Harvesting well-being: An exploration of community considerations in farming decisions across diverse social-ecological contexts

by

Jean Ribert Francois

B.S., Université d'État d'Haïti, 2012
M.S., University of Florida, 2019

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Geography and Geospatial Sciences
College of Arts and Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2025

Abstract

The historical development of agriculture in the United States has been extensively studied and well-documented in the literature. Similarly, research has thoroughly established the impacts of the U.S. agricultural sector – home to some of the most advanced farming systems in the world – on both the environment and human well-being. For example, numerous studies have explored the connections between agriculture and community well-being over the past century, often guided by the influential Goldschmidt hypothesis, which suggests that the shift toward large-scale farming operations is associated with substantial sustainability challenges for individuals and communities. These well-established negative consequences are often the result of a complex interplay of various factors and circumstances inherent in the organization, structure, and management of modern agricultural systems. Addressing these challenges requires data-driven research to inform and support potential policies and interventions to mitigate the multiple community concerns that arise from human management practices.

In three specific studies, this dissertation examines the interactions between agricultural systems, farmer decision-making, and community well-being, emphasizing the extent to which and how community concerns are considered in farming decisions across different agricultural contexts in the U.S. Study 1 investigates, through spatial analysis and descriptive statistics of county-level data from 2010 to 2019, how well-being varies across communities that differ in their levels of crop diversity and productivity, and the intensity levels of farming systems. Findings suggest that community well-being is generally high across most diversity–productivity categories. However, notable exceptions and variability within groups highlight the influence of contextual factors, such as social infrastructure and economic diversification, beyond agricultural indicators alone.

Next, the second study, using both interview and survey data, explores how farmers incorporate community concerns into their decisions across diverse contexts of crop diversification. The analysis identifies key themes such as economic contributions, community health, education, and community care that farmers consider when making agricultural decisions while also noting misalignment between awareness of community impacts of farming and action to include community considerations in decision-making. Lastly, study 3 investigates the core attributes of farmers and contextual factors that shape the inclusion of community considerations in farming decisions. Through modeling techniques, the analysis emphasizes the role of awareness, community values, coordination, and structural challenges in influencing individual decision-making related to considering community well-being in farming decisions. These studies, taken together, have implications for advancing the inclusion of community considerations in farming decisions, which is important for the sustainable relationship between agricultural systems and communities.

Harvesting well-being: An exploration of community considerations in farming decisions across diverse social-ecological contexts

by

Jean Ribert Francois

B.S., Université d'État d'Haïti, 2012
M.S., University of Florida, 2019

A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Geography and Geospatial Sciences
College of Arts and Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2025

Approved by:

Co-Major Professor
Katherine S. Nelson

Approved by:

Co-Major Professor
Matthew R. Sanderson

Copyright

Abstract

The historical development of agriculture in the United States has been extensively studied and well-documented in the literature. Similarly, research has thoroughly established the impacts of the U.S. agricultural sector – home to some of the most advanced farming systems in the world – on both the environment and human well-being. For example, numerous studies have explored the connections between agriculture and community well-being over the past century, often guided by the influential Goldschmidt hypothesis, which suggests that the shift toward large-scale farming operations is associated with substantial sustainability challenges for individuals and communities. These well-established negative consequences are often the result of a complex interplay of various factors and circumstances inherent in the organization, structure, and management of modern agricultural systems. Addressing these challenges requires data-driven research to inform and support potential policies and interventions to mitigate the multiple community concerns that arise from human management practices.

In three specific studies, this dissertation examines the interactions between agricultural systems, farmer decision-making, and community well-being, emphasizing the extent to which and how community concerns are considered in farming decisions across different agricultural contexts in the U.S. Study 1 investigates, through spatial analysis and descriptive statistics of county-level data from 2010 to 2019, how well-being varies across communities that differ in their levels of crop diversity and productivity, and the intensity levels of farming systems. Findings suggest that community well-being is generally high across most diversity–productivity categories. However, notable exceptions and variability within groups highlight the influence of contextual factors, such as social infrastructure and economic diversification, beyond agricultural indicators alone.

Next, the second study, using both interview and survey data, explores how farmers incorporate community concerns into their decisions across diverse contexts of crop diversification. The analysis identifies key themes such as economic contributions, community health, education, and community care that farmers consider when making agricultural decisions while also noting misalignment between awareness of community impacts of farming and action to include community considerations in decision-making. Lastly, study 3 investigates the core attributes of farmers and contextual factors that shape the inclusion of community considerations in farming decisions. Through modeling techniques, the analysis emphasizes the role of awareness, community values, coordination, and structural challenges in influencing individual decision-making related to considering community well-being in farming decisions. These studies, taken together, have implications for advancing the inclusion of community considerations in farming decisions, which is important for the sustainable relationship between agricultural systems and communities.

Table of Contents

List of Figures

List of Tables

Acknowledgments

This experience has been marked by moments of doubt and questioning, but also by profound joy and fulfillment. I am deeply grateful to the many individuals, groups, and institutions who have supported me, directly or indirectly, throughout this adventure. First and foremost, I extend my deepest gratitude to my supervisor, Dr. Katherine Nelson, for her exceptional mentorship, guidance, and support. Your encouragement and insights have been invaluable, and I cannot thank you enough for the impact you have had on my academic and personal growth.

I am equally grateful to my committee members, Dr. Audrey Joslin, Dr. Emily Burchfield, Dr. Matthew Sanderson, and Dr. Zak Ratajczak, for their thoughtful feedback, guidance, and contributions to this work. I appreciate the time and effort you have invested in my success. Special thanks to Dr. Sanderson who was willing to step into the role of co-advisor in the final stages of this journey.

I sincerely thank everyone in the Department of Geography and Geospatial Sciences at Kansas State University, including the faculty, staff, and students, for creating such a supportive environment. Thanks to Penny Darfler in the main office for her kindness and assistance, as well as to my officemates, Michael Madin, Denise Reyes, and Caroline Ruto, for their camaraderie and encouragement throughout my program.

A special acknowledgment goes to USDA-NIFA [Grant No. 2020-67019-31157] and North Central SARE [Agreement No. 2021-38640-34714 and Project No. GNC22-348] for funding my PhD program and research project. I am also thankful to Kansas State University, the Graduate Student Council, the College of Arts and Sciences, and the Natural Resources and Environmental Sciences Fellowship for their financial support of my professional development.

I would also like to thank Dr. Amariah Fisher, Dr. Jeremy Cowan, and Dr. Andrea Rissing for their invaluable assistance in conducting the interviews. I am equally grateful to the extension agents who guided and facilitated connections with interview participants. A heartfelt thank you goes to all the farmer participants who generously gave their time and shared their insights, making this research possible.

Thank you to my wife and daughters! You know what you mean to me. Thanks to all my relatives, parents, siblings, and all my friends. To those I may not have had the chance to thank personally, please accept this acknowledgment as a testament to my deepest gratitude.

Declaration of generative AI

During the preparation of the dissertation, I incorporated suggestions from Microsoft Word and Grammarly to address spelling, grammar, and tone and occasionally used ChatGPT to improve the readability of specific sentences. The content was reviewed and edited as needed.

Chapter 1 - Introduction

For centuries, agriculture has been a classic example of human-nature interactions involving the management of natural resources to ensure human survival. It supplies society with essential goods such as food, forage, fiber, bioenergy, and pharmaceuticals (Power, 2010). However, these benefits come at the expense of significant transformations of the Earth's surface (Dale et al., 2013), including large-scale deforestation, soil degradation, water scarcity, and alterations of natural habitats to create spaces for farming activities.

There is growing awareness of the costs of agricultural practices, which increasingly threaten both ecosystems and communities (Bentley Brymer et al., 2020; Burchfield et al., 2022; Jackson, 2008; Meredith et al., 2021). For example, agriculture, alongside food production and deforestation, is recognized as a major contributor to climate change (Intergovernmental Panel on Climate Change, 2022). Although complex, pursuing the sustainability of agricultural systems and communities is, therefore, a critical endeavor for stakeholders, including farmers, policymakers, researchers, communities, and all individuals connected to the agri-food industry. The present study draws on the agriculture–community interface to examine the inclusion of community considerations (ICC) in agricultural management processes, which informs innovative ways to build more sustainable and healthy relationships between agricultural systems and communities.

1.1 Research background and context

In 1990, the U.S. Congress defined sustainable agriculture as an integrated approach to plant and animal production practices, tailored to specific locations, that aims to achieve the following long-term objectives: "A) satisfy human food and fiber needs; B) enhance environmental quality and the natural resource base upon which the agriculture economy depends; C) make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; D) sustain the economic viability of farm operations; and E) enhance the quality of life for farmers and society as a whole" (Congress.gov, 1990, p. 3705). After three decades, although U.S. farms can be proud of their achievements in terms of productivity and operational efficiency within their production systems, they continue to play a substantial role in contributing to global greenhouse gas emissions, degradation of natural resources, biodiversity decline, and public health issues (National Research Council, 2010; Reganold et al., 2011).

Recent studies assessing the social and environmental performance of U.S. agriculture have highlighted challenges on multiple fronts. For instance, the prevalence of large monocultural fields across agricultural landscapes has significant implications for ecosystem health, including reduced biodiversity, soil degradation, and increased vulnerability to pests and diseases (Bigelow & Borchers, 2017; Dainese et al., 2019; Hunt et al., 2019; Leitschuh et al., 2022). The rate at which U.S. agriculture has simplified is notable: in less than three generations, the proportion of counties reporting the cultivation of more than ten crops has declined dramatically from 88% in 1940 to a mere 2% in 2017 (Crossley et al., 2021). Moreover, there are challenges pertaining to the well-being of people and communities who live and work across these agriculture-modified landscapes (Bentley Brymer et al., 2020; Meredith et al., 2021). For example, Burchfield et al. (2022) demonstrate that U.S. farm operators are systematically incurring losses due to increasing input costs, fluctuating production values, and rising land rents. Bailey et al. (2021) examined rural communities in Alabama and found that concentrated and absentee ownership of timberland was negatively associated with several community well-being indicators, such as education, unemployment, and food security.

Tensions between agriculture and communities have been around for decades. These tensions persist as the structure and function of farms continue to change over the years, with shifts towards fewer and larger, more industrialized operations and technological advancements reshaping traditional farming practices. Early in the second half of the last century, Goldschmidt (1946) initiated a new line of research that brought attention to these conflicts within agricultural communities. They hypothesized that the structural transformation of agricultural systems—marked by a shift towards fewer and larger farms—negatively affects the quality of life of communities. This hypothesis has triggered significant debates within academic, policy, and advocacy circles (Lobao & Stofferahn, 2008). For example, studies testing Goldschmidt's hypothesis have produced varied results, with some supporting, others refuting, and some offering mixed conclusions (Bailey et al., 2021; Foltz & Zeuli, 2005; Jackson-Smith & Gillespie, 2005; Lyson et al., 2001; Park & Deller, 2021). These debates have also influenced state-level legislation, particularly corporate farming laws in the Midwest and Great Plains states, designed to protect family farming and rural communities, though these laws have faced challenges from agribusiness interests (Lyson & Welsh, 2005). Keeping these debates active is critical for highlighting the need to prioritize human well-being in agricultural practices, as achieving sustainability in farming systems will necessitate transformative changes in multiple areas, including markets, policies, and science (Reganold et al., 2011).

To date, science has made significant progress in understanding the outcomes of various agricultural management practices, though discrepancies in research focus persist (Bonfanti et al., 2023; Johnston et al., 2015; National Research Council, 2010; Sainju, 2018). Certain outcomes, such as productivity and biodiversity, along with their interactions, have been studied more extensively than others (Meredith et al., 2021). For example, agricultural management research often focuses on the relationship between farming practices and ecological processes to understand biodiversity and productivity outcomes (Meredith et al., 2021). Meanwhile, social scientists have traditionally concentrated on the broader socioeconomic impacts of farming systems (Bailey et al., 2021; Besser et al., 2017; Park & Deller, 2021). As a result, there remains a need for research that addresses the interconnectedness and functional associations between different elements of farming systems and other dimensions of human life (National Research Council, 2010). Specifically, existing literature lacks a comprehensive understanding of how diversity–productivity conditions within agricultural systems relate to human well-being. Moreover, several studies have called for more research on management practices that integrate community well-being (CWB) alongside production and environmental goals (Lyons et al., 2016; National Research Council, 2010; Reganold et al., 2011). If these research gaps are not addressed, critical interactions between agricultural practices, ecological processes, and social dynamics may be overlooked – interactions that have significant implications for the sustainability of farming systems and communities.

1.2 Research objectives and research questions

The overarching goal of this dissertation is to improve understanding of the interactions between cropping systems' diversity, crop productivity, and management practices with the well-being of agricultural communities. Shaped by human management, it is increasingly accepted that modern farming has well-established negative impacts on social-ecological systems. Therefore, solutions to these human-created problems must come from humans themselves (Sumner, 2005). Intentional management practices that consider the broader community landscape of the farming operation are an important starting point for tackling many of the community issues attributed to agricultural systems (Rosburg & Grebitus, 2021). To advance the inclusion of community considerations in the management processes of agricultural systems, the study addresses the following research questions and objectives.

First, the study examines the interaction of CWB with distinct levels of diversity and productivity in agricultural systems and production systems with different farming intensity levels. This section addresses two specific research questions: (1) How does community well-being vary across the intersection of agricultural diversification and levels of crop production? (2) How does the variation in community well-being change across both diversity–productivity characteristics and farming intensity levels?

Second, the dissertation examines farmers' perspectives regarding community considerations in on-farm decision-making processes across two distinct contexts of crop diversification. Specifically, this section of the study seeks to determine how farmers within diversifying and simplifying county contexts perceive the community impacts of their management practices and elucidate scenarios in which farmers include community concerns in their farming decisions.

Third, the dissertation explores farmers' attributes and contexts that either enable or constrain the incorporation of community considerations in farming decisions. Two specific research questions were addressed: 1) What attributes of crop producers (knowledge and norms) are important for explaining the inclusion of community considerations in on-farm management decisions? and 2) How do landscape characteristics and regional contexts influence the relationships between crop producer attributes and the inclusion of community considerations (ICC) in farming decisions?

1.3 Research significance

This research has several important implications. First, it provides a description of the linkages between global sustainability priorities, such as crop diversity, productivity, and community well-being. Studies in the main literature connecting agriculture with community well-being overlooks these potential linkages and primarily focuses on exploring the connections between CWB indicators and structural changes in farming systems in terms of scale, organization, and market integration (Arbuckle & Kast, 2007; Barnes & Blevins, 2010; Mhadhbi & Napoléone, 2022). It also addresses multiple calls from scholars and practitioners for research into the inclusion of community well-being in agricultural management decisions (Francois et al., 2024; Francois & Nelson, 2024; Lyons et al., 2016; National Research Council, 2010).

Second, the findings of the research offer policy implications for the sustainability of agricultural systems and communities. The examination of the inclusion of community considerations in farming decisions provides actionable insights to policymakers and other agricultural stakeholders by knowing the range of community concerns accounted for in management decisions, the key attributes of farmers, and the contexts that support this integration. Such knowledge can inform the development of programs and interventions that encourage more sustainable farming practices, ultimately contributing to improved quality of life of people and communities and the long-term sustainability of agricultural landscapes.

1.4 The dissertation outlined

This dissertation is organized into six chapters. Following this introductory chapter, Chapter 2 offers an account of the literature broadly centered on the relationship between agricultural systems, human decision-making, and community well-being. It also introduces the theoretical frameworks that guide the research.

Chapter 3, published in *Sustainability*, explores the linkages between crop diversity—productivity characteristics, intensity levels of farming systems, and the well-being of agricultural communities. This chapter provides a baseline analysis of CWB across regions, highlighting how different contexts of crop diversification and farming intensity are associated with well-being outcomes. This initial analysis sets the stage for subsequent chapters, which focus on investigating the inclusion of CWB concerns into on-farm decision-making.

Does community well-being matter in the on-farm management of farming systems? Chapter 4 addresses this question by investigating farmers' perspectives on integrating community considerations in their decision-making. This chapter focuses on high-yielding areas within two distinct crop diversification contexts. Specifically, it elucidates some scenarios where farmers include community concerns in their farming decisions.

Building on this, Chapter 5 explores which farmer attributes and contextual factors, including diversity–productivity characteristics of agricultural systems, support the broader inclusion of community well-being in farming decisions. Using survey data from crop producers across the U.S., this chapter employs regression modeling to examine the key attributes that drive the inclusion of community considerations, with or without socioeconomic controls and contextual influences.

Finally, Chapter 6 synthesizes the findings from the previous chapters, providing a summary of the main conclusions and policy implications. It also discusses potential avenues for future research and the broader implications for agricultural sustainability and community well-being.

Chapter 2 - Literature Review

This dissertation focuses on the agriculture–community interface, emphasizing the interactions between agricultural systems, human decision-making, and social-ecological outcomes. Unlike studies that seek to provide evidence of the community consequences of farming – an area of considerable debate in the literature – this research explores the extent to which and the ways in which community well-being issues are integrated into farm management decisions across different contexts of crop diversification and productivity. The literature review is organized into several thematic sections to provide a comprehensive understanding of the changing dynamics within agriculture. It addresses critical questions about changes in farming systems and landscapes, including where we currently stand, how we arrived at this point, what these changes mean for communities, and whether there are viable pathways forward. The review also identifies gaps in the existing literature that this dissertation aims to address and outlines the conceptual framework guiding the research.

2.1 Understanding U.S. Farming Systems and Landscape Changes

2.1.1 Structure and dynamics of U.S. farming systems

Hallam (1993) conceptualized the structure of agriculture in terms of the number and size of farming operations, resource ownership and control, and what the farming profession has required, including management choice, use of technology, and money. Throughout the 20th century and early in the 21st century, the structure of U.S. agriculture underwent major changes, including the decline in the number of farms and farm population, the increase in farm size, and the gradual switch from family to hired labor (Hemond et al., 2023; Lobao & Meyer, 2001). Early in the 21st century, less than two percent of the U.S. population engaged in agriculture compared to one-third of individuals who lived on farms in the early decades of the 20th century

(Lobao & Meyer, 2001). While the number of farms decreased steadily from over 6 million in the early 1900s to about 2 million in the early 2000s, the average farm size increased gradually from around 150 acres to over four hundred acres (Burchfield et al., 2022; MacDonald, 2020).

Beyond changes in numbers and sizes of operations, the farming sector has undergone substantial transformations, particularly in farmland ownership patterns, access to resources, technological adoption and use, choices of management, and labor dynamics (Baines, 2017; Hemond et al., 2023; Lobao & Meyer, 2001). These changes center around the core elements that form the foundation of farm structure, such as land, labor, and capital (Hallam, 1993). In particular, who owns the land for farming activities has been subject to major shifts over the years, primarily through operator turnover and land consolidation (Ashwood et al., 2022; Hemond et al., 2023). For example, in a recent study examining farmland in California, Hemond et al. (2023) indicated an operator turnover of approximately 62.4% of parcels between 2002 and 2018. These shifts, however, are not only about switching operators but are reflective of broader agricultural structural changes, which increasingly favor larger farms over smaller operations and are often entrenched in deep inequalities (Hemond et al., 2023; MacDonald, 2020; Ren et al., 2019). For example, despite the increasing reliance on land tenancy in the U.S. agricultural sector, over 80% of rented land is owned by “non-operating landlords (NOLs)” who do not farm themselves (Burchfield et al., 2022, p. 13; Carolan, 2005). In fact, half of NOLs-owned land, accounting for 40% of all U.S. farmland, was acquired through inheritance or gifts (Bigelow et al., 2016; Burchfield et al., 2022).

Over the past century, land-use practices have followed a clear trend toward the intensification of agricultural production (Godfray et al., 2010; Millennium Ecosystem Assessment, 2005). This has facilitated the development of industrial agriculture by increasing the scale of production through the intensive use of land, mechanization of farming operations, the growing reliance on chemical inputs such as fertilizers and pesticides, the adoption of high-yield crop varieties, irrigation systems, and advanced biotechnologies (Gray & Gibson, 2013; Hunt et al., 2019; Leitschuh et al., 2022; Ranjha et al., 2022; Wilson, 2001; Zhang et al., 2007). Monocultural production of annual crops has become the defining feature of many agricultural landscapes. For example, Leitschuh et al. (2022) described the scene of rural Midwestern United States as dominated by vast monocultural fields of corn and soybeans, creating a homogeneous agricultural landscape across a region where over 80% of the land is classified as farmland. These patterns reflect the broader trajectory of U.S. agriculture over the past century, marked by the simplification of agricultural production, which facilitates industrialization and reshapes farming practices and the landscapes and communities they intersect with.

2.1.2 Some explanations of patterns found in agricultural landscapes

Across the agri-food scholarship, many researchers have employed the term ‘productivism’ to capture these transformational processes of agricultural systems, emphasizing the maximization of production and the increase in productivity (Almstedt, 2013; Beacham et al., 2023; Evans et al., 2002; Lowe et al., 1993; Wilson, 2001). Wilson (2001) identified seven interrelated dimensions that have been used to conceptualize productivism. This production paradigm has its own ideology, actors, food regimes, method of agricultural production, agricultural policies, farming techniques, and environmental impacts (Wilson, 2001). Wilson provides a detailed description of these dimensions, but briefly, under this regime, agriculture occupies a central position in society where farmers are perceived as the best protectors of the rural space, prioritizes corporations with strong institutional networks, involves mass consumption of commodities, subject to market competition and the state intervention, makes extensive use of mechanization and chemicals while diminishing human labor. In terms of environmental impacts, this regime shows increasing incompatibility with environmental conservation. Trauger (2001) made it simpler to grasp the development of productivism with three key features such as intensification, concentration, and specialization. It is worth noting that these broad conceptualizations of productivism are skewed toward countries in the global North dominated by the United States, the United Kingdom, and Europe (Wilson & Rigg, 2003). However, although the literature has described some advantages of this model, it has not been free from criticism.

Troughton (1986) stated that a major criticism of productivism is that the success measured ignores largely the cost in both human and environmental terms. The model results in a range of impacts, including economic (e.g., unemployment of farm families, income inequality), social (e.g., deterioration of civism, reduced enjoyment of property, poorer community services), and environmental (e.g., water depletion, air quality) issues (Lobao & Stofferahn, 2008; Troughton, 1986). Other criticisms concern the lack of resilience of farming systems that focus on single-crop specialization, a narrow emphasis that does not capture other crucial elements of farming, and global inequality with uneven processes of development (Evans et al., 2002; Woods, 2007, 2012).

