Dottorato di Ricerca in
"Ingegneria per l'Innovazione e lo Sviluppo Sostenibile"

FOOD POLICIES AS STRATEGIES FOR INNER AREA DEVELOPMENT: INSIGHTS FROM EDE AND MONTAGNA MATERANA

SSD: "AGR/01 Economia ed estimo rurale"

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Ciclo XXXVIII

Abstract

This thesis explores the role of food policies in shaping sustainable territorial development, with the ultimate goal of proposing a conceptual model of food policy tailored to marginal and inner areas. The research investigates how food policies can serve as strategic instruments to counter depopulation, farmland abandonment, and socio-economic decline, particularly focusing on the Montagna Materana area in southern Italy.

The first part presents a systematic review of the literature on methodologies for evaluating food policies, identifying key frameworks, indicators, and analytical approaches used to assess their impacts across governance, environmental, economic and social dimensions.

The second part builds on fieldwork conducted through two complementary experiences: an in-depth study of the food policy of Ede, the Netherlands, which serves as a benchmark for integrated territorial governance, and an empirical investigation in the Matera Mountain, which examines how local stakeholders—farmers, administrators, and community organizations—interpret and implement food-related initiatives.

By integrating theoretical insights and empirical evidence, the thesis proposes an ideal-type model for designing and implementing food policies in marginal areas, emphasizing participatory governance, territorial resilience, and place-based innovation as drivers for sustainable local development.

Summary

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Introduction

Recent global crises—including the COVID-19 pandemic, the energy and climate emergencies, and geopolitical shocks—have exposed the vulnerabilities of global supply chains, revealing the fragility of current models of food production, distribution, and consumption. These events have underscored the urgent need to transform food systems in ways that ensure resilience, sustainability, and equity, while reconsidering the relationship between rural and urban territories.

Food systems serve as vital connectors between rural and urban areas, linking agricultural production, supply chain logistics, and a wide range of economic, social, and environmental dimensions (Berkhout et al., 2023). However, the dominance of globalized agri-food chains has raised growing concerns about environmental degradation, market concentration, and social inequality, prompting a renewed interest in local food networks and urban agriculture as strategies to relocalize production and consumption (Woods, 2020). These initiatives reflect a broader attempt to reshape rural–urban relations at the territorial scale, and to reposition food as a key driver of sustainable development.

Over the past two decades, a growing body of scholarship has examined the emergence of local food policies designed to influence territorial food systems, often stemming from grassroots movements or civil society engagement (Fattibene et al., 2023). Such policies—variously described as food strategies, food plans, food councils, food districts, or food communities—share the goal of making food a strategic policy domain. Their boundaries often overlap, yet all express the ambition to integrate economic, environmental, and social objectives within a territorial framework (Mazzocchi et al., 2023).

Municipalities have increasingly reintroduced food policy into their agendas, developing institutional structures and strategic tools to intervene in the food system, even in the absence of formal mandates (Battersby, 2017). At this local level, public and private actors collaborate to address food security, public health, social inclusion, and local economic development—policy areas where national and supranational measures have often proven insufficient or poorly coordinated (Barling et al., 2002). Cities are also seeking to reconnect urban and rural dimensions within spatial planning processes (Cattivelli, 2022; Cattivelli & Rusciano, 2020).

Within this evolving landscape, two main policy instruments have become central: Food Policy Councils (FPCs) and Urban Food Strategies (UFSs). FPCs bring together diverse stakeholders—from institutions and producers to civil society organizations—to discuss, coordinate, and influence food-related decisions (Bassarab et al., 2018; Harper et al., 2009). Their functions range from data analysis and policy monitoring to building networks and supporting community education (Matacena, 2016).

UFSs, often elaborated within FPCs, serve as collective frameworks that articulate shared visions, guiding principles, and operational actions for sustainable food systems (Sonnino, 2009; Marsden & Sonnino, 2012). The first examples—Toronto (1991), Belo Horizonte (1993), and San Francisco (1997)—paved the way for a rapid proliferation of similar initiatives, culminating in the Milan Urban Food Policy Pact (MUFPP, 2015), now signed by 300 cities worldwide (as of October 2025).

Food, thus, has become a policy catalyst for transforming urban spaces and improving public health, social cohesion, local economies, and environmental sustainability (Moragues-Faus & Morgan, 2015). Yet, while most food policy innovation has been concentrated in urban contexts, non-urban territories—including rural and inner areas—are increasingly experimenting with original models of food governance. These emerging experiences represent a significant frontier in food policy research, as they require analytical and conceptual tools distinct from those applied to metropolitan settings.

At the European level, recent policy frameworks such as the European Green Deal, the Farm to Fork Strategy, and the Common Agricultural Policy (CAP) 2023–2027 have placed strong emphasis on revitalizing marginal and inner areas, aiming to balance economic development with ecological sustainability and social cohesion. In Italy, the National Strategy for Inner Areas (SNAI)—introduced in 2012—embodies a place-based and multi-level approach to territorial development (Lucatelli, 2015). Supported by national and EU funding (ERDF, ESF, EAFRD, EMFF), SNAI seeks to reverse demographic decline by improving essential services and promoting innovative local development projects. Complementary instruments such as the National Recovery and Resilience Plan (PNRR), launched under the Next Generation EU programme, further reinforce this commitment.

Despite these efforts, a major challenge persists: the evaluation of food policies and their impact on territorial transformation. Existing assessment frameworks often suffer from methodological fragmentation, limited comparability, and a lack of suitable indicators. As highlighted by Carlsson et al. (2017) and Tanguay et al. (2010), the absence of clear definitions of sustainability, the scarcity of integrated data, and the difficulty of translating global conceptualizations into local decision-making contexts continue to hinder systematic evaluation. Furthermore, most studies focus on national or urban-level initiatives, rarely capturing the specificities and contradictions of rural or marginal areas (Hiremath et al., 2013; Lynch et al., 2011).

In this context, this research aims to identify, through a review of the literature, the tools for evaluating food policies, to develop a structured model of food policy, and to explore how such policies can contribute to countering depopulation, farmland abandonment, and socio-economic decline—particularly in the Montagna Materana area (southern Italy). By analyzing the perceptions, experiences, and strategies of local stakeholders, it seeks to understand how food policies are

interpreted and implemented at the territorial level and how they can serve as levers for resilience, cohesion, and sustainable development.

Ultimately, the research aspires to conceptualize and propose a potential model of food policy specifically designed for marginal areas.

The papers on which this thesis is based are submitted (or published) in an international journal. Each of the papers is presented in a different chapter, and at the beginning of such chapters the reader is informed accordingly.

Chapter I presents a systematic review and critical appraisal of evaluation methodologies for urban food policies developed between 2015 and 2025. Through an integrated bibliometric and content analysis of forty peer-reviewed articles, it maps the field across four analytical dimensions—policy type, evaluation approach, impact domain, and Type of Indicators—while assessing the strengths and limitations of the most influential frameworks, such as the Milan Urban Food Policy Pact (MUFPP) and SAEMETH. The chapter highlights persistent methodological barriers, including data scarcity, limited analytical capacity, and the difficulty of integrating qualitative and quantitative evidence, and proposes actionable pathways to enhance the effectiveness, comparability, and adaptability of food policy evaluation tools.

Chapter II establishes the conceptual and historical foundations of territorial and urban food policies, clarifying how food systems mediate rural–urban relations and why cities have (re)entered the food policy arena. It analyses the emergence, diffusion, and governance logics of key instruments—such as Food Policy Councils and Urban Food Strategies—drawing on pioneering cases including Toronto, Belo Horizonte, San Francisco, and the Milan Urban Food Policy Pact. The chapter also systematizes the recurrent policy domains of short supply chains, circular economy, food waste reduction, and health and social inclusion, and examines the institutional architectures through which municipalities operate despite limited formal mandates. Finally, it identifies three cross-cutting barriers—resistance to change and limited capacities, weak or asymmetric rural–urban linkages, and fragmented multi-actor governance—thereby motivating the choice of Ede (Netherlands) as an illustrative case and providing an analytical framework for understanding how municipal food policies can strengthen territorial value chains and inform strategies to counter depopulation and land abandonment in inner areas.

Chapter III adopts an interpretive and qualitative approach to investigate how stakeholders in the Montagna Materana—farmers, local administrators, representatives of agricultural associations, and Local Action Groups—interpret, experience, and respond to the intertwined phenomena of

depopulation and farmland abandonment. Through ethnographic fieldwork, semi-structured interviews, and narrative and content analysis, it explores the perceived causes and consequences of these processes, their socio-economic and territorial impacts, and the locally developed strategies of resistance and adaptation, including diversification, multifunctionality, and cooperative initiatives.

Finally, this research aims to define an ideal-type model of food policy for inner areas, developed through the integration of theoretical insights and empirical findings from both the literature review and fieldwork.

Chapter I

Evaluating Urban Food Policy Impact: A Systematic Literature Review of Frameworks and Methodologies[1]

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Introduction

Rapid urbanization and its associated food challenges have increasingly captured political attention across international, national, and local levels. In recent decades, a growing number of cities have leveraged the convening power of food to unite civil society, policymakers, and the private sector in efforts to build more sustainable urban environments. This mounting awareness of the relevance of urban food systems has led to increased calls for integrated urban food policies (Pothukuch & Kaufman, 1999; Blay-Palmer, 2009, Morgan 2015).

Despite the multitude of urban food initiatives currently in place, a significant challenge persists in effectively measuring the impact of these policy processes and specific projects on enhancing the sustainability of farming systems and reinforcing the position of farmers within agri-food value chains. Various initiatives, such as the Milan Urban Food Policy Pact (MUFPP) established in 2015, underscore the global recognition of the need for coordinated actions and robust evaluation methods to support the implementation and improvement of food policies. In order to develop, implement, or monitor food policies, there have been different frameworks presented on how to assess the sustainability of a food system. These include works by Peano et al. (2015), Chaudhary et al. (2018), Bene et al. (2019), Moragues-Faus & Marceau (2019), Fanzo et al. (2021) and by Hebinck et al. (2021). The thematic scope varies among the different approaches. Some of the analysis tools provide a broader view of sustainability by considering social, environmental, and economic themes. More recently, tools to track food system transformation in the global context became available (Schneider et al., 2023) such as the Food System Countdown Initiative (FSCI) or the Food Systems dashboard. Complementarily, frameworks grounded in resilience thinking have been proposed to connect agro-food chain dynamics with ecosystem service provision. Salvia and Quaranta (2020) develop a participatory assessment framework linking resilience mechanisms within

[1] Submitted to: ***Economia agro-alimentare/Food Economy*, FrancoAngeli.**

food chains to their socio-ecological impacts, emphasizing the integration of social, economic, and environmental dimensions within localized food systems.

However, even with the proliferation of food policies, a notable gap remains in comprehensive and standardized methodologies capable of effectively assessing their multidimensional impacts. The inherent complexity of food systems, which involves intricate interdependencies across governance, environmental, economic, and social spheres, renders the assessment of policy impacts particularly challenging. Therefore, systematic and integrated approaches are essential to provide policymakers and practitioners with actionable insights and evidence-based recommendations.

This study aims to address this critical need through a systematic literature review, designed to present the current state-of-the-art in the development of evaluation frameworks and indicators for assessing the impact of food policies. Adopting this approach, the article systematically examines the methodologies used to assess the impacts of food policies from 2015 to 2025, employing comprehensive bibliometric and content analysis techniques. The primary objective of this review is to clarify the state-of-the-art of methodologies utilized in food policy evaluation, identifying key trends, the most influential evaluation frameworks, and common methodological approaches, such as indicator-based evaluations, participatory and co-design methodologies, and mixed-method approaches. The analysis examines the strengths and limitations of these methods, highlighting their applicability and adaptability in various geographical and socio-economic contexts.

This paper contributes to the existing literature by offering an integrated overview of methodological approaches to food policy impact assessment, thereby bridging theoretical developments and practical applications. It highlights significant methodological advancements, identifies persistent challenges—particularly those related to data availability and the integration of qualitative and quantitative data—and proposes critical directions for future research. Ultimately, this review seeks to support the continued development of robust and practical assessment methodologies, consequently enhancing the effectiveness and sustainability of urban food policies globally.

Methodology

This section outlines the systematic literature review (SLR) methodology employed in this study. Following the guidelines proposed by Massaro et al. (2016), who define an SLR as "a method for studying a corpus of scholarly literature, to develop insights, critical reflections, future research paths and research questions", we adopted a multi-step procedure.

A preliminary search was conducted across two major electronic databases: Scopus (Elsevier) and Web of Science. For each database, a comprehensive and optimized list of keywords, including

synonyms, was meticulously curated to maximize the identification of relevant peer-reviewed articles. In line with the SLR's objectives, the initial search string utilized was: "food policy" AND (evaluation OR performance OR effectiveness OR impact OR assessment OR metrics OR measurement OR indicators OR rural areas OR generational renewal).

The initial database search yielded 840 articles from Scopus (Elsevier) and 1,351 studies from Web of Science. To ensure congruence with our research objectives, the search was further refined (see Table 1.1). The study focused exclusively on peer-reviewed literature published between 2015 and 2025.

Specific subject areas relevant to the impact assessment of food policies were applied as filters. For Scopus, these fields included: (1) Social Sciences; (2) Agricultural and Biological Sciences; and (3) Environmental Science. Similarly, the Web of Science search was restricted to the following categories: (1) Agricultural Economics Policy; (2) Economics; (3) Environmental Sciences; (4) Multidisciplinary Science; (5) Agriculture Multidisciplinary; and (6) Social Sciences Interdisciplinary. Furthermore, the search was limited to English-written articles, excluding books, book chapters, editorials, conference papers, reports, and contributions in other languages. Research articles from all countries/regions were included.

Table 1.1 - Search string and inclusion/exclusion criteria

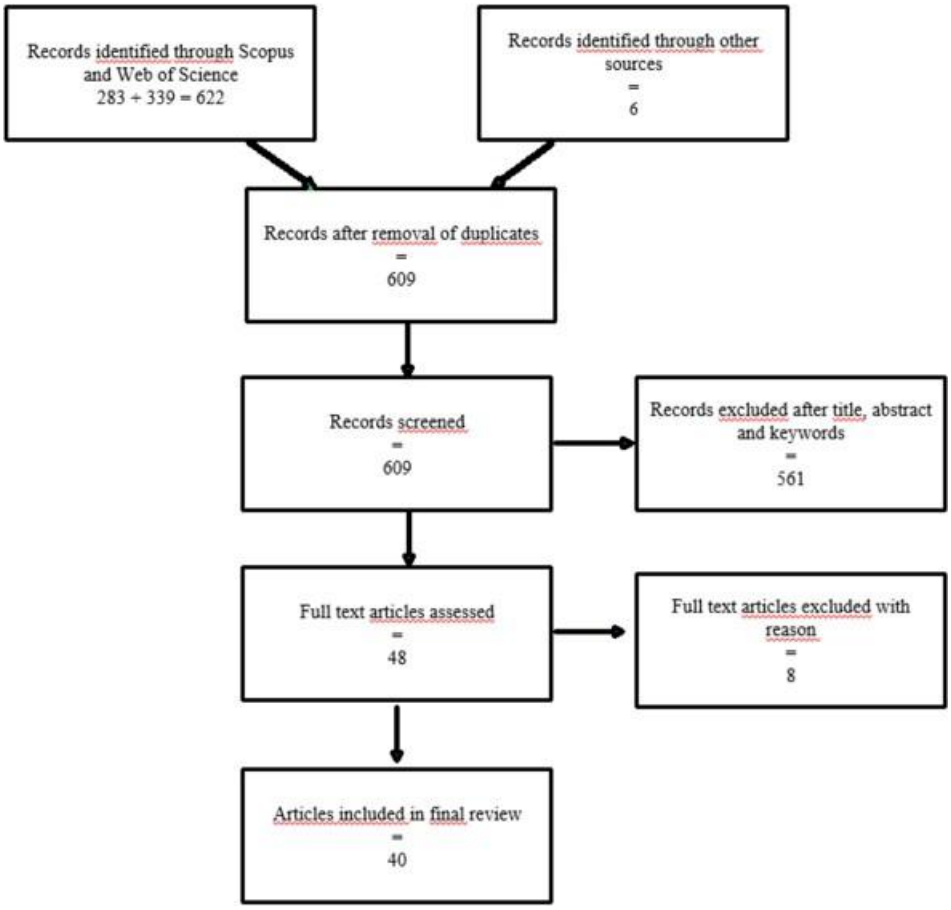
	Web of Science	*Scopus*
Advanced search	ALL= *"food policy"* AND (*evaluation* OR *performance* OR *effectiveness* OR *impact* OR *assessment* OR *metrics* OR *measurement* OR *indicators* OR *rural areas OR generational renewal*).	TITLE-ABS-KEY = *"food policy"* AND (*evaluation* OR *performance* OR *effectiveness* OR *impact* OR *assessment* OR *metrics* OR *measurement* OR *indicators* OR *rural areas OR generational renewal*).
Include	All countries/regions	All countries/regions
Limit to	English	English
	Articles	Articles
Exclude	Books	Books
	Book chapters	Book chapters
	Conference papers	Conference papers
	Editorials	Editorials
	Reports	Reports
Categories	Agricultural Economics Policy	Social Sciences
	Economics	Agricultural and Biological Sciences

Environmental Sciences	Environmental Sciences
Multidisciplinary Sciences	
Agriculture Multidisciplinary	
Social Sciences Interdisciplinary	

Source: authors

The combined database search, after initial retrieval, resulted in 622 contributions (283 from Scopus and 339 from Web of Science). A manual screening was performed to identify and remove duplicates. Following the screening of all studies based on their titles, abstracts, and keywords, 48 studies were selected for in-depth analysis. Subsequently, the full text of these 48 studies was critically reviewed, leading to the exclusion of 8 articles that did not primarily focus on food policy impact assessment. Consequently, a final set of 40 studies was selected for the systematic review (cf. Appendix I). The hierarchical process of study selection is visually represented by an adapted PRISMA framework (Moher et al., 2009), as shown in Figure 1.1.

Figure 1.1 - PRISMA Framework for detailed information



Source: authors

In the subsequent stage, a comprehensive bibliometric and co-citation analysis was conducted to further analyze the selected data. Additionally, social network analysis (SNA) was employed to identify the most influential authors within the research network. The bibliometric analysis was performed using R, specifically with the bibliometrix package (Aria et al., 2017). The analysis of the extant literature on the impact of food policies focused on: (1) year of publication; (2) country of research; (3) most-cited sources and articles; and (4) collaboration network.

For the qualitative data analysis, NVivo software was utilized to manage and visualize the data through descriptive research (Jackson, K.; Bazeley, P. 2019). As highlighted by O'Neill et al. (2018), NVivo "enables creation of a snapshot of each theme … to highlight the gaps in the literature … (and) to conduct an effective analysis of the literature". Each selected study underwent rigorous examination using a coding grid structured around four key dimensions:

- Policy Type
- Evaluation Approach
- Impact Domain
- Type of Indicators

The final phase of the SLR involved the interpretation of key findings and a thorough discussion of results. This was aimed at addressing the pre-determined research questions stated in the study's introduction and gaining a deeper understanding of potential future research directions.

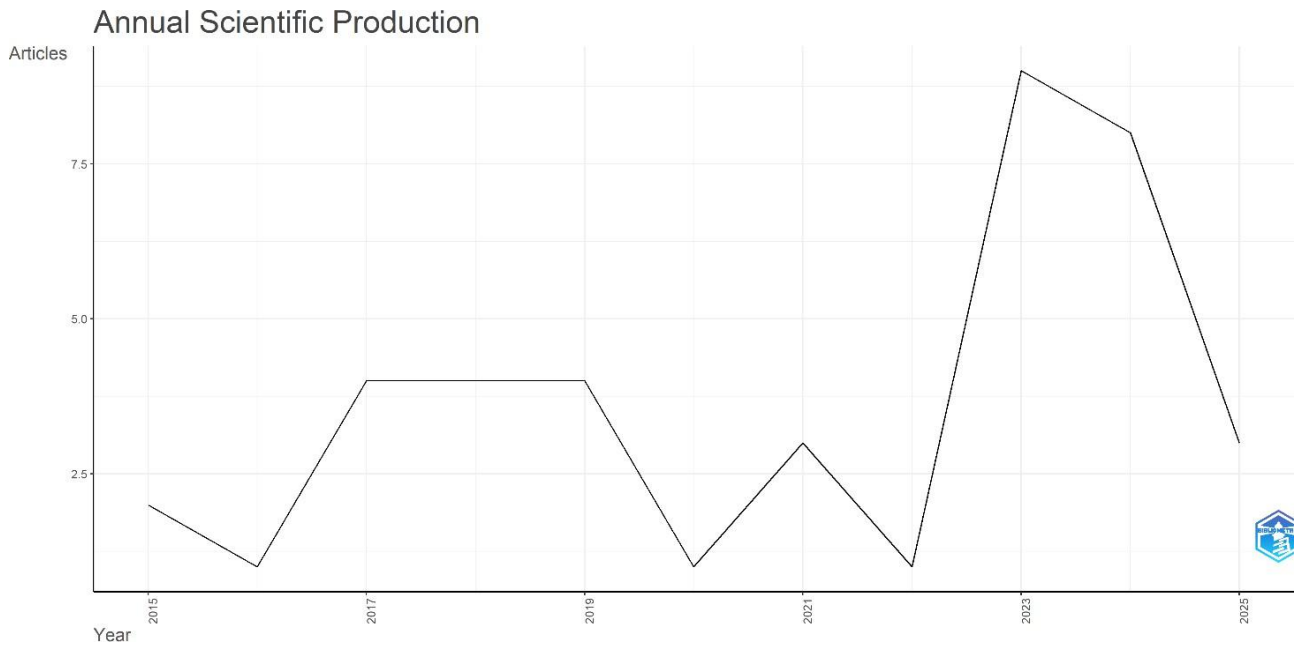
Results

Main bibliometric findings

This section provides a concise overview of the characteristics of the studies included in this literature review on food policy evaluation methods published between 2015 and 2025. The selection of articles from 2015 onwards is justified by the steady increase in the number of cities formulating and implementing their own food policies, particularly following Expo 2015 and the signing of the Milan Urban Food Policy Pact (Dansero et al., 2022)

Figure 1.2 illustrates the annual distribution of documents published and the annual growth rates of scientific output. A notable increase in publications within the chosen area is evident after the year 2022.

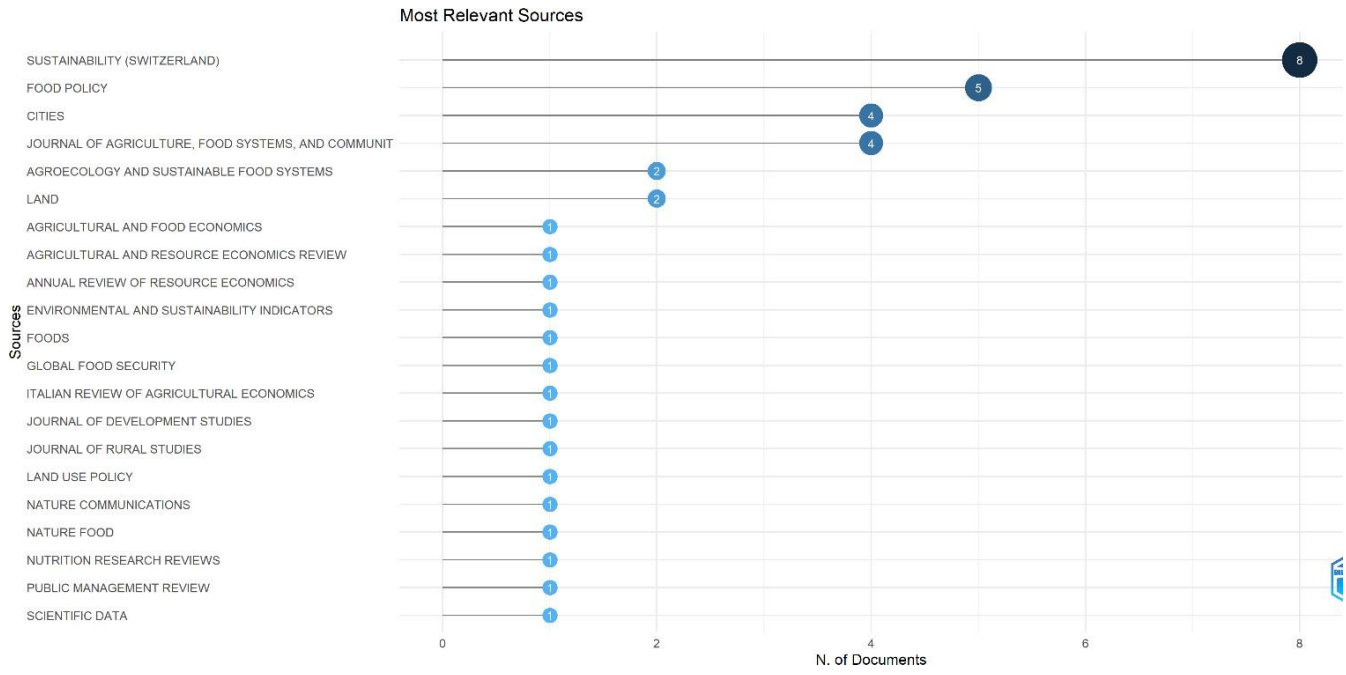
Figure 1.2 – Evolution of the literature over time



Source: authors

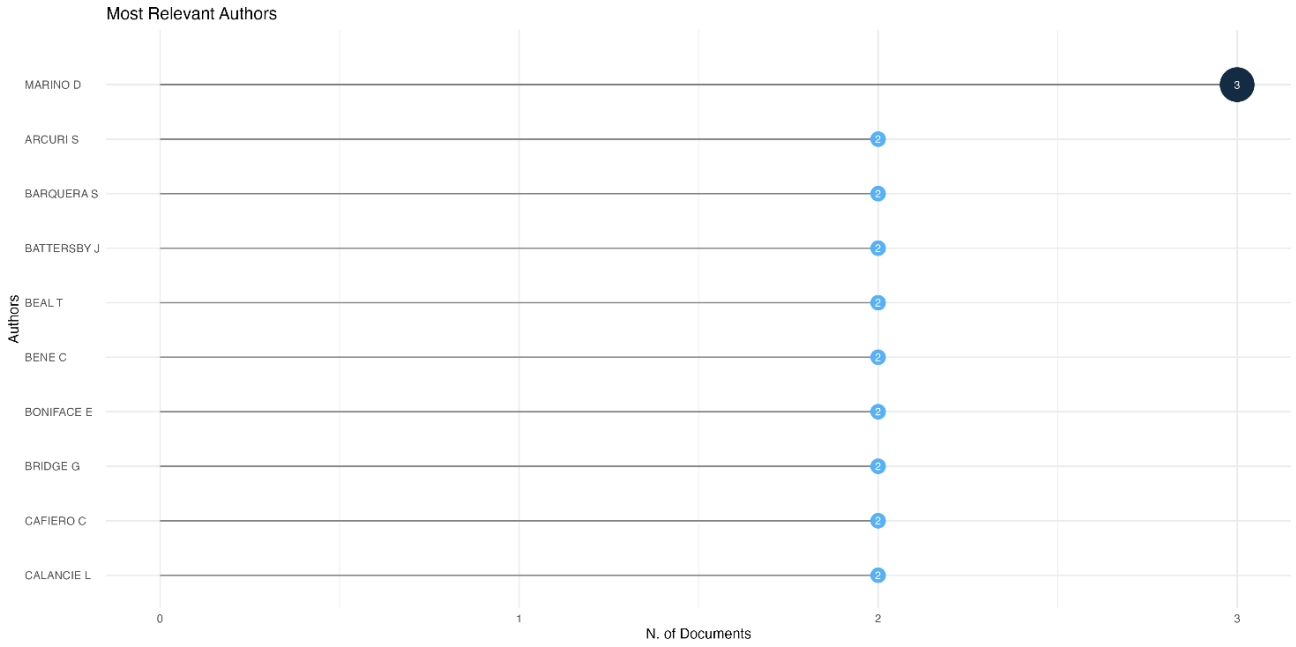
Figure 1.3 displays all journals that have published studies on food policy evaluation methods. Among these, *Sustainability* has published more studies on food policy evaluation methods than any other journal, with *Food Policy* ranking second. Similarly, the most relevant authors are presented in Figure 1.4.

Figure 1.3 - The most relevant sources



Source: authors

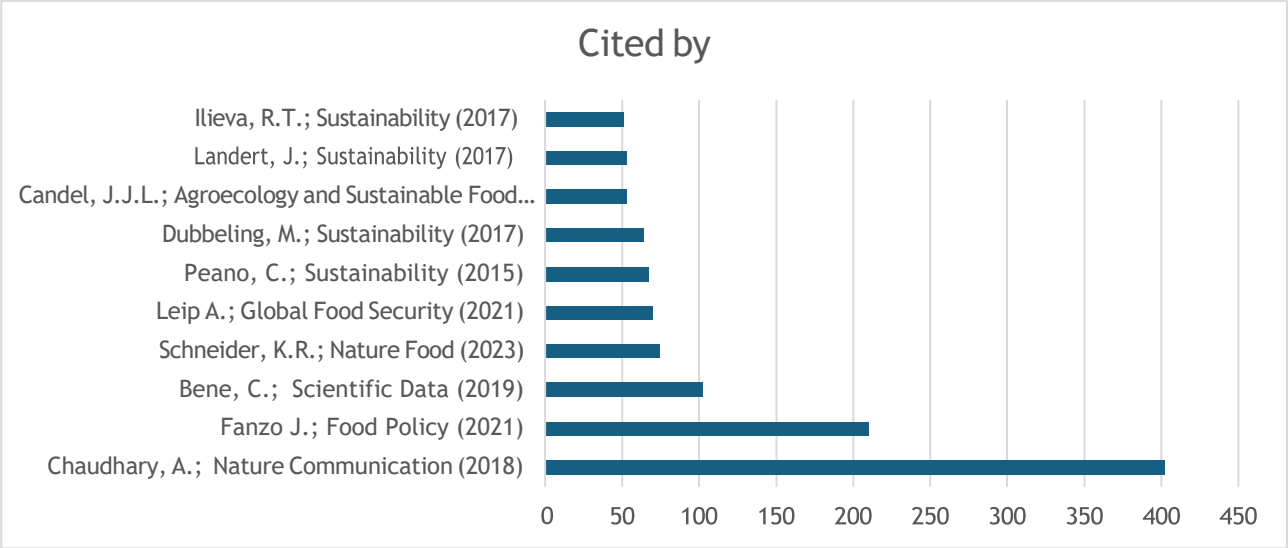
Figure 1.4 - The most relevant authors



Source: authors

The most globally cited article (Figure 1.5) was authored by Chaudhary A. et al. (2018), followed by Fanzo J. et al. (2021), Bene C. et al. (2019), and Schneider K.R et al. (2023).

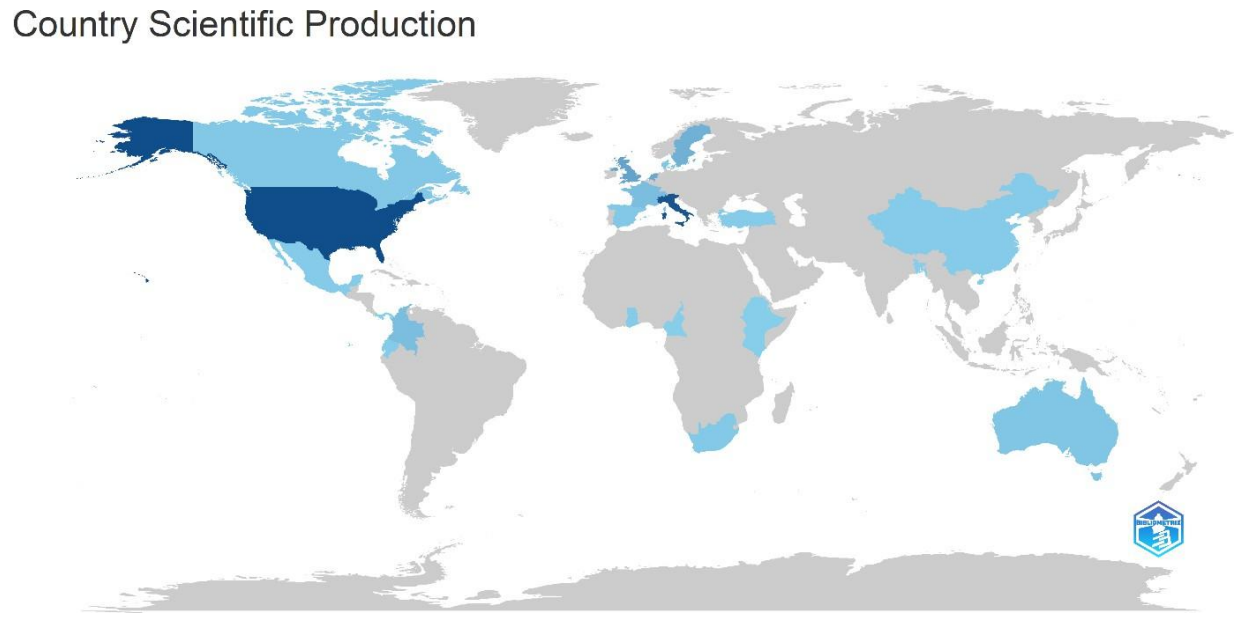
Figure 1.5 – The most global cited articles



Source: authors

Regarding geographical distribution, the mapping of studies was conducted by identifying the nationality (based on affiliation) of the first author, as shown in Figure 1.6. The United States of America and Italy emerge as the two largest contributors compared to all other countries. Other significant contributing countries include the United Kingdom, the Netherlands, SwEden, France, Switzerland and Australia, while Bangladesh, Ethiopia and Kenya show the least contribution.

Figure 1.6 – The most prolific countries



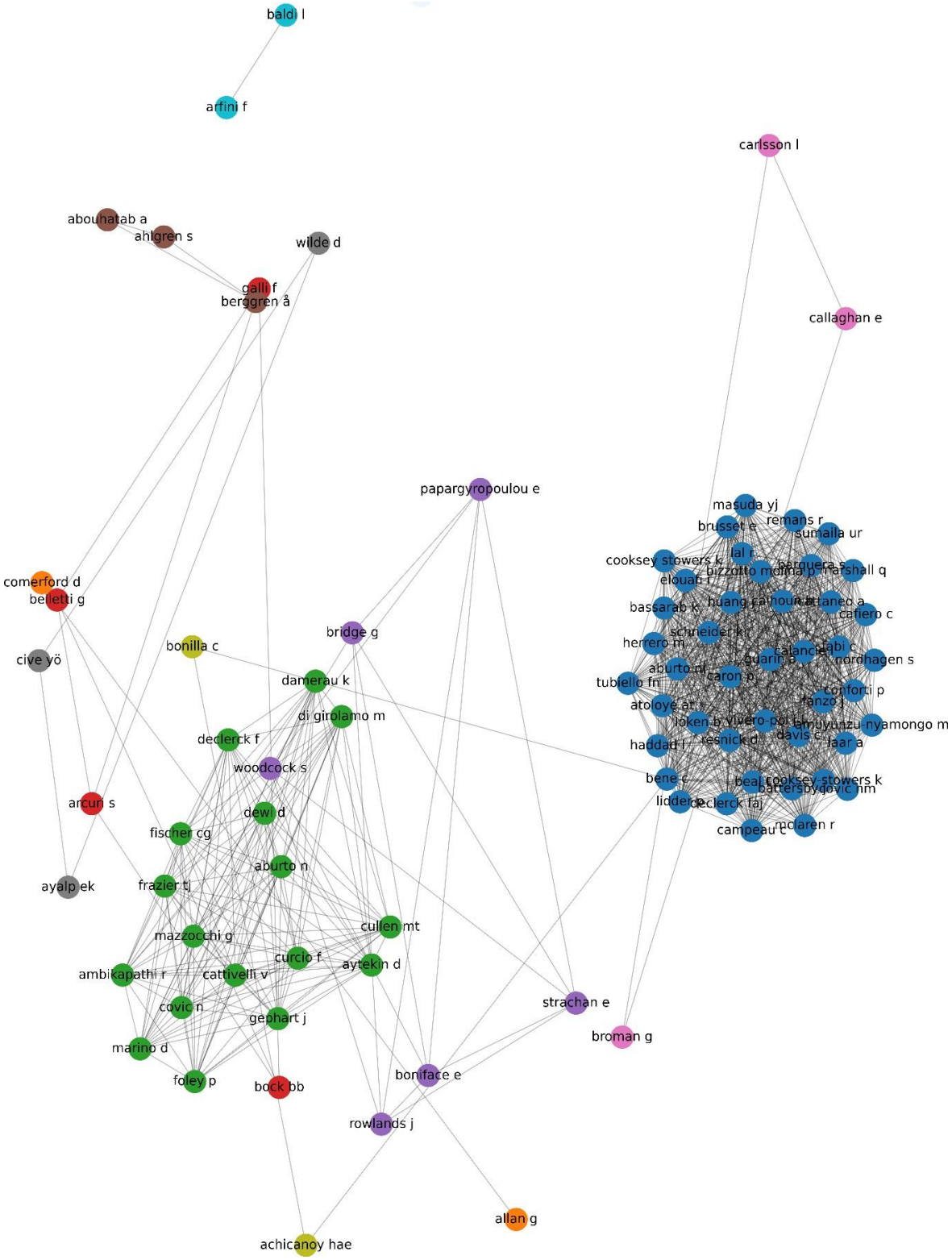
Source: authors

Subsequently, a scientific collaboration network was analyzed, where nodes represent authors and links signify co-authorships. This is recognized as one of the most well-documented forms of scientific collaboration (Glänzel & Schubert, 2004). The relevance of these nodes was measured using three key centrality indicators: PageRank, Betweenness Centrality, and Closeness Centrality.

