá, Local Department of Agriculture, female.
4. Tanguá, Local Department of Agriculture, male.
5. Tanguá, Local Department of Agriculture, female.
6. Tanguá, Independent cultural agent in the Eastern Metropolitan Region of Rio de Janeiro, male.
7. Tanguá, Animal Health, Plant Protection and Inspection - SEAPEC-RJ, female.
8. Tanguá, Local Department of Agriculture, female.
9. Tanguá, Local Department of Tourism and Culture, female.
10. Cachoeiras de Macacu, Local Department of Environment and Nature, male.
11. Cachoeiras de Macacu, Local Department of Agriculture, male.
12. Cachoeiras de Macacu, Corporation of Technical Assistance and Rural Extension - EMATER-Rio, male.
13. Cachoeiras de Macacu, Corporation of Technical Assistance and Rural Extension - EMATER-Rio, male.
14. Cachoeiras de Macacu, Local Department of Agriculture, male.
15. Niterói, Corporation of Technical Assistance and Rural Extension - EMATER-Rio, State programme for supporting small-scale and family farmers – PROSPERAR, male.
16. Itaboraí, Corporation of Technical Assistance and Rural Extension - EMATER-Rio, male.
17. Macaé, Agricultural Research Company of the State of Rio de Janeiro - PESAGRO-Rio, male.
18. Itaboraí, Regional articulator of the Ministry of Agrarian Development – MDA, female.
19. Regional coordinator of SEBRAE (Brazilian Service to Support Micro and Small Enterprises) in the East Rio de Janeiro, male.
20. Seropédica, farmer and independent researcher on guava varieties, female.
21. Cachoeiras de Macacu, farmer and independent researcher on guava production system, female.
22. Brazilian Agricultural Research Corporation – EMBRAPA, male.
23. Brazilian Agricultural Research Corporation – EMBRAPA, female.

Appendix 3

Overview of major changes in agriculture in the last four decades at regional and local levels

Farmers' compilation from interviews

① É a base da vida.
Filosofia e meta a ser vivida!

② * Loteamentos desordenados:
± 2002.

* ↑ Índice no uso de agrotóxicos:
± 10 anos

* ↑ Desmatamentos: Queimadas
± 5 anos

* Falta de proteção do solo e da água.

* Venda da Fazenda Bulhões: 2007

* Fábrica de Ração: ± 3 anos

③ Falta de informação / climática / Atravessador /
Controle de Dragas / ↓ Agrotóxicos / Cuidado água

1-

AGRICULTURA
básica de citros,
e culturas de
Alpimim e quiabo

2-

ANOS 70:
Grande Produção
e expansão da
árvore plantada.

3-

Recuperar o solo
e a água com
Novas técnicas
e culturas.

1- Recuperar o solo e a água
através de melhoramento
da cultura e acúmulo de matéria orgânica
no solo.
2- Aumento do número de árvores
plantadas por hectare, com uma queda de
produção a partir da década de 80, em
particular de quiabo e alpimim, devido ao
aumento da incidência de pragas e doenças.
3- Aumento da produção de frutas de alto
valor agregado e plantas forrageiras.

ANOS 80:
AUMENTO do número
de pragas e Redução
da produção

ANOS 90:
Abandono das
plantações de
Citrus, e muitos
se dedicando a
Criação de GADOS

ANOS 2000:
RECOMEÇO da citricul-
tura com pequenos
produtores.



Elton Soares
Rafael Soares
Raimundo Lima
Danell Pinheiro
João Manoel de Sousa
Claudionor Cardoso da Rocha
Roberto DA SILVA ALVES DE OLIVEIRA

01/11/2012
afif

🍏 Melhorias na Agricultura 🍏

Organização

Conscientização

CLIMA

Comprometimento

Diversidade de
Produtos

Redução
de
Agrotóxicos ☹️

Redução
das
Queimadas

Tratamento
dos
SOLO

Preservação das Nascentes

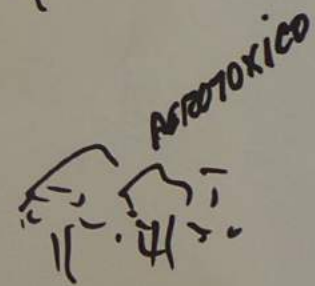
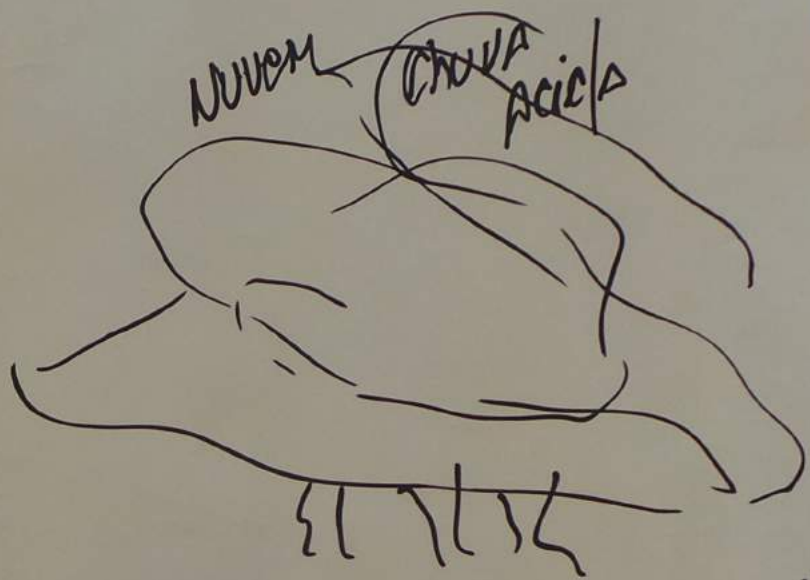
- Grupo
- * José Resende
 - * Rosilene Lima
 - * Ryan Lima
 - * Isabela Francisco
 - * Aparecem Francisco
 - * Douglas Lopes
 - * Carlos José A. Francisco
 - * Natalino Ribeiro Barbosa
 - * Ester Lima