With the emergence of new opportunities within the agricultural sector, many scholars have proposed new conceptual frameworks to capture these farming dynamics. One such concept is post-productivism, which seeks to embrace new patterns found in agricultural landscapes with the reorientation of agricultural production towards a wide diversity of goals beyond food production (Trauger, 2001; Wilson, 2001; Wilson & Rigg, 2003). Wilson (2001) contrasts post-productivism with productivism using the same dimensions, viewing it as the antithesis of productivism in terms of ideology, actors, food regimes, agricultural production, policies, techniques, and concerns for the environment. Evans et al. (2002) also see post-productivism as a transition from quantity to quality in agricultural output, highlighting on-farm diversification and off-farm employment (pluri-activity), adherence to sustainable practices, and diverse production patterns, and regulation. However, the utility and applicability of this framework have faced substantial criticism. While Mather et al. (2006) find the term “post-productivism” appropriate, Wilson (2001) and Evans et al. (2002) argue that it is limited in its ability to capture the realities of rural communities not only in the global North but also in the South.

Evans et al. (2002) argue that the concept of post-productivism is invalid and should be abandoned. They point to the widespread and often uncritical use of the term in agricultural and rural studies despite debates in human geography about rejecting dualistic thinking. Evans and colleagues (2002) specifically challenge five key features commonly associated with post-productivism – regulation, production dispersion, sustainability, quality of food, and pluri-activity – arguing that these features are not uniquely tied to post-productivism. Instead, they caution against using these terms to theorize agricultural change under this framework. The authors propose that future progress in agricultural research can be better achieved by examining deeper processes of agricultural transformation through established theoretical perspectives in human geography, such as regulation theory and actor-network theory. They also advocate for the concept of ecological modernization, which “retains the centrality of production whilst recognizing the fluidity of production relations and changes in the nature of markets” (Evans et al., 2002, p. 23).

Moreover, Wilson (2001) suggests that the term ‘multifunctional agricultural regime’ might better capture transformations in modern agricultural and rural society than the term ‘post-productivism.’ Wilson and Rigg (2003) highlight the lack of consensus about the key indicators used to define post-productivism. These indicators encompass policy changes, quality of food production through organic farming, counter-urbanization, the inclusion of formerly marginalized actors, viewing the countryside as a space of consumption rather than simply a place of agricultural production, and on-farm diversification (Wilson & Rigg, 2003). The authors challenge the uniqueness of these indicators, suggesting that they could also be applied to productivist models. This raises questions about the clarity and appropriateness of post-productivism as a conceptual framework for understanding the evolution of agricultural practices.

2.1.3 Driving forces of the trajectories of agricultural landscapes

How farming systems arrived at their current state is a legitimate question to ponder. A number of approaches have been used to explain the evolution of agriculture in advanced societies. For example, Turner et al. (2020) adopted a historical approach, focusing on the major demographic changes that have occurred over the last two centuries to explain land use change. The world population crossed the bar of 1 billion people at the beginning of the 19th century (Bongaarts, 2009) and now exceeds 8 billion. Agriculture has faced the challenge of feeding this rapidly growing population, and addressing society's food-related concerns would not have been possible without profound transformations of global agricultural landscapes (Alexandratos & Bruinsma, 2012; Godfray et al., 2010; Schneider et al., 2022). Human innovation has undeniably boosted global crop production substantially, well beyond the natural constraints of agriculture (Foley et al., 2011; Matson et al., 1997).

Lobao and Meyer (2001) highlighted some macro-level theoretical explanations for agricultural change, particularly focusing on neoclassical economic theories and political economy perspectives. From a neoclassical economic perspective, agricultural change is seen as a natural outcome of market-driven forces, technological advancements, and the pursuit of efficiency (Halloran & Archer, 2008; Lobao & Meyer, 2001; Lyson & Gillespie, 2010). In other words, structural change is explained through the linkages between market structure and production structure (Lyson & Gillespie, 2010). In this view, as industries and sectors advance, agriculture also evolves, driven by the adoption of mechanization, chemical inputs, and innovations that enhance productivity. Farms become larger, more specialized, and increasingly capital-intensive (Burton, 2004; Lobao & Meyer, 2001). This theoretical approach suggests that these changes reflect farmers' rational responses to economic pressures, such as fluctuating commodity prices, demand for higher yields, and competition in global markets (Lobao & Meyer, 2001).

On the other hand, the political economy perspective provides a more critical view of agricultural change (Lobao & Meyer, 2001; Stone, 2001). This approach emphasizes the role of power, class, and capital in shaping the structure of farming systems (Baraibar Norberg, 2020; Habibi, 2022; Lobao & Meyer, 2001). According to this perspective, agricultural transitions are not merely the result of market dynamics but are deeply influenced by policies, institutional frameworks, and the concentration of capital in fewer hands (de Boon et al., 2022; Gliessman, 2018). For instance, government subsidies, trade policies, and the growing influence of agribusiness corporations have facilitated the consolidation of farmland and pushed smallholder farmers out of the market (Baraibar Norberg, 2020; Lobao & Meyer, 2001). This view argues that these shifts disproportionately benefit large-scale corporate farms while contributing to rural depopulation, income inequality, and the marginalization of small-scale farmers (Baraibar Norberg, 2020; Lobao & Meyer, 2001).

Some other explanations, mainly rooted in rural geography, consider agricultural transformation as part of the rural restructuring process. The term restructuring draws attention to the qualitative transformation that is happening in a social organization or the transition from one form of social organization to another (Hoggart & Paniagua, 2001). Woods (2009a, p. 429) addressed rural restructuring as "the reshaping of social and economic structures in rural areas during the late twentieth century and early twenty-first century produced by various, interconnected processes of change including the declining economic significance of agriculture, the rise of the service sector, urban to rural migration, and so on." Further, Woods (2010) noted that the theoretical understanding of rural as a space of production and exploitation gives rise to particular forms of social and spatial organizations, landscapes and settlement patterns, and economic and political systems. Rural production and exploitation systems that were basically organized around domestic survival were limited to responding to the increasing human needs without a profound restructuring of the rural space. The latter has been, therefore, subject to multiple transformations, including changes in agriculture (the emblem of rurality), changes in other traditional rural economic activities, such as forestry, fishing, mining, and quarrying, changes in social and demographic systems (e.g., population decline, older communities), transformations in community services, changes in rural environments, and all other globalization processes (Woods, 2011).

Clapp (2015) offers a general framework that summarizes major discussions regarding the transformation of global agricultural systems. They identify four major forces – industrialization, globalization, corporatization, and financialization – that have influenced patterns in the global food regime and contributed to its evolution over time. Industrialization, globalization, and corporatization have already been discussed one way or another in earlier paragraphs; it is important to pause and focus on financialization. While financialization itself is not new, recent developments have introduced complex investment dynamics into agriculture (Ouma, 2020).

Institutional investors are increasingly viewing farmland as a financial asset, which further complicates traditional ownership structures and distancing agricultural practices from local farmers and communities (Clapp, 2015; Fairbairn, 2014, 2020; Sippel, 2023). Birch (2015, p. 122) refers to assetization as “the transformation of things into resources which generate income without a sale.” Current estimates of farmland investments seem to challenge earlier theories about the inherent incompatibilities between agriculture and capital production despite ongoing difficulties in integrating farmland into the financialized market (Lobao & Meyer, 2001; Mann & Dickinson, 1978; Sippel, 2023). Approximately, US$35 billion was allocated into farmland investment funds globally by institutional investors in 2018 (Ouma, 2020, p. 48).

Both who and what owns the land become new puzzles for research on financialization, corporate organization, and land ownership (Ashwood et al., 2022). Financialization involves multiple land acquisition strategies ranging from direct purchases and takeovers to complex financial instruments, such as speculative land acquisition and the formation of landbanks (Collins, 2019; Gasic, 2024; Pritchard et al., 2023). These debates are ongoing, and if interested in a larger overview, readers may want to explore Ashwood et al. (2022), Clapp (2014, 2015), Collins (2019), Duncan et al. (2022), Fairbairn (2014, 2015, 2020), Gasic (2024), Isakson (2014), Magnan and Sunley (2017), Pritchard et al. (2023), and Sippel (2023). These dynamics are reported here due to their importance in addressing basic questions of who benefits and who loses from these processes (Duncan et al., 2022), as they reshape organizational structures, production decisions, and management practices in ways that significantly affect individual farmers, local communities, and the broader patterns of agricultural landscapes.

2.2 Community well-being in agricultural landscapes

The first section of this chapter provided context on how agricultural landscapes have been transformed and shaped by several processes, including industrialization, globalization, corporatization, and financialization. This section explores what these changes mean for local communities, particularly in terms of their well-being.

2.2.1 Definitions

One of the challenges in community-based studies is the variety of meanings and definitions associated with key concepts. Terms like 'rural,' 'community,' and 'well-being' are widely used but lack unanimous agreement on their definitions. Each of these words carries complex, abstract meanings, often shaped by the context in which they are used.

First, defining 'rural' has been particularly complex and has remained a subject of interest for decades (Fischer et al., 2024; Nelson et al., 2021). Michael Woods (2009a, 2009b, 2010, 2011) extensively addresses some of the more general concerns associated with the term 'rural' in the rural geography literature. Traditionally, rural areas have been represented as agricultural spaces, but Woods (2009a) emphasizes the discursive nature of the concept, indicating that 'rural' goes beyond these traditional representations. In exploring theoretical perspectives, Woods (2009b) identifies three approaches to conceptualizing rurality as part of the evolution of rural geography from the 1970s to the 1990s. The functional approach focuses on the functions of rural spaces, such as agriculture and resource-based activities. The political-economic perspective examines how broader economic, social, and political processes shape rural areas. Finally, the social constructionist perspective underscores how rurality is shaped by social and cultural factors, recognizing that perceptions of rural life vary depending on context. This last perspective has faced criticism for neglecting the tangible realities of rural life, which have significant implications for the people who live, work, and engage in rural areas. In more recent work, Woods (2010) refers to rurality as a ‘category of thought’ – an idea shaped by both imagination and material characteristics, such as landscapes, places, and lifestyles.

Beyond theoretical discussions about what rural means, practical concerns also arise, such as how institutions and policies account for rural spaces or the populations that identify themselves as rural residents (Woods, 2011). Definitions of ‘rural’ often use socio-spatial characteristics like population size or indices of rurality derived from combining a range of statistics, but they also incorporate socio-cultural attributes, distinguishing rural areas from urban ones based on resident behaviors, values, and community characteristics (Woods, 2009a, 2011).

Second, with respect to ‘community,’ the term is diversely conceptualized. Theodori (2005) distinguishes between ‘territory-free’ and ‘territory-based’ types of community. Territory-free communities are social groupings that transcend geography, such as religious, academic, or online communities. In contrast, territory-based communities are geographically defined and are often the focus of research and policy, as they are organized around specific geographic units. In addition, our contemporary world is experiencing the rise of online and imaginative communities, which have their own virtual realities or characteristics (Atkinson et al., 2020). While territory-based communities have been a primary focus in studies of rural areas, it is important to consider how these communities intersect with non-geographic forms of community. Scholars like Crowley and Stainback (2019), Lobao and Stofferahn (2008), Lyson et al. (2001), Peters (2019), and Theodori (2001) have all operationalized the notion of community as occurring in specific locations, emphasizing a geographic boundary and where the life of individuals is organized through localized institutions. For example, Lyson et al. (2001) describe community as a place where residents are connected through various institutions, organizations, and social cohesion.

Third, ‘well-being’ is a broad and often debated concept in both social science and philosophy. There is no universally accepted definition of well-being, and scholars approach it from diverse angles. Park and Deller (2021) note that well-being is often used interchangeably with terms like happiness and quality of life. Joshanloo et al. (2019) employed prosperity, societal progress, and development at a broader scale in lieu of well-being. As discussed in more depth in the next section, these varying interpretations reflect the dynamic and evolving nature of well-being, which can differ across time and space.

2.2.2 Conceptualizations and operationalizations of well-being over time

The conceptualization and operationalization of well-being have evolved significantly over the past century. Given the diverse pathways for understanding well-being, the literature is rich in conceptual frameworks and methodological approaches for assessing and evaluating the concept. Peters (2019) traces well-being research back to the 1920s, when the primary focus was on understanding the living conditions of families, either in urban settings or in poor agricultural zones. Following World War II, scholarly interest in well-being grew, especially within community-based studies that linked the socio-economic well-being of communities to the concentration of economic power at the local level (Crowley & Stainback, 2019; Goldschmidt, 1946, 1978; Lyson et al., 2001; Mills & Ulmer, 1946). These early studies emphasized the role of civil society, particularly the middle class, in promoting community health and well-being (Crowley & Stainback, 2019; Goldschmidt, 1946, 1978; Lyson et al., 2001; Mills & Ulmer, 1946).

By the 1990s, there was a renewed interest in well-being studies, driven by the re-emergence of the civic community perspective (Crowley & Stainback, 2019). Around the same time, this research was accelerated with the adhesion of many researchers, communities, global governments, and organizations to the sustainability movement that emerged in the late 1980s (Harrington, 2016). In many sustainability efforts, human well-being holds a central position (Harrington, 2016). This quest for sustainability has stimulated new focuses on well-being, and researchers have investigated the state of well-being in a broad range of contexts to include not only economic factors but also environmental, social, and cultural dimensions.

Well-being is typically conceptualized on two levels with respect to scales and variable selection (Peters, 2019). First, the concept can be operationalized across multiple scales, from individual well-being to community, regional, national, and even global levels. Secondly, well-being can be approached from both subjective and objective perspectives. Subjective measures are commonly used to assess individual perceptions of quality of life or life satisfaction. In contrast, objective measures focus on material and social aspects of well-being, often using aggregate data to evaluate broader conditions (Park & Deller, 2021; Theodori, 2001). Peters (2019) noted an increase in the combination of the two perspectives to get a more comprehensive picture of well-being. For instance, Joshanloo et al. (2019) use a range of both subjective and objective indicators to evaluate national prosperity and quality of life, including factors such as education, health, stress, economic quality, business and natural environments, and enjoyment.

One of the key challenges in well-being research is the lack of consensus on which variables are most relevant for assessment. Traditional neoclassical economic literature often equates well-being with income, assuming that higher income levels lead to improved well-being (Henn, 2015). However, researchers have since demonstrated that the relationship between income and well-being is far from straightforward, i.e., higher income does not always result in greater happiness or life satisfaction (Bruni, 2020; Henn, 2015; Marshall, 1890; Park & Deller, 2021). Non-monetary factors – such as health, education, social connections, and environmental quality – are also important in shaping well-being, leading scholars to view well-being as a multidimensional construct (Membiela-Pollán et al., 2019).

Studies such as Barnes and Blevins (2010), Joshanloo et al. (2019), Lyson et al. (2001), Park and Deller (2021), and Ramsey and Smit (2002) have all emphasized the need for multidimensional approaches to well-being assessment. For example, Lyson et al. (2001) evaluate community well-being using both economic and non-economic indicators, such as family poverty, unemployment, fertility rates, and crime rates. Similarly, Ramsey and Smit (2002) develop a model encompassing four interrelated dimensions such as social, economic, psychological, and physical. Monetary and non-monetary considerations in well-being assessments are critical, as both influence well-being in significant ways. The literature reflects an ongoing effort to refine these assessments, recognizing that well-being is dynamic and context-dependent (Matson et al., 2016; Sung & Phillips, 2018; Wiseman & Brasher, 2008).

2.2.3 Linking community well-being with the dynamics of farming systems

Lobao and Meyer (2001) identified three major research traditions that have documented the transformation of U.S. agriculture. A first tradition, macro-level transformation research, examines broad structural changes in the agricultural sector and highlights how these structural changes have impacted the economy and social systems at large. A second tradition, household response research, explores how farm households have adapted to structural changes, particularly through strategies like diversification, off-farm employment, and shifts in family labor dynamics.

A third tradition that focuses on the community effects of farming addresses questions about whether and how agriculture supports or undermines the well-being of rural communities.

For decades, social scientists have investigated the relationship between agricultural change and community well-being, often asking whether transformations in agriculture have adversely impacted rural areas (Bailey et al., 2021; Goldschmidt, 1946, 1978; Green, 1985; Parker & Moore, 2008). A significant body of work examines how structural shifts – such as the trend toward fewer and larger farms – affect community well-being(Goldschmidt, 1946, 1978; Lyson et al., 2001; Lyson & Welsh, 2005; Park & Deller, 2021). Among the most influential lines of inquiry is the Goldschmidt hypothesis developed from a comparative study conducted in 1947. This study hypothesized that agricultural structural changes, particularly the rise of large-scale farming, negatively affect community well-being.

Goldschmidt's study compared two counties in California – Arvin, characterized by large-scale corporate farming, and Dinuba, surrounded by small-scale family-operated units. Conclusions from this study contended that the socioeconomic well-being of local communities decreased with large-scale farming. Among other things, Goldschmidt articulated the consequences of agricultural structural change using words such: "a smaller middle class, more hired workers, lower family incomes, and higher poverty. There were poorer quality schools and public services and fewer churches, civic organizations, and retail establishments" (Lobao & Stofferahn, 2008, p. 221).

Goldschmidt's (1978) study remains a classic of literature linking agricultural production to community well-being and has inspired extensive research testing the hypothesis across different regions and using different methodologies (Jackson-Smith & Gillespie, 2005; Lyson et al., 2001; Park & Deller, 2021; Tolbert et al., 1998). Lobao and Meyer (2001) identified four generations of research in this series, with Goldschmidt's seminal work constituting the first generation. The second generation primarily focused on empirically testing the relationships between farm scale and structure and community-level indicators of socio-economic well-being. Subsequent generations expanded these studies by incorporating theoretical perspectives on spatial inequality, the role of civic society, economic structure, state policies, and labor market dynamics, offering a broader understanding of how agricultural restructuring impacts rural communities (Lobao & Meyer, 2001).

However, study findings remain largely inconclusive. Some studies show support for Goldschmidt's conclusions, some show mixed results, and others even reject the hypothesis (Lobao & Stofferahn, 2008). Lobao and Stofferahn (2008) synthesized findings from 51 empirical studies on the subject, with 42 of them reporting negative community outcomes associated with large-scale farming. These detrimental outcomes of farming are felt at the level of socio-economic well-being (e.g., income levels, unemployment, and poverty), indicators of social fabric (e.g., social class and population change), and indicators of environment quality (e.g., water depletion and air quality issues). On the other hand, 22% of the studies they reviewed reported positive impacts, mainly related to economic conditions such as job creation and income growth in certain contexts.

The Goldschmidt literature is embedded within broader discussions of agricultural structural change, which refer to the profound transformations in farm numbers, sizes, and ownership patterns, as well as management choices, technology use, and labor structures (Lobao et al., 1993; Lobao & Stofferahn, 2008). The structural transformation of farming has implications for rural areas, including shifts in labor dynamics, community cohesion, and local economies (Lobao et al., 1993). In their critique, Lobao et al. (1993) argued that the Goldschmidt literature's focus on agricultural structure is too narrow, calling for a more comprehensive approach that includes broader global and rural restructuring processes.

As established earlier, Woods (2009a) supports Lobao et al.'s (1993) view by situating agricultural structural change within the broader context of rural restructuring. Woods emphasizes that these changes are not isolated but are part of global processes that have reshaped rural areas. The author addressed rural restructuring as "the reshaping of social and economic structures in rural areas during the late twentieth century and early twenty-first century produced by various, interconnected processes of change including the declining economic significance of agriculture, the rise of the service sector, urban to rural migration, and so on" (Woods, 2009a, p. 429). It is of note that much of the literature on the community effects of farming focuses on assessing how agricultural restructuring impacts community well-being and, particularly, the socio-economic conditions of communities. To gain a more complete understanding of what agricultural dynamics, as previously described, mean for the overall sustainability of communities, it is essential to explore other lines of research (e.g., agricultural management research) beyond the literature that focuses on the community impacts of agriculture (Gomiero et al., 2008; Meredith et al., 2021).

Discussions on agricultural changes and their impacts on human communities could easily fill an entire book. Authors like Bidwell and Falconer (1925), Pauling (2001), and Isett and Miller (2016) have provided more in-depth analyses on this topic, tracing the evolution of agriculture from its origins to contemporary practices. Scholarship consistently demonstrates that change is the only constant, especially for rural communities that have long been at the center of these transformations and the accompanying challenges. Today, these dynamics are manifested within the context of an increasingly changing climate, which threatens the very foundation of farming systems. This situation raises critical questions, such as: is there a way forward for rural communities? Can they adapt, survive, and thrive? There is an increasing need for scientific research that can inform policies for greater impacts (Clark & Harley, 2020). It is within this critical context that this dissertation is positioned.

2.3 Knowledge gaps informing this study

Statistics on U.S. agriculture indicate great achievements in productivity and operational efficiency (Ahearn et al., 1998; Baldos & Hertel, 2018; Wang et al., 2015). However, sustainability in agricultural systems is a complex equation that extends beyond yields and economic returns. It involves the economic viability of farm operations, the well-being of farmers and rural communities, and the ecological health of the environment (Congress.gov, 1990; National Research Council, 2010). Agricultural systems are expected to generate multiple outcomes, including agronomic, economic, and social benefits, while also minimizing ecological harm. Some of these outcomes (e.g., productivity, biodiversity, etc.), as well as their interactions (e.g., biodiversity – productivity), have been studied more thoroughly than others, particularly in agricultural management research (Francois et al., 2024; Meredith et al., 2021). The dominance of the productivist agricultural regime has contributed to this imbalance by emphasizing farming practices that improve yields and economic returns, often neglecting ecosystem preservation and community health (National Research Council, 2010; Sampson, 2018; Tilzey, 2018; Wilson, 2001). This focus has also shaped earlier funding programs and academic work, which largely followed this trajectory by emphasizing production and environmental issues, often addressing them with "Band-Aid" solutions, such as best management practices, while overlooking broader sustainability challenges (Jordan & Constance, 2008, p. 18).

However, recent evidence shows increasing attention from funding programs and researchers to the study of community well-being within the context of agricultural management practices (*see, for example, annual research grants from the Sustainable Agriculture, Research, and Education (SARE) website*) (Bentley Brymer et al., 2020; SARE, n.d.; Smith et al., 2018). While this trend is encouraging, there is still a need for more research in this area to capture more of the social dimensions of agricultural sustainability. For instance, despite growing interest in re-diversifying agricultural systems (Blesh et al., 2023; Rissing & Burchfield, 2024), gaps remain in understanding how agricultural diversity relates to community well-being. Specifically, there is limited research on the interactions between the diversity–productivity of farming systems and social outcomes, particularly in relation to CWB. For example, some studies have explored how agricultural practices and systems that encourage higher levels of diversity, such as organic and regenerative agriculture, influence selected dimensions of human well-being and quality of life, such as income, labor, and food security (Bacon et al., 2012; Brown et al., 2021; Garibaldi & Pérez-Méndez, 2019; Rasmussen et al., 2024; Shreck et al., 2006). However, these studies often focus on individual or broader national scales and provide limited insight into their impact at the community level or offer comparisons across different communities. These gaps in knowledge can limit our understanding of some critical linkages between farming practices, ecological processes, and social dynamics, which have great implications for the sustainability of farming systems and communities. This dissertation examines the interactions between cropping systems' diversity, crop productivity, and management practices with the well-being of agricultural communities.