The results consistently indicate a total of twelve collaboration communities and a core group of authors occupying strategic positions within the network's overall structure, see Figure 1.7. Specifically, Barquera S, Laar A, Vivero-Pol J-L, Tubiello F.N., and Sumaila U.R. consistently ranked highest across all three metrics. This suggests their crucial role, not only within their respective clusters but also as bridges between different scientific communities. PageRank centrality indicates that these authors are not only highly connected but also tend to collaborate with other central authors, acting as authoritative nodes within the network. Betweenness Centrality highlights their role as intermediaries between subgroups, confirming their function as crucial hubs in interdisciplinary collaboration trajectories. Finally, Closeness Centrality underscores their proximity to all other nodes in the network, indicating a favorable position for the dissemination of ideas and knowledge within the analyzed scientific system. Collectively, these authors represent key figures for the cohesion and integration of the network. They ensure both the internal density of clusters and the connection between distinct domains, thereby facilitating the development of a broad and interconnected research community.

The relative strength of all nodes and the clusters of the collaboration network is detailed in Table 1.2.

Figure 1.7 – The co-occurrence Network



Source: authors

Table 1.2 - The relative strength of the nodes within the collaboration network

Node	Cluster	Betweenness	Closeness	PageRank
calancie l	1	6	0,2	0,044551166
atoloye at	1	0	0,142857143	0,02709315
bassarab k	1	0	0,142857143	0,02709315
calhoun h	1	0	0,125	0,020418026
cooksey-stowers k	1	0	0,125	0,020418026
marino d	2	2	0,333333333	0,043234341
mazzocchi g	2	0	0,25	0,032079617
cattivelli v	2	0	0,2	0,013353964
curcio f	2	0	0,25	0,022443189
arcuri s	3	0,5	0,333333333	0,036062378
galli f	3	0,5	0,333333333	0,036062378
belletti g	3	0	0,25	0,019493177
bock bb	3	0	0,25	0,019493177
boniface e	4	0	0,2	0,027777778
bridge g	4	0	0,2	0,027777778
papargyropoulou e	4	0	0,2	0,027777778
rowlands j	4	0	0,2	0,027777778
strachan e	4	0	0,2	0,027777778
woodcock s	4	0	0,2	0,027777778
abouhatab a	5	0	0,5	0,027777778
ahlgren s	5	0	0,5	0,027777778
berggren å	5	0	0,5	0,027777778
broman g	6	0	0,5	0,027777778
callaghan e	6	0	0,5	0,027777778
carlsson l	6	0	0,5	0,027777778
wilde d	7	0	0,5	0,027777778
ayalp ek	7	0	0,5	0,027777778
cive yö	7	0	0,5	0,027777778
achicanoy hae	8	0	0,5	0,027777778
bene c	8	0	0,5	0,027777778
bonilla c	8	0	0,5	0,027777778
arfini f	9	0	1	0,027777778
baldi l	9	0	1	0,027777778
allan g	10	0	1	0,027777778
comerford d	10	0	1	0,027777778
barquera s	11	3,033	0,02	0,024
battersby j	11	3,033	0,02	0,024
beal t	11	3,033	0,02	0,024
bene c	11	3,033	0,02	0,024
cafiero c	11	3,033	0,02	0,024
campeau c	11	3,033	0,02	0,024
caron p	11	3,033	0,02	0,024
cattaneo a	11	3,033	0,02	0,024
conforti p	11	3,033	0,02	0,024

elouafi i	11	3,033	0,02	0,024
fabi c	11	3,033	0,02	0,024
fanzo j	11	3,033	0,02	0,024
guarin a	11	3,033	0,02	0,024
haddad l	11	3,033	0,02	0,024
herrero m	11	3,033	0,02	0,024
huang j	11	3,033	0,02	0,024
laar a	11	3,033	0,02	0,024
lal r	11	3,033	0,02	0,024
lidder p	11	3,033	0,02	0,024
loken b	11	3,033	0,02	0,024
marshall q	11	3,033	0,02	0,024
masuda yj	11	3,033	0,02	0,024
mclaren r	11	3,033	0,02	0,024
nordhagen s	11	3,033	0,02	0,024
remans r	11	3,033	0,02	0,024
resnick d	11	3,033	0,02	0,024
schneider kr	11	3,033	0,02	0,024
sumaila ur	11	3,033	0,02	0,024
tubiello fn	11	3,033	0,02	0,024
vivero-pol j-l	11	3,033	0,02	0,024
aburto nj	11	0	0,016	0,013
amuyunzu-nyamongo m	11	0	0,016	0,013
bizzotto molina p	11	0	0,016	0,013
brusset e	11	0	0,016	0,013
covic nm	11	0	0,016	0,013
davis c	11	0	0,016	0,013
declerck faj	11	0	0,016	0,013
aburto n	12	0	0,018	0,014
ambikapathi r	12	0	0,018	0,014
aytekin d	12	0	0,018	0,014
covic n	12	0	0,018	0,014
cullen mt	12	0	0,018	0,014
damerau k	12	0	0,018	0,014
declerck f	12	0	0,018	0,014
dewi d	12	0	0,018	0,014
di girolamo m	12	0	0,018	0,014
fischer cg	12	0	0,018	0,014
foley p	12	0	0,018	0,014
frazier tj	12	0	0,018	0,014
gephart j	12	0	0,018	0,014

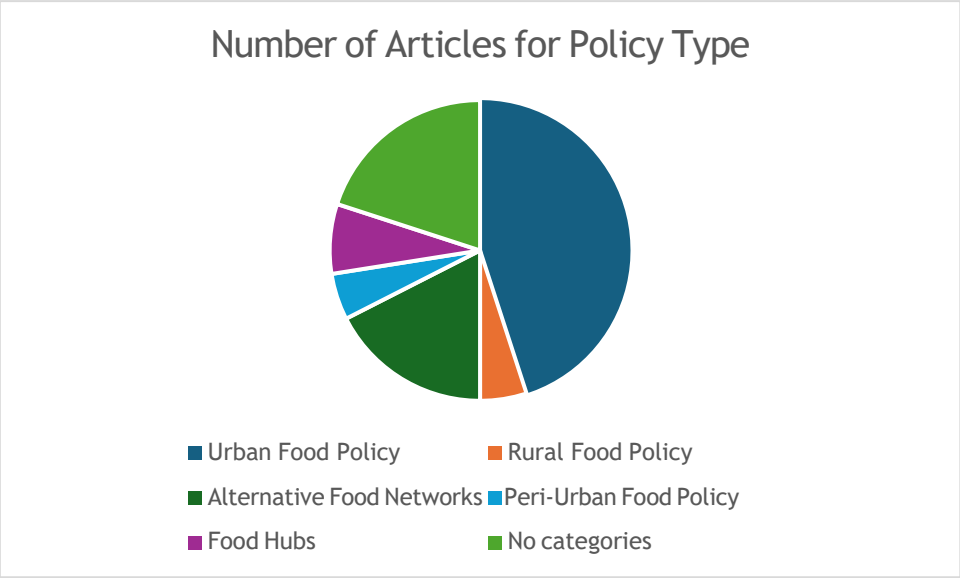
Source: authors

Content Overview

Content analysis is a semi-quantitative research method. Mixed-methods research offers a more comprehensive understanding of a research project than relying on a single approach (Biesta G.,

2012). The fundamental principle of content analysis is based on examining alterations in all forms of information. It is a methodical procedure involving the extraction of precise and meaningful insights from representative words and sentences (Luo J., 2001). For qualitative analysis, we employed manual coding of the papers for the content analysis process. The thematic categories and subcategories derived from this analysis are presented in Table 1.3. Four primary thematic categories were identified: “Policy Type,” “Evaluation Approach,” “Impact Domain,” and “Type of Indicators.” Each category includes subcategories that account for the diverse subtopics addressed in the reviewed publications. Our analysis revealed that Urban Food Policy emerged as the most frequent (n. 18) topic in the sample of articles (Figure 1.8). An increasing number of European cities have been experimenting with an "urban food revolution" (Moragues-Faus, 2021). Many are adopting food policies to address food security-related challenges (Dessì et al., 2017; Barilla Foundation, 2020; C40 Cities, 2019) and facilitate the transition to more sustainable food systems (Doernberg et al., 2019; Sonnino et al., 2019).

Figure 1.8 - Type of Policies in the selected articles



Source: authors

The content analysis specifically focused on identifying evaluation approaches, impact domains, and types of indicators within food policy evaluation studies. The results indicate the use of various evaluation schemes, particularly indicator-based frameworks, mixed methods, qualitative and quantitative evaluations, participatory action research/co-design, and narrative/document-based assessment (Table 1.3). Indicator-based frameworks prominently feature structured indicator sets derived from well-established methodologies. The literature review revealed several ongoing initiatives to develop urban food indicators, such as the Milan Food Policy Pact Monitoring (Sibbing

et al., 2022). The MUFPP is an international agreement proposed by the Municipality of Milan in 2015 to promote sustainable urban food systems through city-to-city collaboration and exchange of practices; 300 cities have signed the pact to date, influencing the food distribution and consumption patterns of their 500 million inhabitants (MUFPP, 2025). This framework addresses multiple impact domains, including Governance, Sustainable Diets and Nutrition, Social and Economic Equity, Food Production, Food Supply & Distribution, and Food Waste.

Of particular importance are the Sustainability Assessment of Food and Agriculture Systems (SAFA Guidelines) developed by FAO (2014), which aim to harmonize existing approaches within a common framework comprising four dimensions of sustainability—Good Governance, Environmental Integrity, Economic Resilience, and Social Well-Being—to evaluate the sustainability of farms or businesses along the food value chain (Landert et al., 2017). Landert et al. (2017) propose a framework to evaluate urban food system governance using SAFA guidelines. To date, a significant portion of the literature has focused on evaluating agriculture's contribution to sustainability. The "Sustainable Agri-Food Evaluation Methodology" (SAEMETH) is a framework designed to guide the evaluation of the socio-cultural, agri-environmental, and economic sustainability of various organizational forms within the small-scale agri-food supply chain (Peano et al., 2015). This framework was developed collaboratively with a group of stakeholders through a participatory process to assess the sustainability performance of small-scale agri-food systems. Similarly, Moragues-Faus (2019), Bridge et al. (2025), and Carlsson et al. (2017) designed a participatory action research process to co-produce assessment frameworks.

One such framework was developed through a co-participatory process involving over 100 stakeholders in 41 UK cities to jointly define vision, objectives, and indicators. This framework encompasses three thematic dimensions: economic, environmental, and health and social well-being. Bridge et al. (2025) co-developed a tool organized into four sections, grouping the impacts food hubs have in terms of (a) sustainability and resilience; (b) health and well-being; (c) access and demand for healthy, local food; and (d) food security and economy. Carlsson et al. (2017) propose a process to support communities in self-advocacy to drive change for sustainable food systems, based on a concrete definition of sustainability, which aids coordination across geographical scales. The authors utilized a mixed approach, engaging 31 international experts (academics, professionals, policymakers) in multiple rounds of anonymous online questionnaires and three in-person workshops to discuss emergent results and co-build a thematic list of indicators. Participants were prompted to consider scale throughout the process to explore locally relevant themes. The framework, built upon the Framework for Strategic Sustainable Development (FSSD), is a two-dimensional matrix with four

thematic categories (e.g., ecological integrity, social integrity, human health, food system infrastructure) and three geographical levels (global, national/regional, local). Given the interconnectedness of food systems across multiple scales, from global to local, the ability to examine or monitor outcomes across these scales is highly beneficial.

To guide food system transformation toward sustainability, Hansson et al. (2024) developed the Food System Sustainability House, tailored to a specific national context (SwEden). This model distinguishes between impacts of domestic production arising within territorial boundaries and impacts related to Swedish consumption, regardless of the country of origin. The impact domains cover all three dimensions of sustainability, structured within the "house" metaphor to represent a sustainable food system. This metaphor illustrates how the "ceiling" (societal dimensions), "walls" (economic dimensions and governance), and "floor" (environmental dimensions) are interlinked and each essential in its specific place (Hansson et al., 2024).

An increasing number of studies are evaluating food system performance in relation to various concepts. In recent decades, the concept of agroecology has gained increasing relevance within the global scientific community, becoming a basis for transforming entire agri-food systems. This is achieved by integrating multiple facets of sustainability (Gliessman, 2020) and adopting a bottom-up approach informed by the knowledge and natural resources of local communities for agricultural production (Nicholls & Altieri, 2018). To investigate agroecological transition at the farm level, FAO developed the TAPE framework, launched in 2019 (FAO, 2019). TAPE is a tool that uses a household- and farm-scale approach but also captures information and provides results at the territorial level (FAO, 2019). The TAPE tool is a questionnaire structured around the 10 elements of the Agroecology framework: Diversity, Cooperation and Knowledge Exchange, Synergy, Efficiency, Recycling, Resilience, Human and Social Values, Food Culture and Tradition, Responsible Governance, and Circular and Solidarity Economy. These elements of Agroecology resulted from a multi-stakeholder process intended to generate a system re-design framework optimized and adapted to local contexts. For each of these items, there are questions containing five response modes constructed according to a scale ranging from 0 to 4.

Through the reviewed literature, research on the evaluation of food policies involves quantitative analysis (Freudenberg et al., 2018; Anik & Rahman, 2021; Chaudhary et al., 2018), mixed-methods approaches (Godrich et al. 2024; Monticone et al. 2023), and narrative/document-based assessment (Candel 2020; Ilieva 2017). Freudenberg (2018) proposes an evaluative method based on the analysis of the annual Food Metrics Report to assess how the metrics describe a city’s progress in implementing municipal food policies. The Food Metrics Report tracks 37 separate quantitative

indicators across five Policy Goals: improving nutritional well-being, promoting food security, creating food systems that support economic & community development, ensuring a sustainable food system, and supporting food workers. For each indicator, authors determined whether the observed change represented an improvement, decline, no change, or no assessment. The study by Anik & Rahman (2021) is part of agricultural policies that promote female empowerment and gender equality in agriculture through quantitative econometric analysis using the WEAI framework developed by Alkire et al. (2013). The index is composed of 10 indicators across five domains (i.e., production, resources, income, leadership, and time allocation) of agriculture, which are commonly found in literature defining empowerment (Alkire et al., 2013). Some of these studies use a combination of qualitative (e.g., document analysis, interviews, surveys, focus groups, and participant observation) and quantitative data sources to triangulate policy effects. Finally, Ilieva (2017) and Candel (2020) conducted comparative analyses of existing urban food policy initiatives encompassing a larger number of cities and more diverse geographical contexts, extending beyond North American experiences. Multiple frameworks exist to measure agri-food system performance; however, these often operate at a global scale to align with worldwide initiatives such as the United Nations Sustainable Development Goals (SDGs) (Ilieva 2017; Chaudhary et al., 2018; Béné et al., 2019; Fanzo et al., 2021; Petruzzelli 2023; Schneider et al., 2023).

From the analysis of the literature, quantitative indicators (measurable – percentages, rates) and qualitative (interviews, documents, observations) measures/indicators have emerged for evaluating food systems and food policies (Peano et al. 2015; Carlsson et al. 2017; Landert et al. 2017; Ilieva 2017; Moragues-Faus and Marceau 2019; MUFPP 2018; Freudenberg 2018; Bridge et al. 2025). The most used approaches can be classified into three groups: approaches that use indicator checklists, approaches that apply a framework, and approaches that use composite indicators. The use of indicators was originally focused on economic sustainability, employing measures such as net income and gross margin (FAO, 1993). When the concept of environmental sustainability was approached, the focus shifted to aspects like the evaluation of soil quality, pesticide use, crop rotations, and soil fertility or biodiversity management (The Economist Intelligence Unit).

Non-academic institutions have been particularly active in developing some of these frameworks, including the Sustainability Assessment of Food and Agriculture Systems (SAFA Guidelines). This framework includes 97 quantitative and qualitative indicators based on 58 sub-themes divided into four dimensions:

1. Good Governance
2. Environmental Integrity

3. Economic Resilience
4. Social Well-Being

Among indicator frameworks, the Milan Urban Food Policy Pact (MUFPP) framework currently has the largest potential reach for usage by local governments. Its purpose is:

- to illustrate whether the "desired changes" are occurring and their impact;
- to evaluate gaps in policy advancement and resource mobilization, and reveal overall urban food systems improvement (if measured periodically);
- to encourage collaboration between municipalities and stakeholders, national groups, and governments to address food system challenges (Sibbing et al. 2022).

The framework includes outcome areas, recommended actions to achieve the intended outcomes, and its core: a list of 44 indicators for monitoring improvement in the achievements of cities' expected outcomes (FAO 2019).

Notwithstanding these numerous studies and methodological advances, the spread of reference frameworks and indicators has been exceptionally slow. A significant effort in the dissemination and application of these methodologies involves the particular attention given to the involvement of end-users. For instance, the SAEMETH framework, through continuous exchange with stakeholders, has enabled the selection of qualitative indicators considered relevant for small-scale agri-food systems (Peano et al., 2015). Similarly, Carlsson et al. (2017) emphasize that it is essential for actors to preliminarily agree upon their objectives and methods, as this provides a foundation for selecting, developing, and combining appropriate tools, including indicators. The importance of integrating participatory, multi-stakeholder approaches within local food policy planning is also recognized by Moragues-Faus and Marceau (2019).

Conversely, other studies have positively viewed composite indicators, where a specific set of indicators is evaluated by integrating them into a single value, such as WEAI indicators. The aim is to measure women's achievement and empowerment in agriculture by estimating their role and engagement in agricultural activities, while the other indicator focuses on intra-household empowerment parity in agriculture-related activities (Anik & Rahman, 2021).

Overall, the reviewed studies reveal a wide diversity of frameworks and approaches aimed at evaluating food systems and policies. Both qualitative and quantitative indicators are increasingly being used, either separately or in combination, to assess various dimensions of sustainability. However, literature remains fragmented, with methodologies differing in scope, scale, and data

sources. This heterogeneity highlights the ongoing effort to build comprehensive and comparable evaluation systems across contexts.

Table 1.3 - Summary of Evaluation Approach, Type of Indicators and Impact Domain

Evaluation Approach	Type of Indicators	Author & Year
Indicator-based frameworks	Qualitative & Quantitative	Peano et al. (2015); Candel (2020); Sibbing et al. (2022); Béné et al. (2019); Schneider et al. (2023); Hansson et al. (2024); Landert et al. (2017); Marino et al., (2024)
Mixed Methods	Mixed: qualitative and quantitative triangulated	Carlsson et al. (2017); Godrich et al. (2024); Monticone et al. (2023); Fanzo et al. (2021)
Quantitative Analysis	Quantitative/Composite Indicators	Anik & Rahman (2021); Freudenberg et al. (2018); Chaudhary et al. (2018)
Narrative/document-based assessment	Qualitative (documents, interviews, observations)	Godrich et al. (2024); Candel (2020); Ilieva (2017); Petruzzelli (2023)
Participatory Action Research/Co-Design	Co-produced indicators (qualitative and quantitative)	Bridge et al. (2025); Carlsson et al. (2017); Peano et al. (2015); Moragues-Faus (2019)

Author & Year	Governance	Sustainable Diets & Nutrition	Social & Economic Equity	Food Production & Agriculture	Supply & Distribution	Food Waste & Circularity	Health & Well-being	Environmental Sustainability	Empowerment & Participation	Resilience
Moragues-	✔	✔	✔		✔	✔	✔	✔	✔	✔

Faus (2019)										
MUFPP (Sibbing et al., 2022; Candel 2019)	✔	✔	✔	✔	✔	✔	✔	✔		
Bridge et al. (2025)	✔	✔	✔		✔		✔		✔	✔
Carlsson et al. (2017)	✔		✔	✔			✔	✔	✔	✔
Landert et al. (2017)	✔	✔	✔	✔		✔		✔		
Fanzo et al. (2021)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Peano et al. (2015)			✔	✔				✔	✔	
Hansson et al. (2024)	✔	✔	✔	✔			✔	✔		
Schneider et al. (2023)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Marino et al. (2024)			✔	✔				✔	✔	
Béné et al. (2019)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Petruzzelli et al. (2023)	✔	✔	✔		✔		✔			✔
Coppo et al. (2017)	✔		✔	✔				✔	✔	
Chaudhary et al. (2018)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Type of Indicators and the dimensions assessed		
DIMENSION	INDICATORS	SOURCE
Social & Economic Equity	Percentage of food insecure households based on the Food Insecurity Experience Scale	(MUFPP Sibbing et al., 2022)
	Gender Equity: labor force participation rate, female (% of female population ages 15+)	The World Bank
	Agriculture under-employment (%)	International Labour organization - UN
Food Production & Agriculture	Number of city residents within the municipal boundary with access to an urban (agricultural) garden	(MUFPP Sibbing et al., 2022)
	Employment - Increase in the number of (salaried) workers	(SAEMETH Framework Peano et al., 2015)
	Sale price - Profitability of the product	(SAEMETH Framework Peano et al., 2015)
	Number of different urban agriculture facilities	Toronto Urban Agriculture Indicators (2016)
	Number of people waiting to access urban agriculture programs and plots	Toronto Urban Agriculture Indicators (2016)
Supply & Distribution	Market diversification – New kinds of markets	(SAEMETH Framework Peano et al., 2015)
	New commercial channels – Activation of new commercial channels	(SAEMETH Framework Peano et al., 2015)
	Contracting power of the producer – Increase in producer contracting power	(SAEMETH Framework Peano et al., 2015)
	Economic alliances – Partnership duration with other businesses and distributors	(SAEMETH Framework Peano et al., 2015)
	Existence of policies/programs that address the reduction of GHG emissions in different parts of the food supply chain (e.g. processing, storage, transport, packaging, retail, cooking, waste disposal etc.)	(MUFPP Sibbing et al., 2022)
	Number of urban agriculture growers supplementing their income with produce sales	Toronto Urban Agriculture Indicators (2016)
	Number of farmers who direct market	Los Angeles Food System Snapshot (2013), Food Systems Report (2009)
	Value of direct sales in the foodshed	Los Angeles Food System Snapshot (2013)
	Number of Community Supported Agriculture farms	Food Systems Report (2009)

	Number of food manufacturers receiving monetary benefits from city agencies	New York City Food System Metrics Report (2016)
	Number of food co-ops	Toronto Food by Ward: Food Assets and Opportunities (2016)
	Number of city-wide food box programs	Toronto Food by Ward: Food Assets and Opportunities (2016)
	Number of food festivals	Toronto Food by Ward: Food Assets and Opportunities (2016)
	Number and size of local food hubs	New York City Five Borough Food Flow (2016); Los Angeles Food System Snapshot (2013)
	Number of daily truck and rail trips to or through local food hubs	New York City Five Borough Food Flow (2016)
	Percent of food with lower shelf-life and specific infrastructure requirements	New York City Five Borough Food Flow (2016)
	Percent of annual food volume distributed by distributor type and broken down by types of point-of-sale outlets where it is being sold	New York City Five Borough Food Flow (2016)
	Percent of annual food volume retrieved by different types point-of-sale outlets and broken down by supplier types	New York City Five Borough Food Flow (2016)
	Customer segments served by food hubs per type	New York City Five Borough Food Flow (2016)
	Food distributors market share split	New York City Five Borough Food Flow (2016)
	Percent of excess storage capacity per point-of-sale outlet category	New York City Five Borough Food Flow (2016)
	Typical storage use by different point-of-sale outlets	New York City Five Borough Food Flow (2016)

Source: authors

Discussion

Conducted in accordance with the PRISMA protocol, this systematic review provides a comprehensive mapping of the methodological landscape for food policy evaluation between 2015 and 2025. The analysis reveals both substantial methodological advances and enduring challenges that continue to shape this evolving field. Since its launch in 2015, the Milan Urban Food Policy Pact (MUFPP) has emerged as a pivotal framework, mobilizing cities worldwide and stimulating scholarly attention toward urban food policy evaluation. Its indicator framework—one of the most ambitious attempts to standardize food policy assessment across cities—has significantly influenced research and practice. However, its implementation exposes enduring tensions between the

aspiration for cross-city standardization and the need for context-sensitive adaptation, highlighting a key methodological dilemma for urban food policy evaluation.

From a scientific perspective, this study contributes an integrated bibliometric and content analysis focusing on four analytical dimensions: policy type, evaluation approach, impact domains, and indicator typology. The findings reveal a diversified yet fragmented methodological landscape characterized by considerable evolution but persistent weaknesses. Among these, the availability, quality, and accessibility of data remain the most cited barriers to effective evaluation (Kaur & D'Andreamatteo, 2025; Moragues-Faus & Marceau, 2019; Sonnino & Coulson, 2020; Verma & Raghubanshi, 2018; Coppo et al., 2017). Even when indicators are derived from existing datasets, problems related to data collection (due to resource limitations), data sharing (due to reluctance from data holders), and data analysis (due to technical skill deficits) continue to constrain the robustness and comparability of evaluation outcomes across cities.

Consistently with previous research (Coppo et al., 2017), this analysis confirms that several practical difficulties and methodological limitations persist despite the growing number of frameworks and the development of both qualitative and quantitative indicators. The most recurrent issues concern data availability, accessibility, comparability, and fragmentation, as well as the costs associated with data collection. Moreover, the intrinsic complexity of food systems often challenges their translation into feasible and robust research methodologies. Finally, the definition of research boundaries, scale, and scope tends to influence comparability and replicability across studies. Collectively, these constraints hinder the long-term monitoring of food policy effectiveness and limit the advancement of evidence-based decision-making.

A key methodological insight concerns the heterogeneous and complex nature of evaluation frameworks adopted in different geographical and thematic contexts. Many studies rely on indicator-based frameworks—such as the Sustainability Assessment of Food and Agriculture Systems (FAO, 2014), the Holistic Sustainability Assessment Method (Landert et al., 2017), the City Region Food System Indicator Framework (Carey & Dubbeling, 2017), and the MUFPP Indicator Framework (FAO, 2019; MUFPP, 2018)—which have played an important role in structuring evaluation practices. Yet, these frameworks often struggle to balance analytical comprehensiveness with operational feasibility, particularly in municipalities with limited institutional capacity.

At the same time, the review highlights the growing prominence of participatory and co-design approaches in the evaluation of food policies. Frameworks such as SAEMETH (Peano et al., 2015) and participatory tools developed by Bridge et al. (2025) demonstrate that meaningful stakeholder

engagement increases the legitimacy, relevance, and practical utility of evaluation frameworks. Similarly, Salvia and Quaranta (2019) emphasize that multi-actor platforms can serve as effective mechanisms for knowledge co-creation and adaptive governance within socio-ecological food systems, enhancing collaboration and innovation capacity across stakeholders. By engaging actors from civil society, community organizations, and local governments, these approaches facilitate knowledge co-production and strengthen alignment between policy goals and community needs. However, as noted by several scholars (Dubbeling & Merzthal, 2006; Moragues-Faus & Marceau, 2019), participatory approaches are not without challenges: they are resource-intensive, may reproduce existing power asymmetries, and lack standardized guidance for scaling across different governance contexts.

Another crucial finding concerns mixed-methods approaches, which aim to integrate quantitative and qualitative dimensions in evaluating complex food systems. While recent studies (Godrich et al., 2024; Monticone et al., 2023) have successfully experimented with combining these dimensions, systematic methodological guidance on how to operationalize such integration remains limited. As a result, most studies rely on basic triangulation rather than advanced integration techniques such as participatory mapping, deliberative valuation, or transdisciplinary research. This highlights an enduring implementation gap between methodological innovation and its application in real-world policy evaluation.

Geographically, the research landscape is dominated by studies from Italy and the United States, reflecting differences in institutional capacity, research funding, and the influence of policy initiatives such as the MUFPP. However, this regional concentration also exposes linguistic and publication biases that limit the visibility of work conducted in other regions, particularly in the Global South. Consequently, the generalizability of existing frameworks to contexts with distinct governance structures and socio-economic realities remains uncertain. Future research should therefore emphasize inclusivity and diversity in case selection to enhance the global applicability and equity of food policy evaluation methodologies.

Across the literature, data-related challenges emerge as one of the most persistent and systemic barriers to progress. Common issues include the proliferation of unvalidated indicators, inconsistencies across administrative scales, the absence of longitudinal datasets to capture long-term impacts, and the limited analytical capacity of local administrations. These challenges not only hinder cross-study comparison but also exacerbate the gap between academic development and practical implementation. Moreover, as the scope of this review was limited to publications indexed in Scopus and Web of Science, it may have excluded valuable gray literature and practitioner-

oriented studies. The focus on English-language sources introduces an additional bias, particularly regarding non-Anglophone contexts where innovative evaluation practices are often documented in local or institutional reports. These limitations, together with the rapidly evolving nature of the field, suggest that recent methodological advances may not yet be fully represented.

Despite these constraints, several promising methodological innovations have emerged in recent years. These include the integration of consumption-based accounting into sustainability frameworks such as the Food System Sustainability House (Hansson et al., 2024), the use of digital trace data alongside traditional surveys, and the design of adaptive, capacity-sensitive evaluation frameworks that can evolve with local governance maturity. Collectively, these innovations signal a paradigm shift—from static, prescriptive models toward more dynamic, inclusive, and context-sensitive evaluation approaches.

From a theoretical perspective, the findings underscore the need to develop middle-range theories that link abstract sustainability principles with tangible policy interventions, thus enhancing both the explanatory and practical relevance of food policy evaluation research. Methodologically, future studies should further explore the multi-scalar nature of food systems and their intersections with broader socio-ecological and political structures. Practically, introducing evaluation capacity tiers could help tailor methodological complexity to municipal resources and expertise, improving accessibility and usability for local governments.

Limitations of the Study

This study is not without limitations. The review was restricted to publications indexed in Scopus and Web of Science, which may have excluded relevant gray literature and studies from other databases, particularly those produced by practitioners, NGOs, or local administrations. The focus on English-language sources introduces a potential linguistic and geographical bias, limiting the visibility of non-Anglophone research. Furthermore, the dynamic and rapidly evolving nature of this field means that some of the most recent methodological developments may not yet have been captured. Future research should therefore expand the scope of database coverage, include non-English and gray literature, and explore alternative sources such as municipal reports or policy documents to ensure a more comprehensive and globally representative understanding of urban food policy evaluation.

Overall, this review depicts a field in transition—from early descriptive efforts toward greater methodological sophistication, integration, and inclusivity. The central challenge for the coming decade lies in reconciling scientific rigor with policy relevance, fostering genuine collaboration

between researchers and practitioners, and advancing evaluation as both an analytical tool and a driver of transformative and equitable urban food governance.

Critical Limitations of Urban Food Policy Frameworks and Their Translational Implications for Internal Areas

Despite the substantial methodological advances in urban food policy evaluation documented in the literature, a closer examination reveals that many of the most influential frameworks—such as the Milan Urban Food Policy Pact (MUFPP) monitoring framework and structured sustainability assessment tools like SAEMETH—are grounded in implicit assumptions that significantly constrain their transferability beyond urban and peri-urban contexts. These constraints should not be interpreted merely as empirical shortcomings, but rather as structural features that limit the applicability of such frameworks to rural and internal areas.

A first critical limitation concerns the strong dependence of urban-oriented evaluation frameworks on high levels of data availability and institutional capacity. Most urban food policy assessment tools presuppose access to disaggregated, standardized, and frequently updated datasets across a wide range of domains, including food consumption, logistics, governance, public health, and environmental performance.

While these conditions may be attainable in metropolitan contexts endowed with consolidated statistical infrastructures, they are seldom met in internal areas, which are often characterized by fragmented administrative systems, limited monitoring capabilities, and persistent data scarcity. Consequently, the reliance on extensive and data-intensive indicator sets risks systematically excluding precisely those territories where food policies could have the greatest transformative potential, thereby reinforcing an urban bias in both evaluation practices and policy learning processes.

A second limitation relates to the conceptual orientation of dominant urban food policy frameworks, which tend to privilege a consumption- and distribution-centered understanding of food systems. This emphasis reflects the structural role of cities as hubs of demand aggregation, logistics, and service provision. Within frameworks such as MUFPP, indicators addressing food access, retail diversification, food waste reduction, and urban logistics occupy a central position, while primary production is often treated as a secondary or ancillary dimension. In contrast, rural and internal areas are defined by multifunctional agricultural systems, in which production is deeply interwoven with landscape management, ecosystem service provision, cultural heritage, and processes of social reproduction. Evaluation models that fail to adequately capture these multifunctional roles risk misrepresenting the contribution of agriculture in non-urban contexts and underestimating the

broader territorial impacts of food policies.

A third, and particularly consequential, limitation lies in the limited capacity of most urban-oriented frameworks to account for structural rural challenges such as land abandonment, demographic decline, and farm succession dynamics. Although urban food policy indicators frequently address issues of social equity and economic inclusion, they rarely operationalize variables related to population ageing, outmigration, generational renewal, or the progressive disengagement from agricultural land. In internal areas, these dynamics are not peripheral phenomena but constitutive elements of the food system itself, directly shaping production capacity, landscape resilience, and long-term food sovereignty. Their systematic omission reflects an implicit assumption of demographic stability that is fundamentally misaligned with rural realities.

Moreover, the scalar logic embedded in many urban food policy frameworks assumes relatively short, dense food chains, within which governance interventions can exert rapid and measurable effects on consumption patterns and market structures. Internal areas, by contrast, are embedded in multi-scalar and often asymmetric food systems, where local production is linked to national or global value chains and where policy impacts tend to materialize over longer temporal horizons.

Evaluation models that prioritize short-term outcomes and city-level governance mechanisms are therefore ill-equipped to capture these delayed, indirect, and spatially diffuse effects, limiting their analytical robustness in rural settings.

Taken together, these limitations suggest that the application of urban food policy evaluation frameworks to internal areas poses challenges that extend well beyond issues of contextual adaptation. Rather, they point to the need for a deeper process of conceptual and methodological translation. Instead of extending urban models to rural contexts through incremental adjustments, there is a clear need for evaluation approaches that explicitly acknowledge territorial heterogeneity, data asymmetries, and the structural centrality of agriculture and demographic dynamics in internal areas. From this perspective, the critical review of urban food policy frameworks undertaken in this chapter performs not only a descriptive function, but also a foundational methodological role: it delineates the operational boundaries of existing models and clarifies why alternative, territorially grounded evaluation frameworks are essential for assessing food policies in rural and inner areas.

Conclusions

In this study, we analyzed the current state of research in the field of evaluation methods to measure the impact of food policies, based on literature from the Scopus and Web of Science databases. This review was accompanied by a comprehensive bibliometric analysis mapping global research trends and collaboration networks.

The analysis highlights an evolving and diverse landscape characterized by methodological innovation and persistent, significant challenges in data availability, evaluation complexity, and the integration of qualitative information with quantitative parameters.

The Milan Urban Food Policy Pact (MUFPP) emerges as a key influence, driving scholarship growth and advancing evaluation frameworks for urban food policies. Specifically, indicator-based frameworks such as the Sustainability Assessment of Food and Agricultural Systems (SAFA) and the MUFPP have been instrumental in assessing policy impacts on governance, environmental sustainability, economic resilience, and social well-being.

Furthermore, the results underscore the growing importance of participatory and co-design methodologies in food policy evaluation. Approaches like SAEMETH and other frameworks that engage stakeholders demonstrate greater effectiveness, relevance, and policy acceptance when evaluation methods integrate community perspectives and multi-stakeholder collaboration.

However, despite this progress, significant obstacles remain. Data collection, sharing, and limitations of analytical capacity continue to hinder effective policy evaluation. Moreover, although mixed-methods approaches are promising, operational guidelines for the systematic integration of quantitative and qualitative indicators remain underdeveloped. These gaps point to important directions for future methodological research and capacity building.

Italy and the USA are leading contributors to the development of methodologies for evaluating food policies. The prevalence of these countries could introduce potential bias, thereby limiting the applicability or adaptability to very different contexts. Future research should focus on longitudinal studies that track the impacts of food policy over time and in more diverse geographical contexts.

In conclusion, this study identifies a significant gap between academic advancements and practical applications. Future frameworks should prioritize user-friendliness. This approach will improve policy implementation, facilitate the uptake of evaluation , and ultimately support the transition towards building more sustainable and just cities.

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Chapter II

Local Food Policies and Rural–Urban Linkages: Evidence from Ede[2]

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Introduction

Recent crises have exposed the vulnerabilities of global supply chains, highlighting the urgent need for food system transformation and its implications for rural–urban relations.

Food systems function as crucial connectors between rural and urban areas, linking production, supply chain logistics, and a wide range of economic, social, and environmental dimensions (Berkhout et al., 2023). The dominance of global food chains has raised concerns about negative impacts, spurring the growth of local food networks and urban agriculture as strategies to localize food production and consumption (Woods, 2020). These initiatives aim to reshape rural–urban food relationships at the territorial level.

A growing body of literature has examined local food policy experiments designed to influence territorial food systems, often emerging from community initiatives or civil society engagement (Fattibene et al., 2023). Food-related policy initiatives have proliferated, particularly in urban areas[3], and are referred to by various names—food strategies, food plans, food councils, food districts, and food communities—whose boundaries and definitions frequently overlap (Mazzocchi et al., 2023).

Over the last two decades, cities have increasingly sought to shape food systems, acknowledging their potential influence. Municipalities have reintroduced food policy into local agendas and developed strategies and institutional structures to systematically intervene, even though they generally lack *"a clear formal mandate"* (Battersby, 2017). At this territorial level, public and private actors pursue

[2] Submitted to: ***Agricultural and Food Economics,*** **Springer Nature.**

[3] Three possible reasons have been identified: first, the difficulty of finding local planning instruments that harmonise with agricultural policies (which are individual, such as direct payments, pesticide bans, and fiscal incentives); second, the prevailing interest of local food policies in alternative food consumption and management, which leads to overlooking conventional and large-scale distribution and retail systems that are crucial to food systems; and third, cities have pioneered food policies and programmes in recent decades, when regional and national policies were still developed in sectoral silos (Moragues-Faus & Morgan, 2015).

goals such as food security, health and social inclusion, local economic development, and environmental protection—areas where national and supranational policies have often proven insufficient or inefficient (Barling et al., 2002). Municipal actors have also started to confront the challenge of integrating urban–rural linkages into urban planning (Cattivelli, 2022; Cattivelli & Rusciano, 2020).