NUVEM
D'ÁGUA

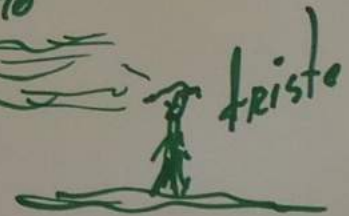


NUVEM ~~CHUVA~~
ÁCIDA



Feliz

OLUKI
FSC070



Triste

ACIDOXICO

Appendix 4

Flyers of events and meetings organised by the farmers' associations and policymakers

August-December, 2017



circuit 
da Laranja
Tanguá - Rio de Janeiro

circuit da Laranja

Localizada no interior do Estado do Rio de Janeiro a 63 km da capital, Tanguá ganha destaque por ter recebido o título de produtor da "Melhor Laranja de Mesa do Brasil".

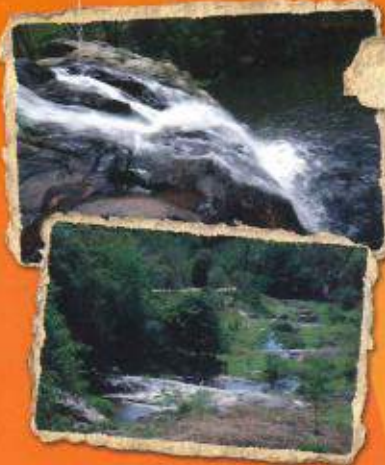
No Circuito da Laranja o turista tem a oportunidade de fazer compras no Mercado do Produtor Rural, visitar e conhecer Pavilhões de Beneficiamento de Laranja e Engenheiros de Farinha, banhar-se nas águas límpidas da Cachoeira de Tomascar, saborear as melhores laranjas de mesa e degustar o seu doce sabor à sombra das laranjeiras.

Venha conhecer o programa "Colha e Chupe" e curtir a inesquecível experiência de um dia no campo!

Circuito da Laranja
Tanguá • Rio de Janeiro • Brasil

Você vai se encantar!

Cachoeira de Tomascar



Com suas águas límpidas e cristalinas, entre diversas quedas d'água emolduradas por verdes pastagens, a Cachoeira de Tomascar é sem dúvida um convite ao deleite e relaxamento de seus visitantes.

Mercado do Produtor Rural



Lugar de comercialização de produtos originados da agricultura familiar do município. Além da laranja de mesa, produto típico da cidade, no mercado do produtor pode-se encontrar uma grande diversidade de produtos locais como o aipim, tangerina, abóbora, mel, pimenta, bananas, mudas de plantas, artesanato local, entre outros.

Colha e Chupe



O visitante irá a uma propriedade de grande produção de laranja e ganhará um canivete e um borná para ele mesmo colher e degustar a fruta debaixo do pé de laranja que ganhou o título da Melhor Laranja de Mesa do Brasil, podendo também comprar para o seu consumo.

Plantações de Laranja

O cultivo da laranja faz parte da história do município, onde ao longo da zona rural os laranjais compõem a paisagem e encantam os olhos dos visitantes que por ali passam e vislumbram as plantações dos tipos "Seleta" e "Natal Murcha". Venha viver a oportunidade ímpar de colher e se deliciar com as mais doces e saborosas laranjas do Brasil, em meio à beleza natural de Tanguá.



Caminho da Roça

Longe da agitação e do stress dos grandes centros urbanos, Tanguá é sem dúvida um ótimo destino para todos aqueles que buscam paz, descanso, tranquilidade, aconchego e hospitalidade das zonas rurais, sendo uma das melhores opções para o turismo rural do Estado do Rio de Janeiro.

Pavilhão de Beneficiamento de Laranja

Nos pavilhões de beneficiamento pode-se acompanhar todo o processo de separação e seleção das nossas laranjas.



Engenhos de Farinha

Em nossos engenhos de farinha o visitante tem a oportunidade de acompanhar todo o processo de transformação do aipim em uma das mais puras e deliciosas farinhas da região.



CIT (CENTRO DE INFORMAÇÕES TURÍSTICAS) e Portal da Cidade

Criado para ser um centro de apoio aos turistas e todos aqueles que chegam em nosso município, o Portal de arquitetura moderna é um grande marco para o desenvolvimento e disseminação do turismo nesta cidade. Nele o turista terá todas as informações sobre os nossos produtos turísticos.



Fonte de água que brota da pedra, onde a natureza mostra o seu encanto e mistério.

Secretaria Municipal de Cultura e Turismo

Rua Julieta de Macedo S/Nº - Praça Robson Siqueira Nunes

Estação da Cultura - Centro - Tanguá - RJ

Tel.: (21) 2747 – 4113

turismo@tangua.rj.gov.br

www.tangua.rj.gov.br





1° - Portal – Centro de Informações Turísticas - Entrada de Tanguá.