2.4 Conceptual background

2.4.1 Study considerations: Agricultural landscapes as social-ecological systems

The agricultural landscape is central to this dissertation as it represents the intersection where the interplay between combined agricultural fields (where active management occurs), human infrastructure (such as roads and settlements), and semi-natural habitats shapes ecological and social outcomes (Marshall, 2004). In addition, landscapes contain smaller-scale elements, such as farm fields, patches, and households, while they are embedded within larger-scale systems, including regional, national, and global systems (Selman, 2006; Wittman et al., 2017). Existing landscape-scale phenomena are, therefore, the result of complex social and ecological dynamics operating across both smaller and larger scales.

Within this context, the landscape serves as a suitable scale for evaluating how agricultural systems perform in ways that connect individual decision-making to broader community outcomes. The inclusion of community considerations (ICC) in farm management decisions can be influenced by the changing characteristics of agricultural systems, including changes in diversity-productivity regimes and intensity of farming practices, which establish the context for ICC. This dissertation examines the connections between farm-level management decisions, as they are embedded in larger agricultural systems, and the well-being of surrounding communities. This consideration aligns with the defining characteristics of social-ecological systems.

The concept of social-ecological systems (SES) has been a central theme in sustainability science, offering a framework for understanding the interdependent relationships between human societies and their natural environments (Berkes & Folke, 1998; Ostrom, 2009). SES are defined as integrated systems consisting of “societal (human) and ecological (biophysical) subsystems in mutual interactions” (Harrington et al., 2010, p. 2778). This dissertation considers farming system landscapes as social-ecological systems.

Increasingly, agricultural landscapes are treated as SES, which embody complex and dynamic interactions between the social and natural systems (Blesh et al., 2019; Fischer et al., 2014; Mcginnis & Ostrom, 2014; Ostrom, 2009; Ostrom & Cox, 2010; Santos-Martín et al., 2019; Wittman et al., 2017). Burchfield et al. (2019) observed that many processes that shape agricultural systems result from complex interactions among land use, biophysical contexts, and human activities, all of which operate at the landscape scale. Consequently, farmers do not have exclusive control over the entire farm management process, as broader landscape-scale dynamics and external factors also shape their decisions and practices (Jackson, 2008; Ostrom, 1990; Primdahl et al., 2013).

For example, Roesch-Mcnally et al. (2018) highlighted the complex interactions between farmers’ agency and the structural barriers that influence their individual actions and the collective actions of their farming communities. The authors found that, beyond basic agronomic considerations like seeding, the integration of cover crops into agricultural systems in the Midwest (USA) is hindered by challenges such as the absence of markets for alternative crops and limited access to suitable equipment for cover crop management. To address these challenges, farmers often engage with farmer networks to share strategies and overcome obstacles in cover crop management (Roesch-Mcnally et al., 2018). Similarly, Krieg (2014) noted the power of social institutions in shaping agricultural beliefs and behaviors to meet broader societal needs.

Moreover, managing farming systems is inherently complex, which involves both the challenges of decision-making and the shared consequences of those decisions on wider ecological and social systems. On the one hand, farm-level decisions are often shaped by broader external factors such as crop insurance policies, market demands, regulations, and climate (Bowman & Zilberman, 2013; Dimitri & Effland, 2020; Lencucha et al., 2020; Regmi et al., 2023; Rissing & Burchfield, 2024). On the other hand, though management practices are implemented at the farm level, many of their cumulative impacts touch the broader community or extend across landscapes (Benton, 2012; McGonigle et al., 2020). For example, farmers' use of dicamba – a broad-spectrum herbicide – to address weed challenges at the farm level has been controversial, as it has been linked to serious human health concerns, including colon and lung cancer (Harp, 2010; Lerro et al., 2020).

As a result, some aspects of farm management (e.g., water use and pesticide application) that affect the wider community can be viewed as a common-pool resource management challenge, one that extends beyond the responsibility of a single farmer, with benefits and costs accruing to surrounding communities or landscapes (Mosimane et al., 2012; Ostrom, 1990). However, Gragson et al. (2008, p. 93) noted that the “rugged individualism” often associated with American agriculture tends to overlook the reality that farming operates within a common-pool resource system, where successful outcomes depend on participants voluntarily adopting policies and working together to build trust and facilitate ongoing interactions. This individuality in decision-making can result in a "tyranny of small decisions" that collectively contribute to undesirable consequences for ecosystems and communities (Benton, 2012; Kahn, 1966; Odum, 1982). In such a system, developing a shared understanding of the need to internalize costs, as well as creating shared value for actors and communities, can be particularly challenging (Benton, 2012; Gragson et al., 2008; Porter & Kramer, 2011).

2.4.2 Selection and adaptation of the social-ecological systems framework

Research on the underlying causes and community-level consequences of current agricultural production systems is extensive. To develop more sustainable agricultural systems, future efforts should not only deepen our understanding of the drivers and outcomes but also focus on interventions aimed at redesigning systems that create shared value for both farmers and communities (Linder & Peters, 1984; Porter & Kramer, 2011). However, Linder and Peters (1984) caution that macro-level theories – such as political economy or neoclassical economics – are insufficient for guiding policymaking across key dimensions, including understanding causes, evaluating outcomes, and formulating effective interventions. To address these limitations, there is a growing need for meso- and micro-level frameworks. The Social-Ecological Systems Framework (SESF) is particularly valuable in this context, as it is a multi-level framework designed to operate at different scales, depending on the specific system being studied (Ekström et al., 2024; Ostrom, 2009; Zhang, 2020).

This dissertation centers on farming systems at the landscape scale, conceptualized as social-ecological systems. Numerous frameworks and approaches have been proposed for analyzing social-ecological systems (Binder et al., 2013; Colding & Barthel, 2019; Pulver et al., 2018). However, the most widely employed in research is the model developed by Elinor Ostrom (Mcginnis & Ostrom, 2014; Nagel & Partelow, 2022; Ostrom, 2007, 2009; Schneider et al., 2020; Zango-Palau et al., 2024). The Ostrom framework offers a systematic approach that allows for greater organization, comparison, and accumulation of insights related to common-pool resource systems (Ostrom, 2007; Pulver et al., 2018). It guides the specification of a subset of variables tied to resources, users, and governance systems that have distinct interactions across various types and sizes of resource systems (Mcginnis & Ostrom, 2014; Ostrom, 2009). Breaking down complex systems into key components helps researchers analyze how different variables interact to influence resource management and sustainability outcomes.

Several researchers have adapted the SES framework to fit the specific requirements of their studies (Partelow, 2018). For example, Ekström et al. (2024) highlight how various agent-based models have been adapted to model forests as SES, integrating agent behaviors, governance structures, and ecological processes to capture the complex interactions between human decisions and environmental outcomes. Duff et al. (2017) modified the original SES framework to assess a network of agricultural producers engaged in stewardship practices in Wisconsin, USA, focusing on how collaborative efforts and governance shape sustainable land use. Similarly, Wittman et al. (2017) utilized an SES approach to explore the interactions between ecological and social-institutional factors that influence food security and biodiversity conservation within agricultural landscapes. These adaptations demonstrate the flexibility of the SES framework in addressing a broad range of human-environment interactions, including those relevant to agricultural systems.

In this dissertation, Ostrom's framework is employed to explore the inclusion of community considerations in farm management decisions. The goal is to identify key system properties and interactions that either support or impede the integration of community well-being into agricultural decision-making. The original framework offers a comprehensive set of first-tier and second-tier variables, making it challenging to incorporate all of them within a single study (Mcginnis & Ostrom, 2014; Ostrom, 2009). As illustrated in Figure 1, this dissertation adapts the SES framework by synthesizing it into key components: biophysical context (Box A), social-institutional context (Box B), socio-economic context (Box C), actors (Box D), and the farming action situation (Box E). Farming is conceptualized as the central action situation, while crop producers serve as the primary actors. The contexts encompass both local and regional scales, reflecting specific environmental, economic, political, social, and institutional characteristics that shape farming practices and decisions. These contexts are not static; they interact with each other and establish the conditions within which farming practices occur. The framework suggests that the farming action situation (Box E) represents the interface where contextual factors are translated into practical decisions and behaviors, which in turn produce outcomes (e.g., changes in production variables, ecosystem health, and human well-being). It also suggests that on-farm reactions serve as the mechanism through which these contexts generate feedback loops, which impact both the farming system and the community as a whole. Examining these feedbacks, as shown by the dashed arrows in the figure, in detail, is outside the scope of this dissertation. Each of the components of the dissertation's conceptual framework is examined in greater detail in the subsequent chapters, clarifying how they are applied to carry out these studies.

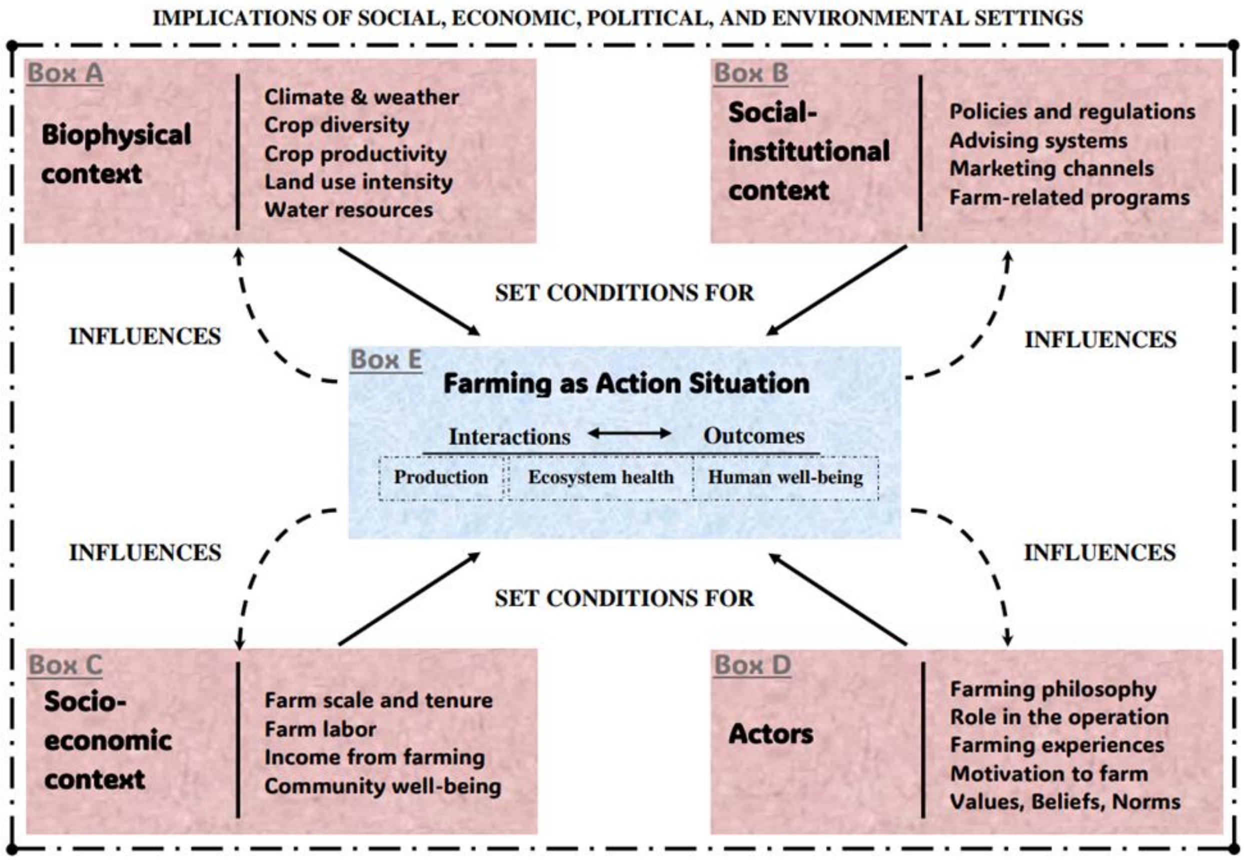


Figure 2.1. Relationships among social and ecological factors and their influence on farming as action situation. Solid arrows show direct links between drivers and outcomes; dashed arrows indicate feedback interactions. This figure is adapted from Mcginnis & Ostrom (2014) and Duff et al. (2017).

2.4.3 Connecting research objectives with the conceptual framework

The three overarching objectives of this dissertation are grounded in the conceptual framework, which guides the exploration of key interactions between farming systems, community well-being, and management practices.

Objective 1 examines the interaction of community well-being with distinct levels of diversity and productivity in agricultural systems and production systems with varying intensities. While this study did not explicitly operationalize the SES framework, it incorporated key elements from the framework, which connect the biophysical context (Box A) and socio-economic context (Box C) to the farming action situation (Box E). Farming, as the central action situation, is viewed as a system where management practices impact both ecological processes, such as biodiversity and productivity, as well as social outcomes, such as community well-being. Through this lens, the study examines how different combinations of agricultural diversification, productivity levels, and intensity levels influence these outcomes. This objective establishes a baseline understanding of the contexts of agriculture–community interactions.

Objective 2 investigates farmers' perspectives on community considerations in on-farm decision-making processes across distinct contexts of crop diversification. This aligns with the actors (Box D) and their role in influencing the farming action situation (Box E). The study examines farmers as central actors in the system, focusing on their perceptions and behaviors. Through a sampling design that captures variation in biophysical (Box A), social-institutional (Box B), and socio-economic (Box C) contexts of farming systems, this objective explores how these broader contexts influence farmers' perspectives on how their management practices impact the community. Additionally, the framework facilitates an understanding of how these actors make community considerations within different agricultural contexts – specifically in diversifying versus simplifying counties.

Objective 3 explores the attributes of crop producers and the contexts that either enable or constrain the incorporation of community considerations in farming decisions. This objective integrates both the actors and context components of the study's conceptual framework (Boxes A-E). The actors – crop producers – are examined in terms of their knowledge, values, norms, and capacities to incorporate community well-being into their farm management practices. The context component is equally critical, as this objective explores how local and regional factors shape or limit the ability of farmers to include community considerations in their decisions.

Chapter 3 - Linking Diversity – Productivity Conditions of Farming Systems with the Well-Being of Agricultural Communities[1]

3.1 Abstract

Agricultural diversity, productivity, and human well-being have been popular topics in recent decades, partly fueled by our quest for sustainability. However, the exact nature of the interconnections among these global priorities remains an area yet to be fully understood and explored. We contribute to this literature by examining how community well-being interacts with distinct levels of diversity and productivity in cropping systems across multiple U.S. communities. Using data at the county-level from 2010 to 2019, we first analyze how well-being varies across communities that differ in their levels of crop diversity and productivity. Then, we investigate how well-being varies across both diversity–productivity characteristics and farming intensity levels. We employ mapping techniques in conjunction with descriptive statistics to uncover and visualize patterns in well-being across contexts. Study findings show a consistent pattern of high levels of well-being across most diversity–productivity categories, with the notable exception of areas that are both highly diverse and highly productive. In addition, places with substantial commercial operations, and where agriculture contributes greatly to overall GDP and employment generally appears to have higher well-being scores compared to other places. Our analysis also reveals that there is more variability in the index of community well-being within each group than across groups of counties. Overall, the results suggest that the differences in community well-being are not solely determined by agricultural indicators, such as diversity–

1 This chapter is a reprint of **Francois et al. (2024)**, published in *Sustainability*, under the Creative Commons CC BY 4.0 License. The original article has been included in its entirety.

productivity characteristics and farming intensity levels, but also depend on contextual factors, such as social infrastructure, non-agricultural job opportunities, or local economic diversification.

3.2 Introduction

Individual and community well-being has been featured among the critical outcomes of sustainability and sustainable development by academics and action institutions across the globe (Burton & World Health Organization, 2010; Nelson et al., 2023; Summers et al., 2012; Wiseman & Brasher, 2008). For example, reviewing rural sustainability studies, Nelson et al. (2023) highlight that well-being exploration constitutes a central focus within rural sustainability outcomes. Addressing the long-term goals of sustainable agricultural systems through the 1990 farm bill, the U.S. Congress contended that agriculture should improve both farmer and community well-being alongside achieving agronomic and ecological goals (Congress.gov, 1990). However, implementing these objectives is a complex task.

The U.S. agricultural sector can be proud of its productivity and operational efficiency in its production systems, but its social contribution remains questionable. Findings from a significant number of social science research studies have reported harmful links between industrialized farming systems and socioeconomic well-being (e.g., income levels, unemployment, and poverty), the social fabric (e.g., increases in hired labor and population change), and environment quality (e.g., depletion of water and air quality issues) of surrounding communities (Bailey et al., 2021; Lobao & Stofferahn, 2008; Lyson & Welsh, 2005). These research results suggest that managing agricultural systems to support the well-being of local communities appears to be one of the greatest challenges at the intersection of agriculture and sustainability. This challenge is rooted in specific agricultural processes, linked primarily to the dominance of the productivist paradigm, such as the widespread adoption of intensive farming practices with a heavy reliance on chemicals (Wilson, 2001), the trend towards monoculture over crop diversity (Leitschuh et al., 2022), the trend towards fewer but larger farms (MacDonald, 2020), and increasing mechanization, which impacts rural economies and social structures (Harrison & Getz, 2015).

Despite the extensive body of knowledge addressing the well-being of agricultural communities (Goldschmidt, 1978; Lobao, 1990; Lobao & Stofferahn, 2008; Park & Deller, 2021), there remain significant gaps in our understanding of the connections between diversity–productivity conditions of farming systems and community well-being (CWB). Existing studies in the main line of social science research on this issue, which can be traced back to Goldschmidt's (1946) comparative case study, have primarily focused on exploring the connections between CWB indicators and structural changes in farming systems in terms of scale, organization, and market integration (Lobao & Stofferahn, 2008; Park & Deller, 2021; Wing et al., 2008), neglecting the examination of potential linkages with other essential aspects of farming activities, including the interactions between diversity and productivity. Related to this, agricultural management research has been criticized for its unbalanced approach to understanding the interactions between agricultural management practices and ecological outcomes, compared to social consequences (Meredith et al., 2021). While there is a better understanding of environmental and production variables (e.g., productivity, profitability, and ecosystem health), the consequences for people and communities who live and work across these agriculture-modified landscapes remain out of focus in much agricultural management research (Bentley Brymer et al., 2020; Meredith et al., 2021). Addressing these research gaps is critical to generating knowledge capable of tackling the sustainability concerns of current food production systems comprehensively (Francois & Nelson, 2024).

Since the release of the Millennium Ecosystem Assessment Report (Millennium Ecosystem Assessment, 2005) in the early 2000s, there has been a growing interest in linking ecosystem services with the social, physical, and mental well-being of individuals and communities, as it was established that ecosystem services are important driving forces of human well-being. While some studies have predominantly focused on the theoretical relationships between ecosystem functions and services and aspects of human well-being (Cardinale et al., 2012; Díaz et al., 2006; Frison et al., 2011; Garibaldi et al., 2017; Keesing et al., 2010; Summers et al., 2012), others have been attempts to empirically link some specific ecosystem components (e.g., diversity) to some specific well-being indicators (Bacon et al., 2012; Garibaldi & Pérez-Méndez, 2019; Shreck et al., 2006). Crop diversity serves as one of the principal agricultural ecosystem indicators employed to explore these connections. For instance, in 2019, Garibaldi and Pérez-Méndez (2019) conducted an analysis of agricultural and socio-economic data from 44 nations, revealing that countries experiencing an augmentation in crop diversity also witness a rise in agricultural employment opportunities. Acknowledging the importance of this association, the authors call for more research assessing the impacts of crop diversity on the multiple dimensions of human well-being. Other studies indirectly associate the adoption of certain farming practices or systems (e.g., organic agriculture), which promote higher levels of diversity, with some specific well-being issues (e.g., labor conditions, farmers' health, local populations) (Bacon et al., 2012; Shreck et al., 2006).

Moreover, the emergence of the United Nations' sustainable development initiatives has broadened the scope of research examining the relationship between crop diversity and the achievement of sustainable development objectives (Feliciano, 2019). Feliciano (2019) highlighted a growing body of research examining the role of crop diversification in achieving various developmental goals, including environmental protection, climate change mitigation and adaptation, crop productivity enhancement, income generation, employment opportunities, nutrition and food security, and gender equality. However, the majority of studies have concentrated on crop diversification strategies within developing countries. Despite these efforts, there is room for more research connecting the following global priorities: diversity, productivity, and CWB.

This paper aims to address the gap in knowledge through the lens of U.S. farming systems. More specifically, we examine the interaction of CWB with distinct levels of diversity and productivity in agricultural systems and production systems with different farming intensity levels. This study recognizes the potentiality and responsibility of every farm, regardless of scale, organization, and marketing strategies, to contribute to various dimensions of CWB (National Research Council, 2010). We address two specific research questions in this study: (1) How does community well-being vary across the intersection of agricultural diversification and levels of crop production? (2) How does the variation in community well-being change across both diversity–productivity characteristics and farming intensity levels?

In the following sections, we first clarify key concepts used in this study, provide a brief overview of the literature on CWB, and describe the framework that guided the construction of our CWB index. We then detail our methods, report the findings, and discuss them in line with the existing literature.

3.3 Definition of Terms, Conceptualization, and Operationalization of Community Well-Being

Before delving deeper into our exploration, we clarify some key terms that we use, acknowledging multiple pathways exist to understanding and interpreting them. We refer to the term 'community' as a place with defined geographic boundaries and where individuals share common concerns of life (Gillespie-Marthaler et al., 2019; Theodori, 2005). We use county administrative units to operationalize community.

With respect to 'community well-being', the literature offers a wealth of definitions, interpretations, conceptual discussions, and methodologies for operationalizing the concept (Lee & Kim, 2015; Sung & Phillips, 2018; Wiseman & Brasher, 2008), depending upon the perspective of who is using the term and for what purpose. We view CWB as an outcome influenced by multiple conditions interacting to fulfill the community residents' needs (Kee et al., 2015; Wiseman & Brasher, 2008). Many authors recognize CWB as a multi-dimensional and context-dependent concept (Matson et al., 2016; Summers et al., 2012; Sung & Phillips, 2018; Wiseman & Brasher, 2008). Treating CWB as a construct with multiple dimensions permits a comprehensive assessment of various facets within a community. Assessments can be subjective (e.g., capturing residents' perceived community satisfaction) or objective, focusing on material and social characteristics that either contribute to or hinder the overall well-being of communities (Summers et al., 2012). One of the challenges noted in the literature is related to the selection of community-level indicators that best evaluate the well-being of communities (Sung & Phillips, 2018). No consensus has yet been reached regarding the most crucial variables that accurately reflect CWB. Certain indicators have been recurrently featured in many studies, highlighting their importance in assessing CWB (Sung & Phillips, 2018).