Local food policies—often termed *"urban food policies"*—are defined as *"a process consisting of how a city envisions change in its food system, and how it strives towards this change"* (Moragues-Faus et al., 2013). The earliest examples were introduced in Toronto (1991), Belo Horizonte (1993), and San Francisco (1997). By 2015, more than 90 local food strategies had been adopted by city and regional jurisdictions in the Global North (Blay-Palmer, 2009; Rocha & Lessa, 2009; Ilieva, 2016). More recently, many European cities and regions have become actively engaged in urban food policies, often encouraged by international initiatives such as the Milan Urban Food Policy Pact (MUFPP, 2015; Ilieva, 2016; Filippini et al., 2019). Recurring themes include new governance models such as Food Councils (Calori, 2015), the potential of short supply chains and alternative food networks (Marino, 2017), and food waste management within a circular economy framework (Fassio & Minotti, 2019; Fattibene, 2018).

Cities implementing urban food policies typically rely on two main tools: Food Policy Councils (FPCs) and Urban Food Strategies (UFSs). FPCs are *"organized groups of stakeholders that may be sanctioned by a government body, or exist independent of government, which work to address food systems issues and needs at the local (city/municipality or county), state/provincial, regional, or tribal levels"* (Bassarab et al., 2018). They bring together diverse stakeholders to plan collective actions for community improvement (Sussman & Bassarab, 2016; Harper et al., 2009). Membership generally includes institutional representatives, sector experts, producer unions, consumer and operator associations, environmental organizations, NGOs, and agri-food chain workers.

The literature identifies four core functions of Food Policy Councils. First, they carry out theoretical tasks such as data collection, problem identification, solution evaluation, and policy monitoring. Second, they play a practical role by supporting changes in food systems through mobilizing organizations and providing resources, tools, and funding. Third, they act as network builders, fostering collaboration among institutions, companies, and organizations, and mediating among diverse perspectives to create a shared narrative. Finally, they contribute to public education, policy learning, and youth engagement, helping to build the cultural foundations necessary for long-term policy change (Matacena, 2016).

Urban Food Strategies, complementary to FPCs, consist of documents—such as food charters and food plans—that articulate visions, actions, and strategies. They are typically developed within Food Policy Councils, where stakeholders from across a territory deliberate to form a common vision and principles. Food charters express the collective will to monitor change and progress towards a more sustainable urban/regional food system, support regional farmers, improve public health through food, and foster stronger connections between urban, peri-urban, and rural areas (Sonnino, 2009; Marsden & Sonnino, 2012). Their overarching aim is to create coherence and synergy (Brunori & Rossi, 2000) among the diverse activities and roles within the city and its surrounding areas.

Building on this debate, the case of Ede provides a valuable lens to examine how municipal-level food policies are implemented and how they interact with local actors in reshaping rural–urban linkages.

The aim of this study is to analyse and discuss the role of food policies in the municipality of Ede, looking at data collected during non-participatory observations and through the examination of questionnaires administered. This paper addresses how a food policy contributes to strengthening short supply chains and generating both economic and social value for small-scale producers. At the same time, it aims to identify the main barriers perceived by local actors—such as farms and processing companies—in the implementation and long-term sustainability of the policy. While much of the existing literature has examined urban food policies in large metropolitan contexts, less attention has been devoted to medium-sized municipalities such as Ede, where food policies interact more directly with short supply chains and local producers.

This study contributes to the literature on Food Policy, by providing empirical evidence from a mid-sized European municipality, near rural area, while also offering practical insights for policymakers and local stakeholders seeking to foster sustainable and inclusive food systems.

Two research questions guided this study:

1. *To what extent has the Ede Food Policy contributed to generating economic and social value for small-scale producers?*
2. *What are the main barriers perceived by local actors—particularly farms and processing companies— to promoting sustainable food systems?*

Materials and Methods

Case Study

This research was conducted in Ede, The Netherlands, a city located in the Province of Gelderland in the centre-east of the country. Gelderland hosts one of the most dynamic agricultural sectors in the Netherlands, with a strong presence of short food supply chains (*korte keten*). In 2016, the initiative *Short Chains (Korte Keten)* was launched by the *Gelders Kennisnetwerk Voedsel* with the aim of increasing connectivity, lowering transport costs, and achieving fairer prices for farmers in the province.

Approximately 1,139 farms are engaged in short-chain sales, of which around 850 sell directly to consumers and 570 through intermediaries (CBS, 2020). This represents about 13% of all farms in Gelderland, marking a three-percentage-point increase since 2017.

The province also has the highest number of organic farms nationwide (358 farms), with about 35% participating in short-chain marketing. The estimated turnover from short-chain sales reached 148 million euros in 2019–2020, positioning Gelderland among the leading provinces in terms of economic value generated through these channels.

The agricultural structure of Gelderland is diverse, with significant representation across fruit cultivation, permanent crops, dairy farming, and livestock production. Regional variations reveal the highest short-chain participation in Arnhem/Nijmegen (20.1%) and Zuidwest-Gelderland (19%), followed by Veluwe (10.4%) and Achterhoek (9.4%) (Venema et al., 2021).

Ede has approximately 124,000 inhabitants (citypopulation.de, 2025) and is among the largest Dutch municipalities by area (318.1 km²). Alongside its urban centre, Ede encompasses an extensive rural area: around 23,480 residents live in rural settings (Figure 2.2), underscoring the municipality's strong agricultural component. Ede is part of the FoodValley region, a cluster of eight municipalities hosting numerous agri-food businesses and knowledge institutes, including Wageningen University.

Ede is one of the few Dutch municipalities to have addressed a broad range of food-related challenges through an integrated food strategy (Sibbing et al., 2019). In 2015, the municipality adopted its first integrated food strategy (Gemeente Ede, 2015), based on a 2012 vision document in which it committed to "choose for food" (Gemeente Ede, 2012). This process involved consultations with diverse local stakeholders, resulting in a bottom-up food policy adopted by the city council and backed with a dedicated budget. The strategy seeks to integrate food education, public health, food waste, short supply chains, and sustainable production through innovative governance approaches (FAO, 2018). Implementation is coordinated by the municipal food team, politicians, and societal

actors such as citizen groups, agrarians, Wageningen University, food companies, schools, sport associations, the province of Gelderland, national ministries, and the FAO.

The Food Team of Ede comprises municipal employees from various departments responsible for implementing the city's Food Strategy. Its members include: an elected official with food in their portfolio, a project manager, a food policy adviser, an economic manager, a health manager, two project officers (for health and sustainability), an education officer, a communications manager, and an administrative assistant. External expertise is engaged when required (Halliday et al., 2019).

In addition, the municipality has established a Food Council to advise on food policy. The council includes 10–15 citizens, entrepreneurs, and food experts who discuss local challenges, implement measures, and collaborate with businesses, schools, and associations engaged in food and health initiatives (CityDeal, 2020).

The municipality sees its role as that of a facilitator and connector: creating opportunities without directly engaging in entrepreneurial functions. Ultimately, it is society that must take ownership of these opportunities.

More practical examples of practices in Ede are:

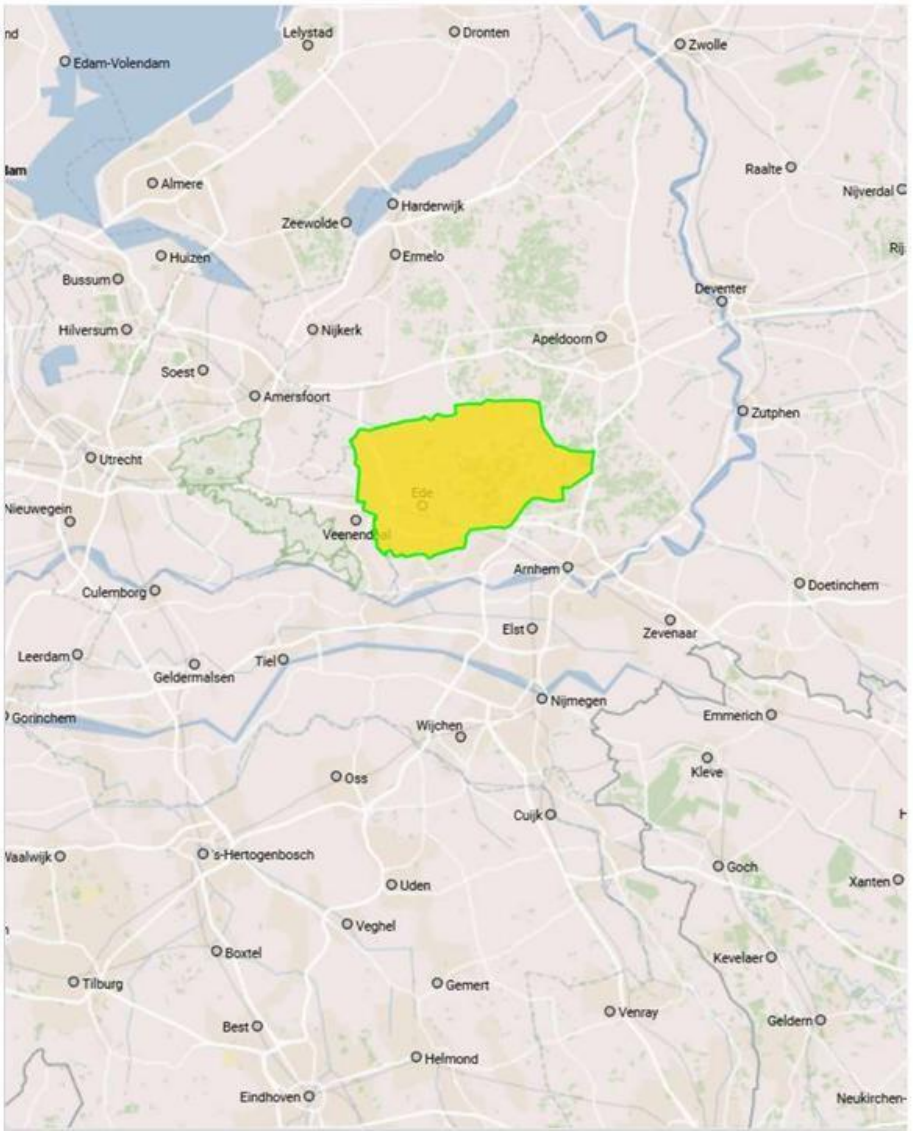
• **FoodFloor**[4]: a participatory platform where citizens pitch ideas for healthy or sustainable food, ask questions, and apply for subsidies. The goal is to foster innovative collaborations among societal groups;

• **Alliantie Voeding**[5]: a collaboration between the local hospital, Wageningen University, and the municipality of Ede aimed at promoting healthy food in society;

• **Korte Ketens**[6]: an initiative designed to bring producers and consumers together while exploring new markets for farmers.

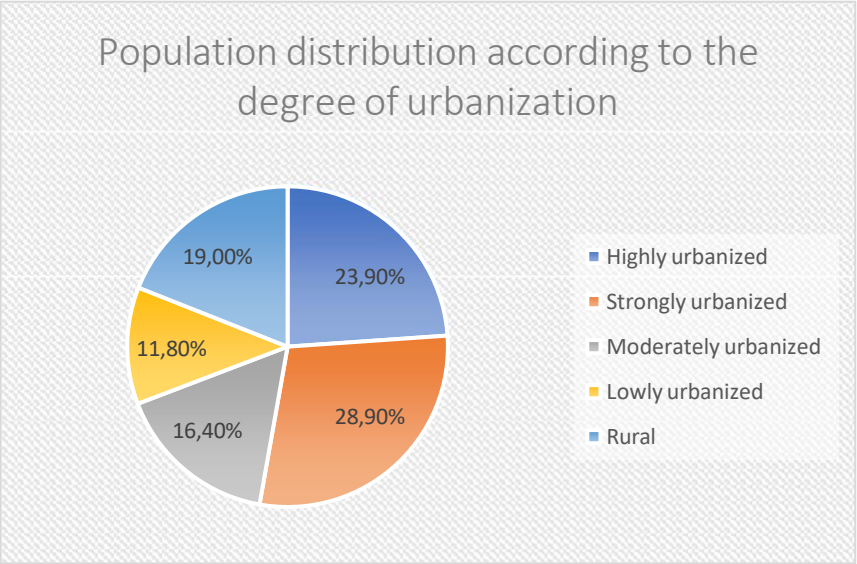
[4] https://eetbaarEde.nl/foodfloor/
[5] https://www.alliantievoeding.nl/nl
[6] https://www.gelderland.nl/themas/agrifood/inspiratie/korte-ketens-met-een-boerenhart

Figure 2.1 - Map of Ede (The Netherlands)



Source: citypopulation.de

Figure 2.2 - Population distribution of the municipality of Ede according to the degree of urbanization



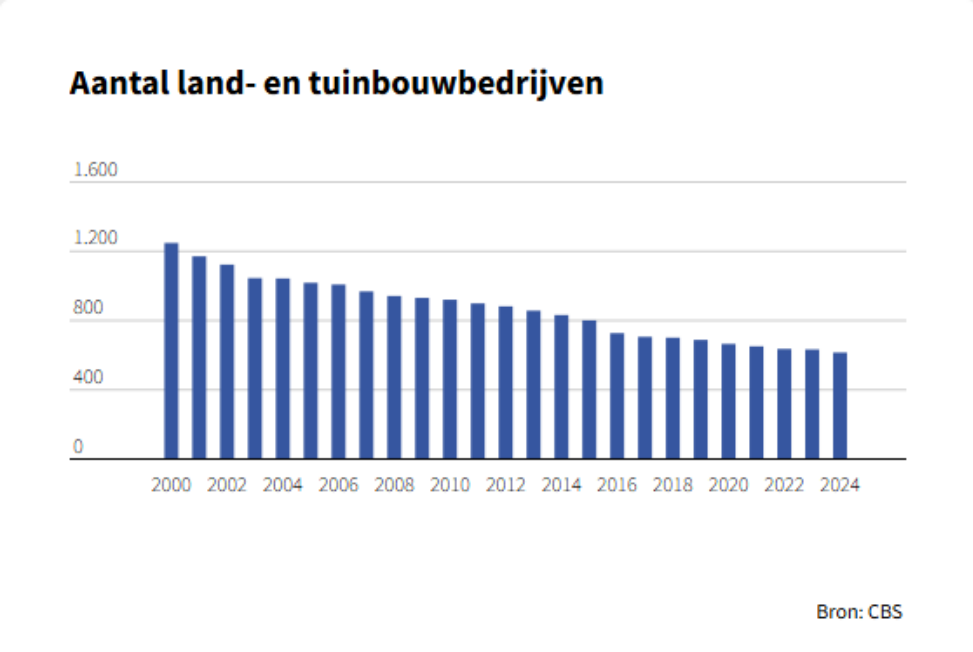
Urbanization (E 2025)	
Highly urbanized	29,510
Strongly urbanized	35,640
Moderately urbanized	20,260
Lowly urbanized	14,630
Rural	23,480

Source: author based on data citypopulation.de

Primary sector

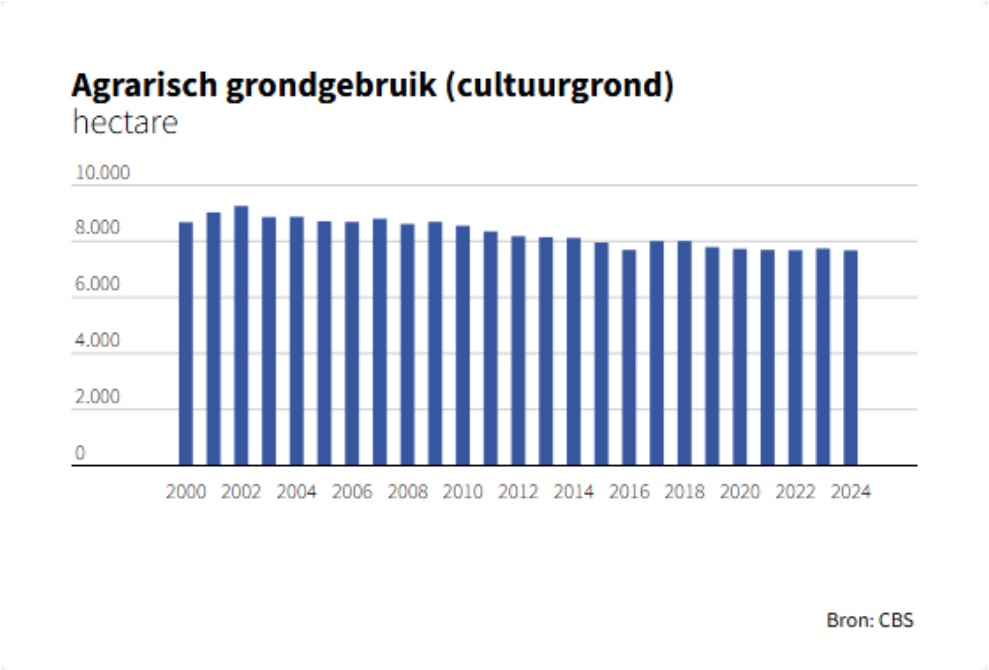
The analysis of the primary sector is based on data from the Centraal Bureau voor de Statistiek (CBS). In 2024, Ede counted 610 agricultural companies, reflecting a decline of just over 50% since 2000.

Figure 2.3 - Number of agricultural and horticultural businesses



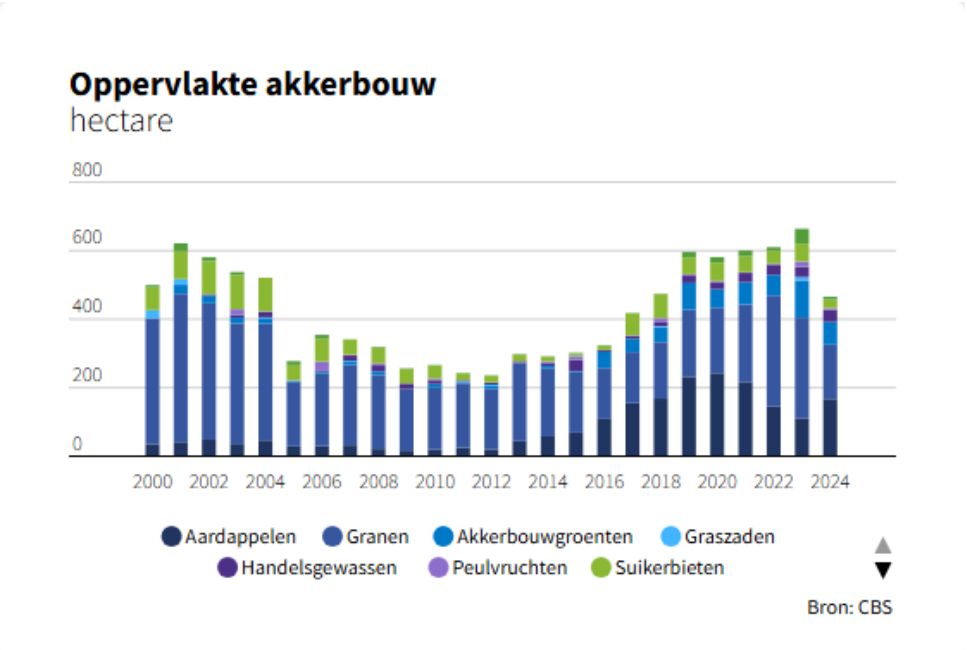
Utilized Agricultural Area (UAA) also decreased, from approximately 8,651 ha in 2000 to 7,645 ha in 2024.

Figure 2.4 - Agricultural land use (cultivated land)



In the early 2000s, cereals and sugar beet dominated the UAA. Following a significant contraction, the 2010s brought diversification with a growing presence of potatoes and vegetables. Cereals remain the most consistent crop, while legumes and grass seeds are marginal. By 2018, arable land exceEded 500 hectares, peaking above 600 hectares in 2022–2023.

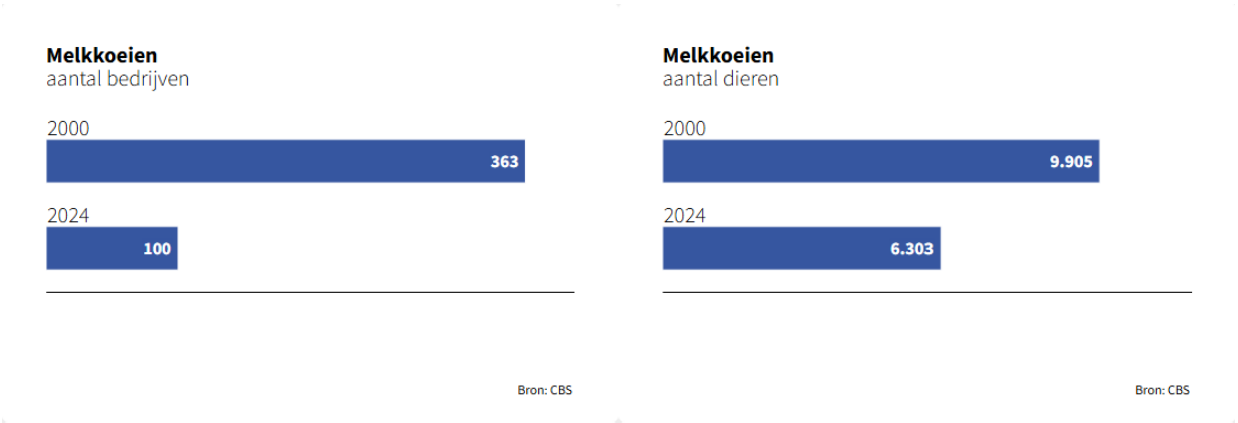
Figure 2.5 - Cultivable surface - hectare



In the Netherlands, over 31,000 livestock farmers contribute more than EUR 16 billion in added value (CBS, 2022). Dairy farming represents the largest share (48%), followed by beef cattle (15%), sheep and goats (10%), pigs (6%), and poultry. Together, dairy farmers manage 1.2 million hectares—about 33% of Dutch farmland.

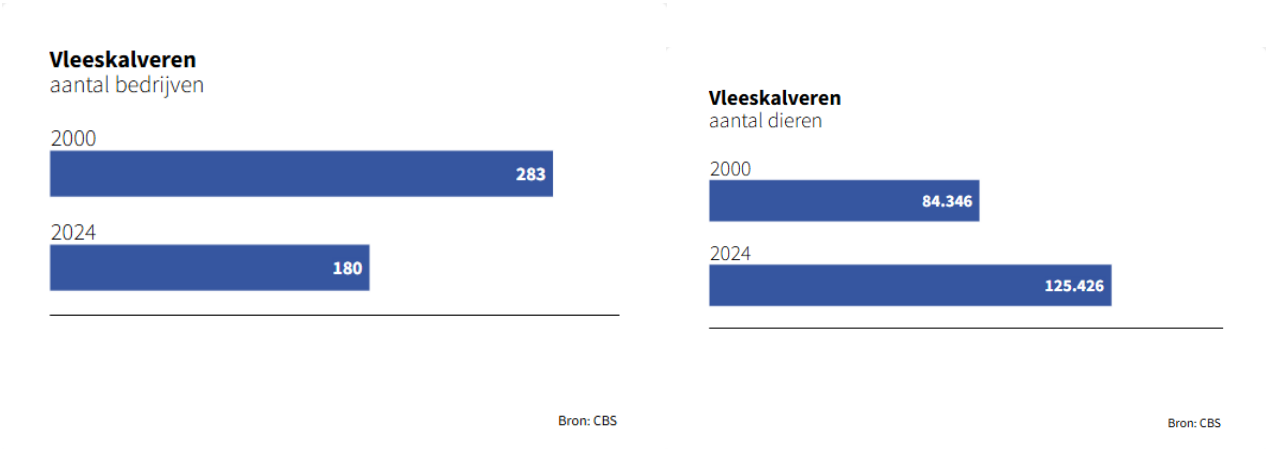
In Ede, the number of agricultural companies has sharply declined, while the livestock population has increased, signalling intensification. However, 2024 saw reductions in dairy cows, veal calves, pigs, and sheep. The national phosphate reduction plan contributed to a 36.4% decrease in dairy cows compared to the 2000s.

Figure 2.6 - On the left, number of dairy cow farms; on the right, number of animals dairy cows



By 2025, the veal calf population had fallen by 49% to 125,426 animals, with a 36.4% decline in the number of farms compared to 2000.

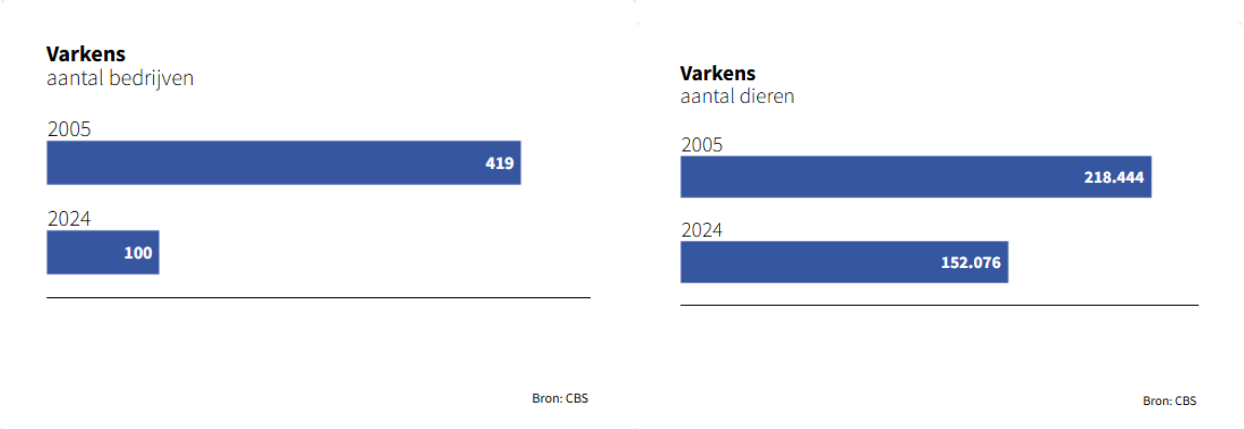
Figure 2.7 – On the left, number of veal farms; on the right number of calves



Pig farming has also contracted: over 75% of Ede's pig farms closed within 20 years, and the animal population decreased by 30%. National buy-out schemes aimed at reducing ammonia

emissions and the *Subsidy Scheme for the Remediation of Pig Farms* played key roles (CBS, 2022)[7].

Figure 2.8 - on the left, number of companies that raise pigs, on the right number of animals



By contrast, dairy goat farming has more than doubled, rising from 8,514 heads in 2005 to 21,054 in 2024. Most goats are concentrated in Noord-Brabant (141 thousand) and Gelderland (117 thousand), together accounting for more than half the national herd.

Figure 2.9 - on the left, number of companies that raise goats; on the right number of goats

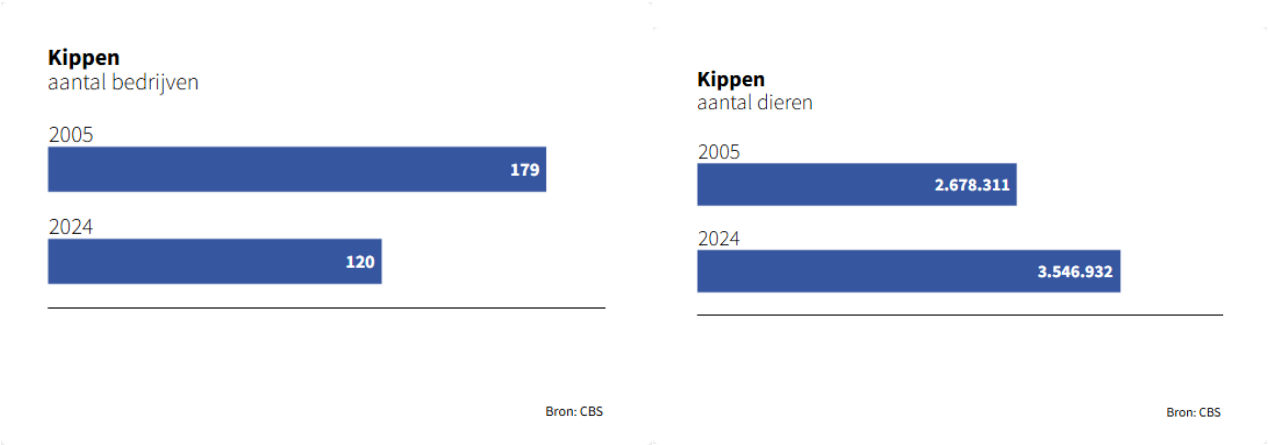
Poultry meat and eggs represent a key source of animal protein worldwide. Since the 1960s, global production has increased sixfold and is expected to continue rising in the coming years (FAO, 2016; Mottet and Tempio, 2017). Compared to other livestock products, eggs have a relatively low environmental footprint per kilogram of protein, particularly in terms of greenhouse gas emissions and land use (Poore and Nemecek, 2018).

In the Netherlands, approximately 10 billion eggs are produced annually, with an additional 3 billion imported (Sorgdrager, 2018). Around 60–65% of Dutch eggs are exported, primarily to Germany (75%) and Belgium (11%), with a total export value of 470 million euros in 2016. Beyond shell egg trade, between 30 and 35% of Dutch eggs are processed into products such as bakery goods, pasta, sauces, and ice cream (van Horne et al., 2017).

[7] In recent years, pig farmers were eligible for various schemes if they decided to cease their operations permanently, such as the Subsidy scheme for the Remediation of Pig farms (SRV) and the buy-out scheme for livestock farmers (CBS, 2025).

Between 2005 and 2024, the number of chickens in the municipality of Ede increased by 32%, rising from 2,678,311 to 3,546,932 animals in less than two decades (Figure 2.10). The majority of Dutch laying hen farms are concentrated in the provinces of Gelderland (32%), Noord-Brabant (15%), and Limburg (14%), which account for 26%, 18%, and 27% of the national flock, respectively. Farms in Gelderland tend to be smaller on average, and hens are generally kept in more extensive systems compared with those in Limburg (De Olde et al., 2020).

Figure 2.10 - On the left, number of companies that raise chickens; on the right number of chickens



Methodology

This study adopts a triangulation approach, integrating multiple research methodologies. The goal is to compare evidence from the literature with field data collected through the case study of Ede.

a) Literature Review

The literature review was conducted using the SCOPUS database, focusing on indexed scientific articles (SCI and SSCI). Keywords included: *(challenge rural agriculture* AND *food policy)* OR *(local food system* AND *peri-urban areas)* OR *(local food system* AND *challenge rural development)*.

b) Non-participant observation

Field data were collected through non-participant observation (Given, 2008), which involves observing without directly engaging in the studied activities. Notes and photographic documentation were produced.

In particular, observations were gathered during a FoodFloor event organized by the *EetbaarEde* [8] Foundation. This event addressed barriers and challenges to implementing and sustaining local food

[8] **FPC** (*Food Policy Council*) **EetbaarEde** is part of the foundation EetbaarEde and was launched in 2018 by the municipality of Ede. While the idea originated from the local government, the actual establishment of the council was delegated to the foundation, ensuring that no formal ties exist with the municipality and preserving its independence. The council has a clear organizational structure and is transparent about its membership composition, which represents a

initiatives. Around 20 stakeholders participated, and the collected inputs were used to formulate policy recommendations.

c) Questionnaire survey

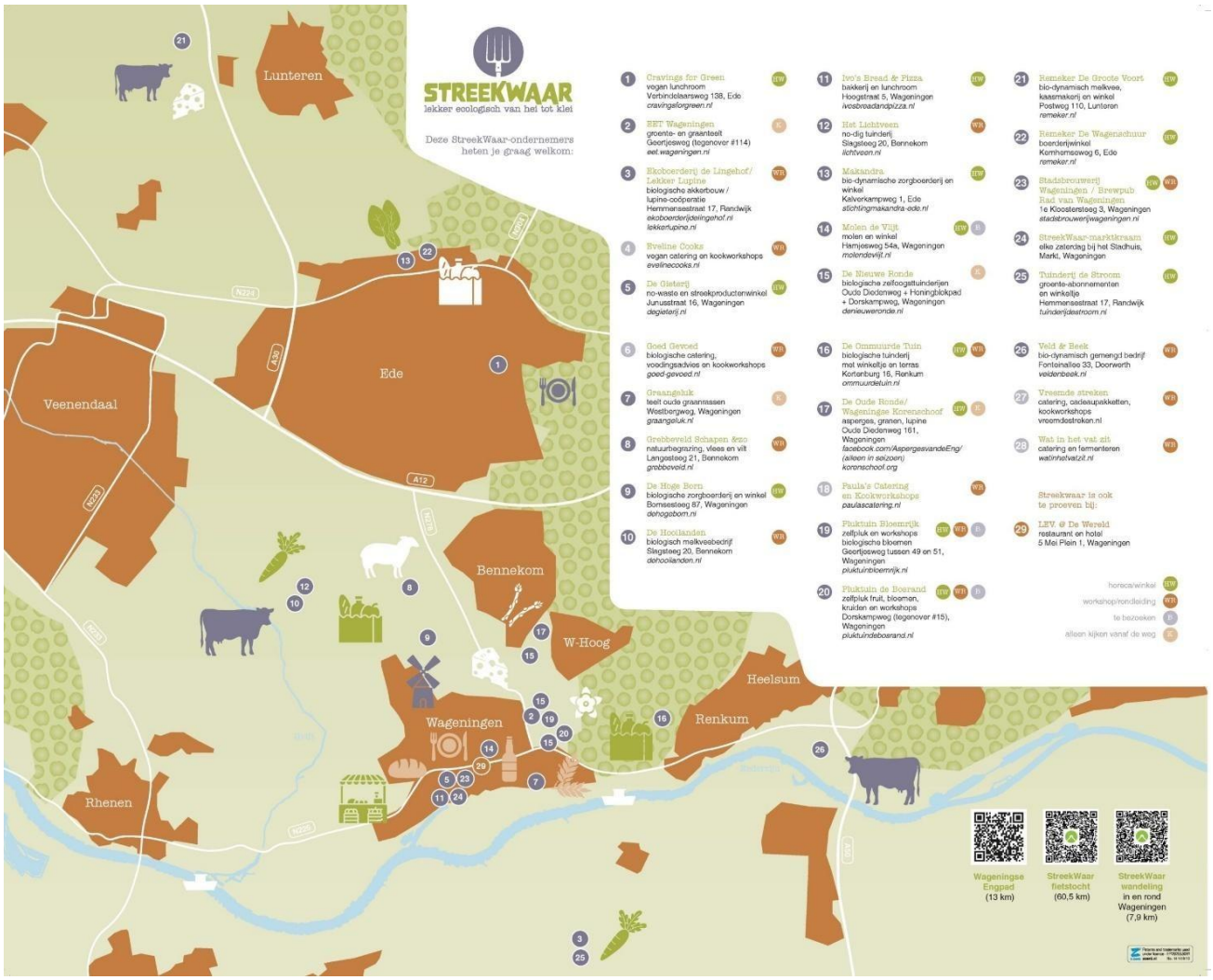
A questionnaire was administered via email between January and February 2025 to 18 farms belonging to *StreekWaar*, an association of around 40 producers in the Wageningen–Ede–Renkum–Betuwe area. Members include farmers, processors (e.g., mills, dairies, bakeries, breweries), shops, and restaurants. The association promotes environmentally friendly farming, animal welfare, fair pricing, transparency, and local supply chains and minimizing environmental impact by using at least 90% of raw materials and inputs sourced from Europe.

The questionnaire was structured in three sections:

1. **Farm description**: socio-economic and demographic characteristics, size, location, production, distribution channels, and customer base.
2. **Logistics**: six questions exploring structural, technological, and institutional barriers to agri-food marketing.
3. **Food policy**: stakeholders' awareness, involvement, and perceptions of Ede's Food Policy, with emphasis on impacts for small businesses.

Figure 2.10 - Map showing the locations of members

diverse range of stakeholders in the local food system. Its role is focused exclusively on providing policy advice to the municipality on food-related issues, whereas other activities commonly associated with food policy councils are carried out by other branches of the foundation. The council operates on the scale of the municipality of Ede.



Source: streekwaar.nl

All three sources—literature review, non-participant observation, and questionnaire—were triangulated to strengthen reliability and deepen understanding. Triangulation integrates qualitative and quantitative data to reveal differences between ideals and realities, providing a more comprehensive perspective on the studied phenomenon (Noble & Heale, 2019; Heale & Forbes, 2013).

Results and Discussion

Literature Review

Barriers to promoting sustainable food systems can be grouped, following an inductive approach, into three main categories:

1. resistance to change and limited capacities in rural areas;
2. weak and asymmetric rural–urban linkages;

3. fragmented multi-actor governance.

The idea of resistance to change as a systemic phenomenon dates back to the 1980s, when scholars sought to explain how apparently inferior designs (e.g., the QWERTY keyboard) (David, 1985) or unsustainable production models (Arthur, 1988) became dominant. In agri-food systems, Conti, Zanello, and Hall (2021), through a systematic review, identify six drivers of resistance: (i) technological persistence; (ii) misaligned institutional settings, policies, and incentives; (iii) attitudes and cultures fostering aversion to change; (iv) political economy factors skewing the direction of change; (v) infrastructure rigidities; and (vi) research priorities and dominant innovation narratives misaligned with transformational agendas. These factors interact through path dependency and inertia, entrenching unsustainable production and consumption models while hindering the adoption of alternatives.

For instance, resource-poor farmers in developing countries may avoid adopting new technologies after initial failures, reinforcing risk aversion and path dependency (Yesuf & Bluffstone, 2009).

The second challenge concerns the growing disconnect between rural and urban areas. While food production is concentrated in rural areas, food consumption is increasingly urbanized (Francis et al., 2005). Food systems reveal a rural–urban gradient across their activities (Gebre & Gebremedhin, 2019). Yet, globalization has widened the divide: international value chains and the decline of traditional markets reduce smallholders' access to nearby urban markets, as they compete with cheaper imports from distant sources (Monaco et al., 2019). Meanwhile, diet globalization and processed food consumption have accelerated the disconnection of rural and urban spheres. Sustainable provision of food to cities requires stronger, more resilient rural–urban connections. This includes reducing the encroachment of urban expansion into agricultural land, which often occurs in developing countries due to the absence of strategic land-use planning (Satterthwaite et al., 2010).