Chegada: 08:00

Parada: 00:20

Saída:08:20

Deslocamento: 10 minutos

2° - Feira Permanente de Artesanato

Chegada: 08:30

Parada: 00:20

Saída:08:50

Deslocamento: 40 minutos

3° - Café rural

Chegada: 09:30

Parada: 00:40

Saída:10:10

Deslocamento: 10 minutos

4° - Engenho de Farinha Movido a Motor (Sítio Rocha, Sr. Nô)

Chegada: 10:20

Parada: 01:00

Saída:11:20

Deslocamento:20 minutos

5° - Engenho D'água de Tomascar (Sr. Amilse)

Chegada: 11:40

Parada: 00:20

Saída:12:00

Deslocamento:05 minutos

6°- Restaurante Tomascar (Marilene)

Chegada: 12:05

Parada: 01:55

Saída:14:00

Deslocamento: 55 minutos

7° - Coiha e Chupe (Sítio do Sr. Délcio Capistrano)

Chegada: 14:55

Parada: 01:00

Saída:15:55

Deslocamento:50 minutos

8° - Portal

Chegada: 16:45

Obs.: Esses horários são aproximados e o roteiro está sujeito a mudanças

1º Encontro De Fruticultura

Dia 30 de Setembro de 2017

- Palestras
- Feira Local

Local: Centro Comunitário da Posse dos Coutinhos

PROGRAMAÇÃO

- *07:30 – Inscrição
- *08:00 – Abertura
- *08:30 - Palestra: Como aumentar a produção conhecendo as características dos solos.
- *09:45 – Palestra: Produção de porta enxerto e mudas de laranja, limão e tangerina.
- *11:45 – Almoço
- *13:30 – Palestra: Algumas frutas de importância econômica para plantio em Tanguá
- *14:45 – Palestra: Crédito Rural
- *15:30 - Encerramento

*Realização:



- Secretaria de Agricultura e Desenvolvimento Rural
- Conselho Municipal de Agricultura e Desenvolvimento Rural Sustentável de Tanguá

Convite

ENCONTRO DE FRUTICULTURA

Dia 30 de Setembro de 2017

1- **LOCAL:** Centro Comunitário da Posse

2- **INSCRIÇÃO:** 7:30 h as 8:00 h

3- **ABERTURA:** 8:00 h as 8:30 h

4- PALESTRAS DE MANHÃ

4.1- Palestrante: **Osório Marques da Fonseca** - Engenheiro Agrônomo da Secretaria de Agricultura de Tanguá.

De 8:30h às 9:30h - **Palestra:** Como Aumentar a Produção Conhecendo as Característica dos Solos.

4.2- Palestrante: **Daves Willian Setin** - Engenheiro agrônomo – Proprietário do Viveiro de Mudanças Frutíferas - Citro Setim – São Paulo.

De 9:45h as 11:45h - **Palestra:** Produção de Porta Enxerto e de Mudanças de Laranja, Limão e Tangerina

5- **HORÁRIO PARA ALMOÇO :** De 11:45h às 13:00h

6- PALESTRAS A TARDE

6.1- Palestrante: **Paulo Cesar Soares da Silva** - Técnico Agrícola e Biólogo – Supervisor Regional da Emater Rio.

De 13:30h as 14:30h – Algumas Frutas de Importância Econômica Para Plantio em Tanguá.

6.2- Palestrante: **Fabio ou João** – Gerente do Banco do Brasil-

De 14:45h às 15:30h – Palestra sobre Crédito Rural

5- Encerramento: 15:30h – **Palavra** da Secretária de agricultura - **Claudia Márcia Souza Milão Cardoso**

Claudia Márcia Souza Milão Cardoso

Secretária de Agricultura de Tanguá

Licínio Silva Louzada

Supervisor da Emater Rio



TOMATEC

Tomate em Cultivo Sustentável



Embrapa
Solos

Sistema de produção de tomate em cultivo sustentável

O Sistema de Produção de Tomate em Cultivo Sustentável (Tomatec) é uma opção já consolidada entre as boas práticas agrícolas voltadas à produção de tomate de mesa de qualidade, com menos insumos, focado na valorização econômica do produto e segurança alimentar.

Ele promove a conservação do solo e da água, redução do uso de agroquímicos, maior produtividade da cultura e condições de produção favoráveis para o agricultor e o meio ambiente.

Essa tecnologia inovadora foi desenvolvida e aperfeiçoada pela Embrapa Solos ao longo de 20 anos de pesquisas, realizadas em parceria com agricultores e instituições de pesquisa, ensino e extensão. Testada em diversas regiões do País, encontra-se em plena adoção no estado do Rio de Janeiro.

O Sistema de Produção Tomatec é uma Tecnologia Embrapa com marca registrada no INPI.



Instituições Parceiras

Embrapa Agrobiologia

Embrapa Agroindústria de Alimentos

Embrapa Hortaliças

EMATER MG

EMATER RIO

Secretaria de Estado de Agricultura e Pecuária / SEAPEC-CDSV

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Syngenta

Supermercados Zona Sul

Casa Agrícola Irmãos Ferreira

Colaboradores

Agricultores que adotaram o Tomatec

Contato ou mais informações

SAC: (21) 2179 4507

<http://www.embrapa.br/fale-conosco>



syngenta.