Matson et al. (2016) presented a sustainability analysis framework that links sustainability objectives with their root causes within complex and dynamic social-environmental systems through the production of goods and services and related consumption processes. The authors define sustainable development as concentrating on individual and social well-being and thus suggest the inclusive social well-being concept to evaluate sustainable development, focusing on improving the well-being of humankind. In addition, Matson and colleagues emphasized the importance of linking well-being to its foundational drivers, conceptualized as social, natural, manufactured, human, and knowledge capital assets. These resources serve as the basis for sustainability and interact in complex systems to impact human life. The role of actors, or agency, is crucial in deciding how capital assets are utilized to achieve common, sometimes conflicting goals. For instance, farming systems illustrate these complex interactions by converting capital assets into the production of goods and services for consumption through human management. However, the industrialization of agriculture over the past several decades, marked by intensive production approaches and widespread use of biochemicals, has faced criticism for its adverse economic, social, and environmental impacts (Burton, 2004; Lobao & Stofferahn, 2008; Wilson, 2001).

In this study, we employ the sustainability analysis framework proposed by Matson et al. (2016) and leverage the existing literature on objective CWB to guide our investigation of the interaction between CWB and some key agricultural indicators, such as diversity–productivity characteristics and farming intensity levels. The framework focuses on six critical constituents of CWB: material needs, education, health, community, security, and opportunity. Recognizing and meeting people's material needs is foundational to enhancing human well-being. The survival of humans hinges on having access to essential requisites such as food, water, energy, and shelter

(Buck et al., 2018; Richardson et al., 2019). Research shows that access to these necessities and CWB are linked positively (Matson et al., 2016; Wiseman & Brasher, 2008). Health and education are widely acknowledged as key constituents of well-being (Hardi & Pintér, 2006; Kim & Koh, 2022). Economic growth and well-being are positively related to community health and education outcomes (Callaghan & Colton, 2008; Summers et al., 2012). Furthermore, access to schools, recreation, and equality (Deller et al., 2001; Rural School and Community Trust, 2003), social cohesion and a sense of community belonging (Matson et al., 2016; VanderWeele, 2019), as well as feelings of safety and security (Hardi & Pintér, 2006; Matson et al., 2016), are all important factors that influence CWB. By examining CWB across these dimensions, we can enhance our comprehension of the factors essential for fostering thriving conditions among community residents.

3.4 Materials and Methods

This paper explores variations in an objective measure of community well-being across agricultural systems with distinct diversity and productivity characteristics and different intensity levels. We first describe our measurement of CWB, then detail the county typology conditional on the diversity and productivity of farming systems. We present other agricultural performance measures to examine the variations in CWB and explain our analytical approach.

3.4.1 Spatial and Temporal Scales

We implement this study at the county scale to accommodate both the characteristics of communities and farming systems within a manageable spatial framework. County boundaries might not accurately represent these systems that maintain complex and dynamic interactions with other broader systems. However, as an administrative unit, the county provides pragmatic ground to gather information that allows us to capture differences regarding those settings. We focus on the aggregate socioeconomic features at the county level during the period 2010 and 2019. The ten-year average is used to capture a more stable and typical picture of the well-being of places over the time period. This method helps mitigate the influence of yearly fluctuations, potential data errors, or missing information, ensuring more robust findings on CWB. While CWB can change over time, significant fluctuations within a short period might reflect localized, temporary shocks rather than sustained transformations in well-being. We limit our analysis to the 2010–2019 period to exclude the immediate effects of major events such as the 2008–2009 global financial crisis and the recent global health crisis caused by the COVID-19 disease. These events can have significant, short-term impacts on communities, which might not accurately reflect their typical well-being.

3.4.2 Measuring Community Well-Being

We collected community-level indicators that reflect the dimensions of well-being, as defined by Matson et al. (2016), from publicly available data sources (Appendix Table A.1). Matson et al.'s framework helps objectively capture some of the most important constituents of CWB with its six broad-based dimensions, such as material needs, health, education, opportunity, community, and security. We consider the dimension of community in the framework to refer to social groupings/interactions. We purposefully rename this dimension as 'social community' to avoid confusion with community defined earlier as territory-based. We obtain a snapshot of a community's material needs through food security, clean water, housing pressure, and affordability. We gain insights into a community's health by including health insurance, life expectancy, infant mortality, and teenage fertility. We picture a community's education through school enrollment, educational attainment, and student–teacher ratio. We have multiple variables to examine the ability of people to make choices about how they want to live and what they want to do. These opportunity indicators include unemployment rate, income inequality (the Gini coefficient), female market participation, housing ownership, population movement, and housing vacancy rate. For the dimension of social community, we add election turnout, age-dependency ratio, establishment rate, and census rate. Crime rate is used to picture the idea of security in a community. Our current analysis is limited to four indicators that tap into community-level material needs, four variables that represent health, three variables assessing education, seven indicators to gauge the dimension of opportunity, four variables to tap into the dimension of social community, and one variable for security (Table 3.1 and Appendix Table A.1). Because we obtained only one indicator for security, we added it to the dimension of opportunity. Based on the framework, an unsafe neighborhood is exemplified as an indicator of a lack of opportunity.

Table 3.1 Number of variables used by CWB dimensions, minimum and maximum scores of dimensions, and the overall index, and the internal consistency of combined variables.

CWBI dimension	Number of variables	Cronbach's alpha	Minimum score	Maximum score
Material needs	4		0.35	0.96
Health	4		0.24	0.98
Education	3		0.39	0.92
Opportunity	7		0.33	0.80
Social community	4		0.26	0.75
All variables combined	22	0.80	2.25	4.10

We used the Tidycensus package in R (Walker & Herman, 2023) to retrieve most of the data from the U.S. Census Bureau (Appendix Table A.1). We collected annual data for the conterminous United States at the county level (n = 3107 counties). Whenever possible, we collected data for the 2010–2019 period and calculated the decadal mean of each variable for each county. We pre-processed the data (Cutter et al., 2014) by transforming the raw data into percentages or rates and normalizing using min–max techniques across all the counties. This processing simplifies comparisons between counties with differing sizes and socioeconomic attributes and reduces skewness and outliers in the data distributions (Cutter et al., 2014; Tate, 2013). Prior to the computation of the index, we adjusted the direction of certain variables so that higher values consistently reflected better well-being. For example, variables such as unemployment rate and infant mortality were reverse-coded to align with the interpretation that higher scores indicate more favorable community conditions (Appendix Table A.1).

We treated each dimension of the conceptual framework separately. We took the average of the indicators under each of the dimensions to obtain a score for each dimension before summing the five dimensions' scores to compute the index of CWB. We gave identical weight to each variable within the dimension as we did not assume any particular importance of variable in the overall index (Tate, 2013). Kyne and Aldrich (2020) have used a similar approach to compute sub-index scores and the final score of a social capital index (i.e., averaging sub-index variables and summing sub-index scores). We employed Cronbach's alpha to evaluate the internal consistency of the overall index (Cronbach, 1951), and it showed that the items are reasonably well-related and consistently measure the same underlying construct (Table 3.1). In all cases, we used custom R scripts to curate the data (R Core Team, 2022). Maps for each dimension can be found in the supplementary information (Appendix Figures A.1–A.5).

3.4.3 Characterizing Farming Systems through Diversity–Productivity Conditions and Farming Intensity Indicators

Nelson and Burchfield (2023) studied county-scale factors that condition agricultural systems that are both highly diverse and productive in the U.S. They developed a diversity–productivity typology, using indicators of land use and yields of major commodity crops to contrast these high diversity–productivity systems to those with alternate agricultural and ecological performances. The authors calculated a county's average Shannon Diversity Index from 2008–2018 to account for diversity. For productivity, the authors computed the crop planted area-weighted average of corn, soy, wheat, hay, and alfalfa yields in excess of regional averages after accounting for temperature, soil, and water (precipitation and irrigation) over the same period. These two indicators were used in a K-means clustering analysis to generate the diversity–productivity typology. After removing the counties that were not distinctly identified within a specific cluster, the typology condensed 2575 counties into five frequently encountered scenarios where crop diversity intersects with crop productivity within the U.S., such as high diversity and productivity (HD/HP, n = 310), low diversity and productivity (LD/LP, n = 368), high diversity and low productivity (HD/LP, n = 442), low diversity and high productivity (LD/HP, n = 743), and average diversity and productivity (AVERAGE, n = 712). This typology constitutes the basis of our sample for this study. For additional details on typology construction, please refer to Nelson and Burchfield (2023).

In addition to differences in diversity–productivity conditions, the types defined represent distinct regimes of production with unique biophysical, social, economic, and regulatory attributes that fundamentally shape their structure and function (Nelson & Burchfield, 2023). Along this line, we study community well-being as a potential performance outcome of these regimes and its variations across distinctive features of these classes. Our initial analysis suggests significant variations in well-being across regimes, warranting a more comprehensive and deeper exploration to understand the underlying factors and the potential implications for the sustainability of our communities and agricultural systems (Appendix Table A.2).

To obtain a more comprehensive picture of the well-being of agricultural communities, we developed a measure of farming intensity inspired by Jackson-Smith and Jensen's (2009) discussions. The authors developed a measure to identify agriculturally important (AI) counties where farming is commercially and materially important in the U.S. with three pieces of data, such as the total agricultural sales combined with either farm sales per acre of total farmland or cropland. The authors present the AI group as counties in the top quartile of total agricultural sales and counties in the second quartile, with either sales per acre of farmland or sales per cropland in the top quartile. This farming indicator complements the farm-dependency (FD) typology developed by the United States Department of Agriculture Economic Research Service (USDA/ERS) in identifying places with high agricultural production levels. ERS employed two farming variables in their definition of FD (i.e., shares of agricultural jobs and GDP) and classifies counties as FD when agriculture contributes to at least 25% of the county's GDP or accounts for at least 16% of the county's total employment. The two indicators—AI and FD—are integrated to form the farming intensity measure, resulting in four mutually exclusive classes: the pure AI (i.e., counties that are AI but not FD), the pure FD (i.e., counties that are FD but not AI), FD/AI (i.e., counties that are both AI and FD), and non-FD/non-AI (i.e., counties that are neither FD nor AI) (Figure 3.1). To construct this farming intensity indicator, we used employment and GDP data from the U.S. Bureau of Economic Analysis (BEA) and survey data from the USDA National Agricultural Statistics Service (NASS) (i.e., total sales and sales per acre of farmland or cropland). Figure 3.2 shows the spatial distribution of counties included in the diversity–productivity typology and their corresponding classification in terms of farming intensity. Table 3.2 offers descriptive summaries for a range of agricultural indicators across these farming intensity classes.

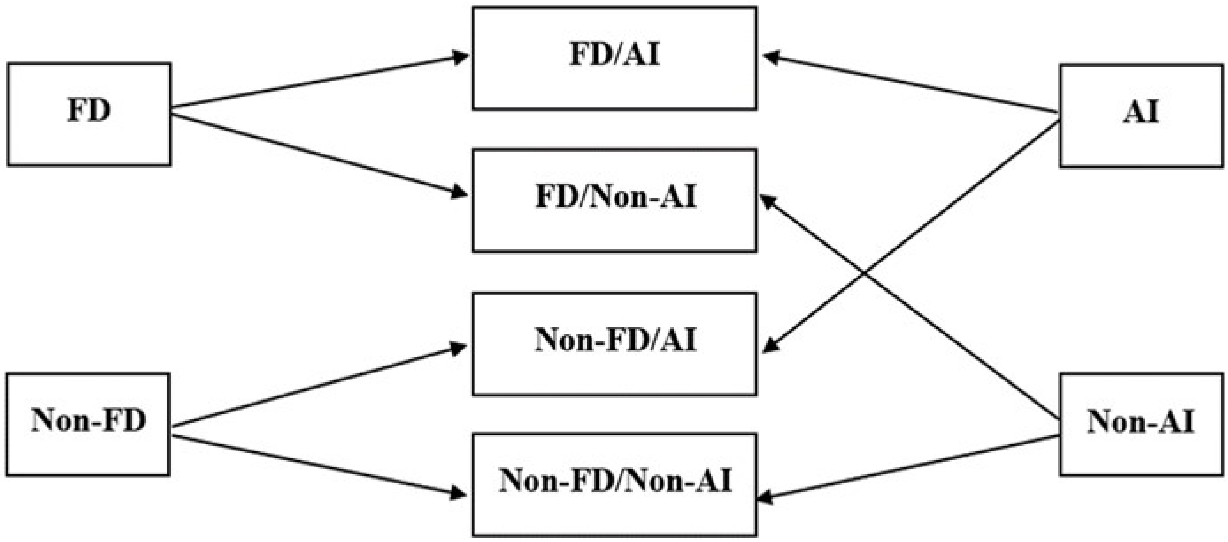


Figure 3.1 Farming intensity classes derived from farm dependency and agricultural importance.

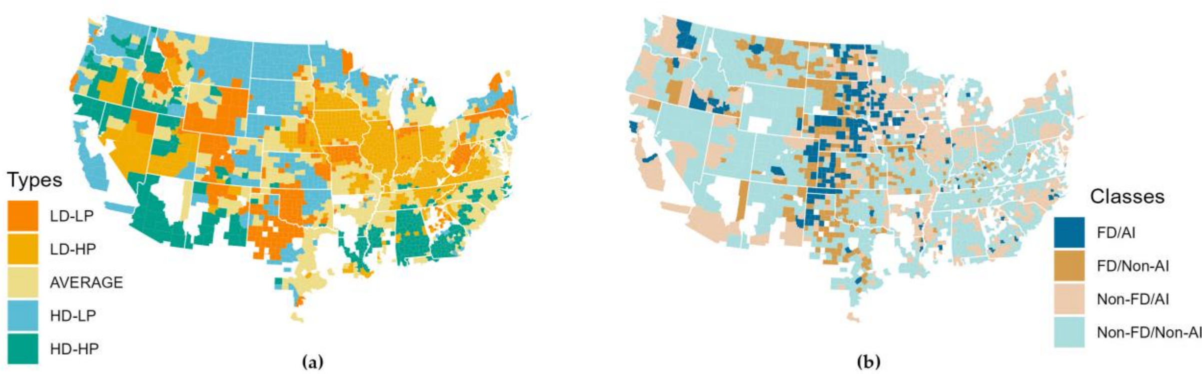


Figure 3.2 Spatial distribution of sample counties: (a) based on diversity–productivity conditions of farming systems; (b) based on their intensity of farming activities (right).

Table 3.2 Descriptive summary (mean and standard deviation in parenthesis) of variables used in the development of farming intensity indicator.

Variables	FD/AI	FD/Non-AI	Non-FD/AI	Non-FD/Non-AI
Total agricultural sales (in $ millions)	372.43 (320.45)	64.51 (39.86)	270.05 (380.57)	41.96 (36.48)
Sales per acre of farmland (in $)	948.00 (835.03)	178.05 (140.92)	1148.65 (948.36)	631.70 (8902.05)
Sales per acre of cropland (in $)	525.90 (448.91)	188.83 (120.05)	982.86 (1619.73)	511.87 (1059.33)
Share of agricultural GDP (%)	36.72 (14.54)	19.90 (16.38)	8.04 (6.82)	2.87 (4.04)
Share of agricultural jobs (%)	18.08 (6.26)	23.15 (6.88)	5.67 (4.02)	5.05 (4.21)
Acres per operation	374.08 (321.77)	716.16 (2350.61)	116.28 (117.40)	120.78 (233.28)
Sales per operation (in $ 1,000)	726.74 (783.47)	169.61 (132.28)	327.48 (261.37)	86.77 (85.55)

3.4.4 Analysis

We established five categories for the community well-being index (CWBI) based on standard deviations (sd) from the mean to facilitate comparisons across counties. We named these CWBI levels as very low (less than one sd below the mean), low (between 1 and 0.5 sd below the mean), moderate (between 0.5 sd below and 0.5 sd above the mean), high (between 0.5 and 1 sd above the mean), and very high (more than one sd above the mean). We combined spatial analysis with descriptive statistics to visualize and identify patterns in the index. We first mapped the index to show how it varies across U.S. counties. We used the Kruskal–Wallis test to compare CWBI scores across diversity–productivity types, agricultural intensity categories, and their interactions, following the indication from the Shapiro–Wilk tests that non-parametric analyses were relevant for our statistical comparisons.

3.5 Results

3.5.1 Community Well-Being across Counties

The computed community well-being index score ranges between 2.25 and 4.10, with the highest scores indicating counties with presumably higher levels of CWB relative to other counties in the U.S. during the same time period. (Table 3.1, Figure 3.3). Accordingly, the CWBI levels are all relative, i.e., the score assigned to each county is compared to the national county average within the U.S. This does not definitively indicate whether the quality of life or well-being is good or bad in certain places; rather, it suggests that it is relatively better or worse compared to other counties.

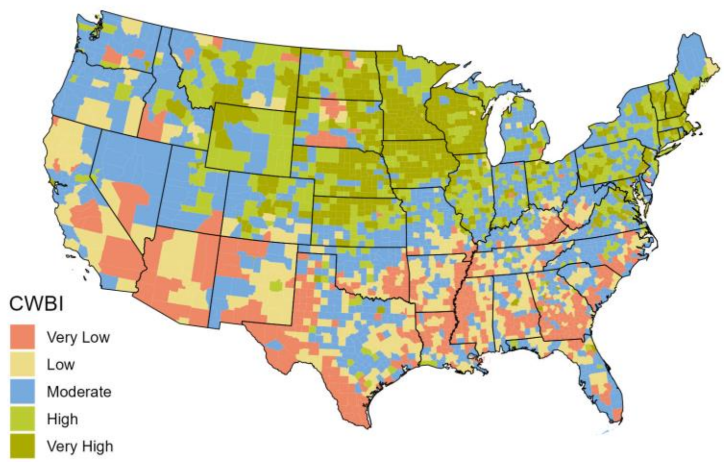


Figure 3.3 Map of CWBI across counties.

We observed a gradient of CWBI from north to south, with northern states exhibiting a higher prevalence of counties in the categories of moderate to very high well-being. As one moves toward the southern regions, including states such as New Mexico, Arkansas, and Oklahoma, there are more counties showing lower scores of CWBI. We observed some regional variations, with the Midwest and Northeastern states displaying predominantly moderate to high levels of CWBI. However, within the Midwest, we observed some areas with very low levels of CWBI scores.

Within states that generally score high on the CWBI, there are distinct counties where CWBI is markedly lower. South Dakota, for instance, stands out with the widest variability in CWBI scores across its communities, with a score range of 1.72 (Appendix Table A.4). Other states showing a score range above one, indicating significant variability in community well-being across counties, include New Mexico (1.66), Texas (1.30), Georgia (1.25), Florida (1.10), and Virginia (1.07). Conversely, the five states with the lowest variability across counties are Delaware (0.17), Vermont (0.29), New Hampshire (0.35), Oregon (0.36), and Connecticut (0.37). In general, Mississippi (3.08) and Arizona (3.11) exhibit the lowest averages of CWBI scores for their respective counties, while Wisconsin (3.75) and Minnesota (3.75) show the highest CWBI score averages (Appendix Table A.4).

3.5.2 Variation in Community Well-Being Based on Distinct Diversity–Productivity Characteristics

The above section considered all the contiguous U.S. counties. We now examine variations in CWBI scores for the 2575 counties included in the diversity–productivity typology. The bar charts in Figure 4 highlight the consistency in the distribution of CWBI across most diversity–productivity types, with a significant proportion of counties showing CWBI scores in the middle category. Except in the highly diverse and productive systems, places with higher levels of CWBI scores outweigh areas with lower scores across diversity–productivity types. The findings raise concerns regarding the well-being of agricultural communities characterized by high levels of diversity and productivity. The results show the predominance—in relative terms and absolute numbers—of counties with very low levels of CWBI within the HD/HP type (Figure 3.4, Appendix Table A.5). There appears to be a pronounced challenge in CWB within the HD/HP type because around two-thirds of counties are situated in the two lowest levels of CWBI.

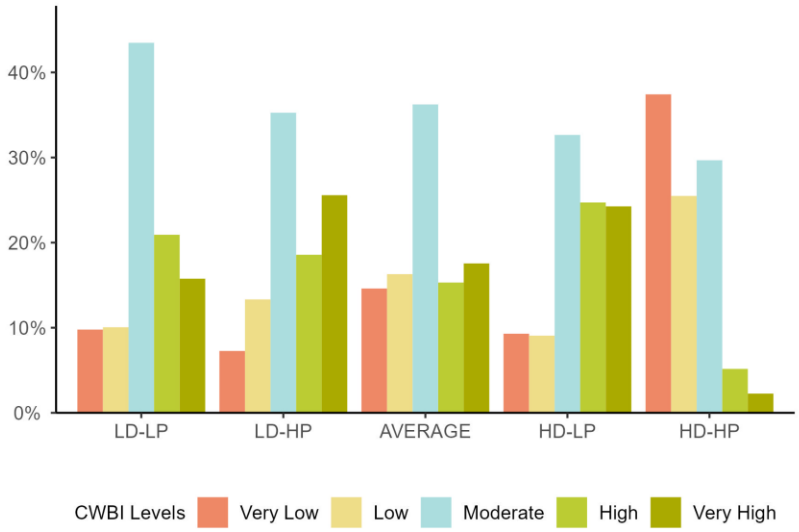


Figure 3.4 Distribution of community well-being levels across diversity–productivity types. Y-axis indicates the percentage of observations that are in a specific level of CWBI relative to each diversity–productivity type.

A closer look at Figure 3.4's configuration indicates the emergence of other clear patterns. For instance, the very high CWBI level is prominently represented in the LD/HP type, comprising 26% of counties within this type. Two contrasting types of farming systems—LD/HP and HD/LP—show similar CWBI scores. Despite their inherent differences, both have above 40% of their counties in the two highest levels of CWBI compared to less than 25% in the two lowest CWBI levels.

3.5.3 Interactions of Farming Intensity and Diversity–Productivity Conditions with Community Well-Being

Figure 3.5 illustrates a comparison of CWBI variations across diversity–productivity types and distinct intensity classes of agricultural systems, offering a nuanced understanding of relationships between these factors and CWB. The findings show that the high diversity–low productivity group exhibits, in general, the largest index variability, while the low diversity areas, regardless of productivity levels, demonstrate the smallest variability in CWBI (Figure 3.5a, Appendix Table A.6).

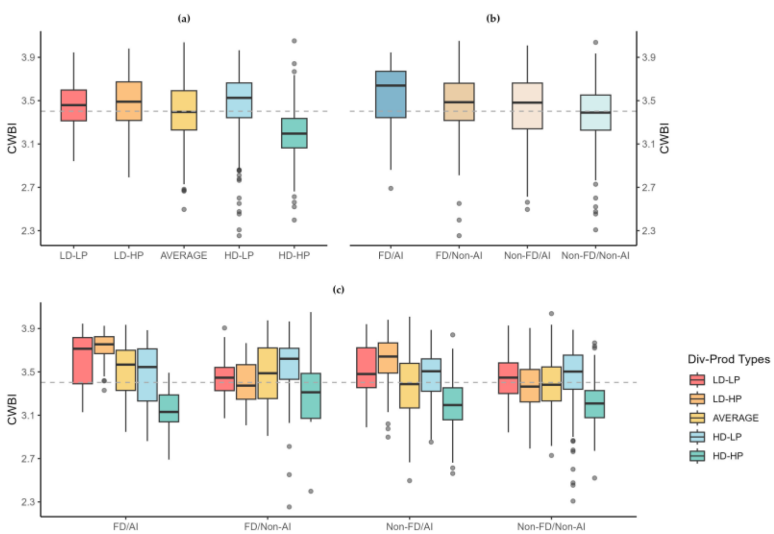


Figure 3.5 Comparison of CWBI scores across the following: (a) diversity–productivity types; (b) farming intensity classes; (c) combinations of diversity–productivity types and farming intensity classes. The dark grey line represents the average CWBI. Boxplots display the median value as a thick black line, the interquartile range within the box, and the 95% confidence interval as thin lines. Outliers are represented by individual points.