Improving rural producers' access to urban markets is also crucial. Local markets in towns and medium-sized cities are often the entry point for rural producers to reach consumers (Proctor & Berdegué, 2016). These dynamics shape livelihoods, local economies, and food security in both rural and urban settings.

City Region Food Systems (CRFS) have emerged as a promising framework for strengthening rural–urban linkages (Forster et al., 2015; Hamm, 2015; Blay-Palmer et al., 2021; González-Azcárate et al., 2023; Steines et al., 2024). Defined a*s "complex networks of actors, processes and relationships concerning food production, processing, marketing and consumption that exist in a given geographical region, encompassing an urban center and its surrounding peri-urban and rural*

hinterland" (Blay-Palmer et al., 2018, p. 3), CRFS approaches integrate resource flows, promote circular practices (e.g., reuse of urban organic waste), and foster inclusiveness by strengthening ties between producers and consumers, including smallholders and vulnerable groups.

Despite their potential, CRFS initiatives often face infrastructural limitations (Blay-Palmer et al., 2021; González-Azcárate et al., 2023) and land-use conflicts, especially in urban and peri-urban contexts (Galli et al., 2024).

The third barrier concerns multi-actor governance. National governments have cEded influence in food governance, while corporations and civil society have gained prominence. Urban Food Policies (UFPs) provide examples of synergies between diverse stakeholders and traditionally siloed policy domains (Wiskerke, 2009). Food Policy Councils (FPCs) increasingly serve as platforms for multi-actor collaboration at subnational levels (Halliday & Barling, 2018).

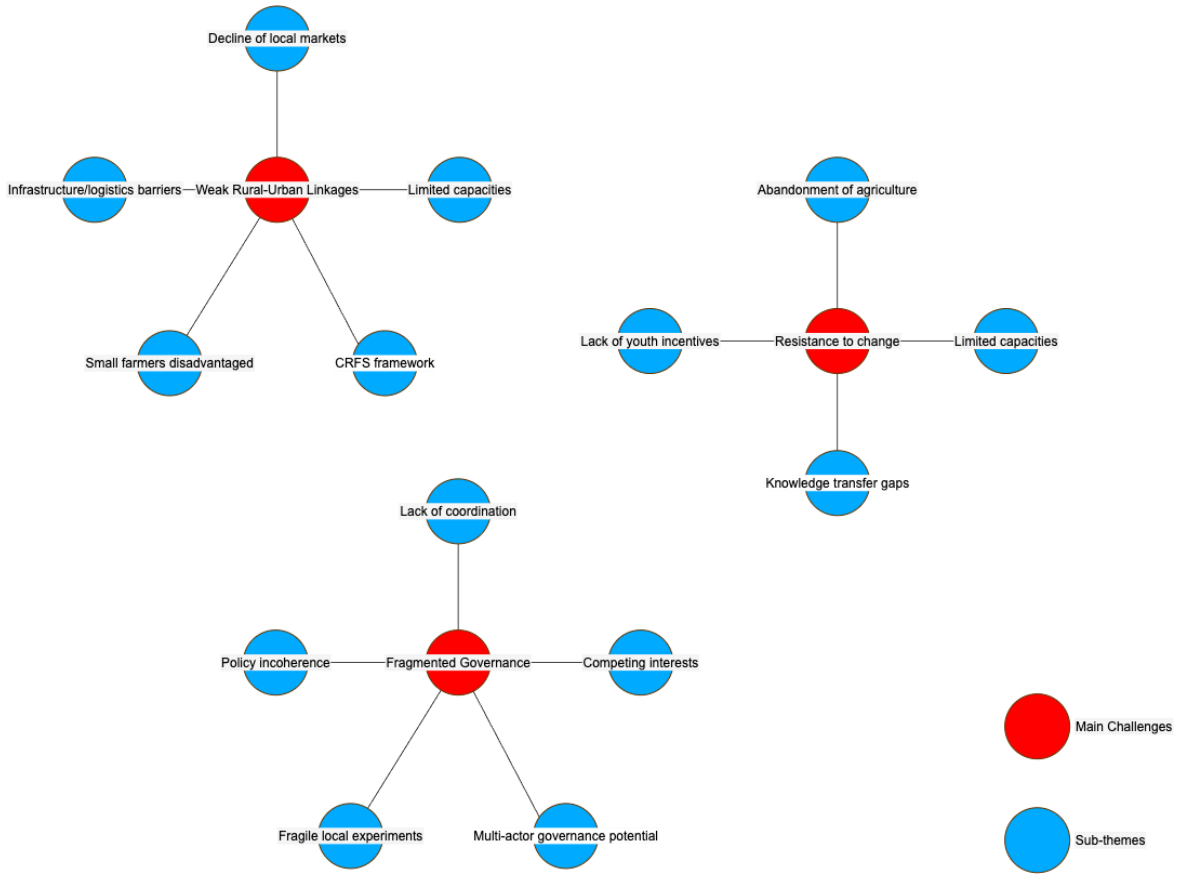
Multi-actor governance enhances adaptability, legitimacy, and transparency, empowers local actors, and supports territorial development by reconnecting agriculture and rural areas (De Vries, 2000; Hooghe & Marks, 2003; Bryson et al., 2006). Yet it also risks inefficiency due to high costs, lack of authority, and policy fragmentation (Benz & Eberlein, 1999; Herzberg, 2005; McGinnis, 2005; Meynen & Doornbos, 2004; Wiskerke et al., 2003).

Koopmans et al. (2018) argue that successful governance requires informal networks, bottom-up initiatives, polycentric decision-making, agency, and trust. Without these, fragmentation and incoherence prevail. Arcuri et al. (2022) illustrate how bottom-up cooperation in Lucca's *Piana del Cibo* produced integrated territorial strategies, but also exposed vulnerabilities to political turnover and resource constraints (Halliday e Barling, 2018).

Finally, transforming current food systems into more sustainable ones will not emerge spontaneously, but it requires a transformation in food system *governance*, which is about '*how farmers, companies in agri-food chains, banks, governments, NGOs and other stakeholders interact and try to influence each other in order to achieve their objectives*' (Runhaar, 2017). Hebinck et al. (2022) caution that participatory arrangements without such foundations risk decision-making deadlock, perpetuating unsustainability.

Advancing towards multi-level and multi-actor governance remains central to sustainable food system transitions.

Figure 2.11 - Barriers to the Implementation of Food Policies



Source: authors

Non participant observation

To complement the literature review, non-participant observation was conducted during three public meetings organized in Ede between October and December 2024. Participants included organic and sustainability-oriented farmers, food businesses, organic shops, chefs, extension services, policymakers, nutritionists, educators, entrepreneurs, tourism representatives, and environmental organizations.

Notes and testimonies revealed recurrent tensions aligning with the three main challenges identified in the literature: resistance to change and limited capacities, weak rural–urban linkages, and fragmented governance.

First, observations underscored fragmentation among actors and the absence of cohesive governance mechanisms. One participant noted:

"We are working to create a social food perspective by actively involving politicians, citizens, and associations. It is a long and complex process that requires constant commitment and a profound cultural change in order to build multi-actor governance..."

This reflects the difficulty of aligning diverse stakeholders, echoing earlier concerns about fragmentation in governance (Benz & Eberlein, 1999; Koopmans et al., 2018).

Citizen participation, although essential, proved difficult to achieve. Low engagement, especially from marginalized groups, remains a challenge. Yet citizen involvement is recognized as a cornerstone for resilient, locally tailored food systems (Levkoe, 2011; Affre et al., 2024).

In the context of increasing urbanization and spatial disparities, there is the danger that urban and rural economies drift apart even further. This may lead to uneven regional development that in the end is not sustainable from an economic perspective. The disconnect between rural and urban spheres emerged as a recurrent concern during the meeting recognizing that rural–urban linkages may contribute to more sustainable economic development at a macro level because they may counteract strong concentration or depletion forces, by giving rural areas opportunities to develop (Davoudi, 2002; Stead, 2002; Tacoli, 2003). Despite Ede's reputation as a pioneer in food policy, connections between the urban centre and surrounding rural areas remain limited. One testimony highlighted:

"*The example of cities such as Ede shows how food can serve as a powerful tool to reconnect rural and urban areas […]. However, due to the urbanization processes of recent decades, the relationship with the surrounding rural environment, which existed in the past, has been partly disrupted […]. Only a small percentage of urban citizens go to the surrounding areas to purchase products, engage in agricultural education, or visit farms*".

This resonates with literature on declining traditional markets, dietary globalization, and competition with cheaper imports that disrupt local linkages (Galli et al., 2024; Blay-Palmer et al., 2021; Berkhout et al., 2023; Mayer et al., 2016). The testimony suggests that, even in municipalities that are actively promoting local food initiatives, spatial and social proximity does not necessarily lead to effective rural–urban integration.

Third, divergent visions and cultural barriers were evident. As one participant observed: "*Within the municipality of Ede, there is a wide range of interests and contrasting opinions on food. There is a lack of connection between these different stakeholders*."

Another emphasized the need for cultural change:

"*The example of cities such as Ede shows how food can be a powerful tool for reconnecting rural and urban areas. However, the relationship with the surrounding rural environment, which existed in the past, has been partly disrupted due to the urbanisation processes of recent decades. Only a small percentage of urban citizens visit the surrounding areas to purchase products, engage in agricultural education or visit farms*".

These testimonies reinforce arguments that cultural inertia, routines, and institutional logics impEde systemic change (Conti, Zanello & Hall, 2021; Dury et al., 2019a; Leach et al., 2020).

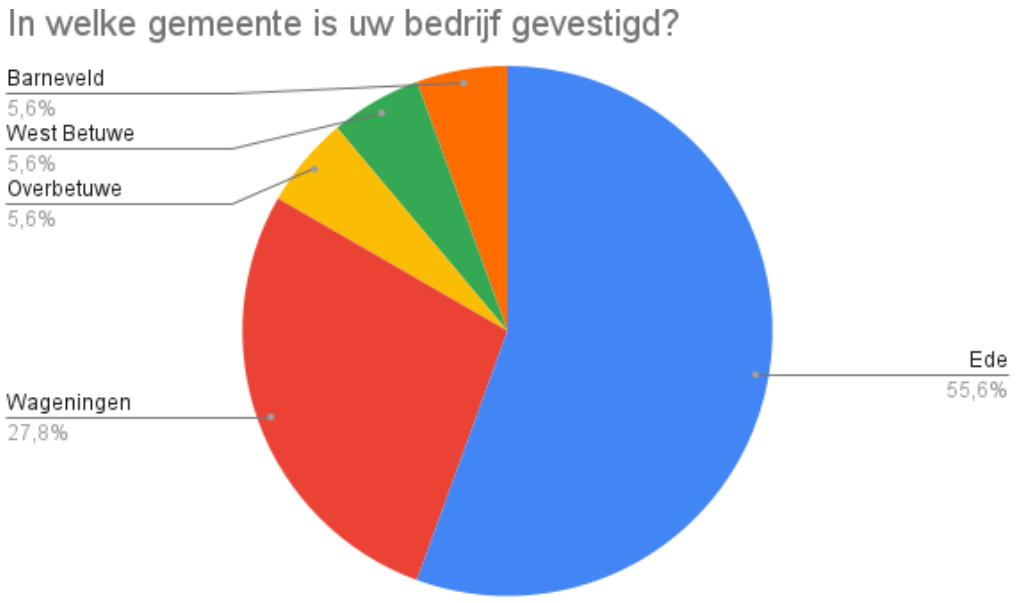
Figure 2.12 - Moments from the FoodFloor (2024)

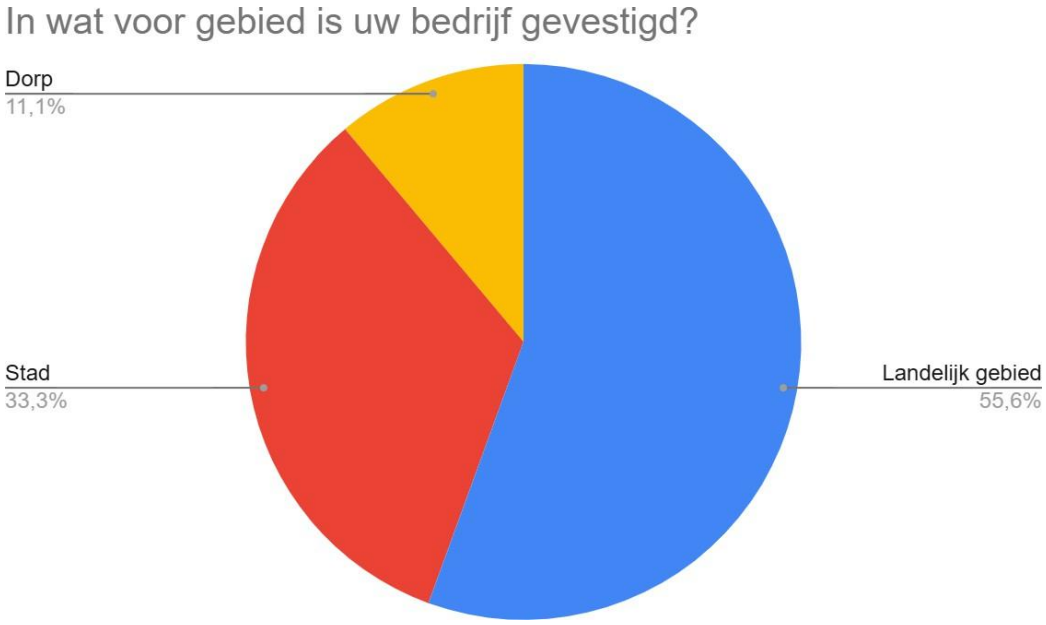
Source: authors

Questionnaire survey

Between January and February 2025, questionnaires were distributed via email to farms participating in *StreekWaar*. Eighteen farmers completed the survey.

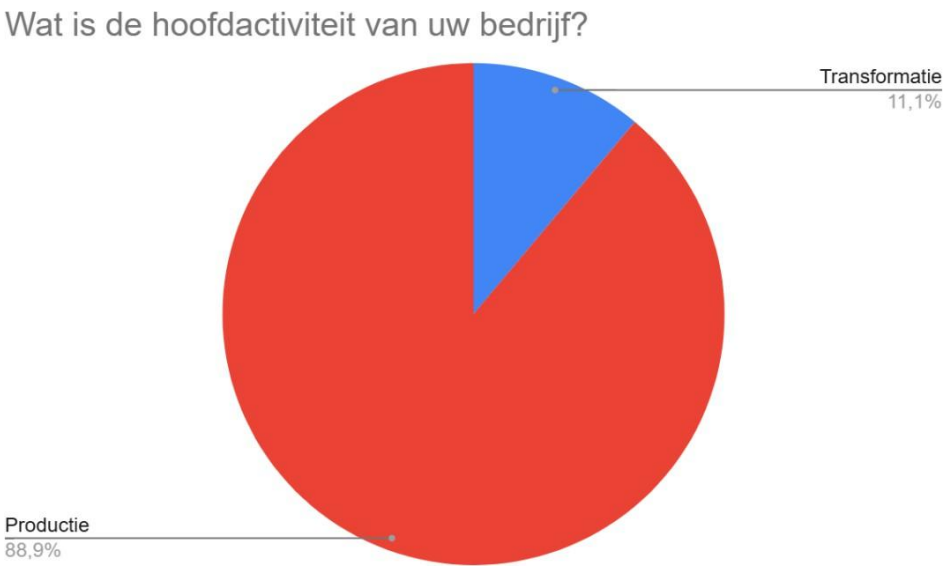
Of the respondents, 55.6% were located in Ede, 27.8% in Wageningen, and the remainder in Barneveld, West Betuwe, and Overbetuwe. A majority (55.6%) were situated in rural areas, while 33.3% were urban and 11.1% village-based.



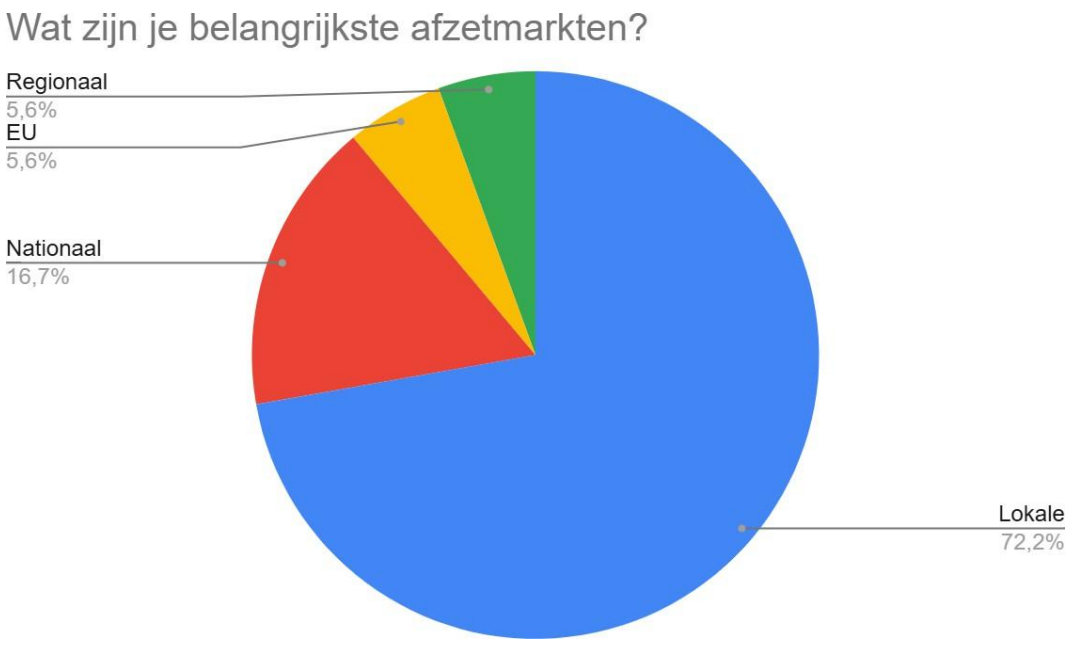


Most farms (77.8%) focused on crop production, while 44.4% engaged in livestock farming. Mixed farms (27.8%) typically produced fresh vegetables, processed meat, cheese, and oil.

Thus, the farms in the sample are predominantly engaged in primary production (88.9%). Regarding the distribution of UAA, most farms fall within the smaller size classes: 61% have between 0 and 5 hectares. Conversely, a few outliers with holdings exceeding 60 hectares indicate the presence of larger-scale enterprises. Small farms (up to 5 hectares) generally employ 1–2 people, often family members supported by occasional seasonal workers. By contrast, larger holdings (65–90 hectares) typically employ 8–20 workers, highlighting a clear positive relationship between farm size and labor requirements.



The survey results indicate that sales are primarily concentrated in local markets: 72.2% of respondents identified the local level as their main market, compared with 16.7% at the national level and 5.6% each at the regional and EU levels. These findings underscore a strong preference for short supply chains and local integration, with limited engagement in broader national or international markets.



Regarding consumer-preferred distribution channels, the findings reveal a strong inclination toward direct sales through farm shops (*boerderijwinkel – rechtstreekse verkoop*), which constitute the majority of responses. Other frequently mentioned outlets include farmers' markets, local food stores, and restaurants, alongside more innovative approaches such as vegetable box schemes (*groentepakketten*), subscription models (*zelfoogstabonnementen*), and online sales. A smaller proportion of farms report engaging with cooperatives, schools, or large-scale distribution. This diversity highlights the range of strategies adopted, while at the same time underscoring the central role of proximity-based marketing. The results emphasize the importance of short food supply chains (SFSCs), not only as an economic strategy but also as a mechanism for strengthening local networks.

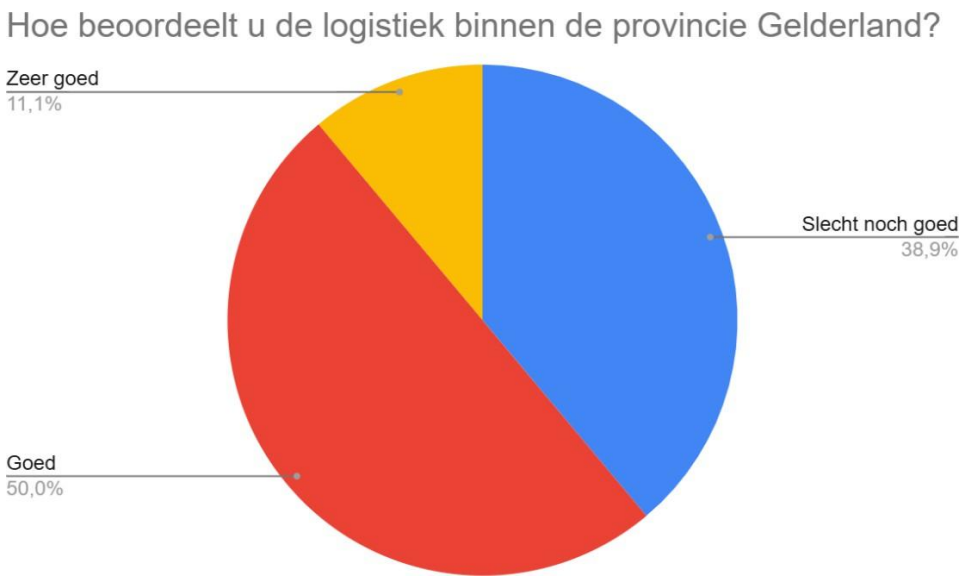
The analysis of customer profiles reveals consistent patterns across farms. The most recurrent consumer categories are:

- individuals attentive to product quality and health aspects, frequently cited in nearly all responses;
- environmentally and socially conscious consumers, sensitive to ecological and sustainability considerations;
- consumers seeking local products that emphasize territorial identity and proximity.
- Additional, though less frequent, segments include consumers interested in organic products, vegan/vegetarian diets, innovative goods, and price-sensitive buyers.

A specific focus of the research concerned perceptions of logistics. Transportation and related operations are essential for ensuring access to goods and services. However, the modern industrial food system faces significant environmental and social sustainability challenges. As emphasized in the literature, competition in today's global economy is largely shaped by speed of market access (Porter & Kramer, 2019; Dolan & Humphrey, 2000) and the efficiency of logistics chains, which exert a decisive influence on product prices (Roche et al., 2006).

According to Ross (1997), logistics encompasses warehousing, transportation, and the management of both materials and information, integrating these operations across the supply chain. Supply chain management, in turn, combines marketing and production with distribution functions to enhance competitiveness. In agriculture and food systems, logistics includes production planning and the movement of goods from producers to consumers—covering processing, storage, handling, and packaging (Gebresenbet & Bosona, 2012). Within the agri-food sector, logistics is therefore a strategic element and a determinant of business success (Omta & Folstar, 2005; Matopoulos et al., 2007; Solarte-Montufar et al., 2021).

In Gelderland, the assessment of logistics reveals a generally positive perception among respondents: 50.0% rated logistics as satisfactory, while an additional 11.1% considered it very good. Together, these categories indicate that over 60% of participants view the regional logistics infrastructure and services favorably. Meanwhile, 38.9% provided a neutral assessment (neither good nor poor), suggesting functionality but also potential areas for improvement. Notably, no respondents rated logistics as poor, reinforcing the overall adequacy of the system.



The analysis of product transportation methods highlights a strong predominance of self-managed logistics. A majority of respondents (61.1%) reported handling deliveries themselves, reflecting a clear tendency toward logistical autonomy. The second most common arrangement is outsourcing, adopted by 27.8% of respondents, suggesting that external logistics solutions may be preferred when managing larger volumes or broader distribution networks. This approach enables farms to concentrate on their core activities while taking advantage of new business opportunities.

Minor alternatives, accounting for 5.6% of responses, involve collective or alternative transport arrangements. Notably, one respondent reported participating in a Community Supported Agriculture (CSA) scheme, while another indicated the use of a privately owned business space.

The findings show that only a minority of respondents (22.2%) reported difficulties in expanding into national or international markets, while the vast majority (77.8%) did not perceive major obstacles. Among those who did encounter challenges, infrastructure and digital connectivity emerged as the most significant constraint (71.5%). These two factors are closely interrelated: in the absence of adequate infrastructure, the deployment of technologies becomes highly complex and costly, as farmers must personally cover expenses for electricity, fiber optics, or internet devices enabling data collection and processing (Ofori & El-Gayar, 2021). Other studies suggest that mobile internet can mitigate these challenges by improving connectivity in rural areas, thereby facilitating technology adoption in agriculture (Michels et al., 2020). A smaller share of respondents (28.5%) emphasized the need for improved physical infrastructure, particularly road connectivity.

Another important dimension of the study concerned stakeholders' awareness, involvement, and perceptions of the Ede food policy. The findings reveal limited awareness: 44.4% of respondents

reported unfamiliarity with the policy, highlighting the need for stronger dissemination strategies and capacity-building initiatives. By contrast, the concept of food policy more broadly enjoys substantial recognition: 77.8% of participants declared familiarity with it, while only 22.2% did not.

When asked whether a food policy could support the long-term survival of small businesses, most respondents expressed a favorable view. As shown in Table 2.1, stakeholders identified several potential benefits. Many argued that food policy should provide tangible support to new ventures, especially through local initiatives and municipal engagement, thereby creating improved market opportunities and consumer access. Suggested measures included facilitating local markets, strengthening customer relations, and improving market conditions. These elements reflect broader characteristics of alternative food systems, such as sourcing from environmentally sustainable local producers, fostering consumer engagement around healthy diets, and recognizing food as a political dimension of collective life (Feenstra, 1997; Winter, 2003; Hinrichs, 2000; Marsden et al., 2018).

Several respondents also emphasized the role of food policy in fostering cooperation among local actors and enhancing the visibility of local products. Nevertheless, some participants identified potential drawbacks. They highlighted the risk that policies, if poorly designed, may disproportionately benefit larger companies while overburdening small businesses with excessive regulation. Others expressed conditional support, stressing that food policies should be implemented efficiently, avoiding unnecessary costs, delays, or bureaucratic complexity. Finally, a minority of respondents questioned the need for policy intervention altogether.

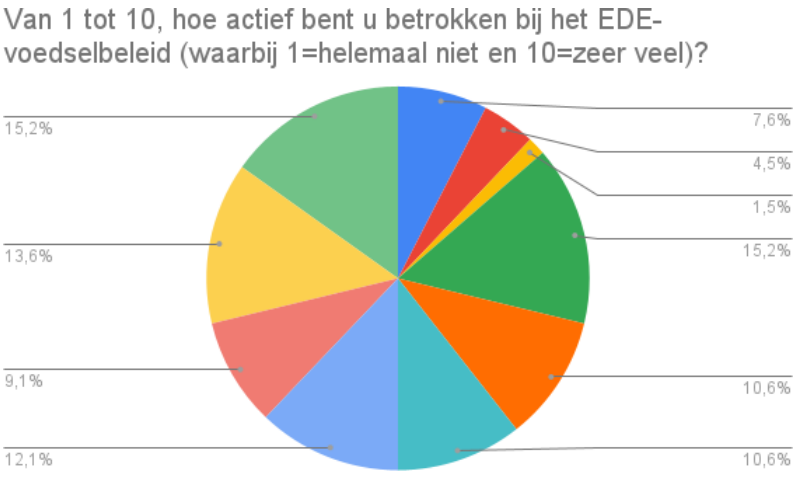
Table 2.1 - Summary of Thematic Categories

Thematic Category	**Example statements (translated/summarized)**
Support measures & startup assistance	“Ede has helped with start-up support”; “the municipality rents a beehive from us and the honey is used in the town hall restaurant”
Improved market access & consumer links	“Helps to establish contact with local customers”; “yes, through local markets and better access to consumers”; “yes, especially through better market conditions”
Local cooperation & awareness	“Offers opportunities for local cooperation”; “promotes awareness”
Need for tailored policy	“Asking what small businesses need”; “clarity is good, too many rules are not, especially for small businesses”

Risk of favoring large companies	"Policy works for large companies, small companies are hindered"; "in theory yes, but without policy capital decides"; "small businesses usually operate on their own—if there is no policy that favors large companies, it would be better for small ones"
Skepticism or conditional support	"Maybe, if they are supported"; "could be, but often such processes take a long time and cost money, with uncertain outcomes"; "only if implemented correctly"
No need / already sustainable	"In our case not needed, we already have a long waiting list"; "our long-term perspective is already good"

Source: authors

Respondents were also asked to indicate their degree of involvement in the Ede food policy on a scale from 1 (not at all) to 10 (very much). The distribution of responses appears relatively dispersed, with no single value clearly prevailing. Only a very small minority reported no involvement (score 1: 1.5%) or very limited engagement (scores 2–3: 4.5% and 7.6%). At the same time, higher scores do not cluster strongly at the top of the scale. Instead, responses are spread across intermediate and higher levels of engagement, suggesting a heterogeneous but overall moderate participation in the policy.



The majority of respondents (70%) stated that the municipal food policy includes measures supporting the valorisation of small businesses, whereas 30% reported the absence of such provisions. This indicates that the policy framework is generally perceived as geared towards strengthening small enterprises, although this view is not unanimously shared.

When asked to specify the most relevant measures, economic instruments were by far the most frequently cited (55.6%), followed by educational initiatives, improved supply stability, enhanced

market access, and participation in meetings with local producers to foster mutual understanding (each 11.1%). These results suggest that while respondents acknowledge the importance of a variety of support mechanisms, they clearly prioritize financial and economic tools as the most effective means of ensuring the long-term survival and competitiveness of small businesses.

As highlighted in the literature (Gafsi et al., 2006; Gliessman, 2007), economic viability represents a cornerstone of sustainable farm development. Ensuring adequate profitability not only promotes environmental stewardship among farmers but also contributes to improvements in the population's overall standard of living (Savickiene & Miceikiene, 2018).

When asked whether the municipal food policy had improved their position within the value chain, respondents expressed a variety of perspectives. Several interviewees reported positive effects,

particularly in relation to market access and consumer relations. For instance, some noted that the policy had strengthened their position by creating direct channels with local consumers and reducing dependence on intermediaries. Others emphasized that greater visibility in regional markets had enhanced recognition of the quality and origin of their products.

Another recurrent theme concerned the role of the policy in fostering networks and partnerships. Respondents highlighted that the establishment of local collaborations had reinforced their bargaining power within the chain, while support for short supply chains had expanded their access to local distribution platforms, enabling them to capture a larger share of the added value.

From an operational standpoint, certain participants underlined the policy's contribution to stabilizing supply conditions, which allowed for more predictable production planning and reduced risks associated with market fluctuations. Similarly, the availability of economic incentives was perceived as a driver of investment in innovation and efficiency, thereby consolidating the role of small businesses in the agri-food system.

However, not all assessments were unequivocally positive. Some respondents argued that, while the policy had generated visibility, its benefits were more substantial for larger actors, leaving smaller enterprises comparatively disadvantaged. Others suggested that improvements were indirect rather than structural, pointing to opportunities for knowledge exchange, capacity building, and greater consumer awareness of sustainable local products as valuable, yet less tangible, outcomes.

Overall, the findings indicate that while Ede's food policy is broadly perceived as a mechanism capable of strengthening the position of small enterprises within the value chain, its effectiveness depends on striking a balance between direct economic incentives and more diffuse benefits such as networking, education, and awareness-raising.

In response to requests for suggestions to enhance the Ede food policy, respondents offered a range of constructive proposals, underscoring both practical needs and strategic priorities. A recurrent theme was the importance of education and intergenerational transfer. Several participants recommended forging stronger partnerships with schools and expanding the role of educational and demonstration farms. These measures were considered crucial for raising awareness among younger generations and fostering a culture of sustainable food consumption.

A further set of recommendations focused on market access and entrepreneurial support. Respondents stressed the need to facilitate new local markets and alternative retail spaces to increase the visibility of small-scale producers, while also providing structured support for young and innovative entrepreneurs. Proposals included the establishment of incubation hubs, mentorship

programmes, and streamlined access to regulatory instruments such as licences. These measures were seen as vital to catalyzing innovation and ensuring business continuity.

Collaboration within the local food system also emerged as a key theme. Participants advocated for stronger partnerships between farmers and the hospitality sector (restaurants, hotels, catering), emphasizing the potential synergies that could boost the presence of local products in the food service industry. This was complemented by calls for greater investment in networking opportunities, continuous training, and knowledge-sharing platforms to help producers remain competitive in a rapidly evolving agri-food landscape.

Finally, respondents emphasized the need for a participatory governance approach that more systematically engages small businesses and civil society actors in decision-making processes. This participatory orientation was linked to broader proposals for fostering direct relationships between producers and consumers, such as community-supported agriculture schemes, self-harvest gardens, and other forms of short supply chains.

The findings highlight the importance of a balanced policy approach that integrates practical support measures (markets, licensing, financial assistance) with long-term cultural and structural interventions (education, networking, participatory governance) in order to enhance the resilience of the local food system.

Conclusions

Fostering synergies between rural and urban areas is central to the EU's ambition for smart and inclusive growth, yet fragmented governance often hampers balanced development.

This study examines how a mid-sized European municipality—Ede—leverages local food policy to reshape rural–urban linkages and support small-scale producers. The findings are based on a triangulation of literature review, non-participant observation, and a survey of local farms and processors. Three overarching conclusions emerge.

First, while awareness of the specific Ede Food Policy is uneven, the broader concept of food policy is widely recognised and perceived as potentially beneficial for small enterprises, particularly by improving market access, consumer engagement, and collaboration.

Second, respondents acknowledge that the policy framework already contains measures aimed at valorising small businesses. Economic instruments are considered the most effective levers, complemented by educational initiatives, networking opportunities, and measures to stabilise supply.

Third, significant barriers remain. These include fragmented multi-actor governance, weak or inconsistent rural–urban connections, capacity constraints, and the risk that poorly designed measures may over-regulate or inadvertently favour larger actors.

Taken together, the Ede case demonstrates that local food policy can contribute to upgrading value chains for small producers through three main mechanisms: (1) the creation of direct consumer channels, (2) the strengthening of bargaining power via networks, and (3) the modest stabilisation of supply conditions. However, interventions must strike a balance between material supports (finance, markets, logistics) and relational or cultural investments (education, awareness, participatory governance). In line with the City Region Food Systems perspective, the most promising pathways are those that integrate economic, social, and environmental objectives—such as short food chains, producer–hospitality partnerships, school and demonstration-farm programs, and participatory arenas (e.g. Food Policy Councils) capable of coordinating diverse interests and monitoring outcomes.

The policy implications are clear. Municipal strategies should:
(i) prioritise targeted economic incentives for small firms;
(ii) facilitate new retail venues and market platforms that reduce intermediation;
(iii) institutionalise training and networking to build long-term capabilities; and
(iv) strengthen polycentric, participatory governance to reduce fragmentation and maintain legitimacy over time.

These actions should be embedded in a coherent territorial vision that reconnects urban demand with peri-urban and rural supply, while aligning land-use, health, education, and economic development policies.

This study is not without limitations. The survey sample is small and non-probabilistic (n=18), raising concerns about representativeness and self-selection bias. The cross-sectional evidence does not capture dynamic effects, and the single-case design limits external validity. Future research should therefore adopt longitudinal and comparative approaches across multiple mid-sized municipalities, while integrating objective performance indicators (e.g. price premiums, market shares, logistics costs, environmental metrics). Governance quality—including participation breadth, decision authority, and resource adequacy—also warrants systematic assessment.

Despite these limitations, the study contributes to the growing body of urban food policy literature by providing empirical evidence that municipal policy can generate tangible—albeit conditional—benefits for small producers. The key lesson is that durable impact depends on the integration of hard instruments (finance, infrastructure, procurement, licensing) with soft infrastructures (trust, learning,

and coordinated governance). Together, these elements foster a resilient, inclusive, and territorially grounded food system.

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Chapter III

Depopulation, Land Abandonment, and the Role of Food Policies: A Qualitative Study in the Montagna Materana[9]

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Introduction

The rural exodus that unfolded during the second half of the 20th century led younger generations to migrate towards urban centres, progressively weakening their ties with farmland. This dynamic produced a widespread depopulation of rural territories and the abandonment of agricultural land.

Farmland abandonment is generally defined as the cessation of agricultural activities on a specific parcel of land (Haddaway et al., 2014; Pointereau, 2008). It represents a complex and multifaceted phenomenon, shaped by the interplay of natural, socio-economic, and institutional factors (Rey Benayas et al., 2007; Subedi et al., 2022). Among natural drivers, topography, climate, and soil fertility play a central role (Leal Filho et al., 2017; Lasanta et al., 2017). Among socio-economic and institutional drivers, land plot size, management practices, market competitiveness, household dynamics, farmland succession, depopulation, and the lack of policies addressing farmers' needs strongly influence the extent and geography of abandonment (Terres et al., 2015; Renwick et al., 2013; Dolton-Thornton, 2021).

The reduction or interruption of agricultural activity inevitably triggers changes through the erosion of distinctive rural features. These include the loss of traditional farming practices (e.g., crop rotation, organic fertilisation, use of native livestock breeds), the disappearance of anthropic rural infrastructures (e.g., dry-stone walls, ponds, shelters, and enclosures), and the decline of intangible cultural heritage (e.g., toponyms, dialects, and musical traditions) (Cullotta & Barbera, 2011).

Such processes predominantly affect marginal inland areas, often located far from major metropolitan centres and thus excluded from development trajectories. These territories typically suffer from poor infrastructure and weak service provision, with detrimental effects on economic opportunities. This in turn accelerates depopulation and exacerbates territorial inequalities (Blečić et al., 2023; González Díaz et al., 2019; Gallo & Pagliacci, 2020; Ragosta et al., 2024). Yet, at the same time, they retain

[9] Submitted to: ***Food Policy*, Elsevier.**

potential for the sustainable use of underexploited environmental and productive resources. To unlock this potential, integrated policy frameworks are needed to foster development while strengthening social cohesion (Marchetti et al., 2017).