Embrapa Solos

Rua Jardim Botânico, 1.024 - Jardim Botânico

Rio de Janeiro, RJ - Brasil - CEP 22460-000

Tel.: (21) 2179 4500 - Fax: (21) 2274 5291

<http://www.embrapa.br/solos>

Embrapa

MINISTÉRIO DA
AGRICULTURA, PECUÁRIA
E ABASTECIMENTO

BRASIL
GOVERNO FEDERAL



RIO RURAL



Desenvolvimento Rural Sustentável em Microbacias Hidrográficas

do Estado do Rio de Janeiro



GOVERNO DO
Rio de
Janeiro

SECRETARIA DE
AGRICULTURA,
PECUÁRIA, PESCA
E ABASTECIMENTO

SUPERINTENDÊNCIA DE
DESENVOLVIMENTO
SUSTENTÁVEL

SOMANDO FORÇAS

RIO RURAL BIRD



Metas

- Plano de Sustentabilidade Institucional da SEAPPA elaborado e implementado.
- **270 microbacias beneficiadas**
- 27.000 agricultores adotando práticas sustentáveis e agregando valor aos seus produtos
- **10.497 beneficiários capacitados**
- 1.575 km de estradas rurais adequadas
- **7.450 sistemas de saneamento rural implantados**
- 5 projetos executados em parceria com comitês de bacias
- **10.304 beneficiários envolvidos em capacitação à distância e inclusão digital**
- 400 técnicos executores e gerentes capacitados
- **118 professores, 59 agentes comunitários de saúde e 59 técnicos municipais capacitados**
- 220 projetos de educação ambiental implantados
- **35 Estatutos Comunitários de Conduta construídos**
- Rede Rural de Cidadania estabelecida
- **Sistema de Pesquisa em Rede implantado**

Inovações

- Autogestão comunitária dos recursos naturais
- **Metodologia de microbacias reconhecida como projeto ambiental**
- Incorporação da biodiversidade com enfoque territorial
- **Microbacia como Mecanismo de Desenvolvimento Limpo da agricultura familiar (MDL)**
- Estatutos Comunitários de Conduta (ECC)
- **Simulador de gestão sustentável de microbacias**
- Integração de políticas públicas multisetoriais
- **Integração entre recursos públicos e privados**
- Integração Plano Executivo da Microbacia e Planos de Bacias
- **Aprimoramento da boa governança do setor rural**
- Incentivo à sustentabilidade das cadeias produtivas
- **Rede de Cidadania Rural**

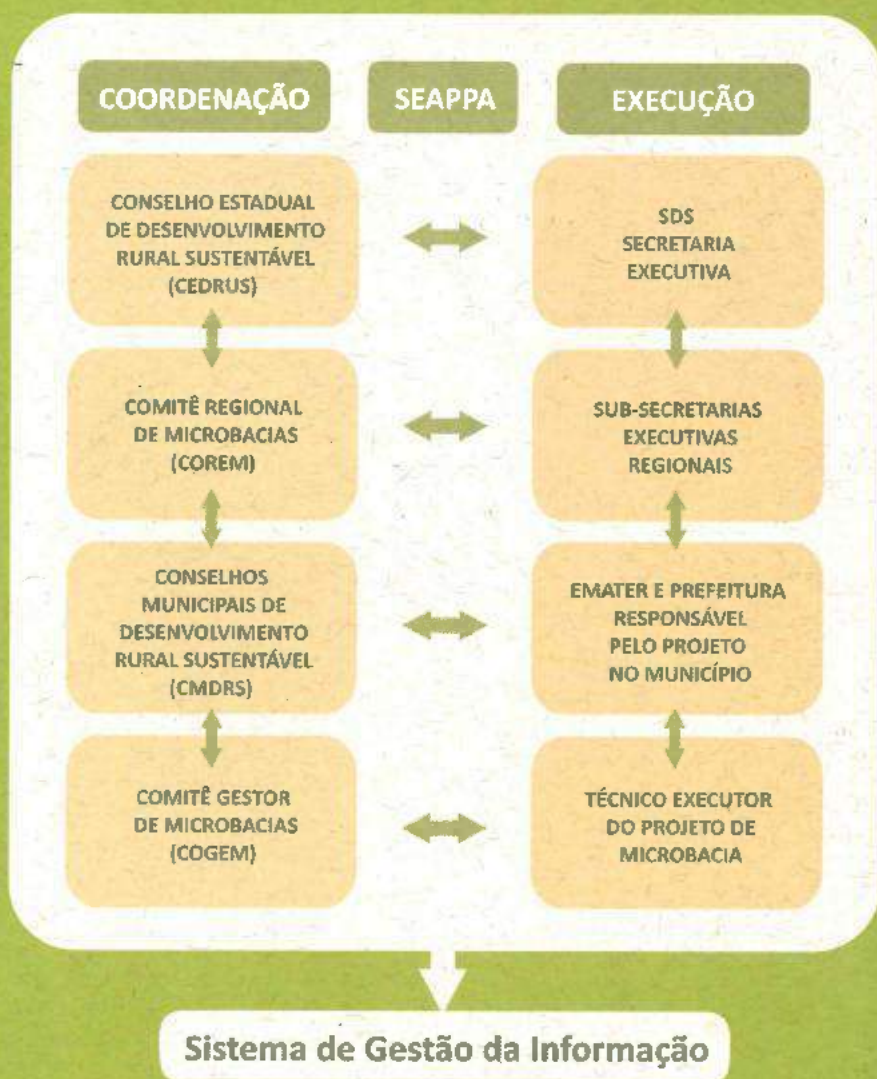
US\$ 79 milhões

BIRD
39,5 milhões

**Governo do Estado
do Rio de Janeiro
e Parceiros**
39,5 milhões



Controle Social



Resultados Esperados

- Estabelecimento de um ambiente de governança favorável ao desenvolvimento territorial sustentável
- Maior participação cidadã na tomada de decisão e engajamento em atividades sustentáveis e solidárias
- Aprimoramento dos investimentos em processos produtivos sustentáveis
- Maior transparência na gestão e democratização das informações