The CWBI index appears to follow a decreasing pattern from the areas classified as FD with high levels of agricultural importance to non-FD counties with lower levels of agricultural importance (Figure 3.5b). FD/AI counties, characterized by substantial commercial operations and the highest mean sales per operation or per acre of cropland, where agriculture substantially contributes to the overall GDP and employment, appear to generally hold a more favorable position than other places. Counties that are neither FD nor AI show a lower median value of CWBI. In essence, if we were to establish a control group to explore the association between farming and CWB, the latter would be in pole position with its low levels of agricultural indicators (Table 3.2). Jackson-Smith and Jensen (2009) contended that this particular group is predominantly characterized by a leisure- or lifestyle-oriented approach to agriculture, lacking a substantial level of agricultural production in both relative and absolute terms.

Figure 3.5c presents a consistent pattern of low CWBI scores in areas where farming systems demonstrate a combination of high diversity and productivity. Those counties are mostly located in the southern regions, where we observed a concentration of low levels of CWBI (Figure 3.2 and Figure 3.3). Regarding the counties that are neither FD nor AI (our control group), with the exception of the HD/HP group of counties, we observed little differences within this class regardless of farming systems' variations in diversity and productivity. Counties in this farming intensity class are characterized by a relatively modest sales volume and a limited agricultural contribution to the overall GDP and employment measures (Table 3.2). Despite the generally low CWBI scores in the HD/HP areas, we observed that the CWBI levels for this type approach the average when the agricultural system is FD/non-AI (i.e., places with the highest share of agricultural employment and the second highest share of agricultural GDP), whereas they are lower in AI regions or areas with limited agricultural involvement. This suggests that, in HD/HP areas, agricultural employment, rather than profitability, may be more closely associated with well-being and that high agricultural sales alone may not enhance well-being without the corresponding employment benefits. Meanwhile, we observed some notable deviations for counties categorized as LD/HP types within FD/AI and non-FD/AI classes. The index scores of counties within LD/HP types are significantly higher in areas where agricultural production is commercially and materially important (i.e., highest agricultural sales and highest sales per acre), whether the place is farming-dependent or not. More than 80% of counties in these agricultural intensity classes are in the Heartland region, with the highest value of production dominated by cash grain and cattle farms.

We conducted Kruskal–Wallis tests to compare the mean CWBI scores among diversity–productivity types ($\chi2(4) = 287.47$, $p < 0.001$), agricultural intensity categories ($\chi2(3) = 110.66$, $p < 0.001$), and their interactions. Although the boxplots displayed some overlap between certain groups (e.g., average-LD/HP), the statistically significant differences observed in the post-hoc tests indicate notable variability in the means across different diversity–productivity types and agricultural intensity categories (see detailed results of post-hoc tests in Appendix Tables A.2-A.3). This implies that CWBI scores vary significantly between different farming system types and categories.

We repeated these tests to compare diversity–productivity types within each farming intensity category to account for interactions. The results confirmed that, in many cases, the interaction between these factors is significantly associated with CWBI scores, suggesting that the specific characteristics and practices of agricultural systems, including their diversity and intensity, play an important role in determining the well-being of agricultural communities. Although not our primary analysis technique, we also examined these interactions using a linear regression model. The predictive plots from this regression analysis revealed that farm dependence has a positive association with CWBI in HD-HP and HD-LP places, whereas agricultural intensity has a negative association with CWBI in these same places (Appendix Figure A.6). However, the large variability observed within each group (Figure 3.5c) implies that localized factors extending beyond agricultural dynamics, such as social infrastructure, non-agricultural job opportunities, or local economic diversification, may play a critical role in influencing CWB.

3.6 Discussion

Since there has been no detailed description in the literature of potential connections between the interactions of diversity and agricultural productivity with community well-being at a macro-social-accounting level, this research study directly linked these global sustainability priorities through the lens of U.S. farming systems. In this paper, we examined CWB across farming systems with distinct diversity and productivity characteristics. To achieve this goal, we built a CWB index with a range of social and economic factors that contribute to a community's overall quality of life and sustainability. We noted a concentration of low levels of index scores in the southern regions and a clustering of high index scores in the northern parts of the country. This observed geographic divide is not new and corroborates previous investigations on CWB, quality of life, and related topics, which highlighted similar patterns of deprivation resulting from the dynamic interplay among multiple social, economic, and political forces (Amin et al., 2021; Dwivedi et al., 2019; Francois & Nelson, 2024; Kodras, 1997).

The examination of variations in the index across farming systems with distinct diversity and productivity characteristics shows some notable patterns of high levels of well-being across most diversity–productivity types. Analyses that combined farming intensity classification with the diversity–productivity typology reveal patterns of high levels of CWBI in areas characterized as low diversity–high productivity and where farming is commercially and materially important. Nelson and Burchfield (2023) noted this type as the most dominant cropping regime, characterized by significant commercial operations and entrenched within a productivist framework, with all the consequences that entails. In general, low diversity areas, regardless of their productivity levels, tend to have more counties with high CWBI scores compared to those with low CWBI scores, whereas high diversity areas have more counties with low CWBI scores compared to high CWBI scores. Of note, both the farming dependence indicator and the agricultural importance indicator used to compute the agricultural intensity categories have a higher proportion of low-diversity places compared to high-diversity areas.

Moreover, the results raise concerns for areas of highly diverse and productive farming systems, as demonstrated by the relative dominance of low levels of CWBI. Overlaying the CWBI with the maps of diversity–productivity types and farming intensity classes, the observed patterns in the HD/HP type may be primarily attributed to the geographic context in which these counties are located. Despite some studies that have touted the advantages of diversification for agricultural communities in terms of strategies to address income challenges (Meert et al., 2005), improving agroecosystem health and resilience to climate events (Liebman et al., 2013; Nelson et al., 2022) and employment (Garibaldi & Pérez-Méndez, 2019), it is important to acknowledge that these benefits may not effectively counteract the enduring impacts of historical and structural legacies that (re)produce disparities across regions. Gaskin et al. (2014) unveiled how historical policies and practices, including discriminatory housing policies and racial segregation, have significantly played a role in perpetuating racial disparities in health and overall well-being in the United States. Cutler and Lleras-Muney (2010) pointed out that factors such as poverty, inadequate education levels, and restricted healthcare access may be critical contributors to the disparities observed in CWB indicators across diverse regions (Appendix Figure A.1–A5). Burchfield et al. (2022) underscored important racial disparities within the U.S. farming sector, particularly regarding federal program enrollment, farm size, and losses in farm income. More unfortunate trends in the livelihoods of U.S. farm operators are noticeably concentrated in areas with a higher presence of non-White farmers.

The present study has its limitations with respect to the construction of the index, the diversity–productivity typology used, and the farming intensity classification employed. First, we are constrained to data availability. Our primary goal was to use a ten-year average of each indicator included within the index. However, for certain variables, the data were only accessible for shorter time frames (Appendix Table A.1). The decision to include these variables was made to ensure the inclusion of as many relevant indicators of CWB as possible while being mindful of data availability constraints. Second, due mostly to data availability, Nelson and Burchfield (2023) noted some limitations in the development of the diversity–productivity typology with their metrics of crop productivity and crop diversity. The authors used productivity data for only five major commodity crops (corn, soy, wheat, hay, and alfalfa), and they expressed concerns about the accuracy of the information captured with the Shannon Diversity Index, such as its sensitivity to larger areas and its potential to misrepresent ecological health. This implies that our findings primarily relate to counties dominated by major commodity production, potentially overlooking areas with different agricultural focuses, such as high-value specialty crops. Finally, the two concepts at the basis of the farming intensity classification each have their own limitations (Jackson-Smith & Jensen, 2009). The AI scheme favors higher-valued commodities (e.g., livestock and specialized vegetables) and excludes the aesthetic components (e.g., wildlife and open space) of agricultural landscapes. The FD scheme catches some relatively isolated rural places through the agricultural employment indicator at the expense of some more fertile and high-rainfall communities with higher yields. However, combining the two measures provides a pathway to capture the diversity of agricultural production intensity across the United States.

3.7 Conclusions

Our study findings highlight both positive and concerning trends in the connections between the diversity–productivity of farming systems and community well-being. Differences in CWB are not solely determined by the diversity–productivity typology and farming intensity categorization but also depend on contextual factors, such as rural–urban distinctions, regional variations, and potentially local circumstances. For example, while most LD/HP counties exhibit higher CWBI scores compared to HD/HP counties, there are instances where LD/HP counties have lower CWBI scores, while HD/HP areas have higher CWBI scores. This suggests that studies linking agriculture with its social consequences should account for local contexts, including the specific social processes and historical backgrounds. Just as we need to understand where, when, and how to diversify for a chance to sustainably increase agricultural productivity (Burchfield et al., 2019), approaches to enhancing CWB in the context of agricultural diversification might benefit from adopting a geographic perspective (Winterton et al., 2014).

The findings from this study indicate that low-diversity and high-diversity areas have distinct needs for maintaining or enhancing CWBI. High-diversity places may benefit significantly more from agricultural employment compared to low-diversity regions, which benefit significantly more from agricultural activities, both in terms of employment and profitability. Therefore, agricultural policies and programs should be tailored to reflect these differences, considering historical and socio-economic contexts to effectively address local challenges and leverage local strengths for improved community well-being.

Being among the current trending agricultural topics of the 21st century, it is clear that interactions of diversity and productivity matter for both ecosystem health and individual and community well-being. To ensure that the advantages of farming systems are translated into improved well-being for both farmers and the surrounding communities, further research is needed to examine the challenges that counteract the benefits of agricultural diversity and productivity or whether community well-being concerns are taken into account in agricultural decision-making. In addition, while this study provides a valuable baseline understanding of the links between these global priorities at a national level, a more regional or context-specific approach is needed to understand better how different diversity–productivity or agricultural system types support CWB.

Chapter 4 - Exploring Farmers' Considerations for Community Well-Being in On-Farm Management Decisions Across Diversifying and Simplifying Farming Contexts

4.1 Abstract

Society has presented agricultural systems with a challenge: maintaining productivity with the implementation of environmentally sound and socially just practices. To begin to meet this challenge for the future, it is important to understand how farmers perceive and integrate community concerns into their farm management decisions in the present. Drawing on a mixed-method approach combining interview and survey data, we address this knowledge gap by examining farmers' awareness and actions regarding the community impacts of their farming practices. Findings reveal that farmers are cognizant of the broader impacts of their operations on local communities and incorporate certain community issues, including community economics, health, education, and community care, into their management decisions. Despite the relatively small sample size, the study offers insight into promoting sustainable relationships between agricultural and community systems and informing policy development and initiatives aimed at enhancing community well-being.

4.2 Introduction

Agriculture faces the challenge of maintaining productivity while implementing environmentally sound and socially just practices. This challenge arises in response to a well-established body of scholarly research documenting the far-reaching and often detrimental impacts of conventional agricultural practices on social and ecological systems. On the ecological side, studies have voiced concern about the ecological cost of dominant production approaches (Dainese et al., 2019; Swift et al., 2004; Zhang et al., 2007). This approach is characterized by cultivation standards centered around large-scale monocultural fields (Leitschuh et al., 2022), increasing mechanization (Bowman & Zilberman, 2013; D. G. Brown et al., 2005), use of agrochemical inputs (Crossley et al., 2021), and increasing use of water resources for irrigation (Edmonds & Rosenberg, 2005; Lauer & Sanderson, 2020). As cultivated areas have expanded over the past six decades, crop diversity has decreased. Four major crops – corn, soybeans, hay, and wheat – now dominate U.S. agricultural landscapes (Bigelow & Borchers, 2017; Crossley et al., 2021).

This simplification process has far-reaching implications for the health of ecosystems and could result, to borrow Melander's (2003, p. 2) catchphrase, in "an endless battle with no happy ending." As species diversity and habitat are lost, soil and water quality degrade (Landis, 2017; Liebman et al., 2013; Yee et al., 2021), water retention and nutrient supply diminish (Power, 2010; Zhang et al., 2007), pollination services decline (Dainese et al., 2019; Power, 2010; Zhang et al., 2007), and pest management becomes more challenging (Rusch et al., 2016). Such an agricultural model is now recognized as expensive to be maintained or regenerated (Bowman & Zilberman, 2013; Burchfield & Nelson, 2021).

On the human side, decades of research have illuminated the extent to which simplification in agriculture impacts various dimensions of rural life, including the socioeconomic well-being of communities, community social fabric, and environmental quality (Goldschmidt, 1946, 1978; Green, 1985; Jackson-Smith & Gillespie, 2005; Lobao & Stofferahn, 2008; Lyson et al., 2001; Lyson & Welsh, 2005; Tolbert et al., 1998). The philosophy of "get big or get out" has painfully disrupted the lives of many agriculturally-dependent communities, which now experience population and community decline (Curtis White, 2008; Gibson & Gray, 2016), joblessness and poverty (Lyson & Welsh, 2005), decrease in community services – including the closure of schools, banks, post offices, and other businesses (Gibson & Gray, 2016; Goldschmidt, 1946), decline in civic engagement and participation (Lyson et al., 2001), and deterioration of property values (Constance & Tuinstra, 2005).

This literature mostly engages with Goldschmidt's (1946) comparative study, which hypothesized that structural transformation of farming systems, specifically the shift toward fewer and larger farms, has negative impacts on the well-being of communities. Studies have examined the community effects of diverse dimensions of change in farming, including changes in farm size (Barnes & Blevins, 2010; Jackson-Smith & Gillespie, 2005; Lyson et al., 2001; Park & Deller, 2021), ownership characteristics (Bailey et al., 2021; Park & Deller, 2021), anticorporate farming regulations (Lyson & Welsh, 2005), farm consolidation (Hendrickson et al., 2020), industrialized grain monocultures (Lobao & Stofferahn, 2008; Winders, 2017), and agricultural engagement (Francois & Nelson, 2024). Despite the depth of scholarly work on community impacts of agriculture, researchers continue to advocate for further investigation into the role of local employment, labor unions, and social safety nets in buffering the potential negative effects of industrialized farming (Lobao & Stofferahn, 2008) as well as specific mechanisms (e.g., access to resources, social networks, and community cohesion) through which changes in farm structure affect community well-being (Park & Deller, 2021).

Given the well-established negative consequences of dominant agricultural practices, a transition toward new models of farming that prioritize sustainability by enhancing and maintaining ecosystem health as well as individual and community well-being is needed (Bowman & Zilberman, 2013; Burchfield & Nelson, 2021; Francois et al., 2024; Garibaldi et al., 2017). Cropping system diversification is a prime example of a management strategy aiming to address some of the sustainability issues associated with the dominant food production systems (Hufnagel et al., 2020; Nelson et al., 2022; Rissing & Burchfield, 2024; Spangler et al., 2022). It entails introducing additional crops into a cropping system to increase its diversity either temporally, spatially, or both (Hufnagel et al., 2020). Along with the benefits of higher yields (Burchfield et al., 2019; Davis et al., 2012; Madin & Nelson, 2023; Renard & Tilman, 2019) and soil quality improvements (Bommarco et al., 2018; Chen et al., 2018; Duarte et al., 2018; Garibaldi et al., 2016; Liebman et al., 2013; McDaniel et al., 2014), crop diversification is linked to multiple social advantages, including increased employment opportunities (Bacon et al., 2012; Garibaldi & Pérez-Méndez, 2019), improved household income from crop sales (Bellon et al., 2020; Pellegrini & Tasciotti, 2014), and enhanced food security (Garibaldi et al., 2017; Renard & Tilman, 2019).

Studies connecting agriculture to community well-being (CWB) primarily concentrate on establishing relationships between farming systems and multiple well-being indicators (Bailey et al., 2021; Park & Deller, 2021; Wing et al., 2008). However, the emphasis on creating more sustainable agricultural systems necessitates not only exploring the community impacts of farming but also a more urgent call for research into the incorporation of societal concerns into agricultural decision-making (Francois et al., 2024; National Research Council, 2010). The overarching goal of this paper is to examine farmers' perspectives regarding considerations for community in on-farm decision-making processes in high-yielding places across two distinct contexts of crop diversification. Specifically, we seek to determine how farmers within diversifying and simplifying counties perceive the community impacts of their management practices and elucidate scenarios in which farmers include community concerns in their farming decisions. Diversified cropping systems serve as prime examples of efforts to sustain agricultural systems that prioritize ecosystem health and the well-being of individuals and communities.

We do not anticipate significant differences in community impact awareness among farmers in different diversity contexts. This expectation is based on prior research indicating that farmers' awareness of the social and environmental impacts of their practices is shaped more by socio-economic factors, such as education and training, access to information, and economic incentives, than by agricultural system type (Gebska et al., 2020; Hou & Wu, 2010; Šarković et al., 2016; Sulewski & Gołaś, 2019). However, we do expect that farmers in diversifying or diversified counties are more likely to incorporate community considerations into their on-farm management decisions compared to those in simplifying or simplified counties. Miaris et al. (2024) suggests that diversified farms are often guided by non-use values, such as social sustainability and the provision of local employment opportunities, rather than focusing solely on profit. Additionally, other studies show that the adoption of sustainable management practices in agricultural systems can be driven by growing community demands for local foods, the influence of farm-to-fork movements, and the need to comply with organic or sustainable standards (Izumi et al., 2010; Lancaster & Torres, 2019).

In the subsequent section, we briefly review existing literature on the inclusion of community considerations in on-farm management decisions. We then outline the social-ecological systems framework and describe the specific variables that guide this study. Subsequently, we outline our methodology encompassing the data collection and analytical approaches. Following the presentation of our findings, we discuss the contributions of this study to the literature on sustainable agriculture and community well-being.

4.2.1 The inclusion of considerations for community in farming decisions

Community issues associated with agriculture do not develop within a vacuum; rather, they stem from human managerial strategies interacting with various factors and circumstances. Therefore, intentional management practices that consider the broader community landscape of the farming operation are an important starting point for tackling many of the issues attributed to agricultural systems (Rosburg & Grebitus, 2021). Recent calls for sustainable transformations of farming systems highlight the significance of management choices that prioritize CWB along with production and environmental objectives (Lyons et al., 2016; National Research Council, 2010; Reganold et al., 2011). As a complementary, more optimistic, and inclusive perspective to Goldschmidt's hypothesis highlighted earlier, the National Research Council posits that every farm, regardless of its size, structure, or marketing approaches, can potentially and responsibly contribute to different aspects of community well-being (National Research Council, 2010).

Prioritizing community concerns is not inherent to a productivist approach, which is primarily driven by the goals of maximizing yields and profits. For example, legislation aimed at addressing valid public concerns, such as mitigating the adverse impacts of industrialized farming on communities, has often encountered resistance from corporations (Francois, 2024; L. Lobao & Stofferahn, 2008; Lyson & Welsh, 2005). This would suggest that a paradigm shift towards prioritizing CWB is not imminent. Paradigms begin to change when actors become aware of an issue with the status quo, prompting them to act toward addressing it through deliberate and purposeful efforts (Sechzer et al., 1994). Hence, the intentional integration of community concerns into agricultural decision-making would start with farmers being aware of the impacts of farming on communities.

Research that examines farmers' perceptions or knowledge of critical societal issues is skewed toward exploring ecological concerns compared to social concerns. For instance, several studies have examined how farmers perceive and adapt to climate change (Chatrchyan et al., 2017; Clements et al., 2021; Findlater et al., 2018; Jemison et al., 2014; Niles et al., 2016). Although social scientists have long contributed to public debates concerning the community impacts of farming (Lobao & Stofferahn, 2008), few studies explore farmers' perspectives on the effects of their industry on local communities, and more particularly investigate the extent to which farmers perceive they account for community issues in their management decisions. The civic agriculture literature, pioneered by Tomas A. Lyson (2000, 2004, 2005), primarily examines the integration of local agricultural and food production within communities. However, this body of work also lacks research on farmer perceptions of the integration of community concerns into decision-making, particularly in comparative studies across different contexts of cropping system diversification.

4.2.2 A social-ecological systems approach to community considerations in farming decisions

The agricultural landscape offers an appropriate scale for examining community considerations in farming decisions. Burchfield et al. (2019) noted that many of the processes that define agricultural systems emerge from complex interactions between human activity, biophysical context, and land use at the landscape scale. Agricultural landscapes encompass a complex matrix of agricultural fields where management activities occur, mixed with human infrastructures such as roads and residences, as well as semi-natural habitats (Marshall, 2004). In addition, these smaller-scale elements are integrated into larger-scale systems such as the broader community or regions (Selman, 2006; Wittman et al., 2017). When management practices are implemented at the individual farm level, their cumulative impacts often extend to the broader community to shape landscapes (McGonigle et al., 2020). For example, the use of groundwater resources for on-farm irrigation practices in Western Kansas contributes to the depletion of the Ogallala Aquifer, which in turn supports the consolidation of farms and the decline of rural communities (Gibson & Gray, 2016). Additionally, the use of pesticides in on-farm management decisions has broader community health implications, including impacts on the mental health of rural residents (Alam et al., 2024). Because of this dynamic, farm management, when considering the wider community, can be viewed as a common-pool resource management challenge that extends beyond the interests of individual farmers (Ostrom, 1990; Partelow, 2016).

Scholars increasingly recognize agricultural landscapes as social-ecological systems, characterized by complex and dynamic interactions between the social and ecological system properties (Blesh et al., 2019; Fischer et al., 2014; Santos-Martín et al., 2019; Wittman et al., 2017). Built upon Ostrom's (2009) social-ecological systems framework (SESF), a common goal of this work is to transition away from the productivist paradigm, urging recognition of the interconnectedness of agricultural systems with social and ecological dynamics, which entails addressing issues beyond solely maximizing production (Blesh et al., 2019). The SESF stands out as one of the most popular frameworks for investigating social-ecological systems (Schneider et al., 2020). Researchers synthesized and adapted the SESF framework to explore its applications and challenges across multiple contexts, including agriculture, fisheries, forestry, conservation, food security, and water (Duff et al., 2017; Partelow, 2018; Wittman et al., 2017). However, Wagner et al. (2020) observe a common trend wherein the metrics employed to operationalize the SESF often overlook the perspectives of individual actors.