In recent years, European policies—such as the European Green Deal, the Farm to Fork Strategy, and the new Common Agricultural Policy (CAP) 2023–2027—have focused explicitly on revitalising inner areas. Their objective is to balance economic development, ecological sustainability, and the preservation of habitats. From a social perspective, these policies seek to counteract poverty and demographic decline, while from an environmental perspective they aim to reduce pollution and prevent ecosystem degradation.

The 2013 CAP reform, implemented during the 2014–2020 programming period, was designed to respond to the main challenges confronting the European Union—both within agriculture and beyond. These included economic priorities (food security, price stability, productivity growth), environmental concerns (climate change, greenhouse gas reduction, biodiversity, and habitat conservation), and territorial goals (ensuring the vitality of rural areas, maintaining agricultural diversity, and supporting resilience).

The new CAP 2023–2027 represents a significant evolution of this framework. Like its prEdecessor, it is structured around two pillars. Pillar I continues to provide direct payments to support farmers' incomes, but places greater emphasis on environmental standards through the mechanism of "conditionality" and the introduction of eco-schemes. These voluntary schemes, which account for at least 25% of the direct payments budget in each Member State, are intended to encourage sustainable practices. Pillar II remains focused on rural development, supporting long-term initiatives aimed at sustainability, innovation, and diversification. As noted by Cisilino and Licciardo (2022), financial instruments (FIs) within Rural Development Programmes (RDPs) offer a potentially valuable yet complex tool for improving access to credit in farming and rural enterprises. Despite their promise, national uptake has been limited—amounting to around 0.8% of PSR resources—due to administrative burdens, regulatory complexity, and a lack of experience among managing authorities. While FIs could help overcome credit barriers, especially for SMEs and young farmers, their effectiveness ultimately depends on sustained institutional commitment, adequate know-how, and alignment with local needs.

In 2012, Italy introduced the National Strategy for Inner Areas (SNAI), an innovative territorial policy aimed at revitalising marginal areas while safeguarding their natural capital (Lucatelli, 2015).

The SNAI is grounded in a place-based approach and relies on a multilevel governance model. It outlines two main lines of action. The first focuses on consolidating essential public services and creating the conditions necessary for socio-economic development. The second promotes local development projects designed to revitalise marginal areas. In addition, the strategy emphasises the importance of long-term structural interventions to optimise local resources (Cotella & Brovarone, 2020). Effective development policies must build on a thorough understanding of heritage and available assets, followed by agricultural planning to protect land and strengthen local supply chains for food, non-food products, and bioenergy (Alhajj Ali et al., 2024).

The SNAI is supported by both national and European funding (ERDF, ESF, EAFRD, EMFF) (Basile et al., 2020). Furthermore, the National Recovery and Resilience Plan (PNRR), launched in 2021 under the Next Generation EU programme (**http://italiadomani.gov.it/content/dam/sogei-ng/documenti/PNRR%20Aggiornato.pdf**), has allocated resources to improve the resilience of inner areas through specific missions and components.

Building on this background, the primary objective of this research is to investigate how different stakeholders in the Montagna Materana—local administrators, farmers, representatives of agricultural associations, and Local Action Groups (GALs)—interpret and frame the phenomena of depopulation and farmland abandonment. By means of semi-structured interviews, the study seeks to capture diverse perspectives, shedding light on the complexity and local specificities of these processes.

More specifically, the research aims to:
(i) examine the perceived causes contributing to depopulation and farmland abandonment over the past fifty years;
(ii) analyse the socio-economic and territorial impacts on agricultural practices, local economies, and community life;
(iii) identify strategies of resistance and adaptation adopted locally to address these challenges; and
(iv) explore stakeholders' visions for the future of marginal areas.

Particular attention is devoted to the role of food policies—including the Rural Development Programme (PSR), local agri-food initiatives, and multi-level governance mechanisms—in shaping sustainable development trajectories.

In doing so, the study seeks to provide a deeper understanding of how depopulation and farmland abandonment are locally perceived and addressed, while also identifying potential policy levers and

community-driven strategies capable of fostering resilience and long-term sustainability in the Montagna Materana.

Materials and Methods

Study Area

The Montagna Materana (MOMA) constitutes the inner area of the Province of Matera, in Basilicata, and includes eight municipalities—Accettura, Aliano, Craco, Cirigliano, Gorgoglione, Oliveto Lucano, San Mauro Forte, and Stigliano—covering roughly 644 km² at the heart of the Lucanian Apennines. The territory is largely hilly and mountainous, with elevations exceeding 1,000 meters, and is marked by significant hydrogeological fragility due to clay-rich soils and the widespread presence of badlands (calanchi), especially around Craco and Aliano. The road network is composed mainly of secondary routes, resulting in long travel times to essential services and major transport infrastructure—the nearest railway stations being Ferrandina and Grassano. This condition has reinforced the area's marginality, leading to its classification as "peripheral" or "ultra-peripheral" under Italy's *National Strategy for Inner Areas (SNAI)*.

From an environmental standpoint, the MOMA area holds considerable natural value, including the Gallipoli Cognato and Piccole Dolomiti Lucane Regional Park, along with numerous Natura 2000 sites that protect forests, hills, and ecologically significant landscapes. Despite its rich environmental and cultural heritage, the territory is severely affected by depopulation: since the 1960s, the total population has more than halved, accompanied by rapid ageing and a persistently negative natural balance. The smallest municipalities, such as Cirigliano and Oliveto Lucano, now count fewer than 400 inhabitants, while only Stigliano, Accettura, and San Mauro Forte exceed one thousand. According to ISTAT's Municipal Fragility Index, all municipalities fall within the highest risk classes, reflecting the area's intertwined demographic, social, and infrastructural vulnerabilities.

Agriculture, historically the backbone of the local economy, is undergoing a deep contraction. Between 2010 and 2020, both the utilized agricultural area and the number of farms declined sharply, leading to widespread land abandonment, particularly in the smaller towns. Cereal cultivation and extensive livestock farming remain predominant, though diversification is emerging—most notably through organic farming in Stigliano, San Mauro Forte, and Craco. Access to irrigation water remains uneven: areas such as Stigliano and Craco benefit from public irrigation systems and consortia, whereas others, including Oliveto Lucano and Cirigliano, lack adequate

infrastructure. This disparity further constrains agricultural productivity in an increasingly arid climate, characterized by recurrent droughts.

Additional challenges include soil erosion, limited service provision, and scarce employment opportunities, all of which continue to drive youth outmigration and demographic desertification. Yet, the MOMA retains a remarkable natural and cultural heritage: its striking landscapes and historic villages—such as Aliano, home to the *Carlo Levi Literary Park* and the *"La Luna e i Calanchi"* festival, and Craco, now an emblematic Italian "ghost town"—offer significant potential for local development rooted in cultural tourism, sustainable agriculture, and the valorization of territorial resources.

In this sense, the Montagna Materana stands as an emblematic case within Italy's inner areas—where regeneration depends on integrated risk management, innovation in productive systems, and the creation of new territorial governance models capable of linking environmental conservation with socio-economic revitalization.

Further information and in-depth data can be found in **Appendix II**.

Methodology

This research is based on an interpretive qualitative methodology, consistent with the approach described by Denzin and Lincoln (Fusch et al., 2018). The objective is to explore social phenomena from the standpoint of participants, giving centrality to meaning, lived experience, and context. Rather than relying on a single technique, qualitative inquiry acknowledges the multiplicity of perspectives and embraces methodological pluralism, positioning knowledge within the specific socio-territorial setting under investigation.

In line with this orientation, the study incorporated ethnographic methods (Moisander & Valtonen, 2006). Fieldwork was conducted primarily in the municipalities of Stigliano and Aliano, where the research team spent extended periods observing local dynamics and engaging in informal conversations with residents. This immersive presence in the field enabled the collection of valuable insights into everyday agricultural practices, perceptions of depopulation, and community concerns. To complement these observations, in-depth unstructured interviews were conducted, designed to elicit detailed accounts directly connected to the research focus.

The interviews were subsequently analysed using a narrative approach (Polkinghorne, 1998), which made it possible to reconstruct both individual and collective trajectories of change. Particular attention was devoted to the temporal dimension of depopulation and farmland abandonment, as well

as to the identification of key periods during which these processes became most evident in the Montagna Materana.

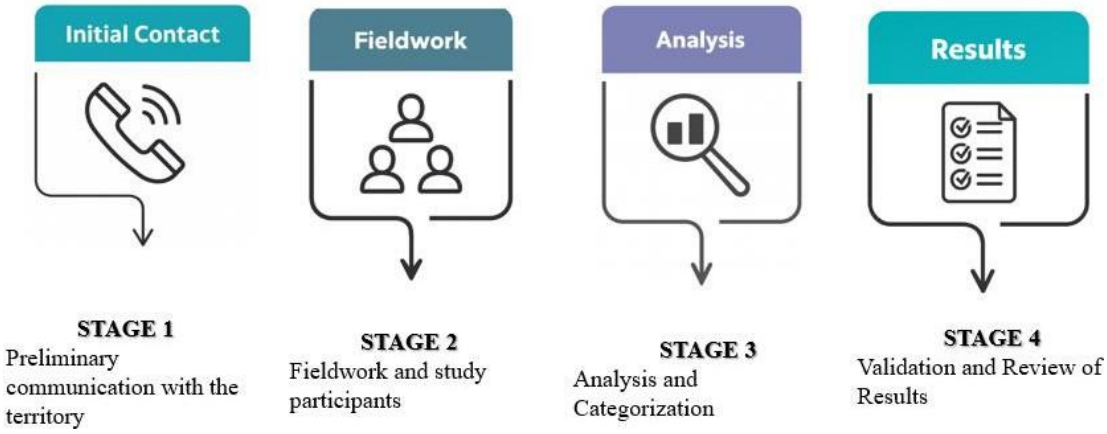
The core of the data collection consisted of **42 interviews**, carried out between June and August 2025. Each interview lasted between 45 and 60 minutes and continued until thematic saturation was reached. The sample included four categories of stakeholders: farmers, mayors or local administrators, representatives of agricultural associations, and members of Local Action Groups (GALs). This structure was deliberately chosen to capture a plurality of perspectives on agricultural development, depopulation, and territorial change in the Montagna Materana.

As Grimble and Wellard (1997) explain, stakeholder analysis is "a holistic approach or procedure for gaining an understanding of a system, through the identification of key actors or stakeholders and the assessment of their respective interests in the system." Similarly, Reed et al. (2009) define stakeholder mapping as the process of identifying the social or natural aspects influenced by a decision or action, as well as the individuals, groups, and organisations affected by, or capable of influencing, those aspects, and prioritising them for involvement in decision-making.

For this study, interviews were guided by an open-ended questionnaire, structured around four thematic areas: causes, impacts, strategies, and future visions.

The research design was articulated into four main stages, as depicted in Figure 3.21:

Figure 3.1 - the four stages of the workflow



- **Stage 1:** *Preliminary Communication with the Territory.* Trust-based communication channels were activated to contact stakeholders across the eight municipalities and explain the objectives of the study. Once contact was established, consent to participate was requested.

- **Stage 2:** *Fieldwork and Study Participants.* Field activities were conducted in all eight municipalities. The researchers spent 12 days in Stigliano, 6 days in Aliano, and 5 days in Accettura, while in the other locations, shorter visits were made. Data collection relied primarily on semi-structured interviews, each lasting approximately 45 to 60 minutes. Interviews were conducted using a semi-structured interview guide, and informed consent was obtained and signed by all participants prior to each session.
  These interview data were complemented by detailed field notes taken during participant observation activities conducted in workshops and seminars held throughout the area.
- **Stage 3:** *Analysis and Categorization.* All interviews were audio-recorded and fully transcribed. The data were analyzed using a content analysis approach by using NVivo 14 software. For each section (causes, impacts, strategies, and future visions) key themes and nested subthemes were identified in order to investigate the sentiment of the different types of stakeholders on abandonment of agricultural land and depopulation representing different motivations and interpretations. In order to maintain anonymity, respondents were coded as M (mayor or local administrator), F (farmer), R (representative of agricultural association) and L (Local Action Groups), followed by the number of the interviewee.
- **Stage 4:** *Validation and Review of Results.* The results were presented to local communities in a feedback phase, ensuring methodological rigor and participant validation. This phase aligns with a triangulation of sources strategy (Fusch et al., 2018), while also reflecting a participatory and applied research approach (Chambers, 1994). By involving local actors not only in data generation but also in the interpretation process, the research aimed to co-produce knowledge that can inform food governance strategies and strengthen the local productive fabric.

Results

The qualitative analysis of the 42 interviews with mayors or local administrators, farmers, representatives of agricultural associations, and Local Action Groups (GAL) offers a rich account of the dynamics surrounding depopulation and farmland abandonment in the Montagna Materana.

Causes of depopulation and farmland abandonment

Socio-cultural, Political-economic and Environmental Drivers of Land Abandonment

From the analysis of the interviews, three key themes emerged as drivers of land abandonment in Montagna Materana: **socio-cultural factors**, **political-economic conditions**, and **environmental dynamics**.

Demographic and generational change is perceived as the overarching socio-cultural cause of land abandonment, and is articulated through five main sub-themes:

1. Youth outmigration
2. Ageing population
3. Declining social value and attractiveness of farming
4. Community disintegration and rural depopulation
5. Cultural barriers and weak cooperation

Youth outmigration and the lack of generational renewal were repeatedly mentioned as central factors. Several local administrators and farmers stressed that young people leave for education or employment opportunities in urban centres or abroad, and rarely return to continue farming. The deputy mayor of one municipality observed:

"Every year more young people leave, and the ones who stay are older and tired. Without generational renewal, the land is left uncultivated" (M.2).

A young farmer expressed it clearly:

"Without people, there is no future. Many of my peers have emigrated to the North, abandoning the land. I decided to stay and study in Basilicata to contribute to my territory" (F.39).

Similarly, another farmer noted:

"The real problem is that no one wants to work in agriculture anymore. Many prefer an office job, even if here the land is fertile and productive" (F.41).

Closely linked to this is the **ageing of the rural population**. Older farmers often struggle to maintain their holdings and, in the absence of successors, plots are gradually abandoned. One interviewee emphasised:

"Agriculture in the inner areas is heroic. Those who remain are older and tired, while young people are no longer willing to take over" (F.40).

Another recurring theme is the **declining social value and attractiveness of farming**. The public perception of farmers has deteriorated over time, undermining the profession's status and discouraging generational renewal. As one respondent put it:

"The farmer today is not seen with dignity. In the past, the farmer had a role and respect; now he is considered at the bottom" (R.7).

Interviewees repeatedly underlined the demanding nature of agricultural work, which offers little leisure and exposes farmers to all weather conditions:

"Farming is hard work. With the sun, rain, heat and cold you are always outside, and sometimes all this effort is not rewarded" (F.38).

Community disintegration further accelerates abandonment. Depopulation leads to the closure of schools, shops and social venues, weakening the social fabric and making farming less viable. As one farmer explained:

"*Shops and bars have closed, many families have left. Without people, even tourism cannot take off, and selling local products becomes harder*" (F.39).

Finally, cultural barriers such as **individualism and weak cooperation** emerged as important obstacles. Although collective action could alleviate economic and labour shortages, mistrust and rivalry among farmers often hinder cooperation.

"Collaboration is scarce. In small villages, envy often prevails and there is a tendency to discredit others" (F.41).

This sentiment was echoed consistently across interviews.

Beyond socio-cultural aspects, political-economic factors include:

1. Low farm profitability
2. Inefficiencies in agricultural policies
3. Credit and investment barriers
4. Labour shortages
5. Infrastructural weaknesses

The dominant theme concerns the **structural weakness of agricultural and rural development policies**, which has exacerbated territorial marginalisation and reduced the viability of farming as a sustainable livelihood.

Low profitability and market pressures were repeatedly cited as major obstacles. Farmers stressed that selling prices often do not cover production costs, especially in cereals, dairy and livestock.

"We sell our best products at very low prices and then we buy poor quality goods from outside. When I sell a calf, I often cannot even cover the expenses" (F.41).
"The market sets the price, but it is often below what we spend to produce. This discourages investment and pushes people to abandon marginal lands" (F.40).

As observed in other districts of Southern Italy, small-scale agriculture generally yields low profits, and generational turnover remains extremely problematic—particularly in mountain areas, where urban opportunities are more appealing (Coppola et al., 2020).

The **absence of local value chains** exacerbates this situation, leaving producers dependent on intermediaries:

"There is no slaughterhouse here; we have to take the animals to Puglia… even for wheat there is no value chain, we are forced to sell it outside. In this way, the added value leaves and we are left only with the expenses" (F.26).

Another interviewee stressed the lack of cooperative structures and processing facilities:

"Here there is nothing that helps us to valorize our products. We have no processing, no cooperatives. We are obliged to sell to intermediaries and outside the territory, and in the end everyone earns except the farmer" (F.22).

Access to credit is another major barrier, particularly for young farmers with no financial background. Although some credit institutions have recently shown greater willingness to support agriculture, private funding remains scarce (Fi-Compass, 2020). Many farms are unable to meet the criteria or provide the guarantees required to access EU agricultural funds, particularly small and medium-sized farms (Fi-Compass, 2020; ENRD, 2012).

"If a young person wants to start from zero and has not even one euro, he cannot do anything. They ask you to put in 10–20% of your own money, but if you have nothing, how can you?" (F.34).

Interviewees also highlighted a **disconnect between institutional discourse and local realities**:

"Regional officials come to talk about agritourism in Stigliano, where we do not even have drinking water. It is ridiculous" (F.33).

Farmers expressed frustration with regulations perceived as distant from local knowledge systems. Not one farmer reported positive experiences with subsidies under the EU's Common Agricultural Policy (CAP).

Infrastructural deficits were mentioned across all groups. Adequate infrastructure improves quality of life and mitigates rural depopulation. Road networks are essential for market access, competitiveness, and income opportunities. However, most villages in the study area have poorly developed transport systems and limited social or economic infrastructure:

"Without schools, without doctors, and without roads, families cannot stay, and the fields are left empty" (M.14).

The **water supply network** is also in poor condition:

"We still use water infrastructures built in the 1970s, and the Region itself admits that 70% of the water resource is lost along the network."

Finally, interviews revealed a **crisis of trust and governance fragmentation**. Farmers voiced scepticism towards institutions, citing limited dialogue and frequent procedural errors in public funding:

"*Everyone lives off subsidies, few share ideas, and institutions are disconnected from reality" (F.33).*

Nevertheless, innovative initiatives such as **community cooperatives** show that collective action, when supported by governance and territorial investment, can mitigate decline (R.35).

Environmental challenges were a transversal concern. Farmers and local administrators alike described the **increasing impacts of climate change**—longer droughts, unpredictable rainfall, and extreme weather events—which undermine crop reliability. In Montagna Materana, **desertification** caused by climate variations and human activities is a major factor in agricultural land degradation, often coupled with flash floods.

"Climate change weighs heavily on agriculture; we cannot predict the seasons anymore" (F.39).

Additionally, **wild fauna**, particularly wild boars, were identified as immediate threats:

"Wild boars destroy up to 40% of my crops every year; electric fences are useless, and the costs of iron ones are unbearable" (F.40).

Table 3.1 - Themes of land abandonment mentioned by stakeholder groups

Themes	M (Mayor or Local Administrator)	F (Farmers)	R (Representative of Agricultural Association)	L (LAGs)	No. of Stakeholder Groups
Youth outmigration & lack of generational renewal	✓	✓	✓	✓	4
Ageing population	✓	✓	✓	✓	4
Declining social value of farming		✓	✓		2
Community disintegration & depopulation	✓	✓	✓	✓	4
Cultural barriers & weak cooperation		✓	✓		2
Low profitability & market pressures	✓	✓	✓	✓	4
Absence of local value chains	✓	✓	✓	✓	4
Access to credit barriers		✓	✓	✓	3
Ineffective agricultural policies & bureaucracy	✓	✓	✓	✓	4
Infrastructural weaknesses (roads, schools, water)	✓	✓	✓	✓	4
Labour shortages	✓	✓	✓		3
Governance gaps & mistrust		✓	✓	✓	3

Climate change	✓	✓	✓	✓	4
Wildlife (wild boars)	✓	✓	✓		3

Source: authors

Socio-economic and Territorial Impacts

The consequences of depopulation and farmland abandonment are multifaceted, affecting agricultural practices, local economies, and the social fabric of rural communities. Farmers described a **progressive contraction of productive activities**, particularly in livestock farming and artisanal processing. The closure of multiple small dairies has been attributed to a combination of factors, including declining profitability and a lack of generational continuity. As one breEder observed:

"Dairies cannot survive without young people willing to wake up at four in the morning" (F.24).

The phenomenon of land abandonment is further compounded by **processes of land ownership concentration**. Stakeholders from diverse backgrounds described the emergence of what they termed "**neo-latifundia**", in which external investors or large landowners acquire abandoned parcels. This trend has generated disparities in land access and eroded local autonomy. Notably, few farmers mentioned land consolidation as an effective land management technique.

Local administrators repeatedly emphasised the **impact of depopulation and land abandonment on quality of life**. All respondents expressed dissatisfaction with living conditions in the municipalities of the Montagna Materana. Depopulation was seen as being accelerated by school closures, declining public services, inadequate infrastructure, and the contraction of commercial life. As one mayor put it:

"The closure of a school invariably signifies the loss of potential for the future of the village" (M.6).

The phenomenon of **social isolation** affects not only the elderly but also remaining families, who experience a sense of alienation from opportunities and essential services. This limited access can lead to further isolation, acting as a push factor for young people to migrate to more developed areas.

From a **territorial perspective**, the presence of abandoned land contributes to **environmental fragility**. Farmland abandonment has been shown to negatively affect socioeconomic development, the environment, and landscapes (Perpiña Castillo et al., 2021). Consequences include **loss of biodiversity** (Rey Benayas et al., 2007; Keenleyside & Tucker, 2010; Hart et al., 2013; Lasanta et

al., 2017), **landscape homogenisation** (Leal Filho et al., 2017; Rey Benayas et al., 2007; Lasanta et al., 2017; Hart et al., 2013; Höchtl et al., 2005), **increased fire risk** (Hart et al., 2013; Lasanta et al., 2017), **soil erosion**, **desertification**, **land degradation** (Rey Benayas et al., 2007; Keenleyside & Tucker, 2010; Lasanta et al., 2017; Hart et al., 2013), and an **expansion of intensive agriculture** (Perpiña Castillo et al., 2021). Other effects include **changes in ecosystem processes** (Cramer et al., 2008), the **loss of nature conservation areas** such as Natura 2000 (Keenleyside & Tucker, 2010), reduced water availability, and the **erosion of cultural values** (Rey Benayas et al., 2007).

Within an economic framework, agricultural land abandonment can **compromise food security** (Schierhorn et al., 2019) and lead to the **erosion of local agricultural practices and knowledge** (Gellrich et al., 2007).

In line with previous studies linking abandonment to landscape homogenisation and the spread of invasive vegetation (Rey Benayas et al., 2007; Lasanta et al., 2017; García-Ruiz et al., 2020), several respondents highlighted the visible **encroachment of weeds and brambles** in areas that were previously cultivated. One farmer remarked:

"The scarcity of labour is a matter of consequence; in the past, the role of the herder was commonplace, yet this is no longer the case. Fields have been left abandoned and are now overgrown with weeds and brambles. In contrast to the present day, when the land is being overtaken by wild vegetation, there was a time when much more land was used for cultivation" (F.38).

Strategies of Resistance and Adaptation

Rural areas continue to suffer from a lack of sustainable development, but **farm diversification** emerged as a key strategy among farmers. According to Hansson et al. (2013), farmers diversify for economic, family, and social reasons, reflecting the importance of **human and social capital** in managing diversified farms (McElwee & Smith, 2014).

Several respondents described experimenting with **alternative crops**—such as ancient grains, pistachios, mushrooms, and medicinal herbs—often combined with **organic farming practices**, as a means of spreading risk and ensuring survival. These crops provide supplementary income, foster multifunctionality, and support **gastronomic tourism** in sustainable agricultural systems.

One farmer explained:

"We are converting to organic. It is expensive, but it is the only way to make our products recognizable and sustainable. Without this added value, we cannot resist market pressures" (F.40).

Another farmer added:

"Only by transforming our milk into cheese and our cereals into flour can we keep agriculture alive here. Selling raw products is no longer enough" (F.33).

Others pointed to **multifunctionality** as a tool for resilience:

"Over the last 3–4 years, we have organized walks through the olive groves with tastings, a form of olive oil tourism that brings people closer to the world of olive oil" (F.13).

As suggested by Giarè et al. (2018), multifunctional diversification can **promote social inclusion and sustainability**, helping to keep rural communities dynamic and resilient.

Mayors supported the **integration of agriculture with tourism and gastronomy**, though some farmers expressed concerns about land-use conflicts with renewable energy. Associations argued that innovation should be embedded in **resilient value chains**, and one farmers' representative described integrated initiatives combining agriculture, tourism, and social services:

"We transformed a forest building into a hostel, managed the municipal swimming pool, and created a 72 km cycling route" (R.35).

At the collective level, interviewees stressed the **importance of cooperation**, while acknowledging persistent cultural barriers such as individualism and local rivalries. Producer networks, cereal and olive oil consortia, and Coldiretti's *Campagna Amica* markets were cited as promising initiatives, though often hindered by fragmentation.

"Everyone agrees on the importance of cooperation, but when it comes to practice, each one goes their own way" (F.17).

Across stakeholder groups, there was broad agreement that **agricultural cooperatives (ACs)** are essential to support small-scale farmers in marginal areas.

Local administrators identified **integrating local food into schools and community events** as one of the most innovative strategies. This approach creates economic opportunities for farmers and fosters a renewed sense of belonging among local communities. As one mayor explained:

"If we can connect local food to schools and festivals, we give farmers a reason to stay and people a reason to feel proud" (M.3).

This strategy is seen as a promising way to **address the historic underdevelopment and social exclusion of rural areas**, unlocking their potential through a *place-based* perspective (Barca, 2009; OECD, 2011).

Representatives of GAL and agricultural associations emphasised the role of **integrated projects** as strategic tools. LEADER programmes, Green Communities, and multi-actor initiatives were highlighted as mechanisms for creating synergies across municipalities. One GAL representative remarked:

"We need to move beyond the single village logic and build networks that link agriculture, culture, and tourism" (L.31).

Finally, at the **individual level**, several farmers highlighted the importance of **personal resilience**, often relying on family support, personal savings, or bank loans. This resilience was described as both a strength and a vulnerability:

"We resist with passion, but without support we are left alone" (F.19).

Table 3.2 - Strategies for the Development and Preservation of the Montagna Materana by Stakeholder Category

Stakeholder category	Strategies identified
Farmers	• Diversification into niche crops (ancient grains, pistachio, mushrooms, medicinal herbs) • Transition to organic farming • Product transformation (milk → cheese, cereals → flour) • Multifunctionality (olive oil tourism, agritourism, educational farms) • Attempts at cooperation, despite cultural barriers • Personal resilience and reliance on family savings
Mayors / Local Administrators	• Integration of local food into schools, canteens, and festivals • Promotion of agriculture–tourism synergies • Investment in infrastructure and basic services (roads, water, healthcare, education) • Concerns about land-use conflicts with renewable energy
Agricultural Associations	• Innovation embedded in resilient value chains • Establishment of processing facilities and producer consortia • Promotion of structured markets (e.g., *Campagna Amica*) • Emphasis on cooperation as a precondition for sustainability

Local Action Groups (GALs)	• Integrated and multi-actor projects • Building inter-municipal networks • Linking agriculture with culture and tourism • Use of LEADER programmes and Green Communities to strengthen place-based governance

Source: authors

Future Visions for Marginal Areas

The social and economic changes of recent decades have left rural areas particularly vulnerable, due to depopulation, ageing populations, and a lack of infrastructure and services. Looking to the future, stakeholders expressed a mix of **hope, pragmatism, and scepticism**.

Local administrators identified **urban and rural regeneration** as key priorities, envisioning investment in **slow tourism**, **renewable energy communities**, and **supra-municipal cooperation**. As one mayor argued:

"The future of these villages depends on our ability to connect agriculture with tourism, culture, and new forms of energy" (M.3).

Farmers emphasised the **central role of youth participation** and the need for **generational renewal**. Several participants suggested that training courses, incentives, and improved infrastructure would be effective in attracting and retaining young farmers. At the same time, their narratives reflected the **personal sacrifices** required to stay. As one young farmer explained:

"I chose to stay, but without roads, internet, and credit, how long can we resist?" (F.29).

Representatives of agricultural associations stressed the importance of **strengthening local value chains** through cooperatives for processing, quality certification, and marketing, as tools to empower small producers. One representative noted:

"Only by adding value collectively can we compete with external markets" (R.7).

Intermediate actors such as GALs proposed **integrated development models**, particularly the **Agriculture–Culture–Tourism (ACT)** approach, as pathways to revitalisation. They argued that multifunctional territorial development could address **economic, social, and environmental challenges simultaneously**. As one GAL representative put it:

"The ACT model is not a slogan; it is the only way to keep these territories alive" (L.31).

Stakeholders were invited to reflect on the **potential role of food policies** in revitalising marginal areas. Across all groups, food policies were widely recognised as important, though their interpretations varied.

Local administrators viewed food policies as a **means to link agriculture with public services**, thereby reinforcing municipalities' roles in supporting local production. Several respondents highlighted the **potential of school canteens** within territorial food systems. As one mayor observed:

"Linking local farmers with canteen procurement could guarantee both healthier meals and local economic circulation" (M.3).

Public food procurement and collective catering (in schools, hospitals, universities, care homes, prisons, etc.) were identified as both a **challenge and an opportunity** for implementing sustainability practices. Such procurement can shift consumption towards **healthier, lower-impact food products**, moving away from prioritising only cheaper food (Morgan & Sonnino, 2007). This perspective reflects a belief in the **transformative potential of public procurement**, providing stable markets, valorising local products, and generating community spillovers.

However, administrators also acknowledged **coordination difficulties** among fragmented actors and **bureaucratic burdens**, which often slow implementation and reduce the transformative capacity of such initiatives.

Farmers offered a more **ambivalent view**. Many recognised the potential of food policies to enhance biodiversity, add value to local products, and open new markets. However, their narratives were permeated by scepticism towards bureaucracy, market volatility, and **unequal benefit distribution**.

"Food policies could change everything, but if they remain only on paper, nothing will change" (F.29).
"Without real opportunities, not just money, young people cannot buy land or equipment" (F.39).

Several highlighted the **mismatch between policy rhetoric and practical needs**, citing infrastructural gaps and inaccessible support measures:

"Projects are often inaccessible to young people; you must anticipate 70,000 or 100,000 euros, and without guarantees no bank will give you credit" (F.39).

Agricultural associations framed food policies as tools to **foster cooperation and counter individualism**, which remains a recurrent obstacle in rural economies. One representative explained:

"We have excellent products, but we do not know how to sell them… our dream is to create a consortium for typical products, as in Emilia-Romagna" (R.35).

This highlights the need for **collective branding and territorial marketing strategies** to successfully promote regional products.

GAL representatives emphasised integrating food policies within **broader rural regeneration strategies**. Such integration was seen as essential to **facilitate municipal collaboration**, **attract young people**, and **promote integrated approaches**.

Nevertheless, concerns remained. Measures were often perceived as favouring **established actors**, rather than small or new initiatives. As one cooperative member noted:

"We cannot do this alone; municipalities are overwhelmed, and without concrete regional support our villages will be empty in ten years" (L.31).

Collectively, these perspectives reveal a **shared recognition of food policies as potential drivers of innovation and territorial cohesion**. At the same time, they highlight **widespread doubts about their practical feasibility**:

- **Administrators** emphasised their public function.
- **Farmers** highlighted structural inequalities.
- **Associations** pointed to cooperation.
- **GALs** situated them within governance mechanisms.

Despite this shared vision, there was broad agreement that **current approaches remain inadequate**. Excessive bureaucracy, poor coordination, and insufficient support for small-scale or emerging actors continue to undermine trust in these policies.

The result is a **paradoxical landscape**: food policies are imagined as transformative levers capable of linking agriculture, services, and communities, yet are often experienced as **fragile, fragmented, and at risk of remaining merely aspirational**.

Table 3.3 - Stakeholders' perceptions of food policies across categories

Stakeholder category	Perception of food policies
Mayors/Local Administrators	Instruments to connect agriculture with public services (esp. school canteens); opportunities for stable markets and valorization of local products; but limited by bureaucracy and fragmented coordination.
Farmers	Ambivalent: potential to enhance biodiversity, add value, and open markets; but skepticism about bureaucracy, market volatility, and inequitable distribution of benefits; many see them as aspirational rather than practical.
Agricultural Associations	Tools to foster cooperation, counter individualism, and promote territorial branding and marketing; seen as enabling collective strategies to valorize regional products.
LAG	Embedded in broader rural regeneration strategies; potential to encourage municipal collaboration, youth involvement, and integrated territorial approaches; concerns about limited accessibility for small/new actors.

Source: authors

Table 3.4 - Common cross-cutting themes and stakeholder perspectives

Common Theme	Mayors/Local Administrators	Farmers	Representative of Agricultural Associations	LAG
Economic fragility	Emphasize lack of generational renewal due to low incomes	Stress unprofitability, high costs, unstable markets	Criticize CAP/PSR favoring large farms	Highlight structural imbalances and need for systemic solutions
Infrastructural marginality	Schools, healthcare, and transport closures drive depopulation	Poor roads and internet hinder farm viability	Weak logistics limit market access	Stress inter-municipal gaps and isolation
Environmental pressures	Concern about fire risk and land degradation	Daily damage from wild fauna, droughts, climate stress	Stress biodiversity loss and unmanaged land	Highlight climate change and hydrogeological risks
Need for cooperation	Promote inter-municipal alliances	Call for stronger producer networks	Advocate collective bargaining and consortia	Propose integrated territorial projects (LEADER, ACT model)

Role of food policies	Link local farms to schools and communities	Valorize local products and biodiversity	Strengthen small producers' role in value chains	Governance framework for integrated territorial development

Source: authors

Discussion

The ongoing depopulation of the Montagna Materana, though uneven across municipalities, is closely intertwined with farmland abandonment. This is reflected in the progressive decline in the number of farms, in line with broader trends observed both in Italy (Mazzocchi et al., 2020) and across Europe (Verburg & Overmars, 2009; Quintas-Soriano et al., 2022).

By integrating the perspectives of farmers, mayors and administrators, agricultural associations, and Local Action Groups (GALs), the findings highlight both the structural determinants of decline and the locally embedded perceptions that shape its interpretation. Farmland abandonment is widely attributed to the lack of generational renewal, but this dynamic is deeply interconnected with broader social, cultural, economic, and political processes (Rey Benayas et al., 2007; Subedi et al., 2022). Similar patterns have been documented in other Mediterranean inner areas, where demographic decline and weak generational turnover emerge as the most persistent drivers (Lasanta et al., 2017; Coppola et al., 2020).

Economic vulnerabilities were repeatedly identified as decisive: low farm profitability, dependence on intermediaries, the absence of local value chains, and weak market access undermine the economic sustainability of farming. These vulnerabilities are aggravated by structural infrastructural deficits, such as inadequate road networks, water supply systems, and digital connectivity. **Environmental pressures**—including climate change, desertification, and damage caused by wildlife—further erode agricultural reliability. At the same time, **governance fragmentation** and the perceived distance between institutional discourse and local needs reinforce mistrust, limiting the effectiveness of policy interventions.

The role of policies such as the Common Agricultural Policy (CAP), LEADER programmes, and the National Strategy for Inner Areas (SNAI) appears ambiguous. While these instruments are designed to support marginal territories, they are often criticised for being unable to reduce inequalities or to address the specific needs of local actors (Alonso-Carrillo et al., 2023). Subsidies and financial

instruments can represent both opportunities and obstacles: their success depends on how well they are aligned with territorial specificities and on the institutional capacity for implementation.

The **impacts** of depopulation and abandonment are not limited to agriculture but extend to the social and cultural fabric of communities, service provision, and environmental stability (Rey Benayas et al., 2007; Perpiña Castillo et al., 2021). The phenomenon of *neo-latifundia*—the acquisition of abandoned parcels by external investors—illustrates how abandonment reshapes land governance, raising concerns over equity, territorial control, and community autonomy. This highlights the need for governance mechanisms capable of safeguarding local ownership and ensuring fair resource distribution.

Despite these structural vulnerabilities, the research also documented **resilience and innovation** at the local level. Farmers are diversifying production, adopting organic practices, engaging in multifunctionality, and experimenting with value addition. Municipalities are attempting to strengthen the relationship between agriculture and local services, for example through public procurement for schools and festivals. GALs, meanwhile, are promoting integrated strategies that link agriculture with culture and tourism. However, the expansion and consolidation of these initiatives are limited by **cultural barriers to cooperation**, persistent individualism, and bureaucratic inefficiencies.

Looking forward, the study identified three priorities that recur across stakeholders' narratives: (i) the mobilisation of younger generations, (ii) infrastructural investment, and (iii) the strengthening of local value chains. **Food policies** were generally recognised as potential levers for revitalisation. Yet perceptions differed: administrators viewed them as a way to integrate agriculture with public services; farmers stressed financial and bureaucratic obstacles; associations emphasised their role in promoting cooperation and territorial branding; and GALs framed them as part of broader governance strategies.

This ambivalence reflects the **dual nature of food policies** in marginal contexts: on the one hand, they hold the capacity to foster cohesion, innovation, and sustainability; on the other, they risk remaining aspirational and fragmented if not embedded in inclusive governance frameworks and supported by long-term structural commitments.

From a policy perspective, the results reaffirm the need for a **place-based, multi-level governance approach** (Barca, 2009; OECD, 2011). Effective development strategies must build on territorial uniqueness by mobilising both fixed assets (e.g., geography, climate, natural resources) and malleable

assets (e.g., leadership, social capital, institutional capacity) (Bosworth et al., 2015). Equally important is the promotion of cooperative models able to overcome individualism and strengthen the bargaining power of small-scale farmers. By ensuring democratic governance, equitable distribution of benefits, and environmental sustainability, such models can contribute to resilience, biodiversity preservation, and long-term territorial stability.