Rural change in the context of globalization: examining theoretical issues

FELIPE DA SILVA MACHADO¹

Abstract

Early discussions and theoretical positions concerning rural change were developed by researchers from countries with post-production economies in order to explain the rural transformations. When discussing economic change in rural space over the last decades, MARS DEN, T. *et al.* (1993) presented a new perspective for understanding rural restructuring that includes new subjects, such as capital mobility, flexible production regimes, complexity in the relationship between technology and environment, economic deregulation and new political processes. According to these authors, in order to understand such processes, it is necessary to research the effects of globalization at local scale of action. A recurrent theme in rural studies has been the significance of diverse globalization processes as drivers of rural change (MARS DEN, T. 2003; ROBINSON, G.M. 2004; WOODS, M. 2005, 2007; PLOEG, J.D. VAN DER 2008). Multidimensional and multidirectional perspectives have indicated that rural space has become more embedded within a globalized rural world. Therefore, in recent years, researchers have displayed an interest in understanding the dynamics of the rural spaces in developing countries which are also being affected by global processes in different pathways (WILSON, G.A. and RIGG, J. 2003; RIGG, J. 2006; BRYANT, C.R. *et al.* 2008; PLOEG, J.D. VAN DER *et al.* 2010). In summary, this article forms a critique of the simplistic assumptions formulated in the literature regarding spatial change, which assumes the rural is essentially subject to external actions. I argue that the rural space should also be seen to possess its own dynamics which contribute to complex pathways and so adapts to new scenarios of spatial change in the contemporary world.

Keywords: contemporary rural space, rural change, rural geography, globalization, developing countries

Introduction

This article provides a framework for understanding rural change, based on an extensive literature review, and discusses the diverse characteristics of this process, primarily in developed countries. It also includes a discussion of rural change and globalization, with a focus on the contemporary conceptual debate concerning rural studies in the global world. As much of the critical literature on rural change and globalization (MARS DEN, T. *et al.* 1993; PIERCE, J.T. 1998; MARS DEN, T. 2003; WOODS, M. 2005, 2007; BRYANT, C. *et al.* 2008) has emphasized, rural studies need greater focus on the diversity of contexts in which rural restructuring takes place. Agricultural and non-agricultural production

systems are involved in this process and are interconnected to different degrees, including rural and urban interaction and the articulation of rural dynamics with urban and global dynamics. Last years have probably seen most dramatic changes in rural areas and pace of change appears to accelerate in an increasingly globalised and interlinked world (ROBINSON, G.M. 2004).

National and regional interests also play an important part, particularly in rural spaces with higher levels of rural and urban interaction, such as occurs with large industrial projects and transport infrastructure that converges on urban agglomerations and connects different regions (BICALHO, A.M.S.M. *et al.* 1998). SÁNCHEZ, G.P.Z. (2000) pointed out that rural spatial transformations caused

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by large-scale development projects, such as dams, airports, electric transmission lines, oil exploitation or tourist resorts, imply spatial modifications that, in turn, cause changes and new dynamics in every aspect of local life, generating profound transformations for the rural population.

SÁNCHEZ, H.A. (2012) emphasized the need to create practices that introduce the most inherent aspects of territorial dynamics and that acknowledge the development of endogenous processes, whose actions are crucial for strengthening and consolidating territorial management with the participation of actors in their different economic, political and cultural expressions, notably, in spaces of rural and urban interaction. There is an increased need for understanding governance in spaces where conflict can exist between different agents and institutions involved in concrete territorial processes. Some examples are: “disputes for land and natural resources, real estate speculation for new non-agricultural activities, gentrification, outsourcing of rural space, spatial mobility of rural population or even strengthening the rural land market with new farm activities” (SÁNCHEZ, H.A. 2012, 49). Therefore, the focus on the territorial dimension is crucial for managing and enforcing public policies in multifunctional rural space.

This theoretical debate is based on the critical discussions that have moved away from the rigid notion of simply ‘exporting’ indicators developed in advanced economies to the developing world situation towards an analytical framework that emphasizes complex rural space. This would mean, I have explored the diverse meanings that have been attached to the recurrent significance of globalization as a driver of rural change, arguing that it needs to be adapted and developed to address conditions found in the developing world. Furthermore, this analysis questions the implied linearity of the traditional concept of rural space and explores different perspectives in human geography. The theoretical discussion is based on debates concerning contemporary rural space

with an emphasis on spatial processes and globalization in a rural context (WILSON, G.A. and RIGG, J. 2003; MARSDEN, T. 2003; WILSON, G.A. 2007, 2012; WOODS, M. 2007, 2011).