This paper draws partially on the SESF to determine how farmers perceive considerations for the broader community in their management choices. Partially, because we recognize that farmers do not hold exclusive control over on-farm management decisions and practices (Jackson, 2008; Primdahl et al., 2013), and our research will not fully encompass all aspects of the framework. Actors are an important feature of the SES framework. At the core of the SESF lies the presumption that "humans can make conscious choices as individuals or as members of collaborative groups, and that these individual and collective choices can, at least potentially, make a significant difference in outcomes" (Mcginnis & Ostrom, 2014, p. 1). This perspective implies that farmers, as members of a larger social-ecological system, can actively contribute to shaping outcomes related, for instance, to CWB through their management decisions and interactions with broader social and ecological dynamics. For example, the state of well-being of agricultural communities can be considered as a consequence of farmers' decisions and actions, such as diversification of farm enterprises (National Research Council, 2010), reduction of agrochemical usage (Centner, 2021), and participation in local food markets (Schoolman et al., 2021).

Farmers' strategies to diversify their cropping systems may directly or indirectly address community concerns associated with agricultural practices. Research shows that well-being is connected to ecosystem services (Millennium Ecosystem Assessment, 2005), and crop diversity can be an indicator to explore these linkages (Garibaldi & Pérez-Méndez, 2019). In their study analyzing socioeconomic information and agricultural data from forty-four countries, Garibaldi and Pérez-Méndez (2019) demonstrate an increase in agricultural jobs across nations experiencing an increase in crop diversity. Moreover, Feliciano (2019) shows a growing body of knowledge linking crop diversification with multiple sustainable development objectives, such as gender equality, income generation, food security, and nutrition. However, to what extent farmers' decisions to diversify their systems are linked to their awareness of community implications of their management practices is not yet clear.

At the center of the SESF are the focal action situations (see Figure 2.1 displayed above and Figure 2 in Mcginnis and Ostrom (2014)), which are critical points where farmer decisions and actions can significantly influence the functioning and sustainability of agricultural systems and communities. Schlüter et al. (2019) broadened Ostrom's concept of an action situation beyond its original context of social interactions to include two additional types: the social-ecological action situation and the ecological action situation. While the former encompasses interactions between humans and the natural environment (such as a particular landscape, which is the focus of this study), the latter focuses on interactions between biophysical or ecological components. Schlüter et al. (2019) identified six general types of social-ecological action situations: cultivating/harvesting, converting, recreating, cultural activities, ecological monitoring, and polluting. These types represent typical interactions between humans and non-human entities, resulting in specific outcomes such as landscape change, new perceptions, or increased knowledge.

Knowledge plays a pivotal role in informing management decisions in the context of a cultivating/farming action situation. For example, farmers may adjust their management practices based on their perceptions or knowledge of potential outcomes, such as a decrease in soil quality due to monocultural practices or community health issues associated with the extensive use of agrochemicals. Knowledge of the social-ecological systems is a key variable in Ostrom's model (Mcginnis & Ostrom, 2014; Ostrom, 2009), yet defining and measuring this variable has posed considerable challenges (Partelow et al., 2021). What constitutes knowledge for Dancette and Sebastien (2019) in the context of SES is the comprehension of systems' attributes and/or dynamics. Prior research refers to knowledge as an understanding of the effectiveness and efficiency of various actions, particularly in achieving desired outcomes (Ackoff & Emery, 1972; Yim et al., 2004). In this study, we emphasize farmers' knowledge of the effects of on-farm management practices on CWB to better capture the extent to which community considerations influence farmers' decision-making across places with high crop productivity that also demonstrate diverging trends in cropping system diversification.

4.3 Methods and Analysis

This paper investigates considerations for community in the on-farm decision-making of crop producers (CP)[2] in the U.S. Our analysis primarily utilizes data from CP interviews, complemented by select items derived from a structured survey, aiming to capture a larger picture of community considerations in agricultural decision-making processes. The study draws upon the design and methods of a larger mixed-method project which explores the local- and regional-scale factors serving as barriers or bridges to the diversification of agricultural landscapes. Interviews were conducted first as an exploratory approach to gather insights from farmers, which then informed the development of the survey instrument used nationwide.

4.3.1 Semi-structured interviews

We selected four counties for interviews using methods based on prior research exploring change in Shannon Diversity Index (SDI), computed using USDA's Cropland Data Layers from 2008 and 2018, and the levels of productivity of five major crops, such as corn, alfalfa, hay, soy, and (winter) wheat (Burchfield & Nelson, 2021). Specifically, we prioritized counties that

[2] The terms crop producers and farmers are used interchangeably throughout this paper.

produce high yields across multiple crops, have a high percentage of their land dedicated to cultivation, and where current levels of landscape diversity have resulted from significant recent changes in land use. Counties with diverging diversification trajectory contexts were intentionally selected to capture participants' viewpoints from different management regimes. This method yielded two pairs of counties in two distinct USDA-defined farm resource regions (Tables 4.1 & 4.2, Figure 4.1) consisting of one diversifying county and one simplifying county. Two counties – Ellsworth County, Kansas, and Nuckolls County, Nebraska – are located in the Prairie Gateway region. The other two counties – Bertie County, North Carolina, and Washington County, North Carolina – are in the Southern Seaboard region. Table 4.1 demonstrates that, within each region, simplifying counties have larger farms and fewer full owner-operators and receive more cash from government programs. Diversifying counties show greater median household income.

Table 4.1 Some characteristics of the interview counties

Farm Resource Region	Prairie Gateway		Southern Seaboard	
	Ellsworth, KS	Nuckolls, NE	Bertie, NC	Washington, NC
Crop trajectory	Diversifying	Simplifying	Diversifying	Simplifying
Counties				
Total population	6376 (-1.86)	4095 (-9)	17,934 (-15.73)	11,003 (-16.82)
White (%)	88.7	94.3	35.34	45.43
Black (%)	3.98	0.15	60	48.85
Hispanic (%)	5.72	2.88	1.84	3.37
Median household income ($)	56,306	52,975	35,042	30,941
Agriculture				
Farm operations (#)	384	431	323	141
Median acres/operation	271	480	111	132

Median net farm income ($/operation)	36165	83467	96,011	66,734
Acres operated by full owners (percent)	14.78	10.71	18.67	11.39

Note: Demographic and farm data from the 2020 US Census and 2017 USDA Census of Agriculture, respectively. Numbers in parentheses in the total population row indicate the percent decennial change from 2010 to 2020.

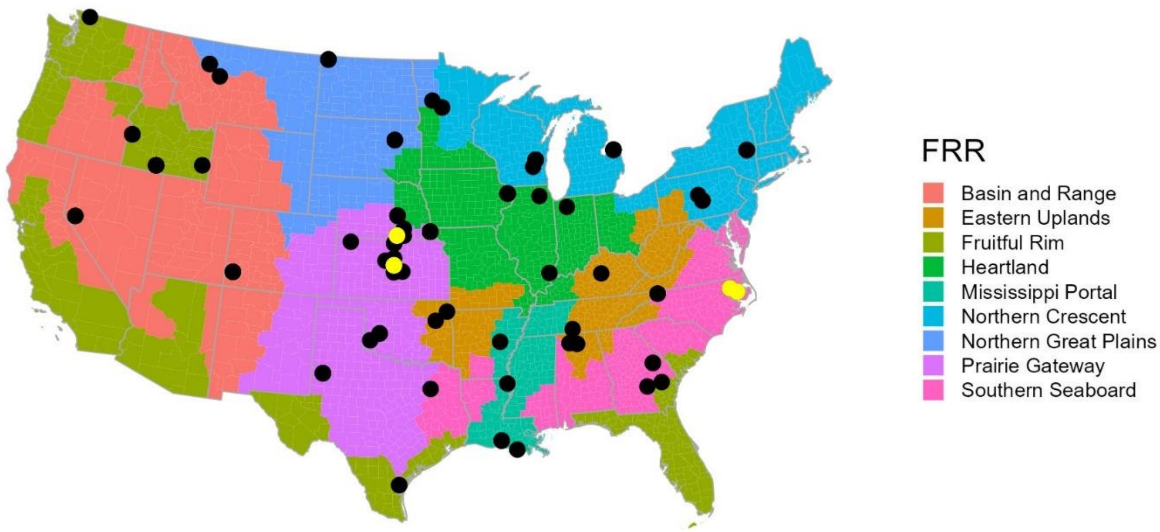


Figure 4.1 Counties of survey respondents (black dots) from each of the nine US Farm Resource Regions (FRR) delineated by the USDA ERS (2000). Yellow dots show counties that were considered as both interview and survey sites

We initiated participant recruitment using snowball sampling techniques, starting with referrals from county agricultural extension agents. With interview protocols approved by university Institutional Review Boards, data collection spanned from October 2021 to May 2023. Recorded following each participant's consent, the interviews extended for an average duration of 60 minutes and focused on a range of topics, including factors influencing crop selection decisions, decision-making with distant community/ecological impacts in mind, the perception of the contribution to the local economy, and community factors impacting management decisions. We developed an interview guide primarily consisting of open-ended questions to enhance dialogue with participants. For example, to explore CPs' awareness of community impacts of on-farm management decisions, we asked the question, "Do you manage your land with distant landscape/community/ecological outcomes in mind? If so, how and why? These open-ended questions allow interview participants to interpret and respond based on their own perspectives. In total, we conducted twenty-six semi-structured interviews with CPs, including 7 in Ellsworth, 5 in Nuckolls, 5 in Bertie, and 9 in Washington, which represents an average of approximately 2% of the farm operators in each interview county (Table 4.2, Appendix Table B.1). Interviewers found no new explanations of on-farm management decision-making factors after interviewing around three-fourths of participants in the Prairie Gateway region and two-thirds of participants in the Southern Seaboard region[3].

Table 4.2 Participant profile

		Interview	Survey
Gender	*Male*	25	132
	Female	1	14
	*Other**	0	8
Education	*High school*	6	34

[3] Here, we considered the measure of interview saturation for the overall data collection of the larger project, which included both crop producers and agricultural experts. We realized that breaking down these figures for interviews conducted by the same interviewers over the same period on similar themes is not practical. Fifty semi-structured interviews were conducted in total, with 18 participants in the Prairie Gateway region and 32 participants in the Southern Seaboard.

	Associate degree or some college	9	21
	Bachelor's degree	10	66
	Graduate degree	1	27
	Other	0	6
Age	*18 to 34*	6	2
	35 to 54	6	23
	55 to 64	5	38
	65 or older	9	84
	Other	0	7
	Total	26	154

* Other designates cases that are either blank or prefer not to answer

Following transcription of the interview data, we constructed a hybrid coding framework that integrated deductive elements, guided by our interview questions rooted in the existing literature on the community impacts of farming, with inductive techniques that captured emergent codes of interest (Braun & Clarke, 2006). Our coding process followed three distinct steps: 1) open coding, where we identified broad thematic domains to organize the data; 2) axial coding, which involved refining and categorizing the open codes to explore relationships between themes; and 3) selective coding, in which we further developed and elaborated on the key themes identified (Cope & Kurtz, 2016). We used Taguette, a free and open-source software for qualitative research (Rampin & Rampin, 2021), to code the transcripts and further refined and visualized the codes using R (R Core Team, 2022) to examine patterns in the data. We ensured validity and reliability through our iterative approach, which involved revisiting transcripts when new explanations required defining additional codes.

The primary intent of this data collection approach was to explore both inter-regional and intra-regional dynamics of farming decision-making. This allows the research to not only explore regional variations of community considerations within farming decisions but also illuminate disparities between the prevailing monocultural paradigm, criticized for its various economic, social, and environmental drawbacks (Lobao & Stofferahn, 2008), and its proposed sustainable alternative, which prioritizes ecosystem health and the well-being of individuals and communities (Bowman & Zilberman, 2013; Burchfield & Nelson, 2021; Garibaldi et al., 2017). However, we chose to examine themes across different agricultural contexts rather than conducting detailed comparisons between them because the interview data revealed considerable variability in responses on specific topics and lacked consistent patterns that could be reliably compared across diversity contexts. Our analysis focused on identifying and understanding the overarching themes that emerged from the interviews to better illustrate the range of community considerations included in farm management decisions.

4.3.2 Survey

This paper's analysis is also informed and complemented by data from a structured survey conducted with CP nationwide. In contrast to the interview county selection approach, the survey adopted a broader approach to county selection, utilizing Nelson and Burchfield's (2023) diversity–productivity typology. This typology, based on county-level data from 2008, categorizes counties into five groups: low diversity and high productivity (LD/HP), low diversity and productivity (LD/LP), high diversity and low productivity (HD/LP), high diversity and productivity (HD/HP), and average diversity and productivity (AVERAGE) (Appendix Figure B.1). For this study, which places greater emphasis on diversity contexts rather than productivity levels, we reduced the types to three categories by grouping counties based on diversity characteristics: low diversity (LD), average diversity, and high diversity (HD) contexts.

Using contact information obtained from a commercial farm contact service, data collection targeted farm owners and operators from 56 counties across 27 states (Figure 4.1), covering major agricultural regions in the U.S. and representing each category in the diversity-productivity typology. Data collection took place from August 2022, when a pilot online survey was run using a random 10% sample, to summer 2023, when the last full mail surveys were received. We reached out to participants of the full survey using both email and postal mail methods. For the full survey, we sent over 6,000 emails, accompanied by multiple follow-up reminders, and mailed a paper version of the survey to approximately 3,000 randomly selected contacts from the participant pool, preceded and followed by one invitation postcard and one reminder postcard. Participants were given the option to be included in a random drawing for $50 gift cards. Despite these efforts, the response rate remained low, with only 73 responses received from the online survey and 140 responses from the paper version. We noted that the number of requests to be removed from the survey distribution list was similar to the number of survey completions. Out of these 213 individuals who initiated the survey, we excluded approximately 30% of cases due to incomplete responses (Table 4.2). On average, the survey responses in each county accounted for less than one percent of the total number of farm operators (Appendix Table B.1). This low response rate reflects broader, widespread trends observed in survey research, particularly in agricultural contexts (Eggleston, 2024; Pennings et al., 2002; Shiyab et al., 2023; Stedman et al., 2019; Ulrich-Schad et al., 2022; Wu et al., 2022) but does indicate that our analyses are more likely to be affected by non-response bias.

Survey questions encompassed a wide range of farming aspects, including operational productions and attributes, political-economic incentives, livelihoods, markets, management practices, perceived community outcomes, values, beliefs, well-being, and demographics. For this study, the items included in the analysis were derived from question sets that comprised multiple items measured on 5-point scales, such as agreement and importance, with a focus on community-related aspects. As an illustration, farmers were prompted to indicate their level of agreement with statements such as "My management decisions impact the local community and environment." Additionally, they were queried about their beliefs regarding the importance of certain characteristics for being a good farmer, such as considering the health of their community.

We performed a purely descriptive statistical analysis by indicating the median and mean for the selected items. When necessary, we displayed figures of percentage distributions for some of the survey questions under consideration to provide a clearer visual representation of the data and facilitate a better understanding and comparison of the responses. Due to the ordinal nature of the select survey items (Boone & Boone, 2012; Subedi, 2016), we employed non-parametric statistical methods to compare the three groups that make up the diversity typology used in the survey (Appendix Tables B.2 & B.3).

4.4 Results

Our primary objective in this paper was to identify farmers' perspectives regarding community considerations in on-farm decision-making processes across distinct contexts of crop diversification. We have integrated survey and interview data to structure our study results, determining how farmers perceive the community impacts of their management practices and elucidating scenarios in which farmers include community concerns in their farming decisions.

4.4.1 Farmers' awareness of community impacts of on-farm management decisions

We explore crop producers' (CPs) awareness of community impacts of on-farm management decisions by asking questions about their consideration of distant landscape/community/ecological outcomes when managing their land, as well as their recognition of the potential neighborhood impacts of their land management. Interview participants primarily centered their responses on the perceived ecological impacts of farming practices in their responses to the above questions. For instance, one participant from Kansas expressed a sense of frustration and conflict between their desire to work in alignment with natural processes and the practical necessity of using synthetic fertilizers and herbicides. They emphasized, “I try to work with nature, but I know that I'm failing. When it doesn't rain, it's kind of like, every time I have to use synthetic fertilizers or herbicides, I know it just goes against everything I want to do.” Another Nebraska farmer shares a similar perspective, discussing the significance of the environmental impacts of farming practices, expressing, “I think what's really important is the impact you have on your environment. And you want to have a positive impact on that, like leaving the world a better place than when you were first here. And the hardest thing is understanding how you do that.” One participant expressed apprehensions regarding monoculture farming practices that diminish the visual appeal of the community, stating, “I think most of the places that really get ugly are where it's nothing but corn and soybeans grown.”

Crop producers tended to overlook other perceived community impacts, such as economic and social impacts, unless prompted with further probing questions by the interviewers. When asked to consider these potential impacts, respondents most commonly mentioned marketing strategies (e.g., buying and selling locally) and social relationships (e.g., engagement and participation). The next section provides further details on these considerations. However, we noted more instances where participants discussed potential negative environmental impacts compared to negative social or community economic impacts associated with their farming practices, as reported in Lobao and Stofferahn (2008). Interview data was collected across sites by different interviewers using very open-ended questions, allowing participants to freely express their perspectives. Responses varied across the four counties, and we did not observe consistent thematic differences across diversification contexts.

Additionally, the structured survey expanded on the interview responses, which mostly focused on the ecological impacts of farming practices, to further explore CPs' awareness of the community impacts of their farming decisions. We asked a set of questions to describe how CPs view their farming activities interacting with neighboring operations in their community. Particularly, the questions sought farmers' agreement on a 5-point agreement scale regarding the influence of neighboring activities on their decision-making or farming performance (Table 4.3). A small percentage of farmers strongly agree that neighboring practices affect their cultivation decisions and farm productivity, while a significant portion neither agree nor disagree. Interestingly, a large majority of farmers (58%) disagree that their livelihood depends on outperforming neighbors, which suggests a more cooperative than competitive outlook among actors. Concerns about herbicide drift or cross-pollination are notable, with over half of the respondents agreeing to some extent, highlighting awareness of environmental interdependencies among farmers in the community.

Table 4.3 Farmer perspectives (in percentage) on neighboring impacts on their operations

Survey questions (n = 154)	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
What happens on neighboring operations affects my cultivation decisions	14.71	17.65	31.62	26.47	9.56
What happens on neighboring operations affects the productivity of my farm	14.71	15.44	32.35	25	12.5

My livelihood depends on outperforming my neighbors	40.44	17.65	34.56	5.15	2.21
I am concerned about herbicide drift or cross-pollination from my neighbor's farm	12.5	12.5	21.32	33.09	20.59

Figure 4.2 illustrates the degree of agreement among survey respondents regarding the impact of their management decisions on the local community and environment. The data reveals that a majority of farmers either strongly agreed (22%) or somewhat agreed (42%) with the notion that their farming activities have an impact on the local community and environment (Fig 4.2a & 4.2b, Appendix Table B.2). Fewer respondents remain neutral, and an even smaller number disagree to varying degrees (12%). This distribution suggests a high degree of recognition among farmers of the interconnectedness of their work with community well-being and their role within the broader community landscape. Except for a small percentage of CPs expressing strong disagreement in the low-diversity counties, we generally observed the same patterns of agreement/disagreement across types of counties. This suggests that most CPs recognize the impact of their management decisions on the broader community and environment, regardless of the county type. In addition, the results from the Kruskal-Wallis test show no significant differences between the two groups of counties (Appendix Table B.3). Thus far, these findings meet our expectations of no significant difference in community impact awareness among CPs from different diversity types of counties (Appendix Table B.2). We found that these results held consistent even when considering county productivity by analyzing the five categories from Nelson and Burchfield’s (2023) original typology (Appendix Figure B.2).

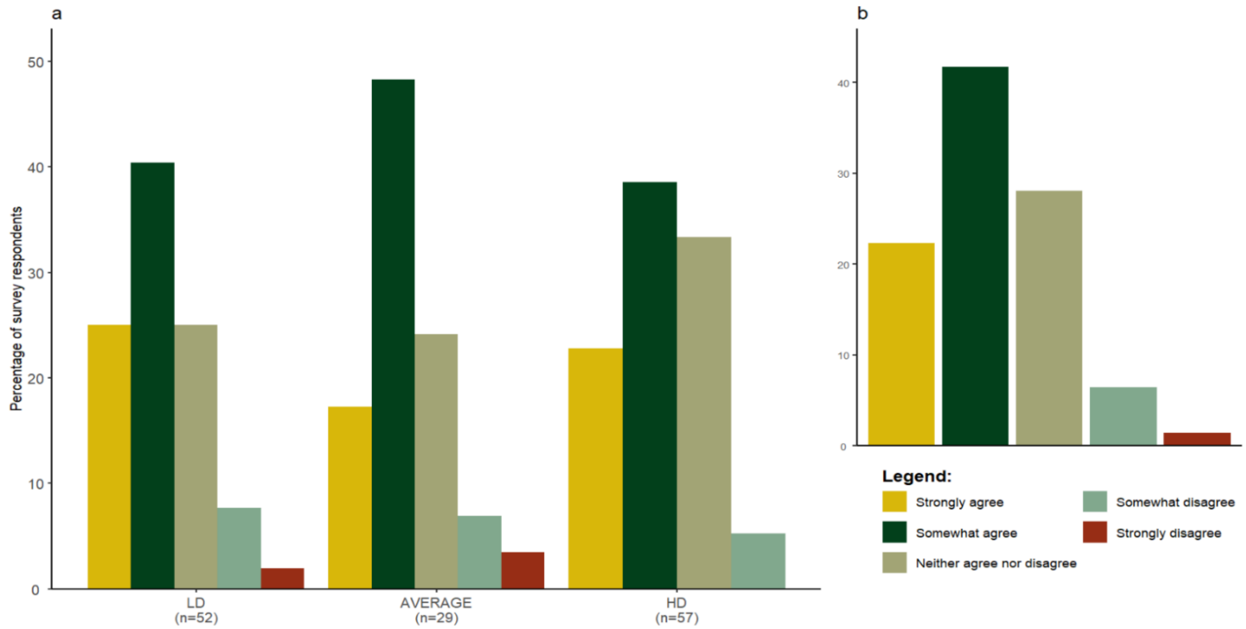


Figure 4.2 Percentage of survey respondents reporting their agreement/disagreement to the statement related to the impact of their management decisions on the local community and environment across the three types of counties (a) and considering all survey respondents as one group (b)

4.4.2 Incorporation of community concerns in farming decisions

A major part of the conversations on considerations for community in on-farm management decisions was on identifying some scenarios through examples provided by farmers of decisions they made/avoided in their farm operations because they thought these decisions would have positive/negative effects on the community. Many interview participants provided insights into decisions they have actively made or refrained from in their farm operations due to community considerations (Appendix Table B.4). These encompass a wide range of factors such as community health, water resource management, economic opportunity creation, education, as well as engagement and participation. Driven by prominent themes emerging from the coding, we organized CPs' responses into four main themes, encompassing considerations for community economics (19 participants), considerations for community/public health (10 participants), education (8 participants), and community cohesion (14 participants).