From Conceptual Model to Policy Action: An Operational Framework for Inner Areas

While the conceptual model developed in this thesis is grounded in an ideal-type logic, its analytical and practical relevance can be substantially enhanced through a clear operationalization aimed at policy makers and local practitioners. In inner areas such as the Montagna Materana, the effectiveness of food policies depends not only on conceptual coherence, but also on their capacity to be translated into concrete, sequential actions that are compatible with existing governance arrangements and funding architectures.

Building on the empirical evidence emerging from the qualitative analysis, this section translates the conceptual pillars of the model into an operational framework structured around a set of sequential and interrelated phases of implementation. Each phase corresponds to a specific policy objective and is explicitly linked to the main financial instruments currently available at European and national levels, including the Common Agricultural Policy (CAP 2023–2027), the National Strategy for Inner Areas (SNAI), LEADER programmes, and the National Recovery and Resilience Plan (PNRR).

The framework is designed to respond directly to the structural constraints identified by local stakeholders—such as depopulation, land abandonment, weak value chains, and governance fragmentation—while enhancing the practical usability of the model for decision-makers. Rather than introducing new policy instruments, it proposes a strategic reorientation and recombination of existing funding mechanisms around a coherent territorial logic, positioning food systems as key drivers of inner-area regeneration.

Table 3.5 – **Operational Framework for Implementing the Conceptual Food Policy Model in Inner Areas**

Conceptual Pillar	Operational Phase	Key Actions	Main Policy Instruments & Funding Mechanisms	Expected Territorial Outcomes
Territorial Reconnection between Food, Land and Community	Phase 1 – Diagnostic and Territorial Activation	Mapping abandoned land, local food actors, demographic trends; stakeholder engagement and trust-building	SNAI (diagnostic phase); LEADER (animation and participation); ESF+	Shared territorial vision; reactivation of social capital; identification of priority areas

Multifunctional and Resilient Agriculture	Phase 2 – Productive Re-activation	Support to young farmers, organic conversion, diversification, multifunctionality	CAP Pillar I (eco-schemes); CAP Pillar II (young farmers, agri-environmental measures); PNRR Mission 2	Reduction of land abandonment; increased farm viability; environmental resilience
Local Value Chain Structuring	Phase 3 – Value Addition and Market Access	Creation of cooperatives, processing facilities, short supply chains, public procurement	CAP Pillar II (cooperation measures); LEADER; public procurement schemes; SNAI local projects	Increased local value retention; stable markets; strengthened bargaining power
Food–Service Integration	Phase 4 – Institutional Anchoring	Integration of local food into schools, canteens, public services and events	Municipal procurement; CAP Pillar II; PNRR (social infrastructure)	Stable demand for local products; social inclusion; renewed territorial identity
Multi-level and Adaptive Governance	Phase 5 – Governance Consolidation	Inter-municipal coordination, monitoring, adaptive policy learning	SNAI governance framework; LEADER; technical assistance funds	Reduced fragmentation; policy coherence; long-term sustainability

The conceptual model proposed in this study is deliberately constructed as an ideal-type, aimed at capturing the structural relationships between food policies, territorial resilience, and demographic dynamics in inner areas. Its analytical value, however, increases significantly when it is interpreted not as a static blueprint, but as a process-oriented framework capable of guiding concrete policy action. From this perspective, operationalization does not imply a simplification or reduction of conceptual complexity; rather, it entails translating that complexity into a sequence of interdependent implementation trajectories that are compatible with the institutional and financial context of rural development in Europe.

The framework begins with a **territorial diagnostic and activation phase**, which responds directly to the empirical evidence gathered in the Montagna Materana. Stakeholders consistently emphasized that policy interventions often fail not due to insufficient funding, but because they are poorly aligned with the specific spatial, demographic, and productive characteristics of inner areas. Accordingly, the first operational requirement of the model is the construction of a shared territorial knowledge base capable of identifying patterns of land abandonment, demographic vulnerability, infrastructural gaps, and existing productive capacities. This diagnostic activity must be accompanied by the activation of trust-based governance mechanisms and stakeholder engagement processes. Far from being merely preparatory, this phase is constitutive of the entire policy trajectory: without a shared understanding

of territorial priorities and without the active involvement of local actors, subsequent interventions risk remaining fragmented and ineffective. In policy terms, this phase aligns closely with the diagnostic and strategic components of the National Strategy for Inner Areas, as well as with the animative and participatory functions traditionally supported by LEADER programmes.

On this basis, the framework advances toward the **productive reactivation of land and human capital**, with a particular focus on generational renewal. The qualitative analysis highlights how depopulation and land abandonment operate as mutually reinforcing processes, driven by economic uncertainty, limited access to credit, and the social marginalization of farming activities. The operational logic of the model therefore prioritizes measures that simultaneously lower entry barriers for new and young farmers and enhance the ecological and economic sustainability of agricultural practices. In this phase, agricultural land is conceptualized not merely as a productive asset, but as a multifunctional resource whose activation contributes to environmental stewardship, landscape maintenance, and social cohesion. Existing instruments under the Common Agricultural Policy—particularly eco-schemes, agri-environmental measures, and support for young farmers—constitute the financial backbone of this stage, while investments under the PNRR may strengthen its infrastructural dimension.

However, the reactivation of production alone is insufficient if local systems remain structurally dependent on external markets and intermediaries. For this reason, the framework places strong emphasis on the **structuring of local value chains** as a subsequent operational trajectory. Interviews conducted in the Montagna Materana consistently reveal how the absence of processing facilities, cooperative arrangements, and territorial branding mechanisms undermines farm profitability and accelerates land abandonment. Within the model, value-chain development is therefore not treated as a secondary economic complement, but as a core condition for territorial resilience. By promoting cooperation among producers, supporting small-scale processing and transformation, and strengthening short supply chains, this phase aims to retain value within the territory and rebalance power relations along the agri-food chain. Rural development measures under the CAP, together with integrated territorial projects supported through LEADER, are particularly well suited to sustaining this transition, especially when coordinated at an inter-municipal scale.

A further critical step in the operationalization of the model concerns the **institutional anchoring of local food systems through public services**. One of the most concrete strategies emerging from interviews with local administrators involves the integration of local agri-food products into school canteens, public catering services, and community events. Within the framework, this strategy is interpreted as a mechanism for stabilizing demand, reducing market volatility, and reinforcing both material and symbolic links between food, community, and territory. Public procurement thus

becomes a strategic governance lever rather than a purely administrative procedure, capable of generating multiplier effects across the local economy. When combined with educational and social initiatives, this phase also contributes to reshaping cultural perceptions of agriculture and strengthening territorial identity, addressing several of the socio-cultural drivers of depopulation identified in the empirical analysis.

The final trajectory of the framework addresses the **consolidation of multi-level and adaptive governance structures**, which is essential to ensure continuity, coherence, and policy learning over time. Governance fragmentation and institutional mistrust emerge in the Montagna Materana as persistent barriers to policy effectiveness, often undermining even well-designed interventions. The operational logic of the model therefore emphasizes the need for stable coordination mechanisms across municipalities, policy sectors, and funding instruments. Rather than proposing new institutional bodies, the framework advocates for the strategic use of existing governance arrangements—particularly those embedded within the National Strategy for Inner Areas and LEADER partnerships—supported by lightweight monitoring systems based on a limited set of territorially meaningful indicators. This adaptive governance approach allows policies to evolve in response to local feedback, reducing rigidity and enhancing long-term sustainability.

Taken together, the framework outlines a progressive and cumulative pathway through which food policies in inner areas can evolve from isolated measures into an integrated territorial strategy. Each phase reinforces the others: diagnostic capacity enables targeted intervention; productive reactivation supports demographic and environmental resilience; value-chain structuring enhances economic viability; public procurement stabilizes local demand; and adaptive governance ensures coherence and learning. By explicitly aligning conceptual pillars with existing policy instruments, the framework demonstrates that food policies can function as effective levers of rural regeneration—not through the multiplication of new programmes, but through the strategic recombination and territorial reorientation of those already in place.

Conclusions

This study contributes to the literature on rural decline and farmland abandonment by foregrounding the perspectives of multiple stakeholders in the Montagna Materana. Through semi-structured interviews with farmers, local administrators, agricultural associations, and Local Action Groups (GALs), the research explored the perceived drivers of depopulation and land abandonment, their socio-economic and territorial impacts, the strategies of resistance and adaptation developed locally, and the visions for the future of these marginal areas.

The findings confirm that depopulation and farmland abandonment are **multidimensional processes**, shaped not only by demographic decline and the absence of generational renewal, but also by economic vulnerabilities, environmental pressures, and governance fragmentation. At the same time, the research revealed a variety of **locally rooted strategies**—including diversification, organic conversion, multifunctionality, and integrated territorial projects—that demonstrate the resilience and creativity of rural communities.

Nevertheless, without systemic interventions, these local strategies risk remaining fragmented and insufficient. Policies such as the Common Agricultural Policy (CAP), the National Strategy for Inner Areas (SNAI), and emerging food governance frameworks have the potential to play a transformative role. However, their effectiveness depends on reducing bureaucratic barriers, aligning measures with local capacities, and ensuring equitable access for small-scale farmers and young people.

The Montagna Materana exemplifies both the vulnerabilities and the opportunities of Europe's inner areas. On the one hand, it faces population decline, ageing, infrastructural deficits, and environmental risks; on the other, it retains rich cultural heritage, agricultural potential, and strong community commitment. Its future will depend on the capacity of institutions and local actors to co-design **inclusive development trajectories**, capable of valorising local resources, strengthening social cohesion, and integrating agriculture with broader territorial dynamics.

Within this context, food policies emerge as particularly promising tools: they can provide stable outlets for local products, promote healthier diets, support biodiversity, and reinforce territorial identity. Yet to move beyond aspiration, they must be embedded in inclusive governance frameworks, supported by long-term structural commitments, and made accessible to all actors, including the smallest and most vulnerable.

By documenting local perceptions and strategies, this research provides insights not only into specific case of the Montagna Materana but also into broader challenges shared by many European inner areas. It underscores the importance of combining bottom-up knowledge with top-down policy frameworks, in order to foster resilience , sustainability, and long-term vitality in rural territories.

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Conclusions and Future Visions

The model proposed in this research emerges from the lived experiences of farmers, mayors, association representatives, and Local Action Group (GAL) practitioners, rather than from a generic template. It takes seriously the conditions they describe—youth outmigration, ageing populations, low profitability, infrastructural fragility, bureaucratic opacity, climate stress, and wildlife damage—and translates them into an integrated approach in which food policy becomes a practical instrument for keeping value, people, and care anchored to place.

At its core, the model is both place-based and pragmatic. It does not assume that agriculture alone can reverse demographic decline, yet it affirms that when agriculture is reconnected to public services and community life, staying becomes a credible and dignified choice. To be meaningful in the Montagna Materana, policy must begin where respondents actually are: facing narrow farm margins, the absence of local processing and slaughtering facilities, long and costly journeys to sell undifferentiated products, and the gradual disappearance of schools, shops, and doctors. Added to this are unreliable water networks, deteriorating roads, and slow digital connections—all factors that obstruct modernization.

The model therefore frames food as territorial infrastructure: it links production, processing, logistics, public procurement, education, welfare, and hospitality so that income, dignity, and social services advance together rather than separately.

Governance represents the first lever. Interviewees describe fragmented responsibilities, weak coordination, and a lack of trust. The model responds by proposing a light, continuous, and locally rooted coordination arena—an institutionalised yet open forum convened by municipalities, GALs, and producer organizations. Its role is to co-design priorities, arbitrate trade-offs, and maintain project momentum. This is conceived not as a new bureaucracy, but as a standing table where agricultural knowledge, administrative capacity, and civic expectations meet regularly. Its legitimacy depends on transparency, agreed timelines, and public reporting—ensuring that measures no longer remain "on paper" but are visibly implemented and corrected when needed. The same arena can also voice supra-municipal issues—transport, water, broadband, or veterinary coverage—with a single territorial stance rather than fragmented petitions.

The second lever is economic viability, addressed not by urging farmers to become more entrepreneurial but by repairing the missing middle of local value chains. Respondents highlight dependence on intermediaries and the absence of processing as major constraints. The model thus prioritises small, distributed facilities that transform raw materials into products with identity and

added value close to where they are produced—micro-dairies, small mills for heritage grains, shared cutting and storage spaces for livestock, and modest packaging and labelling units. These facilities are conceived as shared assets, cooperatively governed with municipal facilitation and risk-sharing rather than direct substitution of private initiative. Territorial product recognition, workable quality protocols, and a collective visual identity further enhance reputational capital, making local produce visible to schools, residents, and visitors.

Public procurement constitutes the third lever, transforming political intention into a stable, non-speculative market. Interviewees express enthusiasm for connecting local food with school canteens and community events but also concern about bureaucracy and coordination costs. The model addresses these challenges by standardising tender criteria—based on freshness, distance, seasonality, and essential environmental and animal-welfare thresholds—while simplifying documentation and payment for small suppliers. Menu design follows the seasonal calendar; procurement lots are tailored to small farms; and deliveries are coordinated through shared processing and logistics nodes. In this way, schools, care homes, and municipal events become anchor clients, stabilising cash flow, dignifying agricultural work, and reinforcing a civic narrative in which public money circulates locally.

The fourth lever concerns finance and land access, approached with the pragmatism reflected in farmers' testimonies about credit barriers and collateral constraints. The model combines microcredit and revolving funds with technical assistance, phased grant–loan blends tied to verifiable milestones, and local land-access mechanisms matching abandoned parcels with new or expanding farms. The aim is to overcome the threshold that traps young people between aspiration and feasibility. Instruments are designed for liquidity and speed, with partial guarantees at cooperative or municipal scale and early mentoring on compliance, bookkeeping, and marketing. Rather than dispersing subsidies, this approach de-risks specific, income-generating steps—such as organic conversion, small-scale processing, or water-saving technologies—so that each investment incrementally enhances earning capacity.

Environmental reliability is the fifth lever, responding to farmers' daily uncertainty in the face of droughts, violent rainfall, and wildlife pressure. The model integrates agroecological practices as risk management, not as moral imperatives: soil cover strategies to reduce erosion, crop rotations suited to hilly terrain, collective water-harvesting and on-farm storage, and affordable micro-irrigation systems. Wildlife control is coordinated territorially through cost–benefit-based fencing, deterrents, streamlined compensation, and cooperation with relevant authorities, paired with landscape management that discourages attractants near vulnerable plots. Climate adaptation is learned in the

field rather than in seminars, involving schools and citizens through gardens, open-air lessons, and community workdays—making environmental care part of daily life and socialising future generations to the land.

Culture and belonging form the sixth lever, addressing the link between economic fragility and loss of meaning. The model reconnects food with public rituals and hospitality without turning villages into theme parks. Vacant buildings can host distributed accommodation linked to agricultural seasons, education, or care functions, ensuring that tourism reinforces rather than disrupts local rhythms. Festivals, markets, and storytelling nurture continuity between tradition and innovation, while signposted paths connect fields, dry-stone walls, and processing sites, showing how value and landscape stewardship are interdependent. This cultural infrastructure fosters pride of place and counters the narrative that leaving is the only rational option.

The final lever involves cooperation and the social architecture of work. Interviewees acknowledge individualism and mistrust, which the model interprets not as moral failures but as legacies of scarcity and disappointment. Cooperation is built progressively around concrete, low-risk tasks—shared transport, packaging schedules, or processing governance—before advancing to joint branding or negotiation. Each collaborative step is designed to produce quick, fair benefits and to allow voluntary exit, rebuilding trust through practice rather than exhortation. Training and peer exchanges are organised around farm calendars, with facilitators drawn from nearby territories facing similar agroecological conditions.

Implementation follows a simple and visible cycle. It begins with a shared baseline mapping of abandoned parcels, existing skills, infrastructure gaps, and public demand. Early, income-generating projects signal momentum. Monitoring combines quantitative dashboards (volumes, prices, school-meal shares, participation) with narrative reports that document challenges and learning, allowing the community to see how policy evolves through use. Over time, as revenues and confidence grow, procurement expands, processing capacity increases, and financial instruments revolve more quickly. As schools, markets, and hospitality interconnect, the territory's bargaining power strengthens. In essence, the model translates local needs into an actionable architecture that answers low profitability with local transformation and anchor demand; credit barriers with patient, small-scale finance; infrastructural gaps with federated municipal voice; governance fatigue with a modest standing forum; climate uncertainty with everyday adaptation; cultural erosion with public rituals; and mistrust with cooperation grounded in shared tasks. While it does not claim to reverse demographic trends alone, it builds the conditions for young people to stay or return, older farmers to pass on land with dignity, and municipalities to align welfare, education, and environmental care through food. In doing

so, it offers the Montagna Materana a coherent pathway from aspiration to implementation and contributes to the wider European debate on how inner areas can evolve from fragile fragments into resilient, self-respecting territories.

Looking ahead, research and practice in this field should move in three interconnected directions.

First, comparative and multi-scalar analyses are needed to test the model's transferability beyond the Montagna Materana. Rural and inner areas across Europe share challenges—ageing, low profitability, loss of services—but differ in institutional capacity, ecology, and social organisation. Comparative studies can reveal how these factors affect the feasibility of territorial food policies and how coordination among local, regional, and European levels can generate coherence rather than dependency. By connecting place-based experiences through cross-case learning, future research could help consolidate a European perspective on rural food governance.

Second, stronger methodological and evaluative capacity is required to monitor food policy impacts in non-urban contexts. As this thesis has shown, fragmented data and inconsistent frameworks hinder visibility and comparability. Future work should develop mixed-method approaches that integrate quantitative indicators—production volumes, employment, procurement shares—with qualitative evidence of cooperation, learning, and well-being. Participatory evaluation systems, combining digital dashboards with narrative monitoring, can enhance transparency and make communities active participants in policy assessment rather than passive subjects. Evaluation would thus become an ongoing process of collective reflection and adaptation, consistent with the principles of place-based governance.

Third, the ecological and cultural dimensions of the model must be further integrated into policy. Climate change, biodiversity loss, and wildlife pressure increasingly shape the daily risk landscape of rural areas. Food policy should therefore act as a platform for collective adaptation, linking agroecological practices, water management, and landscape stewardship with education, tourism, and civic engagement. Schools, markets, and festivals can serve as laboratories of environmental literacy and social participation, nurturing generations of citizens who view care for the land as a shared civic duty.

Finally, the next challenge will be scaling from isolated local experiments to coherent frameworks of rural food governance at national and European levels. The Montagna Materana experience provides a prototype for a new generation of "rural food strategies" aligned with the European Green Deal, the Farm to Fork Strategy, and the Long-Term Vision for Rural Areas. These strategies require flexible funding, multi-level coordination, and recognition of food as a transversal field connecting

agriculture, welfare, education, and spatial planning. The goal is not replication but translation—the ability to adapt principles of proximity, participation, and reciprocity to each territory's specific context.

In conclusion, this research contributes to a growing body of knowledge that views food policy as both a lens and a lever for territorial resilience. Grounded in the narratives and practices of those inhabiting fragile regions, it demonstrates that regeneration begins with lived experience rather than abstract design. The Montagna Materana model shows that, even in contexts of demographic decline, coherent and inclusive food governance can transform vulnerability into agency and dependence into cooperation. Its ultimate message is clear: the transformation of inner areas will depend not on imported blueprints, but on the capacity of their communities to turn food into a vehicle of dignity, connection, and self-respect.

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Appendix I

Author	Title	Year	Published In	DOI
Monticone, Francesca; Samoggia, Antonella	Food Policy Coherence and Integration: a review of adopted methodologies	2024	RIVISTA DI ECONOMIA AGRARIA	10.36253/rea-14439
Schneider, K. R., Fanzo, J., Haddad, L., Herrero, M., Moncayo, J. R., Herforth, A., et al.	The state of food systems worldwide in the countdown to 2030	2023	Nature Food	10.1038/s43016-023-00885-9
Mastronardi, Luigi; Marino, Davide; Giaccio, Vincenzo; Giannelli, Agostino; Palmieri, Margherita; Mazzocchi, Giampiero	Analyzing Alternative Food Networks sustainability in Italy: a proposal for an assessment framework	2019	Agricultural and Food Economics	10.1186/s40100-019-0142-8
Chaudhary A, Gustafson D, Mathys A.	Multi-indicator sustainability assessment of global food systems	2018	Nat Commun	10.1038/s41467-018-03308-7
Landert, Jan; Schader, Christian; Moschitz, Heidrun; Stolze, Matthias	A Holistic Sustainability Assessment Method for Urban Food System Governance	2017	Sustainability	10.3390/su9040490
Moragues-Faus, Ana; Marceau, Alizée	Measuring Progress in Sustainable Food Cities: An Indicators Toolbox for Action	2018	Sustainability	10.3390/su11010045
Carlsson, L.; Callaghan, E.; Morley, A.; Broman, G.	Food System Sustainability across Scales: A Proposed Local-To-Global Approach to Community Planning and Assessment.	2017	Sustainability	10.3390/su9061061
Lulovicova, Andrea; Bouissou, Stephane	Environmental Assessment of Local Food Policies through a Territorial Life Cycle Approach	2023	Sustainability	10.3390/su15064740
Filippini, Rosalia; Arfini, Filippo; Baldi, Lisa; Donati, Michele	Economic Impact of Short Food Supply Chains: A Case Study in Parma (Italy)	2023	Sustainability	10.3390/su151511557
Anik, Asif Reza; Rahman, Sanzidur	Women's Empowerment in Agriculture: Level, Inequality, Progress, and Impact on Productivity and Efficiency	2021	The Journal of Development Studies	10.1080/00220388.2020.1817393

Allan, Grant; Comerford, David; McGregor, Peter	The system-wide impact of healthy eating: Assessing emissions and economic impacts at the regional level	2019	Food Policy	10.1016/j.foodpol.2019.05.008
Petruzzelli, M.; Ihle, R.; Colitti, S.; Vittuari, M.	The role of short food supply chains in advancing the global agenda for sustainable food systems transitions	2023	Cities	10.1016/j.cities.2023.104496
Bergonzini, Chiara	Just food transition: for a gender mainstreaming approach in urban food policies. A review of 20 cities	2024	Cities	10.1016/j.cities.2024.104876
Marino, Davide; Vassallo, Marco; Cattivelli, Valentina	Urban food policies in Italy: Drivers, governance, and impacts	2024	Cities	10.1016/j.cities.2024.105257
Marini, Michele; Caro, Dario; Thomsen, Marianne	Investigating local policy instruments for different types of urban agriculture in four European cities: A case study analysis on the use and effectiveness of the applied policy instruments	2023	Land Use Policy	10.1016/j.landusepol.2023.106695
Rao, Madhura; Luger, Jonathan; Regeer, Barbara J.; Lopez, Cristina Yacoub; Wilde, Danielle; Wilde, David; Ayalp, Emel Karakaya; Gil, Julia Pinedo; Moeller, Nina Isabella; Cive, Yağmur Özcan; Van Der Meij, Marjoleine G.	Small wins in practice: Learnings from 16 European initiatives working towards the transformation of urban food systems	2024	Food Policy	10.1016/j.foodpol.2024.102761
Liu, Tianzhu	Governing the reterritorialization of agricultural activities: An assessment of food planning policies in France	2024	Journal of Rural Studies	10.1016/j.jrurstud.2024.103302

Hansson, Helena; Säll, Sarah; Abouhatab, Assem; Ahlgren, Serina; Berggren, Åsa; Hallström, Elinor; Lundqvist, Peter; Persson, U. Martin; Rydhmer, Lotta; Röös, Elin; Tidåker, Pernilla; Winkvist, Anna; Zhu, Li-hua	An indicator framework to guide food system sustainability transition – The case of SwEden	2024	Environmental and Sustainability Indicators	10.1016/j.indic.2024.100403
Kaur, Amandeep; D'Andreamatteo, Antonio	Accounting, auditing and accountability for urban food policy governance: Insights from a structured literature review	2025	Cities	10.1016/j.cities.2024.105656
Cho, Beomgeun; Noh, In Hae; Roggio, April M; Luna-Reyes, Luis Felipe	Exploring the impact of collaboration processes on policy networks success: a case study of food policy councils	2025	Public Management Review	10.1080/14719037.2023.2241047
Range, Camille; O'Hara, Sabine; Jeffery, Tia; Toussaint, Etienne C.	Measuring the Effectiveness of Food Policy Councils in Major Cities in the United States	2023	Foods	10.3390/foods12091854
Atoloye, Abiodun; Schouboe, Sophie; Misiaszek, Caitlin; Harding, Jamie; Cooksey Stowers, Kristen; Bassarab, Karen; Calancie, Larissa	Developing a food system indicators database to facilitate local food systems assessments: Using a scoping review approach	2023	Journal of Agriculture, Food Systems, and Community Development	10.5304/jafscd.2023.131.008
Marino, Davide; Curcio, Francesca; Felici, Francesca; Mazzocchi, Giampiero	Toward Evidence-Based Local Food Policy: An Agroecological Assessment of Urban Agriculture in Rome	2023	Land	10.3390/land13010030
Galli, Francesca; Arcuri, Sabrina; Belletti, Giovanni; Marescotti, Andrea; Moretti, Michele; Rovai, Massimo	Integrating Local Food Policies and Spatial Planning to Enhance Food Systems and Rural–Urban Links: A Living Lab Experiment	2024	Land	10.3390/land13122014
Hughes, David W.; Isengildina-Massa, Olga	The economic impact of farmers' markets and a state level locally grown campaign	2015	Food Policy	10.1016/j.foodpol.2015.05.001
Papargyropoulou, Effie; Bridge, Gemma; Woodcock, Sonja; Strachan, Emma; Rowlands, Joanna; Boniface, Elizabeth	Impact of food hubs on food security and sustainability: Food hubs perspectives from Leeds, UK	2024	Food Policy	10.1016/j.foodpol.2024.102705

Béné, C., Prager, S. D., Achicanoy, H. A. E., Toro, P. A., Lamotte, L., Bonilla, C., et al.	Global map and indicators of food system sustainability	2019	Scientific Data	10.1038/s41597-019-0301-5
Calancie, Larissa; Cooksey-Stowers, Kristen; Palmer, Anne; Frost, Natasha; Calhoun, Holly; Piner, Abbey; Webb, Karen	Toward a Community Impact Assessment for Food Policy Councils: Identifying Potential Impact Domains	2018	Journal of Agriculture, Food Systems, and Community Development	10.5304/jafscd.2018.083.001
Josling, Tim	The Historical Evolution of Alternative Metrics for Developing Countries' Food and Agriculture Policy Assessment	2018	Annual Review of Resource Economics	10.1146/annurev-resource-100517-023123
Sibbing, Lara V.; Duncan, Jessica; Arcuri, Sabrina; Galli, Francesca; Bock, Bettina B.	Assessing what food policies lead to on the ground: exploring opportunities and challenges of the MUFPP indicator framework	2022	Agroecology and Sustainable Food Systems	10.1080/21683565.2022.2106007
Jablonski, B. B. R.; Schmit, T. M.; Kay, D.	Assessing the Economic Impacts of Food Hubs on Regional Economies: A Framework that Includes Opportunity Cost	2016	Agricultural and Resource Economics Review	10.1017/age.2016.9
Fanzo, J., Haddad, L., Schneider, K. R., Béné, C., Covic, N. M., Guarin, A., *et al.*	Viewpoint: rigorous monitoring is necessary to guide food system transformation in the countdown to the 2030 global goals	2021	Food Policy	10.1016/j.foodpol.2021.102163
Freudenberg, Nicholas; Willingham, Craig; Cohen, Nevin	The Role of Metrics in Food Policy: Lessons from a Decade of Experience in New York City	2018	Journal of Agriculture, Food Systems, and Community Development	10.5304/jafscd.2018.08B.009
Candel, Jeroen J. L.	What's on the menu? A global assessment of MUFPP signatory cities' food strategies	2020	Agroecology and Sustainable Food Systems	10.1080/21683565.2019.1648357

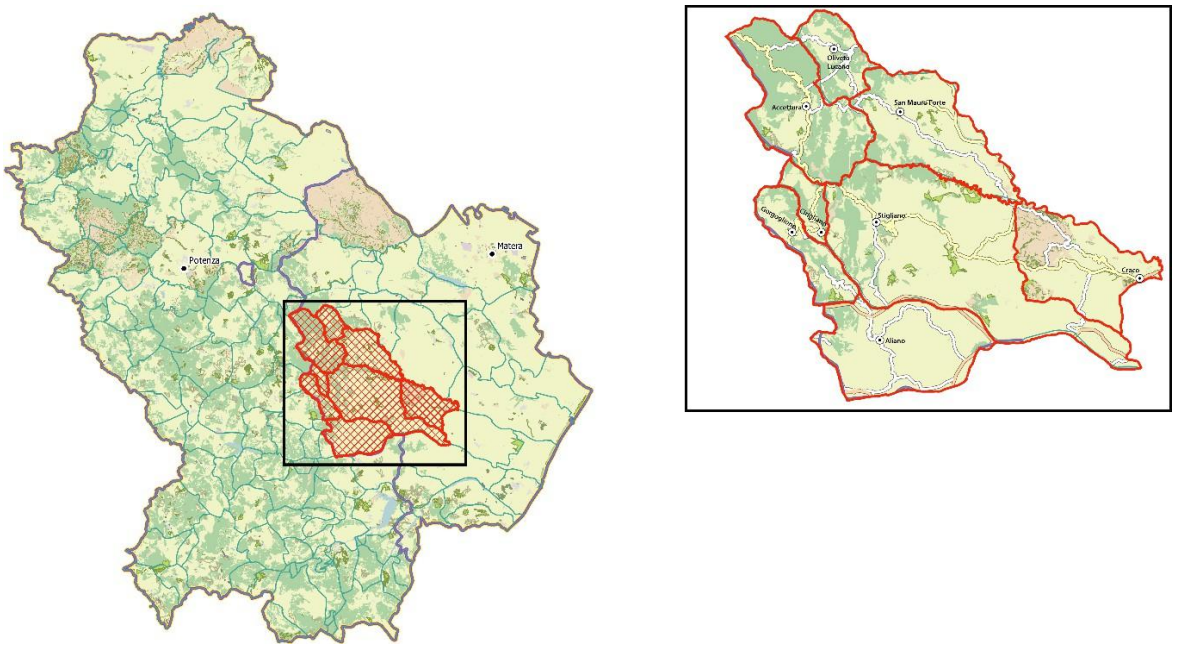
Bridge, Gemma; Papargyropoulou, Effie; Woodcock, Sonja; Strachan, Emma; Rowlands, Joanna; Boniface, Elizabeth	Co-designing an impact evaluation tool for food hubs in the UK	2025	Journal of Agriculture, Food Systems, and Community Development	10.5304/jafscd.2025.142.004
Peano, Cristiana; Tecco, Nadia; Dansero, Egidio; Girgenti, Vincenzo; Sottile, Francesco	Evaluating the Sustainability in Complex Agri-Food Systems: The SAEMETH Framework	2015	Sustainability	10.3390/su7066721
Dubbeling, Marielle; Santini, Guido; Renting, Henk; Taguchi, Makiko; Lançon, Louison; Zuluaga, Juan; De Paoli, Luca; Rodriguez, Alexandra; Andino, Verónica	Assessing and Planning Sustainable City Region Food Systems: Insights from Two Latin American Cities	2017	Sustainability	10.3390/su9081455
Ilieva, Rositsa T.	Urban Food Systems Strategies: A Promising Tool for Implementing the SDGs in Practice †	2017	Sustainability	10.3390/su9101707
Hebinck, A., Zurek, M., Achterbosch, T., Forkman, B., Kuijsten, A., Kuiper, M., et al.	A sustainability compass for policy navigation to sustainable food systems'	2021	Global. Food Secur.	10.1016/J.GFS.2021.100546
Godrich, Stephanie Louise; Doe, Jess; Goodwin, Sarah; Alston, Laura; Kent, Katherine	A scoping review of the impact of Food Policy Groups on local food systems in high-income countries	2024	Nutrition Research Reviews	10.1017/S0954422423000173

Appendix II

Study Area: detailed description

The focus of this research investigation area is represented by the inner area of the Montagna Materana (*MOMA*), largely falling within the central part of the Lucanian Apennine ridge. It is located in the Basilicata region, covering the eight municipalities of Accettura, Aliano, Craco, Cirigliano, Gorgoglione, Oliveto Lucano, San Mauro Forte and Stigliano, located in the administrative province of Matera. It covers an area of 644 km^2 (Figure II.1).

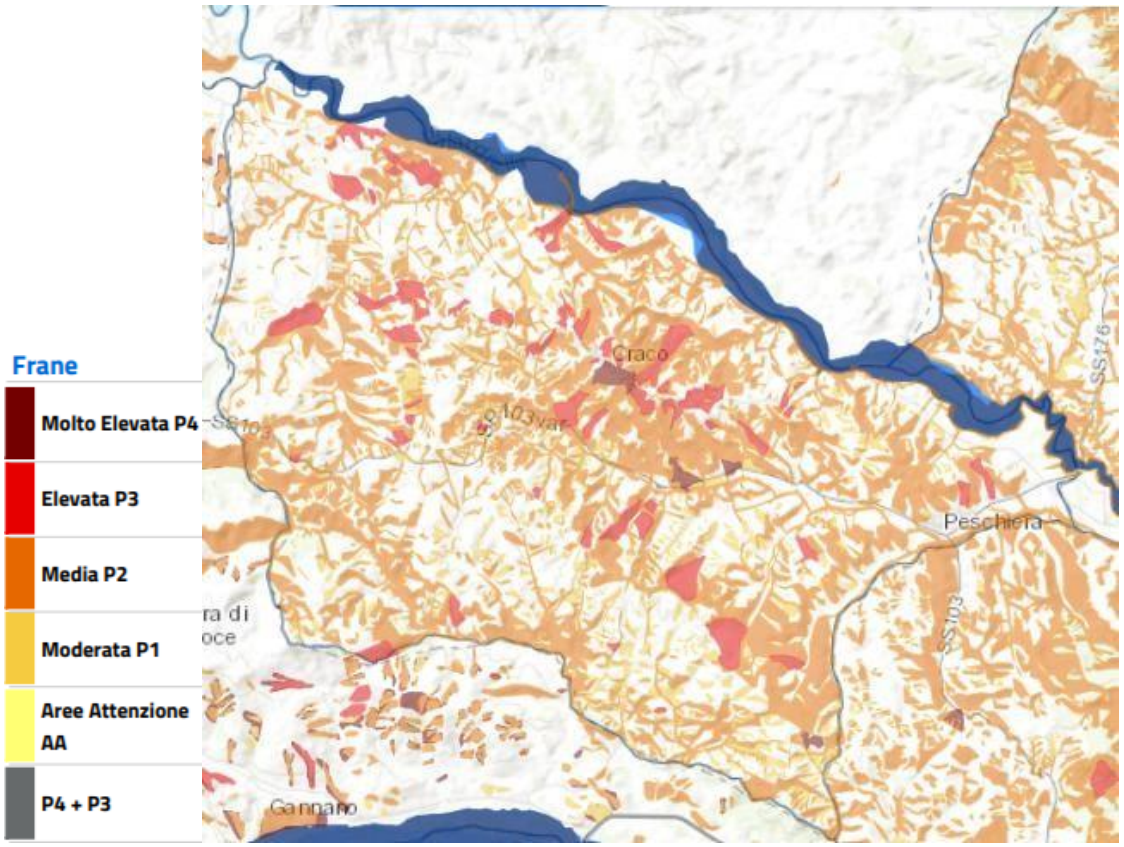
Figure II.1 - Study Area



Source: authors

The area is characterized by extensive hydrogeological instability, particularly in the municipalities of Craco and Aliano, and isolation have resulted in an extremely fragile situation.

Figure II.2 - Hazard and Risk Indicators



Source: Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) - https://idrogeo.isprambiente.it/app/

The region has experienced significant depopulation, with the population declining from 26,287 in 1961 to 12,131 in 2011, and further reducing by about 20% in the last decade. In three municipalities - Accettura, San Mauro Forte and Stigliano - the population exceeds 1,000 inhabitants. On the other side, Cirigliano is the demographically smallest municipality followed by Oliveto Lucano.