Understanding rural change

When discussing economic change in rural space over the last decades, MARSDEN, T. *et al.* (1993) emphasized a new perspective for understanding rural restructuring that includes new issues, such as capital mobility, flexible production regimes, complexity in the relationship between technology and environment, economic deregulation and new political processes. According to these authors, in order to understand such processes, it is necessary to research the effects of globalization at local scale of action. Thus, the modes of development that are internal to particular rural areas must be linked to external influences upon such areas.

In geographical theories of rural restructuring since the 1990s the role of local actors has been highlighted, mainly that involving local people transforms rural spaces (BRYANT, C. 1997; PIERCE, J.T. 1998; WOODS, M. 2005). Structures, other than purely economic ones, are taken into consideration by PRETTY, J.N. (1995), VAN HUYLENBROEK, G. *et al.* (2007) and WILSON, G.A. (2010), allowing for local decision-making, control and management, i.e. focussing on the peculiarities of different kinds of social agents and modalities for organizing rural space. Collective strategic thinking, involving regional institutions and organizations oriented towards territorial development, including the political perspectives of local social actors, is considered to be fundamental for the success of governance (*Photo 1*).

Local development may be deemed the coherent initiatives and actions, based on the mobilization of local social actors who agree to contribute expertise and assistance for improving specific territories. “Actors or a group of actors may contribute in all four functions necessary and required for developing a ter-



Photo 1. Patterns of community are significant for measures to respond to rural change, as any attempt to engage local actors in the delivery of rural development. Community telecenter in Piquiatuba, Pará state, Amazon Region, Brazil. *Source:* Field research, 2013.

ritory: information, integration, planning and action” (CLÉMENT, C. and BRYANT, C. 2004, 191). Participation, cooperation, joint work and construction of partnerships are undertaken giving rise to networks of local actors who devise strategies of resistance, resilience or adaptation of rural communities to new global contexts (WILSON, G.A. 2012). A similar concern is present in assessments of environmental impacts and in socioeconomic policy in developing countries that highlight the need for integrating local knowledge into planning and evaluation of development projects (BRYANT, C. *et al.* 2004).

At the local level, different rural patterns are also driven by diverse elements, and are shaped by various social, economic, and political forces according to different social

and geographical contexts (MARSDEN, T. 2003). The focus for rural studies has been placed on the local community level, as it is at this level that spatiality of resilience are implemented ‘on the ground’ (McCARTHY, J. 2005; PARNWELL, M.J. 2007; WILSON, G.A. 2010). The justification for this is both analytical and pragmatic. As commentators such as AGRAWAL, A. and GIBSON, C.C. (1999) or WILSON, G.A. (2012) emphasized, over the past two decades, there has been resurgence in attention to community as a critical arena for addressing a range of issues, including societal pathways of change. To address this issue, this article questions how rural communities from developing world address resilience in the context of rural change and globalization.

Rural change in the context of globalization

Accumulation crises in capitalist societies provoke periodic and, sometimes, radical restructuring of productive processes in order to establish new investment opportunities, a consequence of which is the reassessment of resources and spaces previously deemed unproductive or marginal. For several reasons, some rural areas, previously deemed places of declining economic activities, start to be seen as investment frontiers (MARSDEN, T. *et al.* 1993) and rural elements, which until then had little social or economic value and are reset and re-functionalized. Good examples are the ‘commoditization’ of nature, landscapes for tourism and environmental preservation, production of healthy foods and creation of rural leisure activities, all of which are part and partial of globalization.

A recurrent theme in rural studies has been the significance of diverse globalization processes as drivers of rural change. The variety of contexts in which globalization has been encountered – economic production, services and tourism, migration, and environmental protects – points to the multiple character of globalization. As a result, new directions in rural studies have called for researches that examine the impact of globalization on everyday life (Woods, M. 2012). Methods in rural geography in the era of globalization have provided wider theoretical frameworks and insights into the rural domain through in-depth studies and bottom-up model and multidimensional approaches (e.g. political economy, cultural studies and political ecology) (Table 1).

Table 1. Contemporary rural studies have provided wider theoretical frameworks and multidimensional approaches

	Approach	Global critical issues	Rural change in globalization
Political economy	A critical account of the impacts of planning and policy-making, and by interpreting decision-making for rural areas in a political economy context (NEWBY, H. 1985; CLOKE, P. 1987, 1989; MARSDEN, T. <i>et al.</i> 1993).	During the 1980s, rural geography was a field for political-economy analyses of agriculture, planning, rural development and rural class re-composition	The privatization of many services, conflicts of land use and the growing of the external interferences in local politics and planning.
Political ecology	It has indicated the environmental problems result from inequality associated with the spread of capitalism and emphasize the need for changes in political and economic process at local, regional, and global levels to solve environmental problems (WATTS, M. 1983; HECHT, S.B. 1985; NEUMANN, R.P. 1998; PEET, R. <i>et al.</i> 2011).	Political ecology looks beyond regional and national boundaries to the structural contexts and transnational interests, networks, and discourses that shape many local cases (MOORE, D. 1995; ESCOBAR, A. 2001; ROBBINS, P. 2004). Political ecology presumes relations and conflicts at more ‘local’ scales.	Questions concerning social and environmental impact, conflict of land use, and toxicity pose recurring problems to the agro-industrial dynamic.
Cultural turn	In the 1990s, it introduced post-structuralist theory and prompted interest in the multiple experiences of rural life by different social groups (MURDOCH, J. and PRATT, A. 1993; CLOKE, P. 1997; HALFACREE, K. 1993, 2006).	The dilemmas of local actors who resist and adapt to contemporary rural contexts.	The rural may lead to a dilution of previously coherence space by to other groups who are already changing the face of rural areas.