Theme 1: Considerations for community economics

When making farming decisions, farmers demonstrated their contributions to fostering the economic vitality of their communities, placing particular emphasis on initiatives aimed at creating economic opportunities locally and bolstering support for neighboring businesses. Many farmers emphasize the importance of deliberate choices regarding where to purchase agricultural inputs and how to support local businesses, with motivations extending beyond mere profit-making and reflecting concerns for the prosperity of the broader community. As one participant from Nebraska expressed, “I like to patronize the small towns and the businesses in the small towns. And I'll be honest with you; it irritates me a little bit when other people come in and gobble up all the farm ground and don't use the local facilities.” Despite their emphasis on prudent financial management in their farming operations, one farmer from Kansas highlighted their commitment to supporting (often more expensive) local businesses by stating, "I try to stay local as much as possible on my inputs." Similarly, another farmer from Nebraska stated: “I buy everything pretty much locally…It is important that we buy. I mean, we support the local guys and their prices.” Another CP from Kansas elaborated on their rationale for sourcing agricultural inputs locally, emphasizing the importance of supporting local employment. They stated, "So that's keeping some local people employed at those locations and around." There are many other instances where participants refer to conducting business locally as an economic consideration they have made for their community.

However, one aspect that didn't prominently emerge from the interviews, conducted within the context of exploring factors influencing crop diversification strategies, was the explicit consideration among CP to introduce a new crop into their operation with the specific intent of generating employment opportunities for community members. We found one participant from North Carolina who discussed the impacts of growing potatoes, not only for their farm success but also for the community's economic dynamics. Despite previous successful experience with conventional crops like corn, soybeans, and wheat, the participant finds satisfaction in mentioning their unique venture into growing potatoes, which significantly impacted the neighborhood's economy. They state, "It's been over the years corn, soybeans, and wheat. My neighbor's got into potatoes. At one time, I started growing chipping potatoes... It changes the economic dynamics in the neighborhood, something tremendous." Overall, no clear patterns were observed across diversifying and simplifying contexts where CPs emphasized economic benefits for the community as a motivator for crop diversification.

Theme 2: Considerations for community/public health

Community health emerged as another critical theme among CP considerations, with the use of dicamba[4], for example, standing out as the primary agricultural practice avoided by farmers. This perception was echoed by several CPs across counties. For instance, one Kansas participant articulated, "I've tried to avoid using dicamba as much as possible because just watching what that stuff did to other plants, it really opened my eyes to how long that stuff stays in the air. And if you live out here, I mean, people are breathing it in, and they don't even know… I would say the avoidance of that is for my community." Similarly, another CP in

---

[4] Dicamba is a broad-spectrum herbicide used to control annual and perennial broadleaf weeds in various crops, including soybeans, corn, cotton, and wheat (Harp 2010). Its usage has been controversial due to its associations with human health issues, including colon cancer and lung cancer (Lerro et al., 2020).

Nebraska emphasized, "The obvious one is dicamba." One Kansas farmer mentions the need to notify neighbors when spraying to avoid contaminating their laundry, for instance, with dust or residue, “I've always got the field sprayed, not when I wanted to, but I've always got it done eventually. We have a couple of people that are far and close to me. The ladies put their laundry out on the line quite often, and if I show up and there's something out on the lawn or on the line, I'm giving them a call that hey, I'm going to be making some dirt fly or spraying… you might want to go grab your clothes…” Another farmer expresses frustration with fellow farmers who prioritize financial gain over stewardship practices, highlighting the tension between economic interests and community well-being: “I think some of them [farmers] are just uninformed. I see some [] farmers that I don't think they know the stewardship part they just know the dollars and cents and saying like I'm such a [] farmer I can't wait for the wind to be right, I gotta scrape today no matter what."

In addition, agricultural practices such as non-conventional tillage appeared to be a community health consideration. While discussing possible considerations for community health, one Nebraska interviewee stated, "Honestly, since we're not conventional till, there's not a whole lot of opportunity for our soil to blow around and create health hazards like that.” In a parallel conversation, a Kansas farmer echoed desires for broader change within the farming community, highlighting community concerns resulting from excessive tillage. They emphasized, “I would say it's [farming practices] better than my neighbor whose dirt's blowing all summer…But I also know it's like a little. What I'm doing isn't going to change anything if nobody around me ever changes.”

Theme 3: Considerations for community education

A common thread throughout the interviews is the lack of interest among younger generations in pursuing farming as a livelihood. While considerations such as economics and health dominate discussions on farming decision-making, education of community youth about agricultural practices emerges as a less frequently mentioned but equally important aspect. Some farmers expressed concern over the disinterest of younger individuals in agriculture, recognizing it as a sustainability issue threatening both the future of farming and the viability of the local community population maintenance. For instance, to address the declining farming literacy, one participant in North Carolina envisioned their farm as a platform for education, planning to construct a classroom to impart agricultural knowledge to young individuals. They stressed the difficulty of engaging young people in agriculture and highlighted their efforts to address this challenge by involving them in farm activities. They emphasized, “The thing there is getting young people involved in that [agriculture] is difficult. So, what we are trying to do on the farm here is get young people involved in this. I would like for this farm to be a demonstration farm...as a matter of fact, we built this to be a classroom and teach young people about agriculture.” A joint discussion with two CPs in North Carolina illustrated their commitment to community engagement and education, particularly in involving young people. They described organizing farm tours for students, stating, “I have schoolteachers call me and want to come to tour the farm and do stuff. And I try, especially the greenhouses, what they really like to see; they don't understand seedless watermelon production, and not many people do. When they say, well, how do you grow a seedless watermelon, you know, and trying to explain what that is.”

Theme 4: Community care/cohesion

Other aspects of community considerations in farming decisions illustrated by the interviews encompass responsible water usage, collaboration with local food pantries, community engagement, and neighborliness. Demonstrating a sense of responsibility towards local water resources, a Kansas CP expressed concerns about the impact of their water usage on the broader community. They remarked, “Sometimes, I don't like watering because we have [some] pivots here, and they all come out of the river, and our local community actually pumps out the river for the water in the community. So, sometimes it's hard to pump water when it's dry like this, knowing that the community is going to have to use the same water, you know. We haven't ever had to stop. But sometimes, yeah, it is a consideration.” In another instance, a participant from North Carolina highlighted their recent collaboration with a food pantry, indicating a shift towards contributing to community well-being by supplying produce to those in need. Several farmers emphasized the significance of allocating time to engage in community activities despite the demanding workload of farming, recognizing it as a crucial consideration for fostering the vitality of their community. A participant from Kansas underscored their extensive community involvement, devoting substantial time and effort to various local boards and organizations.

Freeing farmers from one another has been one of the key expressions of agricultural industrialization in rural life (Kimball, 1949). However, there are many instances throughout the interview discussions where farmers acknowledge some form of neighborliness with their surrounding communities, primarily in actions they abstain from to prevent adverse impacts outside of their fields. One CP from North Carolina emphasized the mutual support within the farming community, stating, “We look out for each other... You don't want to raise something that does help you but hurts your neighbor.” Expressions like this have consistently emerged across the interviews as important community considerations in farming decision-making.

Another North Carolina farmer emphasized the importance of communication among growers to remain “a good steward and have good relationships with everybody.”

4.4.3 Instances of limited community considerations in farming

Several interview participants (approximately 27%) exhibited a tendency to give limited attention to community considerations in their farming decisions despite their awareness of the community impacts of their farm management decisions. For instance, one Nebraska participant indicated that they do not dwell extensively on the broader landscape or do not feel compelled to concern themselves excessively with broader landscape considerations to make farming decisions, emphasizing their focus on their own farming practices, which they believe align with those of others in the community: “I don't consider whole much about it [the community]. I got my own operation, and it pretty much fits in with everybody else's thinking, I believe. Well, the way you farm anyway. Yeah. I don't think I have to concern myself too much about that aspect of it."

In another instance, a Kansan farmer has decided to prioritize practical considerations, such as efficiency and cost-effectiveness, over community factors in their decision-making processes. Despite having a field visible from the county road and potentially affecting the community's perception, the participant chose not to clean it up due to practical reasons, stating: “As much as I wanted to go clean the field up, just because it's an eyesore, it's right along the county road… one good friend of mine gave me a bad time… People were scratching their heads and wondering what I was doing, but I had to stick with what was best, I guess, rather than, in that instance, time and money wasn't.” This demonstrates a tension between awareness and action. Even when farmers recognize the potential impact of their actions on the community, both structural and individual constraints – such as economic pressures or the need to prioritize efficiency – can often result in inaction.

4.4.4 Agreements of considerations for community from the survey

Complementing the interview findings under this section, farmers reported on their agreement with statements regarding the consideration of community health and safety in their farm management decisions, as well as their perceived importance of such considerations in defining a good farmer. Most respondents agree that they consider community health and safety factors in their own farming decisions (73%) or find it important (86%) that farming decisions consider community health and safety (Figure 4.3). The data identifies similar patterns of responses across diversity contexts, as the results from the Kruskal-Wallis test show no significant differences between the different groups of counties (Appendix Tables B.2 & B3). This reflects a collective acknowledgment of the community responsibility held by farmers and the importance they place on these considerations as part of their professional identity. Findings from the Kruskal-Wallis test for these two survey questions do not meet our expectations of significant differences among CPs from different county types regarding the incorporation of considerations for community in farming management choices (Appendix Table B.3). Again, the findings remained unchanged when examined across the five diversity–productivity types from Nelson and Burchfield's (2023) original work (Appendix Figure B.3).

Although no significant differences were found in responses through the Kruskal-Wallace test, a slightly higher proportion of agreement exists in the high-diversity (HD) contexts compared to low-diversity (LD) contexts, as is shown in Figure 3a. This suggests a stronger commitment to community health in farming decisions among farmers in HD counties. Notably, there is a small presence of strong disagreement in the LD counties, whereas no such disagreement is reported in the HD counties. Conversely, Figure 3c indicates that more respondents in LD contexts believe that including community considerations is important or somewhat important for being a good farmer, with very few holding opposing views compared to those in HD contexts. However, despite CPs generally expressing strong beliefs in the importance of considering community health as a key attribute of being a good farmer, the level of agreement on the actual implementation of these considerations in farming decisions is lower. This discrepancy between values and actions is evident across all county types, with a more pronounced misalignment in LD contexts. This suggests that external constraints, such as economic pressures, may hinder farmers from fully acting on their values regarding ICC in farm management decisions.

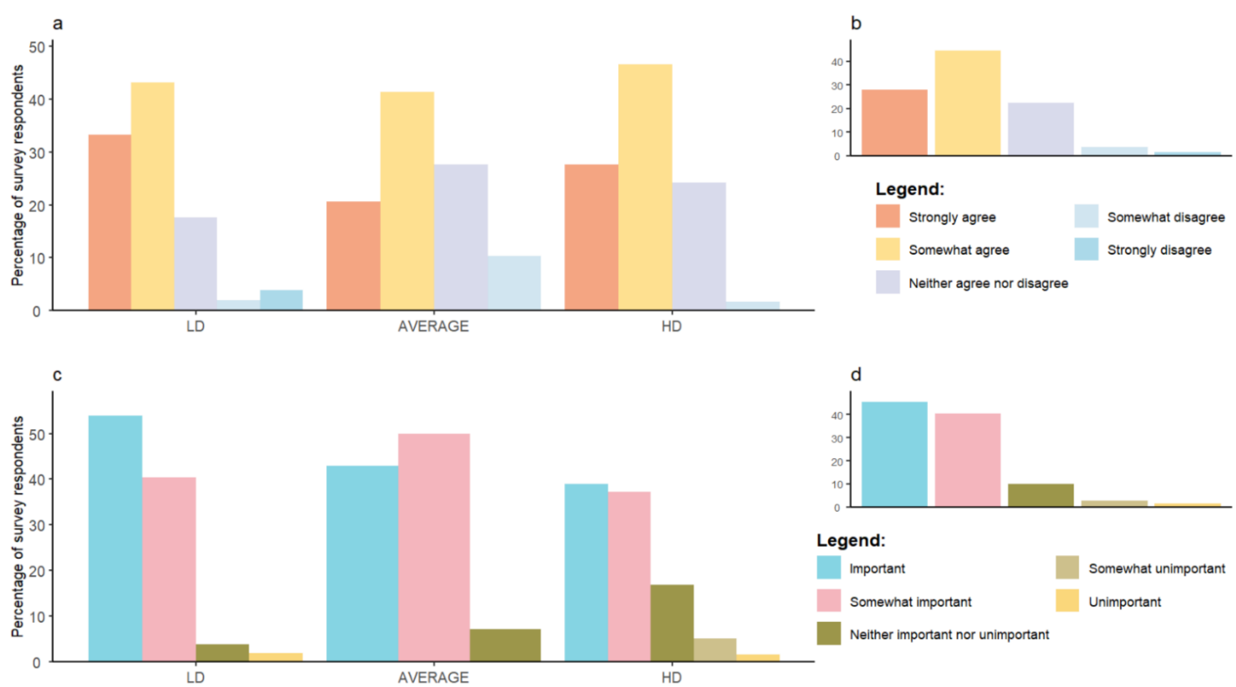


Figure 4.3 Percentage of survey respondents across the three types of counties (a) and considering all survey respondents as one group (b) reporting their agreement/disagreement to the statement "I take the health and safety of my community into account when making decisions about my farm" and across the five types of counties (c) and considering all survey respondents as one group (d) rating the importance/unimportance of the attribute "Considers the health of their community" for being a good farmer

4.5 Discussion

The findings from the survey are consistent with the results obtained from the interviews and provide several insights into CPs' awareness of the community implications of their farming operations and how much they incorporate this awareness into their decision-making processes about land management. Overall, our findings confirm that farmers from a variety of production approaches are conscious of the effects of their management practices on communities, with particular attention paid to environmental impacts. This result aligns with prior research that indicates farmers are aware of the interdependence between their activities and community outcomes (Albizua et al., 2021). While previous studies often emphasize farmers' acknowledgment of environmental impacts, some research also highlights their awareness of the socio-economic implications of their practices, albeit to a lesser extent (Allen & Bernhardt, 1995; Austin et al., 1996; Niles et al., 2016; Partelow et al., 2021; Walter, 1997). For example, in a statewide study conducted in Nebraska, Allen and Bernhardt (1995) found that regardless of their adherence to an alternative–conventional production paradigm, farmers believed that vibrant rural communities are indispensable for the continued prosperity of contemporary agriculture. Niles et al. (2016) found little discrepancy in average awareness between environmental impacts and community impacts.

We also found that community considerations were often secondary to more individually oriented influences in farmers' decision-making processes. When asked broadly: "What are the important factors that go into your management decision-making process?" farmers primarily discussed direct, individual factors to land management, including economic (markets, input cost, and profitability), policy (governmental programs), biophysical, social (labor and succession dynamics), and techno-managerial (technology, time, etc.) factors. However, after further questions asking directly about considerations for community, we found that farmers also take into account various community concerns when making decisions. Through our analyses, we grouped these considerations under four major themes, comprising community economics, community/public health, community education, and community care/cohesion. Not all interviews engaged with each theme equally, as some emerged more prominently than others. Community economics had the highest consensus among participants (73 percent), followed by community care/cohesion (54 percent), community/public health (39 percent), and community education (31 percent). These themes reflect the dimensions through which farmers across multiple farming contexts perceive and integrate community considerations into their decision-making.

The scope of farming decision-making has expanded in recent years to encompass a range of concerns, including ecosystems and individual and community well-being (Bacon et al., 2012; Lyons et al., 2016; Niles et al., 2016; Norman et al., 2000; Schoolman, 2020; Schoolman et al., 2021). Despite primarily focusing on other agricultural concerns, such as climate change, community well-being consistently emerges as a noteworthy consideration in farming systems across several studies employing mental model analysis techniques (Clements et al., 2021; Hoffman et al., 2014). Furthermore, the literature on civic agriculture (Lyson, 2000, 2004, 2005), while primarily focused on smaller-scale agriculture and food ventures, has highlighted numerous instances of farmers engaging in community problem-solving initiatives, thereby fostering diverse forms of social and economic development within their communities (Kaika & Racelis, 2021; Poulsen, 2017).

While our interview data did not allow for inter- and intra-regional comparisons of the inclusion of community considerations in farming decisions across different management systems due to inconsistencies of responses on this specific topic, responses from the survey indicated a general recognition among farmers of the broader implications of their actions and a willingness to take steps toward incorporating community concerns into their farming decisions. Community impact awareness and community concerns' inclusion are similar even within highly productive counties with differences in diversity levels, such as LD/HP and HD/HP. Despite the inherent differences between these farming systems (Nelson & Burchfield, 2023), most respondents in both groups agree that community and environment health considerations are important in farm management and that they actively take the health and safety of their community into account when making farming decisions.

A growing body of research directly or indirectly links crop diversification with multiple indicators of community well-being (Bacon et al., 2012; Bellon et al., 2020; Feliciano, 2019; Garibaldi & Pérez-Méndez, 2019; Pellegrini & Tasciotti, 2014; Shreck et al., 2006). Although this study was conducted within the framework of investigating strategies for cropping system diversification, we did not encounter instances where community considerations emerged as a primary driver for incorporating additional crops into farming operations. In a rare case observed in North Carolina, a participant expressed satisfaction with the economic changes brought about by potato cultivation in their community. However, these positive community impacts were not intentionally sought after but merely coincidental with the participant's economic success. Community well-being can be improved and sustained when there is "a management activity that intentionally targets and plans for both environmental and economic success" (Rosburg & Grebitus, 2021, p. 2968) accompanied by social benefits for individuals and communities.

Finally, it is important to acknowledge some of the limitations of this study. We have presented interview data obtained from a non-representative sample in each county, relying on referrals, which could introduce biases into the findings. However, participation was entirely voluntary, and we assured participants of their anonymity and confidentiality before the interviews began. There is a need to increase the sample size of interviews conducted in each site to enable deeper inter- and intra-regional analysis. Moreover, the survey yielded a very low response rate, which constrained our ability to compare the integration of community concerns into agricultural decision-making across various farming systems and made our data inherently more susceptible to nonresponse bias (Czajka & Beyler, 2016; Johansson et al., 2017). Despite low response rates being a common trend in current survey research (Eggleston, 2024; Pennings et al., 2002; Shiyab et al., 2023; Stedman et al., 2019; Ulrich-Schad et al., 2022; Wu et al., 2022), and studies suggesting that nonresponse does not necessarily lead to nonresponse bias (Czajka & Beyler, 2016; Zahl-Thanem et al., 2021), caution should be taken when generalizing the results of this research.

4.6 Conclusions

Our analysis investigated farmers' awareness of the community impacts of farming systems and their potential considerations for community well-being in farming decisions. We did not anticipate any differences in awareness across different diversity contexts, as the socio-economic conditions of farming communities and the structural transformations in agricultural landscapes have been extensively highlighted over the years. We found that the discussions from the interviews and the responses from the survey confirm this expectation, showing that crop producers from both simplifying/simplified and diversifying/diversified agricultural landscapes are aware of how their management decisions impact local communities. This awareness is consistent across different regional contexts. As highlighted in the introduction, awareness among actors regarding existing issues is a catalyst for starting or supporting a movement toward a paradigm shift. More importantly, our results are from actors representing different regional contexts and a mix of agricultural systems, encompassing simplifying and diversifying cropping systems. These farming systems are fundamentally different in their characteristics and management approaches (Nelson & Burchfield, 2023), which means that our findings can be considered as evidence for the position of the National Research Council that any farm can potentially and responsibly contribute to CWB (National Research Council, 2010).

Additionally, our findings underscore that farmers are not only cognizant of the impact of their industry on community outcomes but also actively incorporate community considerations into their decision-making processes regardless of their production system. From the interviews, we identified four major dimensions of community concerns that farmers integrated into their management decisions: community economics, community/public health, community education, and community care/cohesion. The survey data reinforced the interview findings on the incorporation of community considerations in farming decisions by crop producers. However, the survey results did not confirm our initial expectations of statistically significant differences across diversity contexts. This lack of significant differences may be partially explained by the discrepancy in farmers' expressions of strong community values related to "being a good farmer" and actual implementation of community considerations. Additionally, there may be some degree of selection bias, as those who chose to participate in this study might already be more inclined to prioritize community well-being, potentially masking significant differences across diversity contexts.

The findings further show more complexity with the misalignment between awareness and action. While many producers demonstrate a strong awareness of community concerns related to farm management practices, their ability or willingness to act on this awareness is often inhibited by structural constraints, such as economic pressures and social norms, as well as individual characteristics and personal motivations. These barriers suggest that awareness alone is insufficient to drive meaningful changes in farming practices. In line with prior research (Hendel et al., 2024; Zapata-Ramos & Kim, 2018), this study underscores the importance of not only raising awareness but also addressing the systemic and individual barriers to initiating and sustaining behavioral changes related to the inclusion of community considerations in farming decisions.

These results are important for the future of agricultural landscapes, which are increasingly considered as social-ecological systems. Crop producers are among the key actors who can make conscious decisions that generate significant differences in SES outcomes. As they are required to make decisions for their farm operations, which often have impacts beyond their own fences, considering the well-being of the wider community when making these farming decisions can have significant implications for the sustainability of both agricultural systems and communities. Although we focused on crop producers in this paper, we acknowledge that other actors, including policymakers, researchers, and agricultural extension agents, are also important in shaping the outcomes of agricultural systems. These limited yet promising results offer hope for agricultural sustainability, emphasizing the significance of preserving agricultural landscapes for both producers and the broader society. We further reiterate the importance of conducting additional research to advance the integration of community considerations into farming decision-making processes.

Chapter 5 - Core Attributes of Farmers and Contexts Explaining the Consideration of Community Well-Being into Farm Management Decisions

5.1 Abstract

For over three decades, the scientific community has highlighted the urgent need for a transition towards more sustainable food production systems, not only to mitigate the adverse effects of modern agricultural practices on ecosystem health but also to enhance human well-being, particularly in rural communities. This transition necessitates significant mobilization across society, and its success hinges on identifying specific attributes of farmers and their practices that need to be activated, determining who need these changes, and understanding the contexts in which they are most effective. In this paper, we apply a regression modeling approach, using survey data from U.S. crop producers, to explore the relationships between farmers' attributes, socio-environmental context, and consideration of community well-being in farm management decisions. Our findings indicate that crop producers are more likely to incorporate community well-being considerations into their decision-making process if they have higher levels of awareness about the impacts of their industry on community life, place a high value on community health and well-being, and are willing to collaborate with neighbors and other stakeholders. These explanations are largely consistent when socioeconomic controls, landscape characteristics, and regional contexts of farming activities are taken into account. However, a strong focus on profitability may potentially conflict with community well-being considerations in farming decisions, particularly when considering the level of farming dependence among producers, and the strength of some relationships varies across landscapes.

Although findings are drawn from a limited number of participants, the study still provides a foundation for designing targeted interventions to advance the inclusion of community well-being considerations in farm management decisions.

5.2 Introduction

For over thirty years, scientists have consistently underscored the need to transition toward more sustainable food production systems in response to the detrimental consequences of modern agricultural practices on ecosystem health and human well-being. Such a transition demands significant mobilization across society, especially from those engaged in the agricultural sector. Although farmers possess varying degrees of autonomy to make decisions regarding production and management processes (Raedeke et al., 2003; Zhou et al., 2022), they are among the primary actors that can help move towards increasing sustainability (Goldberger, 2011; McCarthy et al., 2023; Primdahl et al., 2013; Soubry et al., 2020).