Table II.1 – Resident Population (January 2025)

MUNICIPALITY	RESIDENT POPULATION	SURFACE AREA (KM2)	DENSITY (INH./KM2)	ALTITUDE (m a.s.l.)	SNAI Classification 21-27	DEPOPULATION RATE 2015/2025
Accettura	1.572	91	17,34	770	Peripheral	-16%
Aliano	838	98	8,55	555	Ultra-peripheral	-18%
Cirigliano	269	15	17,93	656	Ultra-peripheral	-26%
Craco	585	77	7,60	391	Peripheral	-19%
Gorgoglione	832	35	23,77	800	Ultra-peripheral	-18%
Oliveto Lucano	348	31	11,23	546	Peripheral	-24%
San Mauro Forte	1.203	87	13,83	540	Peripheral	-23%
Stigliano	3.441	210	16,39	909	Ultra-peripheral	-22%

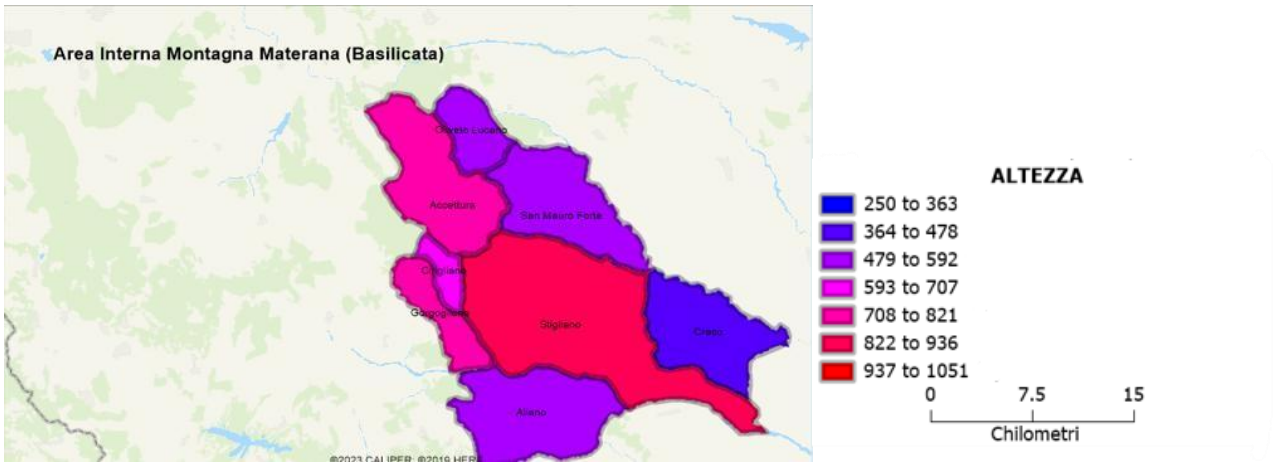
Source: Formez, 2022; Istat

The municipalities are concentrated in medium-high altitude hilly areas, with a tendency to reach extreme altitudes at the borders of the three areas, with the exception of the Montagna Materana. The latter is largely traversed by reliefs of 1,000 meters, particularly in the extensive municipality of Stigliano. According to the Snai *(National Strategy for Inner Areas)* 14-20 classification[10], confirmed in the 21-27 programming, the four municipalities of Accettura, Craco, Oliveto Lucano and San Mauro Forte are classified as peripheral, while the remaining four as ultra-peripheral[11] (Formez, 2022).

[10] The SNAI is a strategic intervention project developed by the Department for Development and Economic Cohesion under the Ministry of Economic Development within the framework of cohesion policy and institutionalised by the Partnership Agreement between Italy and the EU for the 2014-2020 programming cycle, in compliance with Article 14 of EU Regulation No. 1303/2013.

[11] The general definition of Internal Areas as 'that majority part of the Italian territory characterised by significant distance from the centres of supply of essential services'. The 'service offer centre' is identified as that municipality or aggregate of bordering municipalities, able to offer simultaneously: all secondary school offer, at least one hospital with a level I DEA and at least one Silver railway station. The identification of the centres is followed by the classification of the remaining municipalities into four bands: belt areas; intermediate areas; peripheral areas and ultra-peripheral areas, based on an accessibility indicator calculated in terms of minutes travelled from the nearest pole. The bands are calculated using the tertiles of the distribution of distance in minutes from the near pole, equal to about 20 and 40 minutes. A third band, over 75 minutes, equal to the 95th percentile, was then inserted to identify the ultra-peripheral territories.
In February 2022, **CIPESS** updated this methodological framework, further refining the toolkit used to monitor the peripherality of the different territories that make up the country.
The basic approach has remained unchanged, but the bands have changed. Once the poles (i.e. the municipalities barycentric for the presence of services) were established, new thresholds were defined, again based on the distance in terms of time from these centres. For example, a municipality is considered a belt if it is within 27.7 minutes of the nearest pole (it was 20 in the previous classification). Between 27.7 minutes and 40.9 it is intermediate. Between 40.9 and 66.9 it is peripheral. Beyond 66.9 minutes it is ultra-peripheral (OPENPOLIS, 2024. *Che cosa sono le aree interne*, Openpolis, 6 february 2024. Available on: https://www.openpolis.it/parole/che-cosa-sono-le-aree-interne/)

Figure II.3 - HEIGHT indicator maps



Source: authors

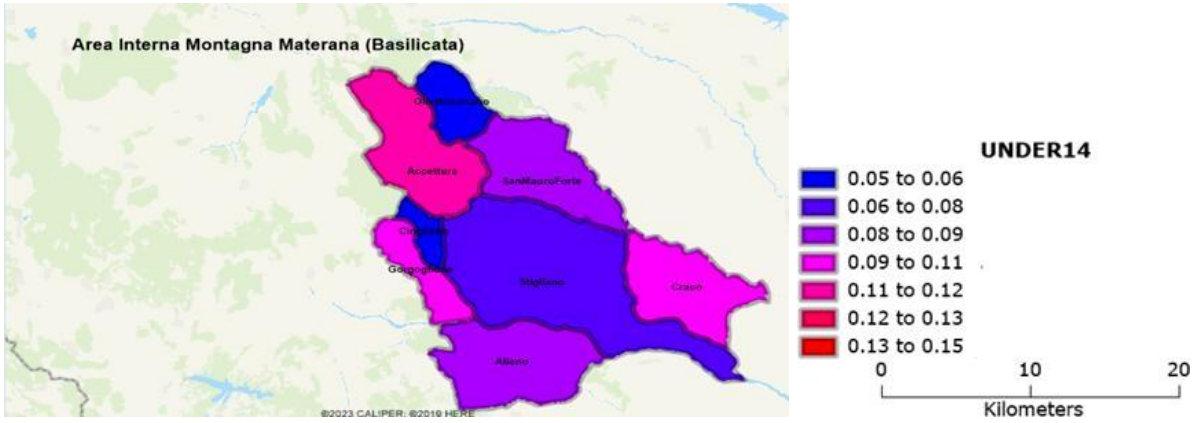
The maps of altitude indicators (Figure II.3) show the altimetric distribution of the area. The population density in the Montagna Materana is very low (Figure II.4). In particular, Aliano, with 98.41 km^2 of surface area, has one of the lowest population densities in Italy.

Figure II.4 - DENSITY indicator maps

Source: authors

The proportion of residents under 14 years of age (Figure II.5) is a crucial element for the future demographic development and consistency of an area's demography. In the study area, these values are very low.

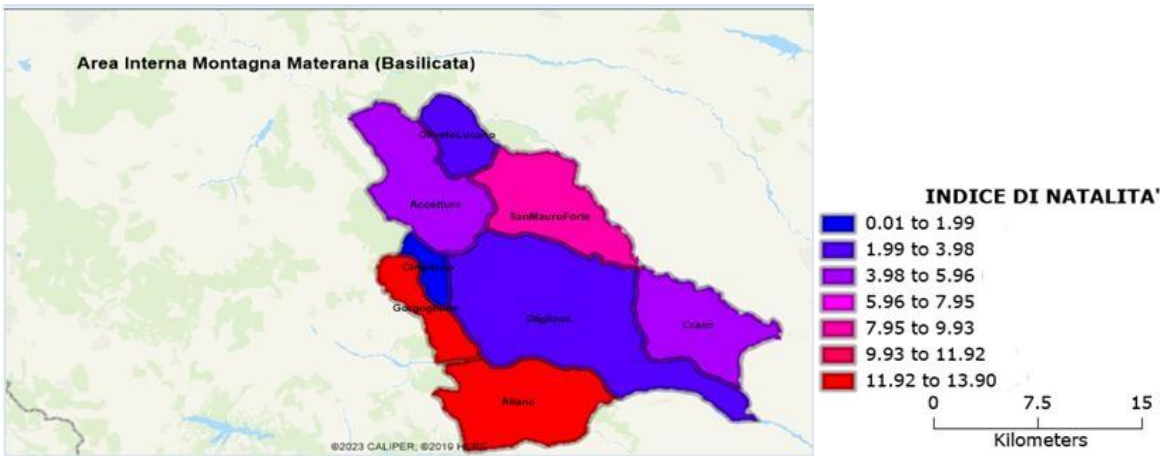
Figure II.5 - UNDER14 indicator maps



Source: authors

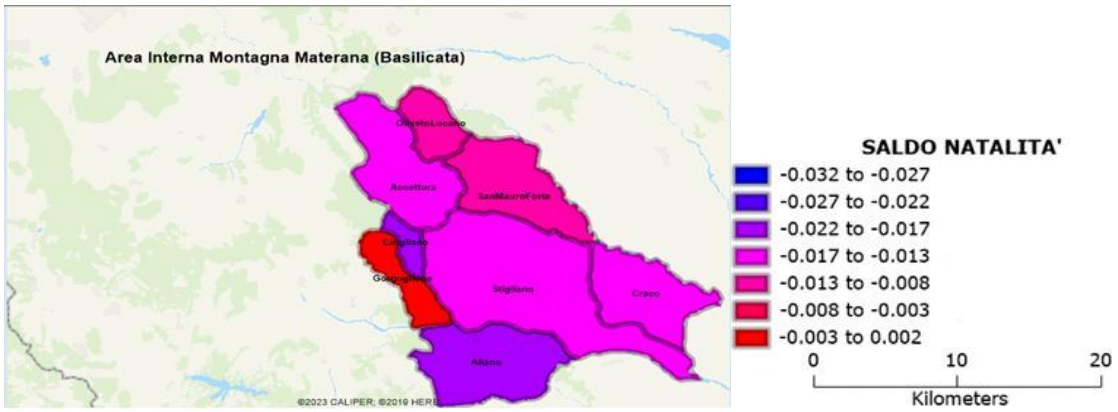
The birth and death rates (the latter being more pronounced in some small municipalities) paint a complementary picture. Consequently, the natural balance is consistently negative, with particularly low values in the municipalities of Cirigliano and Aliano, characterized by a nearly zero birth rate. Figure II.6 and Figure II.7 illustrate these dynamics.

Figure II.6 - Maps of indicators INDNATALITY



Source: authors

Figure II.7 – Maps of indicators SALDONAT

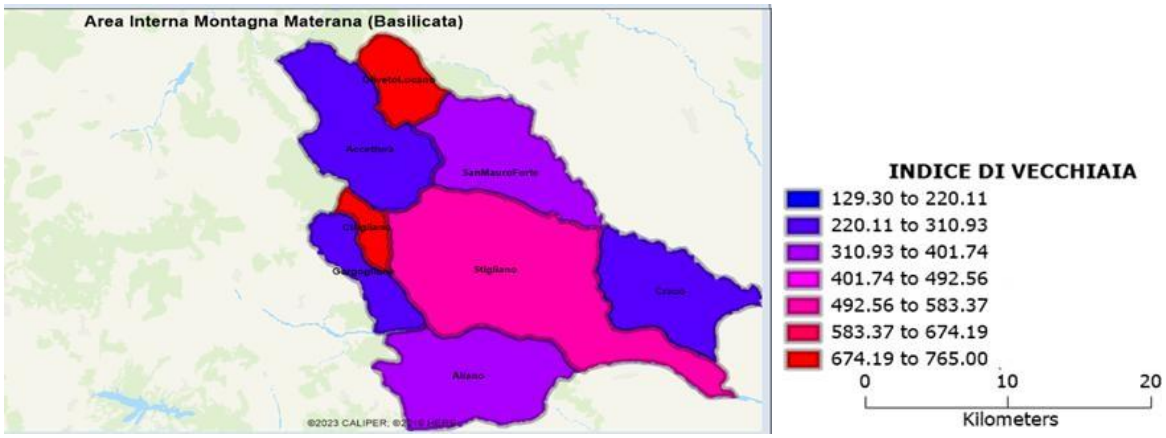


Source: authors

In summary, the area is strongly characterized by demographic decline and an aging population. The aging index, calculated as the ratio between the population over 65 years old and those under 14 years old, is a valuable demographic indicator as it provides information on the degree of aging of a population. A low value indicates a young population, while, conversely, a high value indicates an aged population, with a higher percentage of elderly people compared to young people. This phenomenon is often correlated with youth depopulation, low birth rates, and increased life expectancy.

The implications of a high aging index are manifold, including increasing pressure on welfare systems, with particular reference to the local health dimension. Furthermore, the need to provide adequate services for the elderly population emerges. A high index is also associated with a reduction in the workforce, with possible negative repercussions on the local economy. The municipalities with the highest aging index are Cirigliano and Oliveto Lucano, with 707.1 and 700, respectively. This situation is well illustrated in Figure II.8.

Figure II.8 - Maps of INDVECCHIAIA indicators



Source: authors

The current issue of population aging represents a significant global challenge (Lutz et al. 2008). According to the 2019 edition of the United Nations' "World Population Prospects," the global population growth rate has gradually slowed down after peaking in the 1965-1970 period (United Nations, 2019). Between 2010 and 2020, the population growth rate dropped below 1.1% for the first time. The United Nations anticipates that this slowdown will continue until the end of the century (United Nations, 2019). Concurrently, in 2018, due to the declining birth rate, for the first time in human history, the number of people over 65 years old exceeded that of children, leading to dramatic shifts in the population's demographic structure.

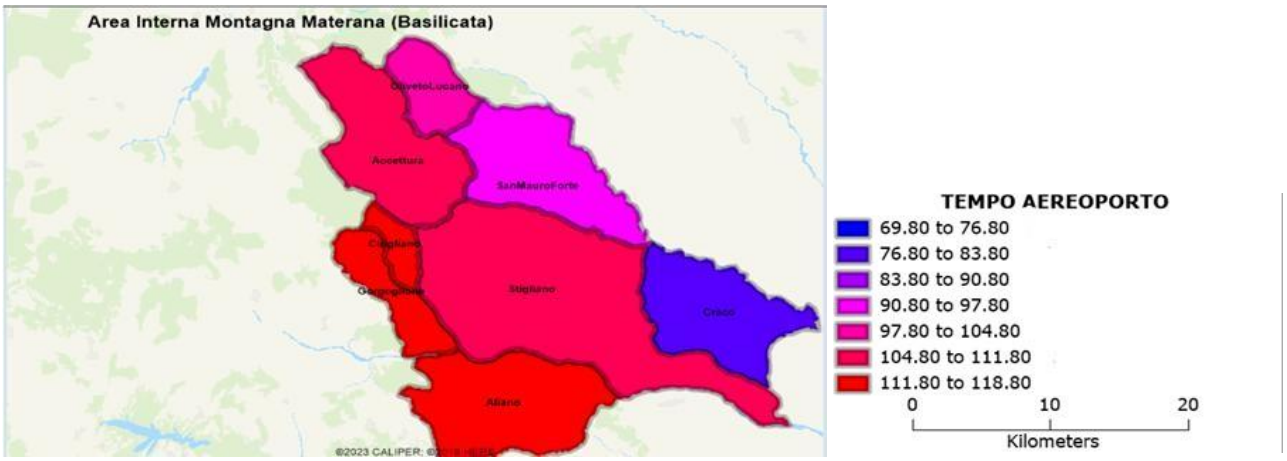
Inner areas are defined as low-density rural zones, distant from essential service centers (education, healthcare, and mobility), but rich in significant environmental resources and cultural heritage. This situation is well illustrated in the following Figures (Figures **II.9**, **II.10**, **II.11**), which highlight the considerable logistical difficulties affecting the Montagna Materana area. The values of these variables offer a dual indicator of the area's geomorphology: on the one hand, they show physical distance and, consequently, its marginality; on the other hand, they indicate the ease (in terms of average speed) of reaching reference structures, considering the often-rugged terrain. Indeed, the entire Basilicata region faces the issue of the fragility of the transport system and the inefficiency of existing connection infrastructures, negatively influenced by the orography of the territory, the structure of the settlement fabric, and the state of maintenance of the road network.

All municipalities in the Montagna Materana area present a critical situation with high transfer times. Access to the area is ensured by an infrastructural system composed of secondary and local roads.

With the exception of some municipalities located on the outer edge of the area, travel times to the nearest railway station are generally more acceptable. The two railway transport nodes are the RFI (*Rete Ferroviaria Italiana*) stations of Ferrandina and Grassano.

The lack of transport and limited logistical operations in rural areas negatively affect the daily lives of residents, particularly socially disadvantaged groups such as the elderly, children, women, and low-income families (Parmaksız *et al*., 2024).

Figure II.9 - TEMPOAEREO indicator maps

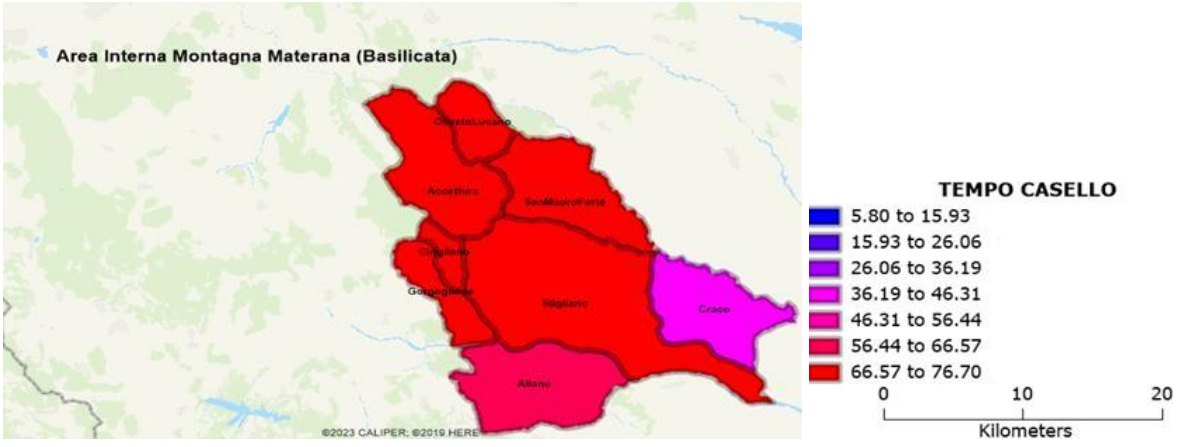


Source: authors

Figure II.10 - TEMPOSTATION indicator maps

Source: authors

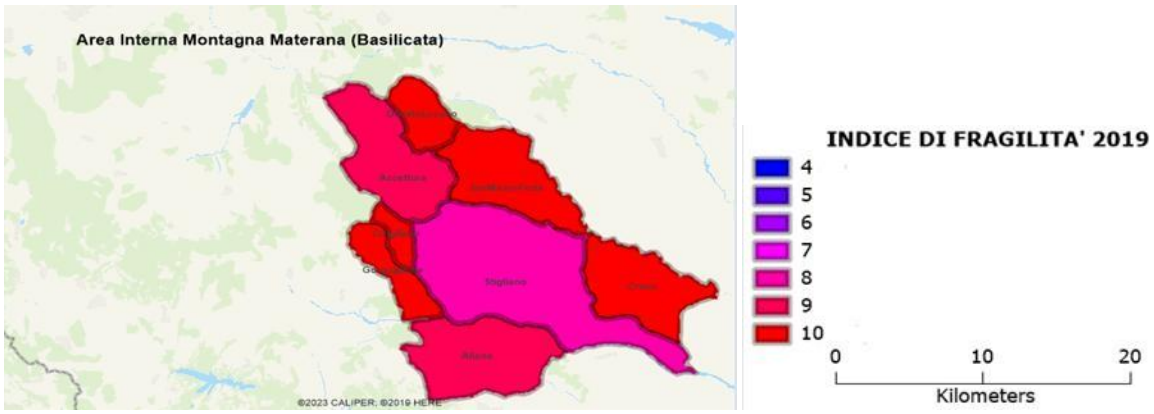
Figure II.11 - TEMPOCASEL indicator maps



Source: authors

The Municipal Fragility Index (IFC), a composite indicator that measures the exposure of municipal territories to risks of natural and anthropogenic origin and to critical conditions linked to the main demo-social characteristics of the population and the economic-productive system, presents consistently high values, i.e., measures 9-10, for all 8 municipalities. The index is a combination of 12 elementary indicators that describe the main dimensions (territorial, environmental, and socio-economic) of municipal fragility (ISTAT, 2023). Figure **II.12** visually illustrates this index.

Figure II.12 - INDFRAGIL2019 indicator maps



Source: authors

Natural Heritage

Environmental richness is one of the strong points of the inland area of the Montagna Materana. The territory boasts elements of attractiveness and absolute value. The municipalities are predominantly small, well-preserved historical centers, which constitute a resource upon which it is possible to develop activities of recovery, restoration, and valorization of artistic, traditional, and natural heritage. Regarding the latter aspect, there is a growing interest from the population in interventions aimed at safeguarding, increasing, or reconstituting biodiversity, as well as protecting the territory from hydrogeological instability.

From an orographic point of view, the Montagna Materana territory is traversed by three watercourses:

- The River Cavone, which flows along the northern border of the municipality of Craco. In its mountainous section, it takes the name Salandrella stream, which crosses the inner area to the north and northeast.
- The River Agri, which flows along the southern border of the municipality of Aliano and part of Stigliano, along with its tributary, the Sauro stream.
- The River Basento, which touches the northern part of the municipality of Accettura.

The area to which the municipalities belong is characterized by the presence of numerous protected areas. The protection and, at the same time, the valorization of natural protected areas in Italy have their roots in 1991, the year in which, after a long debate among the scientific, cultural, and political worlds, the "*Framework Law on Protected Areas"* (Law no. 394 of 6 December 1991) was enacted, recognized internationally (Bertini, 2015).

For the first time, a law linked the conservation of natural environments, fundamental for the protection of biodiversity, to the protection and valorization of the territory, including the built environment, historical-artistic and architectural heritage, intangible heritage, and specific and original productive activities, often identity-forming. The combination of these factors could provide the necessary support to foster the revitalization of biodiversity-rich areas, with prospects for sustainable development. The "*Park Community*" (Art. 10) is equipped with the "*Park Plan*" (Art. 12) and the "*Park Regulations*" (Art. 11), and is supported by "*Incentive Measures*" (Art. 7) and "*Economic and Social Promotion Initiatives*" (Art. 14). These instruments all have the potential to generate eco-sustainable development of the country's protected areas. Finally, the law provides for two levels of protected area classification: national and regional parks, whether large or smaller natural reserves. Park communities at the national level in Central and Northern Italy have successfully taken advantage of the opportunities offered by the law. The municipalities of Accettura and Oliveto Lucano host the Gallipoli Cognato and Piccole Dolomiti Lucane Regional Park, the Monte Croccia Anthropological Reserve within the same park, and various Special Protection Areas (SPAs) and Sites of Community Importance (SCIs) (Figure **II.13**). The Gallipoli Cognato and Piccole Dolomiti Lucane Regional Park extends for approximately 27,000 hectares (ISPRA) and is divided between the provinces of Potenza (Castelmezzano and Pietrapertosa) and Matera (Calciano, Oliveto Lucano, and Accettura). The area in question is surrounded by oak and holm oak forests, as well as Mediterranean scrub. The park's history began in 1971, when the CNR identified the entire area as an ecosystem of flora and fauna to be preserved. The legislative turning point occurred in 1994, with the enactment of Regional Law no. 28 of 28 June 1994, entitled *"Identification, classification, establishment, protection, and management of natural protected areas in Basilicata",* which initiated the process of establishing the Park, completed in 1997[12].

[12] Regional Law No 47 of 24 November 1997 *'INSTITUTION OF THE NATURAL PARK OF GALLIPOLI COGNATO - PICCOLE DOLOMITI LUCANE*' Official Bulletin no. 65 of 27 November 1997. L.R._47_97_AGGIORNATA_ISTITUZIONE_PARCO_GALLIPOLI.pdf

Figure II.13 - Natural heritage

Source: authors

The Basilicata region boasts a total of 58 Natura 2000 sites[13], covering an area of over 117,000 hectares (approximately 18% of the regional territory). These include 29 Sites of Community Importance (SCIs) and 26 Special Protection Areas (SPAs), identified based on scientific and biogeographical criteria. Within the study area fall:

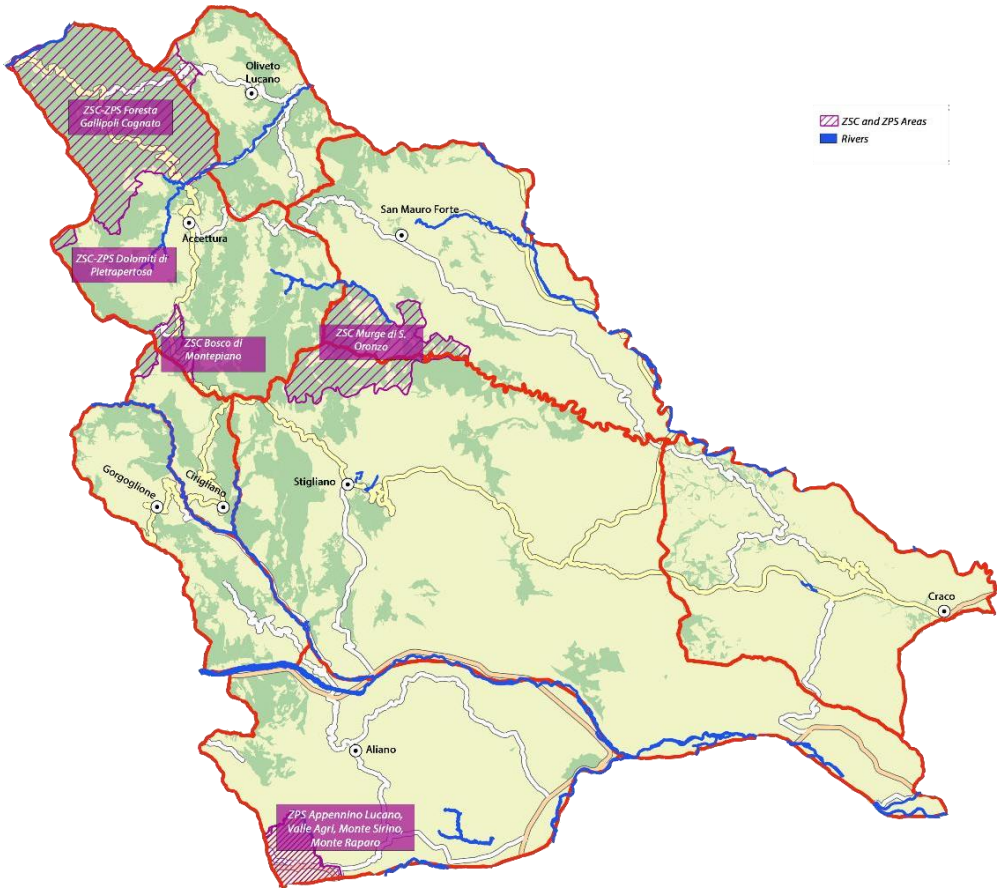
- The SAC-SPA Gallipoli Cognato Forest, within the eponymous park;

[13] Natura 2000 is an European ecological network composed of sites designated under the EU Birds Directive (Special Protection Areas) and the Habitats Directive (Sites of Community Importance and Special Areas of Conservation) following the listed criteria:

- Special Protection Area (SPA): 1% of the population of listed vulnerable species or wetlands of international importance for migratory waterfowl;
- Sites of Community Importance (SCI): habitat types listed in the directive's Annex I and the habitats of the species listed in its Annex II;
- Special Areas of Conservation (SAC): priority SCI sites that are most threatened and/or most important for conservation where the conservation necessary measures have been planned for the maintenance or restoration of natural habitats and peculiar species.

- The SAC-SPA Dolomiti di Pietrapertosa, which only partially borders the municipality of Accettura.
- The SAC Bosco di Montepiano, bordering the municipalities of Accettura and Cirigliano.
- The SAC Murge di S. Oronzio and the SPA Lucanian Apennine, Agri Valley, Monte Sirino and Monte Raparo, which fall within a portion of the municipality of Aliano.

Figure II.14 - Nature 2000 network



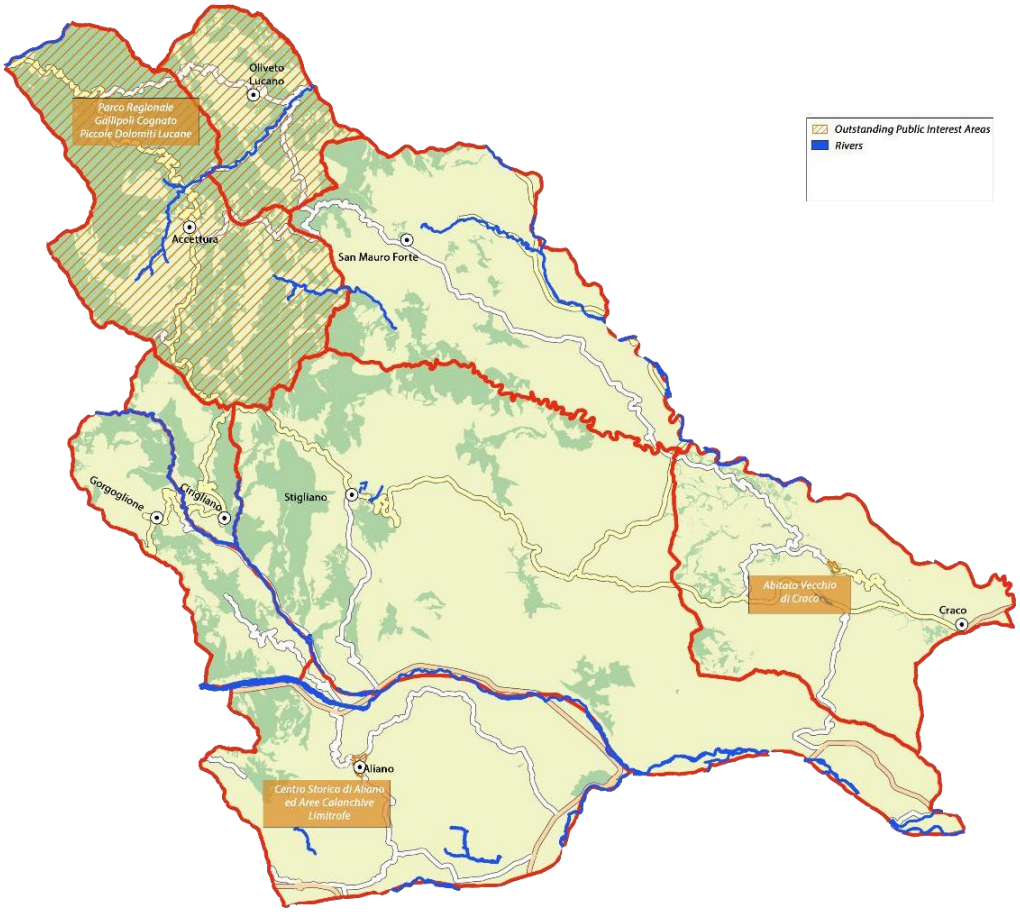
Source: authors

The area of interest is also characterized by the presence of areas of outstanding public interest[14] such as the ancient village of Craco, the historical center of Aliano and the surrounding calanchi, in

[14] The categories of landscape assets that Article 136 of Legislative Decree 42/2004 "*Code of Cultural and Landscape Heritage*" protects on account of their considerable public interest are the following:
(a) immovable things that have conspicuous features of natural beauty, geological singularity or historical memory, including monumental trees;
(b) villas, gardens and parks, not protected by the provisions of Part Two of this Code, which are distinguished by their uncommon beauty;
(c) complexes of immovable property that make up a characteristic appearance having aesthetic and traditional value, including historic centres and nuclei;
(d) scenic beauties and also those viewpoints or belvEderes, accessible to the public, from which the spectacle of those beauties is enjoyed.

addition to the aforementioned Gallipoli Cognato and Piccole Dolomiti Lucane Regional Park (Figure II.15).

Figure II.15 - Outstanding public interest areas



Source: authors

Craco, a small municipality with 585 inhabitants, is surrounded by the Calanchi, deep furrows carved into a chalky terrain by rainwater runoff [15]. In the 1960s, the historic center was emptied following a landslide that forced the population to abandon the village and take refuge in the municipality of Craco Peschiera, about 7 km from the ancient village, closer to a developing industrial area (Pisticci and Val Basento areas). The tourist component has increased over time: tourists arrive individually or in groups to walk the streets of this ancient center, attracted by the suggestive places, also used as sets for film productions (such as some scenes from Mel Gibson's *"The Passion of the Christ").*

[15] Basilicata is among the most affected Italian regions in terms of environmental risks (land degradation, landslides, floods, earthquakes etc.; see, e.g. (Coluzzi et al., 2019; Lanorte, A et al., 2019; Manfreda et al., 2015; Perrone et al., 2021; Lacava et al., 2019; Perrone 2021, Gizzi et al., 2019).

Furthermore, the site represents a destination for educational excursions for geology degree courses and secondary schools involved in various projects[16].

Of the old village remain the stone houses and the Norman Tower, built in the XII century on an area characterized by good geological-geotechnical properties, as evidenced by the fact that it was not affected by the landslides that occurred in the XX century. From Craco's main road, one can access the center of the ghost town, where some large noble palaces still stand, such as Palazzo Grossi and Palazzo Maronna: the first overlooks the small square where the Mother Church stands, the second is located next to the medieval tower and characterized by an imposing brick entrance, topped by a large terraced balcony. Another notable building is Palazzo Carbone, a historic residence from the late XV century with a monumental entrance. Among the assets protected by the Superintendence of Archaeology, Fine Arts and Landscape of Basilicata is the Craco Emotional Museum (MEC), housed in the ancient convent of San Pietro dei Frati Minori founded in 1620, an example of a project for the protection and redevelopment of widespread rural heritage in Basilicata. Figures **II.16** and **II.17** show respectively the effects of a landslide reactivation in Craco in January 1965 and the suggestive ghost village.

Figure II.16 - Effects of CS landslide reactivation in Craco in January 1965

Source: ASDPC, MM.LL.PP. Div.29.

Figure II.17 - The ghost village of Craco

[16] Data not existing as there are no accommodation facilities located in the area.

Source: Photo by F.T. Gizzi

Aliano is a village of 838 inhabitants, located in the central-southern part of Basilicata, in the province of Matera, 94 kilometers from the city of Matera and 83 kilometers from Potenza, the regional capital. The context of Aliano is characterized by numerous calanchi, peculiar slopes originated by the erosion of clayey rocks with scarce vegetation cover. Aliano is difficult to access via the Agri Valley road due to its isolated and perched position. The town is located in the Sant'Arcangelo Basin, of Pliocene to Pleistocene age, a large foredeep wedge basin of the southern Apennine system (Pieri et al., 1994; Pieri et al., 1996b). The territory of Aliano preserves significant historical testimonies, and its landscape is enriched by architectural, artistic, and cultural peculiarities of great value. The village name derives from the Latin *Praedium Allianum*, meaning Allius' estate, a Roman nobleman. Given its proximity to the Agri and Sinni rivers, since ancient times it has been an important exchange center among Greek, Etruscan, and Oenotrian civilizations, as evidenced by the discovery of a necropolis dating from the VII to VI century BC, containing over a thousand tombs and numerous artifacts.

Aliano is one of the most culturally active villages in Basilicata, candidate for Italian Capital of Culture in 2018 and 2024, and among the finalists for the Italian Capital of the Book in 2022. Despite being a small municipality, it boasts a rich cultural offer with a considerable number of museums and cultural venues. It hosts the "*Carlo Levi Literary Park*[17]," aimed at discovering and valorizing places and territories intimately linked to works and authors of national and European literature; since 1988, the National Carlo Levi Literary Prize has been held there. Of great importance is the "*La Luna e i Calanchi*[18]" festival, conceived and directed by Franco Arminio, which takes place every August since 2012[19]. The itinerary also includes the Cammino delle Ginestre, which crosses the municipalities of Cirigliano, Accettura, and Stigliano. It is a 50 km route through woods, calanchi, and ancient villages. Other characteristic places that attract significant tourist flows are the Calanchi Amphitheater (where cultural events take place), the Museum of Peasant Civilization, the Art Gallery, Carlo Levi's Exile House, the House of the Evil Eye, and the Paul Russotto Museum. Aliano, despite being an inland municipality, distant from both the most important urban centers and communication infrastructures, still manages to attract a stable flow of tourists, with an interesting contribution also from abroad. In 2024, the tourist flow is strongly characterized by Italian visitors. Arrivals and presences of Italian tourists constitute respectively 79% (409) and 81% (611) of the total. Foreign arrivals (111) and presences (142), although numerically lower, are not negligible, representing about 21% of arrivals and 19% of presences (APT Basilicata, 2024). Among the assets protected by the Superintendence of Archaeology, Fine Arts and Landscape of Basilicata are Palazzo Caporale and Palazzo de Franchi.

[17] Aliano's recent history is strongly linked to the figure of Carlo Levi (doctor, politician, writer and painter), who set the book *Cristo si è fermato a Eboli* (1945) here.
[18] *La Luna e i Calanchi* is an event that celebrates paesologia, or the encounter between art, literature, music and the landscape of the calanchi, actively involving the local community, transforming the village into an artistic and cultural workshop.
[19] In the last edition, August 2024, the attendance figure exceEded 20,000.

Primary sector

In inner areas, demographic decline and population aging are particularly pronounced. Farm and land abandonment significantly undermine economic productivity, while the digital divide negatively affects the quality of essential services. A large part of Basilicata is prone to land abandonment due to its peripheral position in relation to the most urbanized and economically developed areas of Italy, a persistent depopulation trend, and the predominance of hilly and mountainous land (Coniglio et al., 2017; Salvia et al., 2021; Santarsiero V. et al., 2023). Moreover, the region's topography presents serious challenges for mechanized agriculture. As a result, most of these zones, despite their fertility, have been converted to grazing activities or left abandoned altogether (Salvati et al., 2013; Quaranta et al., 2020).

The geography of the Montagna Materana displays considerable variation, with forested areas in the north gradually giving way to agricultural land in the southern part of the territory.

This analysis focuses on the primary sector and is based on ISTAT data from the 2010 and 2020 agricultural censuses [20]. According to 2010 data, cereal production represented the main agricultural activity in the Montagna Materana. Wheat cultivation in particular boasts a millennia-long tradition, especially in the municipality of Stigliano, where 8183.3 hectares are cultivated by 539 farms. This area is characterized by significant genetic and agronomic diversity. Permanent crops are present, but limited. A substantial proportion of land in several municipalities is classified as unused or "other" land, notably in Craco (253 ha), Oliveto Lucano (201 ha), San Mauro Forte (349 ha), and Stigliano (521 ha), suggesting a growing trend of land abandonment (Table II.2).