Globalization has changed the relationship between urban and rural areas. The city and the countryside modify their dynamics through the intermediation of global exogenous factors, strengthening local-global direct connections. In this way, the rural is not reduced to a mere geographical location, it becomes a place where occurs the mediation of macro social and economic operations directly articulated to global processes. The answers to these processes, however, are different in the political and social content interacting with the exploration of local resources that depends on the characteristics and the relationships of the countryside in the regional context (CLOKE, P. 1990; MARSDEN, T. *et al.* 1993).

The process of globalization has a pervasive influence in transforming rural economies and societies, with implications for the major societal challenges of environmental change and resource security. However, in comparison to studies of the global city, relatively little research has focused on the ‘global countryside’ (WOODS, M. 2007), and existing research lacks integration. Thus, contemporary rural studies have developed an integrated perspective by drawing on relational analysis to focus on the actual mechanics by which rural localities are ‘re-made’ through engagement with globalization processes, examining the mediating effect of national and regional context and the opportunity for local interventions.

WOODS, M. (2007) posited the notion of the ‘global countryside’ as a geographical and conceptual counterpoint to the ‘global city’. The global countryside is presented as a space that has become increasingly integrated and interconnected through globalization process. This emergent global countryside is not a uniform, homogenous space, but rather is differentially articulated, and contested, through particular rural places. According to WOODS, M. (2007), the concept of place is a space of interconnections reconstituted by globalization into hybrid dimensions of transformations and interactions between local, national and global actors.

WILSON’S work on community resilience and transitions particularly pointed towards the fact that the notion of exogenous macro-scalar ‘transitional corridors’ shaped by national and global decision-making processes, and analysed how such corridors influence community resilience (WILSON, G.A. 2012). He argued that the critical literature often portrays macro-scalar corridors as ‘negative’ for innovation. Then analysed the importance of macro-scalar lock-in effects external (i.e. globalization) to communities and discussed how these can shape community pathways and resilience in both positive and negative ways (Table 2).

With regard to experiments in local development in different parts of the world, the Sustainability of Rural Systems Commission

Table 2. Contemporary rural change, concepts and global critical issues

Concept	Debate	Global critical issues
The global countryside		
WOODS, M. 2007, 2011. CHESHIRE, L. and WOODS, M. 2013. MCDONAGH, J. <i>et al.</i> 2015.	Rural space that has become increasingly integrated and interconnected through globalization process	Globalization alters employment opportunities, raise or depress income levels, and change patterns of local service provision. The impact of globalization on everyday life in a rural context.
Rural resilience		
WILSON, G.A. 2010, 2012. McMANUS, P. <i>et al.</i> 2012. SCOTT, M. 2013. WELSH, M. 2014.	The potential of social innovation and collective agency at the community scale in exploring new development	An exploration of farming and its role for rural resilience. The various aspects of community resilience within rural localities

of the International Geographical Union has produced a number of studies which treat rural restructuring in different countries (e.g. BICALHO, A.M.S.M. and HOEFLE, S.W. 2004; FRUTOS, L.M. *et al.* 2010; KIM, D. *et al.* 2013; BICALHO, A.M.S.M. and LAURENS, L. 2014). These studies focus on the influence of globalization, internationalization of agriculture, urbanization of rural areas, the rise of multifunctionality, strategies for promoting sustainable rural development and territorial governance, all linked to the new functions of rural space and the dilemmas of local actors who resist and adapt to new rural contexts.

(Re)positioning debates surrounding rural change and globalization

In recent years, researchers have displayed an interest in understanding the dynamics of rural spaces in developing regions of the world which are also affected by global processes in different ways and the sum result is great global spatial diversity (MARSDEN, T. 2003; WILSON, G.A. and RIGG, J. 2003; RIGG, J. 2006; WILSON, G.A. 2007; WOODS, M. 2007; BRYANT, C. *et al.* 2008; PLOEG, J.D. VAN DER *et al.* 2010). Recognition of the global inter-connection and inter-dependency of rural places points to a dismantling of the separation between rural research on the global north and rural research on the global south, and the promotion of more transnational research. As WOODS, M. (2005, 2011), in particular, emphasized, although rural geographers often consider the global north and south separately, in our ever shrinking world society these two paradigms are often coming together.

Multidimensional and multidirectional perspectives have indicated that, over time, rural areas in developing countries increase embeddedness into a globalized rural world (WILSON, G.A. and RIGG, J. 2003; RIGG, J. 2006; PARNWELL, M.J. 2007; WILSON, G.A. 2008). This article suggests that the repercussion of the challenges for rural areas in the developing world in the early twenty-first century, such as the political economies of new strategies

for economic development and the resilience of rural communities, should receive more attention. Traditionally, a lot of research in rural studies has been empirical in nature, but over the past years a more critical rural social science has developed which has employed a range of conceptual theories in its analysis, including political-economic concepts and post-structuralism (e.g. 'Handbook of Rural Studies' edited by CLOKE, P. *et al.* 2006).

The complexity of spatial restructuring present in the developing world in the era of globalization contributes to better understanding the contemporary rural, going beyond the view of inert spaces only subject to external interferences. CUTTER, S.L. *et al.* (2008) and WILSON, G.A. (2010, 2012) indicated that there is a need for further research in these arenas, arguing that despite metaphorical and theoretical models which have progressed to the operational stages, processes of resilience should be measured and monitored at local level.

Rural transformation in the global world is a hybrid and contested process, that involves actors and forces operating at multiple scales, and which echoes elements of rural restructuring in both the developed world of Europe and North America and the developing world, yet has distinctively different characteristics. Accelerating globalization processes exacerbate the already precarious situation in many rural districts in both the global North and South, as virtually all areas are affected by global propelling forces often outside the control of regional and national regulatory structures.

In addition, agriculture no longer necessarily forms the essential backbone for rural development, and instead rural spaces in both the global North and South are characterised by complex, multidimensional and hybrid development path ways in which questions about the right and wrong development trajectories are increasingly difficult to answer.

WOODS, M. (2011) has highlighted how the global tipping point has come with rapid urbanization in Brazil, China and India, and other fast-growing countries of the global south. (*Photo 2*). Yet, the population shift



Photo 2. Questions about how rural land use should be planned and regulated have also long-standing concerns geographers: Yan'an New District, Shaanxi Province, China, 2016 (A). Cachoeiras de Macacu, Rio de Janeiro state, Brazil, 2013 (B). *Sources:* Field research in 2016 (A) and in 2013 (B).

does not in itself necessarily mean that the rural has been eclipsed, or become irrelevant. On the contrary, as rural studies has demonstrated, the rural continues to be central to many of the key issues confronting the world today, and the study of rural geographies is arguably as important as ever.

HU, Z. and RAHMAN, S. (2015), based on an in-depth case study of a rural community, pointed to the fact that the contemporary state of Chinese smallholder agriculture and changes that it has been experiencing in the context of socio-economic transition through the lens of three main economic drivers: livelihood diversification, market conditions and government interventions. Results reveal that the change in China smallholder agriculture has been complex and multidimensional. All three factors exert profound influence and shape the current state of Chinese agriculture. Massive rural-urban migration has resulted in labour shortages, which in turn have led to a reduction in agricultural diversity and land use intensity.

Understanding the economic drivers of smallholder agriculture is important in the present day, because both the media and academia have recently raised grave concerns regarding a crisis of smallholder agriculture driven by massive nonfarm employment and expressed doubts about an argument used in both policy and academic spheres for reform towards large-scale capitalist agriculture.

Studies have illustrated that agricultural change may involve multidimensional and often parallel processes, which are not only labour-driven intensification, but also technology driven intensification (PLOEG, J.D. VAN DER 2008; PLOEG, J.D. VAN DER *et al.* 2013). AS BROOKFIELD, H. (2001) rightfully contended, driven by livelihood diversification, agricultural change has taken multiple pathways so that intensification alone can never fully capture the complexity of the processes involved. He has highlighted the capability of smallholders and further argues that the key for survival and successful change of smallholder agriculture has been adaptation and innovation. In the context of Asian deagrari-

anization, RIGG, J. (2001) indicated that both intensification and disintensification have occurred in Asian rural change. The theory of rural change in developing countries so far has underscored at least two points. First, change is complex, diverse and multidimensional. Second, change is context dependent and can be affected in diverse pathways.

Conclusions

The repercussion of the challenges for rural areas in the early twenty-first century, such as the political economies of new strategies for economic development based on the use and management of resources and the resilience of rural communities to macro-scalar effects, have been paid little academic attention (WILSON, G.A. 2012; WOODS, M. 2012). This article questions the changes of contemporary rural space under the context of its socio-economic integration into global capitalism.

Most of the studies have explained and interpreted the causality between globalization and factors of rural change in a linear way and therefore produced homogenous conclusions. Consequently, to more comprehensively interpret the effects of different socio-economic and political change drivers on rural dynamics, the main aim in contemporary rural studies is to explore the processes through which differential factors have affected the rural with a focus in how different degrees of rural-urban interaction and global influences give rise to multifunctional diversity and spatial complexity.

However, the literature of rural geography in developing countries still is constituted mainly by agricultural economies and analysis of agricultural policies, such as institutional change, agricultural technological development, rural-urban migration, which emphasize the empirical evidence of how structural factors affect agricultural production (DELGADO, G.D. 2012; IORIS, A.A.R. 2012). At present, great enthusiasm is expressed by the media and governments concerning economic growth directly related to the spread of

agribusiness-scale production in the countryside in developing countries such as Brazil.

In contrast, academics have explored agro-industrial food networks through a critical perspective, placing agribusiness-scale production within a mass production model which includes volume and standardization (BERNARDES, J.A. and FREIRE FILHO, O.L. 2005; BERNARDES, J.A. 2015; HOSONO, A. *et al.* 2016). Questions about social and environmental impact, conflict of land use, and toxicity pose recurring problems to this agro-industrial dynamic. In these cases, the study of globalization in a rural context has commonly focused on commodity chains and its contradictions.

This article argues that the complexity of rural areas and its spatial diversity contribute to better understanding of the multi-directional and multidimensional paths in globalization, going beyond the view of economic space as only subject to external interferences that demand resources. In the case of developing countries, little attention has been paid to investigating the rural space by combining macro-political economy with the analysis of local strategies. In conclusion, I have drawn insights for advancing social resilience in the global countryside through an analysis of rural restructuring related to the current global changes ‘on the ground’. It attempts to develop a connection between rural change, rural community resilience in developing countries and broader rural studies in the context of globalization.

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