The livestock sector is also of notable relevance, especially in Accettura (2309.61 ha), Stigliano (4465.63 ha), and Aliano (1673.75 ha). In these municipalities, animal husbandry plays a key environmental role—through fire prevention, forest clearing, and erosion control—as well as a socio-economic function, supporting households with food production and income generation.

Table II.2 - Agricultural surface area by type of cultivation

	superficie dell'unità agricola (con terreni) - ettari - ANNO 2010					
	superficie	**superficie totale (sat)**				
			superficie agricola utilizzata (sau)			

[20] The General Census of Agriculture is an economic census which consists in counting farms in Europe and identifying their characteristics. The agricultural census is carried out not only to fulfill international and EU legislation requirements, but also, and more importantly, to meet national information needs.

	totale (sat)	superficie agricola utilizzata (sau)	seminativi	vite	coltivazioni legnose agrarie, escluso vite	orti familiari	prati permanenti e pascoli	arboricoltura da legno annessa ad aziende agricole	boschi annessi ad aziende agricole	superficie agricola non utilizzata e altra superficie
BASILICATA	**669047,73**	**519137,45**	**312618,41**	**5626,41**	**45744,16**	**1039,39**	**154109,08**	**2857,45**	**108632,59**	**38420,24**
PROVINCIA DI MATERA	**249222,88**	**212333,16**	**138037,53**	**2029,01**	**31293,83**	**274,53**	**40698,26**	**940,22**	**19741,87**	**16207,63**
ACCETTURA	5327,83	3423,1	929,55	4,75	174,27	4,92	2309,61	40,8	1777,36	86,57
ALIANO	5726,57	5242,1	2964,96	5,08	594,31	4	1673,75	3	291,3	190,17
CIRIGLIANO	746,78	531,79	327,74	6,05	76,52	0,81	120,67	..	186,57	28,42
CRACO	6195,63	5865,09	4251,66	0,8	194,82	2,57	1415,24	17,5	59,2	253,84
GORGOGLIONE	1997,34	1429,97	977,68	1,5	108,24	0,92	341,63	13	491,22	63,15
OLIVETO LUCANO	2837,27	1571,03	493,15	2,83	81,22	2,28	991,55	..	1065,18	201,06
SAN MAURO FORTE	7317,7	6171,96	4137,01	7,74	376,17	0,85	1650,19	1,08	795,19	349,47
STIGLIANO	15442,53	13408,23	8183,3	0,78	753,87	4,65	4465,63	16,63	1496,17	521,5

Source: Istat Census 2010

Table II.3 - Number of Agricultural farms

	numero di unità agricole (con terreni) - ANNO 2010									
	superficie totale (sat)									
	superficie totale (sat)	superficie agricola utilizzata (sau)						arboricoltura da legno annessa ad aziende agricole	boschi annessi ad aziende agricole	superficie agricola non utilizzata e altra superficie
		superficie agricola utilizzata (sau)	Seminativi	vite	coltivazioni legnose agrarie, escluso vite	orti familiari	prati permanenti e pascoli			
BASILICATA	**60640**	**59799**	**40123**	**9955**	**36005**	**11770**	**13213**	**480**	**12172**	**30754**
PROVINCIA DI MATERA	**24124**	**24003**	**14727**	**1475**	**18244**	**2581**	**3153**	**100**	**2626**	**11725**
ACCETTURA	299	290	162	13	202	65	121	4	119	194
ALIANO	559	556	288	6	430	35	124	1	57	118
CIRIGLIANO	106	104	42	12	83	11	29	..	41	55
CRACO	244	244	205	1	144	18	76	1	19	66
GORGOLIONE	209	207	160	1	132	6	51	1	94	84
OLIVETO LUCANO	160	159	122	9	127	50	37	..	77	76
SAN MAURO FORTE	402	398	222	12	291	4	64	1	59	155

STIGLIANO	785	781	539	5	619	60	289	3	271	422

Source: Istat Cenus, 2010

In 2010, a total of 266 livestock farms were recorded in the Montagna Materana area, with sheep farms being the most common (163), followed by cattle farms (119). Accettura registered the highest number of livestock farms (43), followed by Stigliano (39).

In the municipality of Accettura, several species are raised, primarily sheep (1,930 head) and cattle (1,459 head). By contrast, the livestock sector remains marginal in municipalities such as Craco, Oliveto Lucano, and Cirigliano.

Table II.4 - Number of companies with livestock farms

	ANNO 2010						
	NUMERO DI AZIENDE CON ALLEVAMENTI						
	totale bovini	**totale ovini**	**totale caprini**	**totale suini**	**totale avicoli**	**totale conigli**	**tutte le voci**
BASILICATA	**2647**	**3701**	**1793**	**479**	**387**	**145**	**5847**
PROVINCIA DI MATERA	**493**	**676**	**411**	**102**	**91**	**34**	**1153**
ACCETTURA	43	40	25	3	10	5	66
ALIANO	6	16	9	1	1	1	24
CIRIGLIANO	9	7	4	2	..	..	18
CRACO	4	7	4	2	2	..	9
GORGOLIONE	9	16	12	..	..	..	21
OLIVETO LUCANO	5	8	8	3	2	..	15
SAN MAURO FORTE	11	30	13	1	..	..	40
STIGLIANO	32	39	25	8	1	..	73

Source: Istat Census, 2010

Table II.5 – number of animals

	2010					
	NUMERO DI CAPI					
	totale bovini	**totale ovini**	**totale caprini**	**totale suini**	**totale avicoli**	**totale conigli**
BASILICATA	**88354**	**263007**	**58802**	**84838**	**318857**	**125702**
PROVINCIA DI MATERA	**24839**	**70470**	**21734**	**23592**	**93225**	**92926**
ACCETTURA	1459	1930	618	70	488	160
ALIANO	99	1970	676	4000	15	1050
CIRIGLIANO	311	614	95	8	..	..
CRACO	104	2320	648	79	50	..
GORGOGLIONE	357	2344	523	..	..	..
OLIVETO LUCANO	312	307	518	21	115	..
SAN MAURO FORTE	551	4306	1302	170	..	..
STIGLIANO	937	6390	3321	5388	65	..

Source: Istat Census, 2010

The average farm size—approximately 17 hectares—points to a high level of land fragmentation, which has long been identified as a critical barrier to rural development. This fragmentation, combined with the challenge of generational renewal, undermines the viability and competitiveness of local agriculture.

From a strategic standpoint, the push toward greater efficiency and innovation in farming practices is essential. At the same time, the Montagna Materana area faces environmental threats such as desertification, recurrent droughts, biodiversity loss, and soil erosion (TERRASAFE, EU Project)[21].

The 7th Agricultural Census—the last before the transition to a permanent and sample-based model—offers updated data on Italian agriculture up to 2020. These data provide a detailed statistical overview at national, regional, and local levels.

From the last available Agricultural Census data, in nearly all municipalities of the Montagna Materana, both the Utilized Agricultural Area (UAA, or SAU in Italian) and the number of farms decreased between 2010 and 2020. Overall, the area saw an 8.42% reduction in UAA and a 20.29% drop in the number of active farms. The most pronounced declines in UAA occurred in the municipalities of Aliano (-38%), Cirigliano (-33%), and Oliveto Lucano (-39%).

Despite these contractions, three supply chains continue to dominate the local agricultural landscape: arable farming, livestock grazing, and olive cultivation.

Cereal crops, in particular, continue to play a strategic role in local agriculture, in terms of both land coverage and farm numbers, as well as production value. In the municipality of Stigliano, most farms fall within the economic size class of €2,000–€14,999 (141 farms), while 32 farms exceed €50,000, including five farms in the €250,000–€499,999 range (ISTAT, 7th Agricultural Census, 2020).

However, the steady decline in land dedicated to cereal production has often been linked to the lower profitability of cereals compared to higher-value crops such as vineyards, olive groves, and orchards. This trend is exacerbated by growing international competition, as products from developing countries gain market share due to lower labor costs (Salvati & Serra, 2016).

Furthermore, climate change—including prolonged droughts, altered rainfall patterns, and an increase in extreme weather events—has had a direct negative impact on crop yields, especially cereals (Caloiero et al., 2018; Ummenhofer & Meehl, 2017). Ensuring the continuity of traditional

[21] TERRASAFE is an innovative project, supported by the European Commission, aimed at preventing and combating desertification and depopulation of inland areas, phenomena that affect large areas of southern Europe and North Africa. Desertification, aggravated by climate change and human activities, represents a serious threat to agriculture and the sustainability of local communities. The objective of TERRASAFE is to develop and test agronomic and social innovation solutions that not only prevent desertification and abandonment, but also enable the recovery of degraded land and the revitalisation of communities at risk of depopulation.

cereal crops through economically and environmentally sustainable practices is essential to prevent income loss and the further abandonment of marginal areas.

Table II.6 - Farms with agricultural area used by type of cultivation Accettura (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata
Tipo di coltivazione		
Tutte le voci	3.207	178
Seminativi	1.078	124
Cereali in complesso	369	55
Legumi secchi	53	5
Seminativi e orti in serra	0	1
Ortive	3	1
Foraggere avvicendate	405	47
Terreni a riposo	232	54
Altri seminativi	16	4
Coltivazioni legnose agrarie	88	113
Vite	0	1
Olivo per la produzione di olive da tavola e da olio	84	113
Coltivazioni fruttifere	3	3
Altre coltivazioni legnose agrarie	0	1
Orti familiari	1	13
Prati permanenti e pascoli	2.039	96

Source: Istat Census, 2020

Table II.7 - Farms with agricultural area used by type of cultivation Aliano (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata
Tipo di coltivazione		
Tutte le voci	3.258	264
Seminativi	2.464	211
Cereali in complesso	1.150	89
Legumi secchi	447	23
Ortive	9	4
Foraggere avvicendate	283	31
Sementi e piantine	0	1
Terreni a riposo	521	126
Altri seminativi	55	11
Coltivazioni legnose agrarie	408	204
Coltivazioni di agrumi	1	2

Vite	2	10
Olivo per la produzione di olive da tavola e da olio	369	201
Coltivazioni fruttifere	35	10
Altre coltivazioni legnose agrarie	1	2
Orti familiari	1	9
Prati permanenti e pascoli	385	64

Source: Istat Census, 2020

Table II.8 - Farms with agricultural area used by type of cultivation Cirigliano (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata
Tipo di coltivazione		
Tutte le voci	358	38
Seminativi	221	27
Cereali in complesso	81	12
Legumi secchi	41	6
Foraggere avvicendate	61	7
Terreni a riposo	30	7
Altri seminativi	8	3
Coltivazioni legnose agrarie	36	30
Vite	0	1
Olivo per la produzione di olive da tavola e da olio	35	30
Coltivazioni fruttifere	1	2
Orti familiari	1	4
Prati permanenti e pascoli	100	18

Source: Istat Census, 2020

Table II.9 - Farms with agricultural area used by type of cultivation Craco (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata
Tipo di coltivazione		
Tutte le voci	4.639	148
Seminativi	3.849	139
Cereali in complesso	1.607	79
Legumi secchi	789	27
Seminativi e orti in serra	2	2
Piante industriali	7	4
Ortive	100	7

Foraggere avvicendate	492	25
Sementi e piantine	0	1
Terreni a riposo	790	84
Altri seminativi	61	8
Coltivazioni legnose agrarie	157	105
Coltivazioni di agrumi	7	3
Vite	3	7
Olivo per la produzione di olive da tavola e da olio	136	103
Coltivazioni fruttifere	10	5
Orti familiari	1	7
Prati permanenti e pascoli	631	79

Source: Istat Census, 2020

Table II.10 - Farms with agricultural area used by type of cultivation Gorgoglione (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata
Tipo di coltivazione		
Tutte le voci	1.622	121
Seminativi	1.109	112
Cereali in complesso	428	47
Legumi secchi	45	9
Piante industriali	0	1
Foraggere avvicendate	187	21
Terreni a riposo	421	79
Altri seminativi	27	2
Coltivazioni legnose agrarie	61	78
Coltivazioni di agrumi	0	1
Vite	0	4
Olivo per la produzione di olive da tavola e da olio	59	78
Coltivazioni fruttifere	1	1
Altre coltivazioni legnose agrarie	1	2
Orti familiari	1	15
Prati permanenti e pascoli	450	33

Source: Istat Census, 2020

Table II.11 - Farms with agricultural area used by type of cultivation Oliveto Lucano (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata

Tipo di coltivazione		
Tutte le voci	955	95
Seminativi	481	79
Cereali in complesso	170	31
Legumi secchi	37	3
Piante industriali	3	1
Ortive	0	1
Foraggere avvicendate	77	16
Terreni a riposo	186	53
Altri seminativi	7	2
Coltivazioni legnose agrarie	40	70
Vite	0	2
Olivo per la produzione di olive da tavola e da olio	40	70
Orti familiari	0	3
Prati permanenti e pascoli	434	46

Source: Istat Census, 2020

Table II.12 - Farms with agricultural area used by type of cultivation San Mauro Forte (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata
Tipo di coltivazione		
Tutte le voci	5.297	229
Seminativi	3.868	173
Cereali in complesso	2.545	131
Legumi secchi	724	44
Piante industriali	45	10
Ortive	95	5
Foraggere avvicendate	236	17
Terreni a riposo	222	52
Altri seminativi	1	2
Coltivazioni legnose agrarie	338	181
Coltivazioni di agrumi	2	2
Vite	13	9
Olivo per la produzione di olive da tavola e da olio	247	179
Coltivazioni fruttifere	32	9
Altre coltivazioni legnose agrarie	44	4
Orti familiari	2	13
Prati permanenti e pascoli	1.089	111

Source: Istat Census, 2020

Table II.13 - Farms with agricultural area used by type of cultivation Stigliano (2020)

Indicatore	Superficie agricola utilizzata - ettari	Aziende con superficie agricola utilizzata
Tipo di coltivazione		
Tutte le voci	11.445	521
Seminativi	8.153	432
Cereali in complesso	3.968	263
Legumi secchi	1.699	95
Seminativi e orti in serra	0	1
Piante industriali	6	5
Ortive	32	8
Fiori e piante ornamentali	0	3
Foraggere avvicendate	1.032	81
Sementi e piantine	9	2
Terreni a riposo	1.272	218
Altri seminativi	133	33
Coltivazioni legnose agrarie	750	396
Coltivazioni di agrumi	18	9
Vite	3	7
Olivo per la produzione di olive da tavola e da olio	633	392
Coltivazioni fruttifere	96	19
Altre coltivazioni legnose agrarie	0	2
Coltivazioni legnose agrarie in serra	0	1
Orti familiari	1	12
Prati permanenti e pascoli	2.541	222

Source: Istat Census, 2020

Agricultural land remains one of Basilicata's most valuable natural resources. Nonetheless, recent ISTAT analyses reveal a clear and growing trend of land abandonment throughout the region.

In 2020, some municipalities in the Montagna Materana exhibited particularly high levels of underutilized land. Stigliano recorded the highest figure, with 472 hectares of unused agricultural land distributed across 127 farms. Craco (269 ha, 27 farms) and Aliano (188 ha, 48 farms) followed. In contrast, Oliveto Lucano (5 ha, 8 farms) and Cirigliano (12 ha, 13 farms) reported much lower levels of abandonment, possibly reflecting either a more stable land use pattern or limited availability of land suitable for agriculture.

This trend is not merely structural but is strongly shaped by socioeconomic factors. Among the primary drivers are outmigration from rural to urban areas, in search of employment and better services, and a lack of adequate economic incentives to retain agricultural activities. Additionally,

demographic decline and population aging further weaken the viability of farming in these territories (Rey Benayas et al., 2007).

Table II.14 - Unused Agricultural Land and Farms (2020)

	Unused Agricultural Land (ha)	Farms with Unused Agricultural Land
Accettura	34	39
Aliano	188	48
Cirigliano	12	13
Craco	269	27
Gorgoglione	37	21
Oliveto Lucano	5	8
San Mauro Forte	117	19
Stigliano	472	127

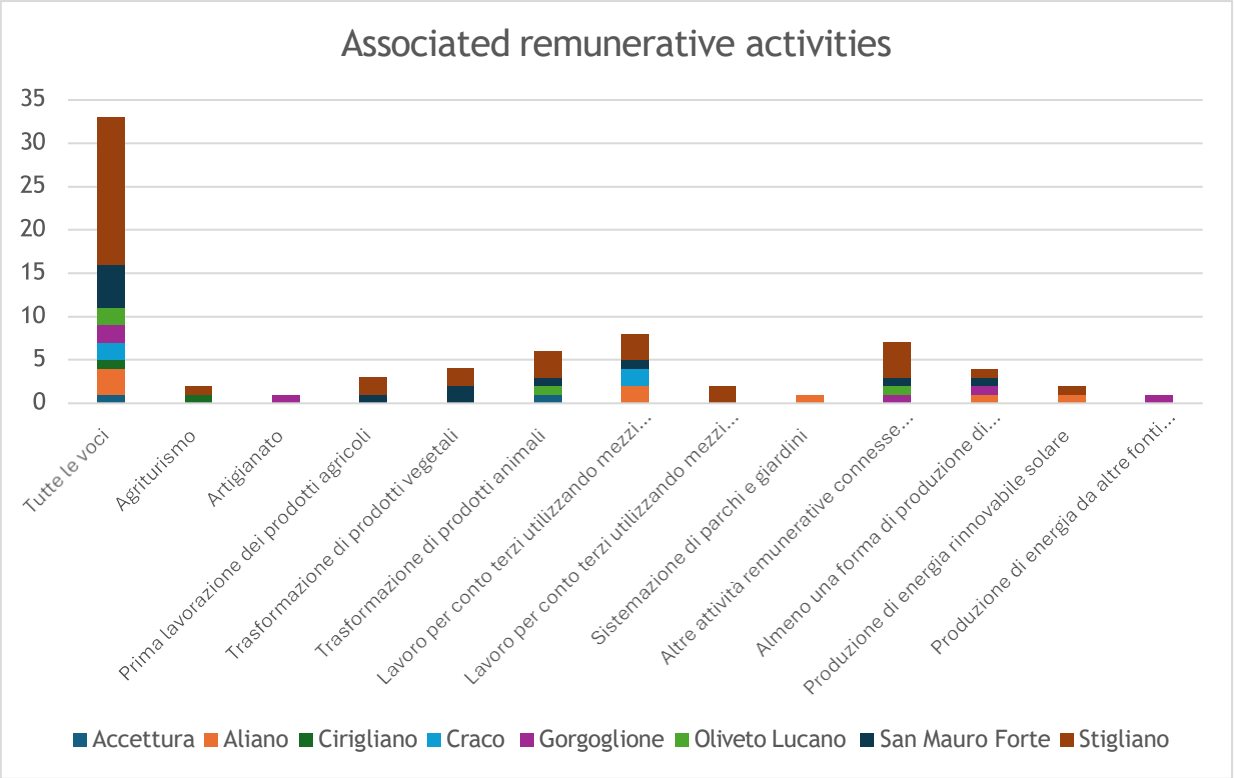
Source: Istat Census, 2020

Achieving solid financial performance—both in absolute terms and relative to labor and capital inputs—is essential for farm holders who wish to remain in agriculture. One increasingly recognized strategy is on-farm diversification, which involves producing non-agricultural goods and services using existing resources (land, labor, and capital). This approach allows farmers to reach new markets, increase income, and reduce reliance on traditional crop and livestock production (Ilbery, 1991; Finger & El Benni, 2021).

Multifunctionality has become a central concept in rural development policy, especially in the European context, where agriculture is increasingly called upon to play environmental, social, and economic roles. Diversified farming activities—such as agritourism, artisanal food processing, educational farms, and renewable energy production—represent key components of this evolution (Bowler et al., 1996; Jongeneel et al., 2008).

As a result, several farms in the Matera Mountain area have adapted by investing in various related activities to diversify and increase their income. The data, as illustrated in the figure II.18, reveal that in most municipalities, fewer than five farms report associated non-agricultural activities. A notable exception is Stigliano, which shows a considerably higher number of diversified enterprises. By contrast, Accettura and Cirigliano report only one such activity each, indicating a more traditional and subsistence-oriented agricultural model.

Figure II.18 – Associated remunerative activities (2020)



Source: Istat, Census 2020

In this context, organic farming can also be considered a form of product and market diversification. It enables farms to tap into sustainability- and health-driven consumer markets and to enhance their competitiveness despite overall declining agricultural revenues. Among the municipalities, Stigliano again stands out, with the largest surface area under organic cultivation (4,515 ha), followed by San Mauro Forte (3,598 ha) and Craco (1,737 ha). Conversely, organic farming remains marginal in Cirigliano and Oliveto Lucano, where only residual areas are managed organically.

Table II.15 - Farms with Organic Area by Type of Crop (2020)

Tipo di coltivazione	Tutte le voci	Cereali per la produzione di granella	Legumi secchi	Patata	Barbabietola da zucchero	Piante industriali	Ortive	Foraggere avvicendate	Vite	Olivo per la produzione di olive da tavola e da olio	Coltivazioni fruttifere	Agrumi	Prati permanenti e pascoli	Altre coltivazioni biologiche

Territorio														
Accettura	625	126	21	..	..	..	..	93	..	15	..	..	297	73
Aliano	1.662	708	236	..	..	..	1	200	1	212	10	0	188	107
Ciriglian o	43	12	22	..	..	..	..	3	..	6	..	..	..	0
Craco	1.737	707	305	..	..	4	85	291	1	35	..	..	211	98
Gorgogli one	238	47	25	..	..	0	..	12	..	10	..	..	123	22
Oliveto Lucano	56	21	..	..	..	3	..	14	..	8	..	..	4	5
San Mauro Forte	3.598	1.813	593	..	..	41	95	91	11	140	25	..	713	75
Stigliano	4.515	1.565	970	..	..	5	31	378	2	276	70	16	923	277

Source: Istat Census, 2020

Between 2010 and 2020, the livestock sector in the Montagna Materana experienced notable changes, particularly in the number and type of farms. In some municipalities, such as Craco, cattle farming sharply declined—by as much as 50%. In others, however, the number of livestock farms either remained stable or increased. Despite this variation, sheep and goat farming continue to hold a central role, both in terms of the number of farms and total livestock units.

In contrast, pig and poultry farming remains marginal across the territory. An exception is Stigliano, where the number of poultry farms increased significantly—from just one in 2010 to twelve in 2020. This spike may reflect evolving consumer preferences, with growing interest in alternative protein sources to red meat. Recent studies suggest that dietary changes, including reduced red meat consumption, are reshaping market demand and opening new opportunities for small-scale poultry producers (Godfray et al., 2018; Arnaudova et al., 2022).

Table II.16 - Number of livestock and farms by type (1 December 2020)

	Numero di capi al primo dicembre 2020							Numero di capi al primo dicembre 2020, nelle unità agricole solo con allevamenti							Unità agricole con allevamenti al primo dicembre 2020							Unità agricole con solo allevamenti al primo dicembre 2020						
	Totale bovini	Totale bufalini	Totale ovini	Totale caprini	Totale suini	Totale avicoli	Alveari	Totale bovini	Totale bufalini	Totale ovini	Totale caprini	Totale suini	Totale avicoli	Alveari	Totale bovini	Totale bufalini	Totale ovini	Totale caprini	Totale suini	Totale avicoli	Alveari	Totale bovini	Totale bufalini	Totale ovini	Totale caprini	Totale suini	Totale avicoli	Alveari
BASILICATA	**95703**	**3902**	**200160**	**40437**	**68763**	**123376**	**16112**	**1541**	**..**	**1126**	**242**	**4775**	**34000**	**755**	**2265**	**20**	**3627**	**1565**	**1106**	**1214**	**353**	**39**	**..**	**29**	**19**	**15**	**7**	**31**
PROVINCIA DI MATERA	**25506**	**2797**	**43364**	**12838**	**24561**	**85540**	**77 05**	**437**	**..**	**422**	**140**	**2847**	**33946**	**237**	**458**	**12**	**621**	**349**	**113**	**2116**	**144**	**8**	**..**	**9**	**8**	**4**	**2**	**9**
ACCETTURA	2017	..	1586	333	612	139	330	154	..	30	5	2	..	..	52	..	35	22	7	10	4	2	..	1	1	1	..	..

ALIANO	250	..	1023	251	5523	..	1	..	..	..	..	..	..	..	7	..	17	13	1	..	1	..	..	..	..	..	..	..
CIRIGLIANO	365	..	653	96	3	55	36	..	..	..	..	..	..	..	12	..	10	8	1	2	1	..	..	..	..	..	..	..
CRACO	64	..	1616	388	..	20	..	..	..	60	..	..	..	..	2	..	7	2	..	1	..	..	..	1	..	..	..	..
GORGOGLIONE	393	1	1160	491	27	30	119	..	..	..	..	..	..	32	16	1	18	13	2	1	3	..	..	..	..	..	..	1
OLIVETO LUCANO	351	..	155	92	15	..	256	135	..	26	10	..	..	..	7	..	7	6	1	..	3	1	..	1	1	..	..	..
SAN MAURO FORTE	833	..	1102	1100	6	10	215	..	..	..	..	..	..	..	19	..	26	16	2	1	4	..	..	..	..	..	..	..
STIGLIANO	1440	154	4111	2525	2927	209	411	95	..	21	..	271	..	..	39	1	49	30	11	12	12	1	..	1	..	1	..	..

Source: Istat Census, 2020

Although organic livestock farming has gained attention at the national level, its presence in the Montagna Materana remains minimal. According to the 7th census, only a handful of organic livestock farms operate in the area: one in Accettura, two in San Mauro Forte, and three in Stigliano.

Table II.17 - Farms and Livestock by Type of Organic Farming (2020)

Indicatore	Numero di aziende (escluse proprietà collettive) con allevamenti biologici							Numero di capi al primo dicembre 2020 da allevamento biologico						
Tipo di allevamento	Totale bovini	Totale bufalini	Totale ovini	Totale caprini	Totale suini	Totale avicoli	Tutte le voci	Totale bovini	Totale bufalini	Totale ovini	Totale caprini	Totale suini	Totale avicoli	Tutte le voci
Territorio														
Accettura	1	..	..	..	..	..	1	40	..	..	..	..	..	..
San Mauro Forte	..	..	1	1	..	..	2	..	..	25	10	..	..	4
Stigliano	..	..	1	1	..	2	3	..	..	11	150	..	51	17

Source: Istat Census, 2020

Meanwhile, climate change poses growing risks to agricultural resilience in the region. Drought has emerged as a critical threat, undermining both local and national water security [22]. This is an emerging and increasingly dominant concept in agriculture research since the Mediterranean is particularly vulnerable to shifting hydroclimatic regimes, with increasing frequency and intensity of droughts observed over the past decades (Poljansek et al., 2017).

A long-term study by Piccareta et al. (2013) found that annual and seasonal precipitation declined between 1951 and 2010, particularly due to reduced rainfall in autumn and winter leading to a significant change in the hydroclimatic regime.

In the scientific literature, the most significant indices proposed for quantifying drought conditions include:

- the De Martonne Index[23];

- the Standardized Precipitation Index (SPI[24]) (McKee et al. 1993).

[22] Drought and water scarcity are two phenomena closely related to water quantity issues, and usually have influences on the society. Drought is defined as a natural temporary imbalance in water availability, which may be related to persistently lower-than-average precipitation. Droughts have uncertain frequencies, durations and severities, and their occurrence is difficult to predict. Water scarcity is defined as the relative shortage of water in a water supply system which can be caused by drought or by human actions (UN-Water). This is an imbalance of water supply and demand.
[23] The De Martonne agrometeorological index is calculated by dividing the average annual precipitation by the average annual temperature plus 10 points.
[24] The SPI is a widely used tool for assessing and monitoring drought conditions. It is a standardized index that quantifies the surplus or deficit of precipitation (drought) compared to the climatology of the area under consideration, providing an indication of the relationship between the amount of precipitation that has fallen in a given time interval and its climatology, thus leading to a definition of whether the monitored location is affected by drought conditions or not. It is very effective for assessing drought in agriculture both in the short term (3-6 months) and in the long term (12, 24, 48 months) (Di Lena et al. 2020, Scalcione et al. 2020).

A study on drought in the Basilicata region, conducted by ALSIA using data analysis and agrometeorological indices, revealed the presence of highly heterogeneous climatic conditions.

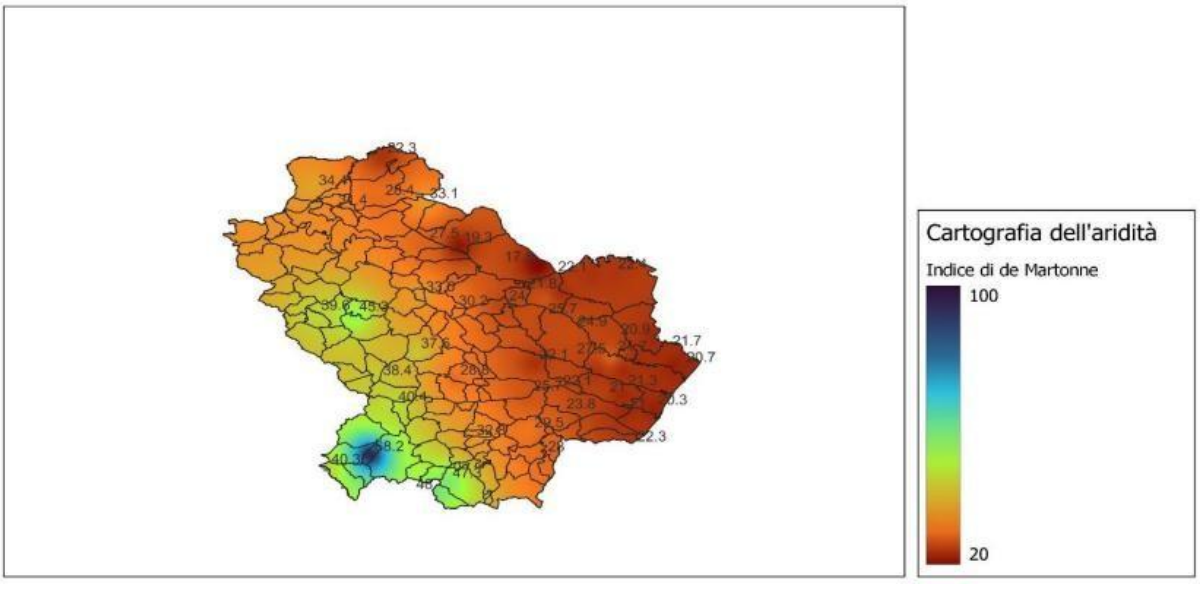
According to De Martonne's index, areas of high aridity extend from the Lavellese area to the mid-hills of Matera (700–800 meters above sea level), reaching down to the Metapontino plain (Figure II.19). Figure II.20 highlights the municipalities in the region where the De Martonne aridity index falls below 25.

Table II.18 - De Martonne's Aridity Index

IDM Values	**Types of Bioclimates**	**Description**
IDM < 10	Arid or dry	Needs continuous irrigation
10 ≤ IDM < 20	Semidry or semiarid	Needs irrigation
20 ≤ IDM < 24	Mediterranean	Needs supplementary irrigation
24 ≤ IDM < 28	Semi-humid	Needs supplementary irrigation
28 ≤ IDM < 35	Humid	Needs occasional irrigation
35 ≤ IDM ≤ 55	Very humid	Needs infrequent irrigation
IDM > 55	Extremely humid	Water self-sufficient

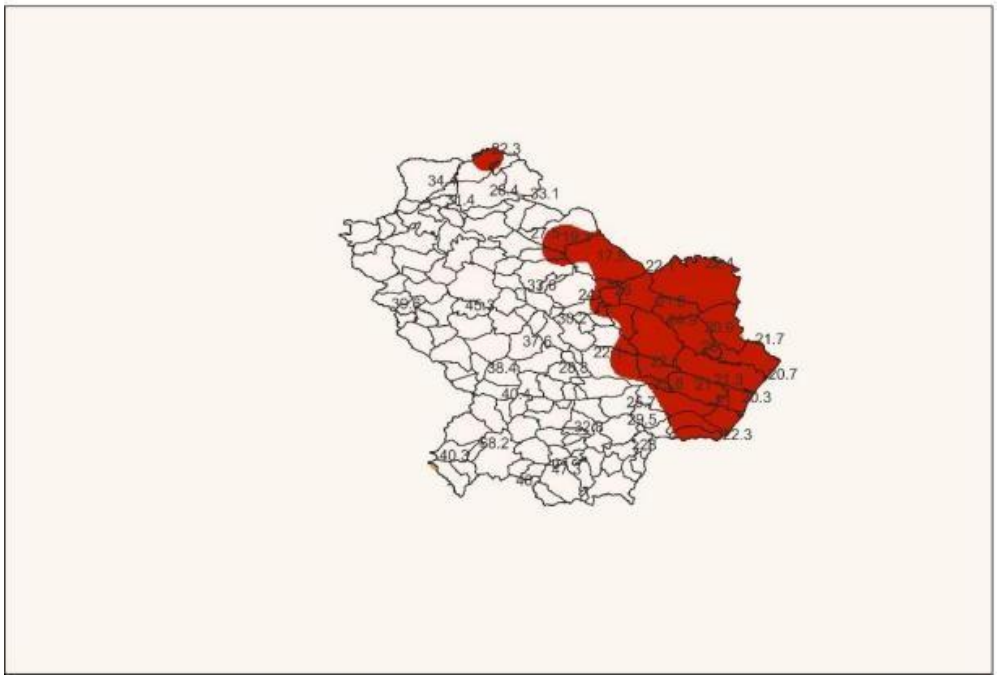
Source: Passarella et al. 2020

Figure II.19 - Martonne index map of the Basilicata Region (2000-2023)



Source: ALSIA – Lucanian Agency for Development and Innovation in Agriculture, 2024

Figure II.20 - Areas in the Basilicata Region with a De Martonne index < 25 (semi-arid and part of the sub-humid classes)



Source: ALSIA – Lucanian Agency for Development and Innovation in Agriculture, 2024

According to the SPI index, abnormal weather patterns are becoming increasingly frequent, with 'very dry' and 'extremely dry' conditions observed in the Metapontino area, the interior of the Materano, and the upper Bradano valley.

Based on calculations by the Lucanian Agrometeorological Service regarding the drought recorded in the months preceding February 2020 (Scalcione et al., 2020), the areas most affected during the winter were the Metapontino and the Alta Collina (Table II.20).

Reinforcing the frequency of such events, Table II.19 also reports the number of cases with SPI values below -1 — classified as 'drought' and 'moderate drought' — for the period 1961–2020.

As will be further explored in Chapter 3, based on interviews with local stakeholders, the mountainous area of Matera appears to be experiencing a trend toward more intense and prolonged drought events.

Integrated water resource management will be a matter of concern for this area in the coming years.

Table II.19 - SPI index classification

SPI	**CLASSI**
> 2,0	Extremely wet

da 1,5 a 1,99	Very wet
da 1,0 a 1,49	Moderately wet
da 0,99 a -0,99	Near normal
da -1,0 a -1,49	Moderately dry
da -1,5 a -1,99	Very dry
< -2,0	Extremely dry

Source: McKee et al., 1993

Table II.20 - Standardized precipitation index (SPI) calculated for periods prior to February 2020

Stagione/mese	Metapontino		Bradanica		Alta collina		Tirrenica
	Metaponto	Policoro	Matera	Lavello	Melfi	Villa D'Agri	Nemoli
Febbraio	-0,91	-1,02	-0,09	-0,61	-0,79	-1,46	-0,90
Inverno	-2,10	-2,36	-1,20	-1,48	-2,03	-1,62	-0,47
Autunno inverno	-1,29	-0,61	-0,40	-1,68	-1,73	-1,03	-0,60
12 mesi	-0,50	-0,50	0,32	-0,81	-0,66	-1,76	-0,54
24 mesi	0,36	0,14	1,01	0,43	0,55	-1,31	-0,46

Source: Scalcione et al. 2020

Agriculture is widely recognized as the largest consumer of global water resources, accounting for approximately 70% of total freshwater withdrawals to irrigate around one-quarter of the world's cropland. However, the combined pressures of climate change and population growth are leading to an increasingly critical scarcity of water for agricultural production.

The agricultural and industrial sectors are the largest consumers of water, typically drawing it from underground sources, lakes, and rivers (Borsato et al., 2020). Falkenmark (2013) highlighted that water scarcity presents significant risks to agriculture, a sector that relies heavily on adequate water supply for irrigation. Crop production and food security are directly linked to water availability (Assouline et al., 2015). When water becomes scarce, plants experience stress, which can trigger environmental issues such as increased soil erosion and salt accumulation (Seleiman et al., 2021). The growing challenges of climate change, land degradation, and population growth further underscore the urgent need for sustainable water management strategies in agriculture.

In the Montagna Materana, disparities in access to irrigation are stark, as shown in Table 3.21. In municipalities like Stigliano and Craco, many farms rely on external surface water sources, such as irrigation consortia and public infrastructure (87 and 113 farms, respectively). In Stigliano, 16 farms also draw from private groundwater wells, indicating a more diversified and integrated supply strategy.

By contrast, municipalities such as Oliveto Lucano, Cirigliano, and Gorgoglione report no or minimal irrigation infrastructure, suggesting a mix of marginal agricultural activity, logistical barriers, and underinvestment in water management systems. This lack of irrigation access further constrains productivity and adaptation capacity.

Table II.21 - Sources of Irrigation Water by Municipality – Matera Mountain (2020)

Fonte di approvvigionamento acque irrigue	Acque sotterranee all'interno o nelle vicinanze dell'azienda	Acque superficiali all'interno dell'azienda (bacini naturali ed artificiali)	Acque superficiali al di fuori dell'azienda (laghi, fiumi o corsi d'acqua)	Acquedotto, consorzio di irrigazione e bonifica o altro ente irriguo	Altra fonte	Tutte le voci
Territorio						
Accettura	8			0	0	8
Aliano	16	0		15	0	32
Cirigliano	0			0		1
Craco	1			113	0	114
Gorgoglione	1	0	0	1	0	1
Oliveto Lucano	0					0
San Mauro Forte	7	0		0	6	13
Stigliano	16	0		87	4	107

Source: Istat Census, 2020