However, implementing management practices that align with sustainability, as defined decades ago in the Brundtland Commission report (WCED, 1987), is not an easy task for agricultural producers. Managing an agricultural operation involves merging various and often competing interests to accomplish ends (Cunha et al., 2023; Marshall, 2004; Oliver et al., 2012). Conflicts can arise when making farming decisions that balance economic, social, and/or environmental tradeoffs. For example, the nature of land ownership (e.g., partial ownership or tenancy) may compromise the potential for long-term investments in management practices that benefit ecosystems (Carolan, 2005). Similarly, while pesticide use in agriculture can prevent crop losses and reduce food production costs, its application poses risks to human health and contributes to environmental contamination (Centner, 2021). Additionally, although irrigation enhances agricultural productivity and supports crop stability, intense groundwater withdrawals can harm the environment and be detrimental to the well-being of surrounding communities (Lauer & Sanderson, 2020; Opie et al., 2018). These scenarios suggest that sustainability in agriculture is a challenging endeavor not only for farmers but also for other community members interested in the well-being and resilience of individuals and communities and the responsible use of resources (Streimikis et al., 2024).

Researchers from various academic disciplines, including sociology, psychology, anthropology, and geography, have a long history of studying the underlying reasons and motivations for human actions (Fishbein & Ajzen, 2011; Hoffman et al., 2014; Rushton, 1993; Wagner et al., 2020b). This multidisciplinary interest extends to agricultural producers, and indeed, given their critical role in sustaining life on this planet, farmers have become a major focus in many social and behavioral studies. For example, the behavior of farmers has been extensively studied in relation to multiple psychological and social dimensions, including their identity (Burton, 2004; Lavoie & Wardropper, 2021; McGuire et al., 2013; McGuire et al., 2015), their values and beliefs (Arbuckle et al., 2013; Sanderson et al., 2018), their socioeconomic characteristics (Comer et al., 1999), and, more broadly, the power of structural contexts (Krieg, 2014; Roesch-Mcnally et al., 2018). However, the literature shows a lack of consensus on what drives individuals' decisions, primarily due to the subjective nature of human motivations (Acosta & Carpenter, 1985; Gill et al., 1992).

For example, in their research examining farmers' perspectives across various agricultural systems on the prairies of southwest Saskatchewan, Canada, Abaidoo and Dickinson (2002) found that farmers' values differ based on their farming practices: conventional farmers typically align with the dominant social paradigm, which prioritizes economic growth, whereas alternative farmers generally adhere to the new environmental paradigm, which emphasizes environmental protection. However, earlier research[5] was cautious in its conclusions due to the complexity of decision-making processes. In a statewide research project involving farmers in Nebraska, Allen and Bernhardt (1995) noted that while farmers may hold diverse values and beliefs shaped by their paradigmatic affiliations (conventional versus alternative), these factors alone are insufficient to understand the observed variations in agricultural practices. Austin et al. (1996) emphasized the unpredictable nature of associations between attitudes and personal attributes with farm management approaches. Walter (1997) shared similar perspectives on the complexity of relationships between attitudes, values, beliefs, and farm management style in a study that correlated how Illinois farmers define success and their attitudes towards alternative farming. But a more recent study by Lincoln and Ardoin (2016) indicates that environmental values significantly influence the adoption of sustainable farming practices.

Building upon this literature and given the increasing interest in sustainable relationships between agricultural systems and communities, it is essential to continue researching management decisions that contribute to community well-being within farming landscapes. For now, although agricultural research increasingly acknowledges the importance of integrating

---

[5] Beus & Dunlap (1990, 1991) have significantly shaped this line of research which emphasized the dichotomy between conventional and alternative agricultural paradigms. Their work contrasted the dominant conventional agricultural system (namely Dominant Social Paradigm), which emphasizes high productivity and efficiency largely reliant on chemical inputs and mechanization, against alternative paradigms (namely the New Environmental Paradigm) that advocate for sustainability, environmental stewardship, and social equity. In their 1990 study, Beus and Dunlap argue that these paradigms are not merely practices but are rooted in deeper worldviews or belief systems about farming's role in society and its impacts on the environment. By 1991, they expanded this discourse by proposing the Alternative – Conventional Agricultural Paradigm Scale (ACAP Scale) to measure adherence to these paradigms, highlighting the roots of these belief systems and their influence on agricultural practices.

both social and ecological components to address the sustainability of agriculture, there is still a tendency to emphasize ecological variables in studies of agricultural decision-making (Bentley Brymer et al., 2020; Meredith et al., 2021). This limitation has prompted several scholars to recommend more investigations into how farming decisions interact with their broader community landscape (Bentley Brymer et al., 2020; Francois et al., 2024; Francois & Nelson, 2024; Meredith et al., 2021; National Research Council, 2010; Rissing & Burchfield, 2024).

The National Research Council's (NRC) Committee on Twenty First Century Systems Agriculture has highlighted the need to increase understanding of how various farming practices and approaches interact to influence pathways toward enhanced sustainability (National Research Council, 2010). The committee recognizes that, while U.S. agriculture has become more efficient in producing food, feed, fiber, and ornamental crops at prices acceptable to consumers, ensuring community well-being, alongside addressing other social concerns, continues to challenge farming systems in the 21st century. Interestingly, several social science studies (e.g., research on civic agriculture and local, community-based food systems) focused on the topic have explored how and when farmers integrate community considerations into their decision-making processes (Bagdonis et al., 2009; Ikerd, 2019; Lyson, 2000, 2005). For instance, Lyson (2005) outlined the concept of civic agriculture, a system embedded with community values, demonstrating that farmers integrate considerations for their community into farm management decisions through various social, cultural, economic, and political dimensions. These include farm-based educational initiatives, support for local businesses, active community engagement, and preservation of rural culture (Lyson, 2005). However, much of this literature concentrates on small-scale farming, often contrasting it with large, industrialized systems (Lyson, 2000, 2005; Obach & Tobin, 2014), a dichotomous framing that NRC seeks to move beyond, because “all types of systems can potentially contribute to achieving various sustainability goals and objectives” (National Research Council, 2010, p. 37).

The overarching goal of this study is to explore how farmers’ attributes and the socio-environmental contexts in which they operate either enable or constrain the consideration of community well-being in farming decisions, henceforth referred to as inclusion of community considerations (ICC). This exploration aims to identify associations and patterns that may inform better support and policy development. We ask two specific research questions: 1) What attributes of crop producers (knowledge and norms) are associated with the inclusion of community considerations in on-farm management decisions? and 2) How do socioeconomic conditions, landscape characteristics and regional contexts influence the relationships between crop producer attributes and the inclusion of community considerations in farming decisions?

In the following section, we introduce the theoretical framework that guides the development of this study. This is followed by a detailed description of our methods and findings. Subsequently, we discuss our results in the context of existing literature before concluding the paper.

5.3 On-farm management decisions: theoretical framework and considerations

On-farm management decisions refer to the range of choices and strategies that farmers implement on their farm operations to meet production goals. Exploring the factors that influence on-farm management decisions has been a long-standing concern for social science researchers (Grover & Gruver, 2017; Jussaume et al., 2022). Most lines of research (e.g., agricultural economics, diffusion theory, and theory of planned behavior) that theorized on this topic commonly refer to the farmer as an individual, autonomous decision-maker, emphasizing the preservation of personal agency in their analytical frameworks (Fishbein & Ajzen, 2011; Gray & Gibson, 2013; Lubell et al., 2013; Rogers, 2010). For example, the central objective of early diffusion of innovation research was to elucidate the characteristics and motivations that drive early adoption of new farming methods and techniques among individual farmers (Jussaume et al., 2022). This insight was then leveraged to spot individual-level barriers that may have prevented some agricultural producers from adopting new farming practices (Jussaume et al., 2022).

However, increasingly, scholars from multiple fields of study situate agricultural producers within a broad range of social-ecological contexts that shape their decisions (Gray & Gibson, 2013; McCarthy et al., 2023; Rissing & Burchfield, 2024). These contexts are dynamic, multi-scalar, and complex, which poses challenges to anticipating the next likely move of individual decision-makers. This is not to say that we cannot tease out the complexities of farm management decisions to facilitate interventions and approaches that promote sustainable production techniques. Humanity finds itself in an era of 'global weirding' (Canavan & Hageman, 2016; Friedman, 2010; Turnbull et al., 2022) that requires us to "learn how to dissect and harness complexity" (Ostrom, 2009, p. 420) for a chance to direct our efforts toward sustainability.

Amidst the challenges of identifying critical variables for evaluating social-ecological systems, Ostrom (2009) initially established the foundation for the social-ecological systems (SES) framework. This framework was further refined by Mcginnis and Ostrom (2014) to improve its utility as a diagnostic tool for sustainability challenges. The SES framework facilitates a comprehensive analysis of the relationships that explain the interactions between resource systems and governance structures, which are related through focal action situations (Mcginnis & Ostrom, 2014; Schneider et al., 2020).

Focal action situations are considered the central settings or contexts where individuals or groups interact, make decisions, and engage in activities that directly impact the SES (Mcginnis & Ostrom, 2014; Ostrom, 2009). For instance, farming is a critical action situation (Schlüter et al., 2019) where numerous decisions are made that affect the short and long-term outcomes for the farm and surrounding communities. In this study, we consider the inclusion of community considerations in farming decisions as the result of farmers' characteristics and interactions among actors/agricultural stakeholders. First, this inclusion can be linked to individual farmers and their personal decision-making processes, which manifest in various ways, such as planning farming operations or engaging with other stakeholders. Second, within an agricultural landscape that we consider here a social-ecological system (Wittman et al., 2017), interactions could occur in various settings, including farmer meetings, cooperative agreements, and sustainable certification programs. The broader social, economic, and political systems define contexts for these interactions (Mcginnis & Ostrom, 2014; Ostrom, 2009).

Ostrom's SES framework is one of the most frequently employed approaches for analyzing social-ecological systems (Schneider et al., 2020). The framework has been widely adopted across various domains, such as agriculture, fisheries, forestry, and water management (Partelow, 2018). We utilized this framework in our research because it effectively integrates a systems perspective with a significant level of agency, without neglecting the impact of contextual factors (see Figure 2.1 above and Figure 2 in Mcginnis and Ostrom (2014)). We emphasize actors' attributes and contexts that are associated with the integration of community considerations into farming decisions.

5.4 Methods

5.4.1 Study context and survey data collection

Our primary objective in this study was to investigate the way in which farmers' attributes and farming contexts are associated with farmers' decisions to incorporate community considerations into their farming practices. We used survey responses from crop producers across a wide range of farming contexts in the United States. Data was collected as part of a larger research project examining opportunities and barriers to agricultural landscape diversification, which gathered farming information on a wide range of aspects, including operation productions and attributes, political-economic incentives, socio-economic information, markets, management practices, perceived community outcomes, values, beliefs, well-being, and demographics.

The survey was designed to cover most agricultural regions in the U.S. and county inclusion was made following a prior research approach characterizing counties based on the intersection of their levels of crop diversity and crop productivity (Nelson & Burchfield, 2023). Nelson and Burchfield (2023) employed crop production and land use data from 2008 to 2018 to classify counties into five groups, encompassing high diversity and productivity (HD/HP), low diversity and productivity (LD/LP), high diversity and low productivity (HD/LP), low diversity and high productivity (LD/HP), and average diversity and productivity (AVERAGE) (Figure 5.1). The authors argued that these county types exemplify distinct food production systems, each characterized by unique biophysical, social, economic, and regulatory attributes that influence their structure and function. Additional criteria for selecting county sites for the survey include the following: the county must have a minimum of 100 farm operations, and more than 30% of the operated land must be under crop cultivation.

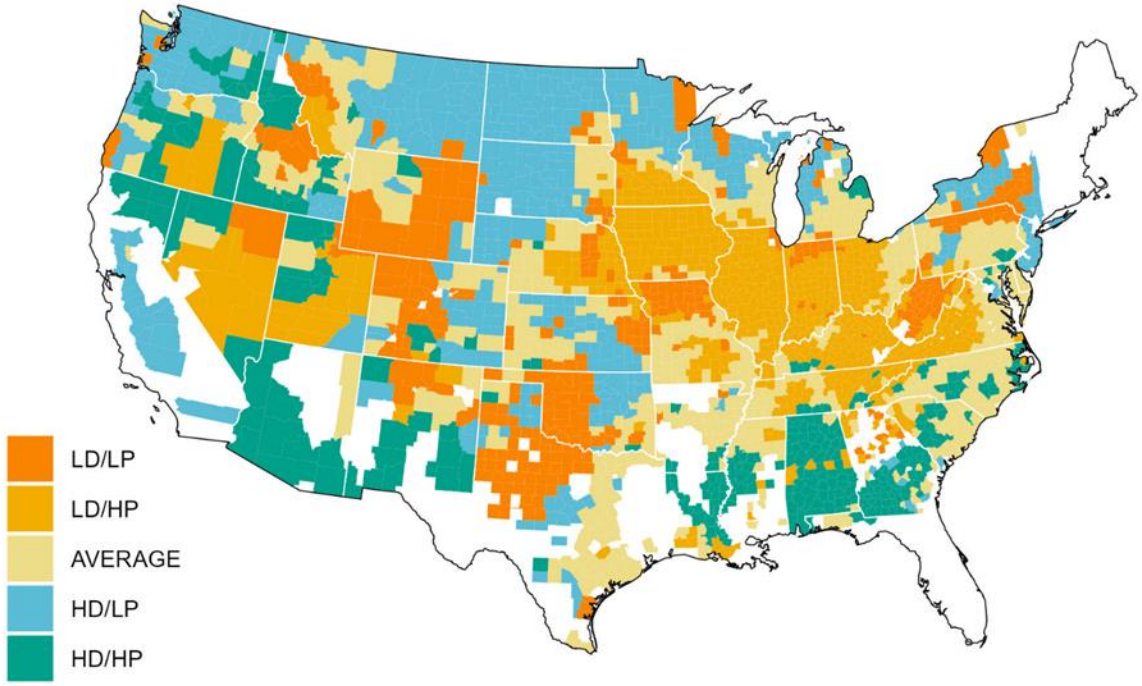


Figure 5.1 Spatial distribution of county types specified using k-means cluster analysis of diversity and productivity for each class as detailed in Nelson and Burchfield (2023).

We recruited participants for the study using contact information from DTN, www.dtn.com, (formerly Farm Market ID). DTN is a for-profit entity that creates farm databases by aggregating data from a diverse range of public and private sources, including the United States Department of Agriculture (USDA) annual surveys and remote sensing data. This company's database is estimated to cover 95% of U.S. farmers and ranchers. The Kansas State University's Office of Educational Innovation and Evaluation provided assistance with survey administration. The survey, conducted from August 2022 through the summer of 2023, was distributed in both online and paper formats. Over 6,000 crop producers were contacted via email for the online survey, and around 3,000 were randomly selected to receive the paper version by mail. The data collection effort yielded a low response rate. In total, the survey gathered 73 responses online and 140 on paper. Data was collected from producers across 56 counties in 27 states, covering all USDA Farm Resource Regions (FRR), as shown in Figure 5.2. On average, the survey responses from each county made up less than one percent of the total number of farm operators (Appendix Tables C1 & C2). It is important to highlight that non-responsiveness in survey research is a common trend reported in many studies, particularly those involving farmers (Eggleston, 2024; Pennings et al., 2002; Shiyab et al., 2023; Stedman et al., 2019; Ulrich-Schad et al., 2022; Wu et al., 2022).

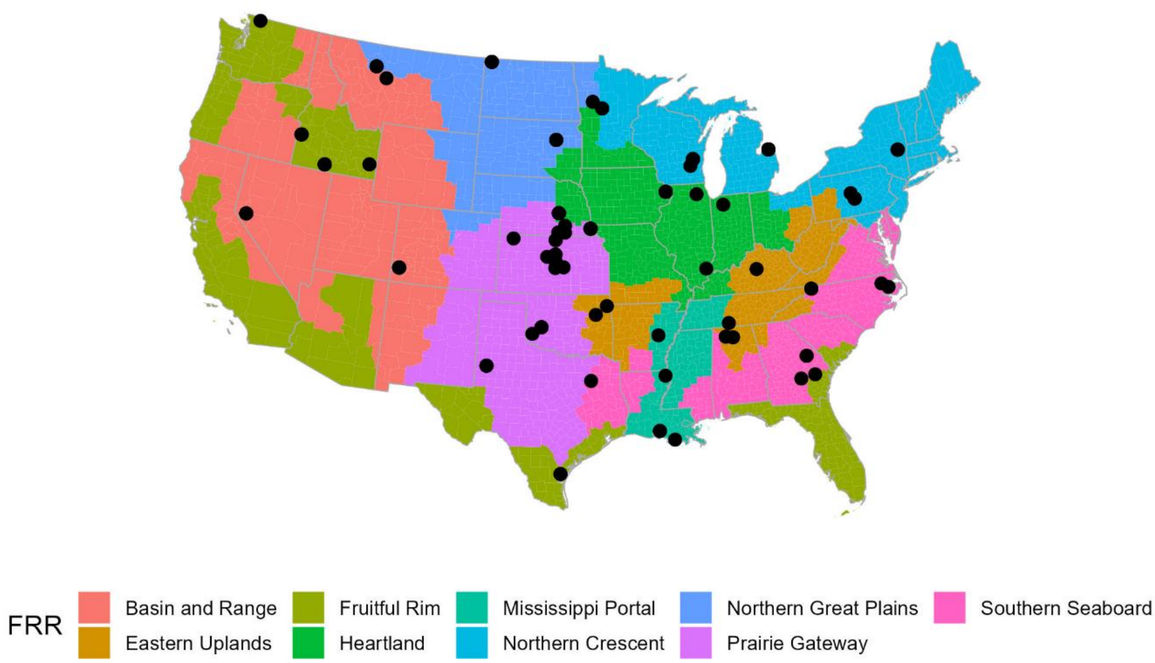


Figure 5.2 Counties of survey respondents (black dots) from each of the nine US Farm Resource Regions delineated by the USDA ERS (2000). Appendix Figure C.1 displays a similar map showing counties of survey respondents from each of the five diversity – productivity types.

5.4.2 Variable descriptions and hypotheses

We rely on the SES framework to identify specific survey items that enable us to explore the relationship between farmers' attributes and farming contexts, and their decisions to include community considerations in their management practices. We selected one dependent variable and three sets of independent variables, including core attributes of farmers, socio-economic controls, and context variables. Table 5.1 describes the survey variables used in our study, indicating how we operationalize them, and the hypothesized relationships we anticipate between them. For example, the variable "Awareness" is defined as the actor's knowledge of community impacts of farming and is hypothesized to influence the dependent variable positively.

Table 5.1 Definitions and descriptions of variables identified based on the SES Framework*

SESF code	Variable category from SESF	Description in this study	Variable Name and expected sign	Survey item used and operationalization
Dependent variable				
O1	Social performance measures	Inclusion of community considerations	ICC	I take the health and safety of my community into account when making decisions about my farm. *Five-point agreement scale from strongly disagree (1) to strongly agree (5)*
Core independent variables				
A6	Norms (trust-reciprocity)/social capital	High profit-seeking values	ProfitValues (-)	High profit *Five-point importance scale from unimportant (1) to important (5)*
A6	Norms (trust-reciprocity)/social capital	Community values	CommunityValues (+)	Considers the health of their community. *Five-point importance scale from unimportant (1) to important (5)*
A6	Norms (trust-reciprocity)/social capital	Competitive attitudes	Competition (-)	My livelihood depends on outperforming my neighbors. *Five-point agreement scale from strongly disagree (1) to strongly agree (5)*
A6	Norms (trust-reciprocity)/social capital	Willingness to coordinate	Coordination (+)	I am willing to coordinate farm management decisions with my neighbors. *Five-point agreement scale from strongly disagree (1) to strongly agree (5)*

A7	Knowledge of SES/mental models	Knowledge of community impacts of farming	Awareness (+)	My management decisions affect the local community and environment. *Five-point agreement scale from strongly disagree (1) to strongly agree (5)*
Socio-economic variables				
A2	Socioeconomic attributes	Education	Education (+)	What is your highest level of education? *Higher education beyond high school = 1*
A2	Socioeconomic attributes	Gender	Gender (±)	What is your gender? *Male = 1*
A3	History or past experiences	Years of farming experience	Experiences (-)	How many years have you been far ming? *Number of years of farming*
A8	Importance of resource	Farming dependence	FarmingDep (-)	In 2022, what percent of your household income was from farming? *All household income from farming = 1*
Context variables				
RU6	Distinctive characteristics (Landscape level)	Diversity – productivity characteristi cs of counties	CountyType (±)	Typology established in prior research (Nelson & Burchfield, 2023)
S	Social, economic, and political settings	Farm Resource Regions	FRR (±)	Established by USDA

*See Figure 2.1 above and Figure 2 in and Mcginnis and Ostrom (2014) for more details on the code and variable names.

5.4.2.1 The dependent variable

Our dependent variable is the inclusion of community considerations (ICC) in on-farm management decisions. This arises from the interactions among actors (farmers) occurring within focal action situations (the farming landscape) and is shaped by their respective contexts. We used one item to account for farmers' considerations for community concerns in farming decisions. This survey item solicited the levels of agreement (5-point scale from strongly disagree to strongly agree) of farmers with respect to the statement, "I take the health and safety of my community into account when making decisions about my farm." In the context of agriculture, there is no shortage of evidence associating a wide range of community issues with farm management practices. Therefore, the promotion of sustainable agricultural practices should emphasize the importance of considering the health, safety, and well-being of communities (Bacon et al., 2012).

5.4.2.2 Core attribute variables

The core independent variables (CIV) are the primary set of independent variables selected to explore the association between farmers' core attributes and their inclusion of community considerations in farming decisions. In the context of this study, we refer to fundamental characteristics or qualities of farmers influencing their decision-making processes as CIV. These characteristics include psychological, behavioral, and value-based factors that drive how farmers manage their operations in relation to their broader community. CIV include farmers' understanding of the community impacts of their farming decisions (knowledge/awareness), their willingness to coordinate farm management decisions with neighbors, the importance placed on the well-being and health of their community, the emphasis on financial gain, and the perception of needing to outperform others in their farming industry.

Awareness. Awareness of a situation is a prerequisite for action (Fishbein & Ajzen, 2011; Prokopy et al., 2008, 2019; Rogers, 2010). McCown (2005) emphasized that change in behavior is expected when situations are perceived as problematic. For example, the integration of community concerns into farming decisions can only be achieved if farmers are aware of potential community issues associated with their management practices. In the context of SESF, we identified this variable as “Knowledge of SES/ Mental models (A7)”, which is an acknowledgment of the effects of management practices on communities. To operationalize awareness, we retained the survey item that sought farmers’ agreement on a five-point scale (strongly disagree – strongly agree) about the statement “My management decisions affect the local community and environment.” We expected greater levels of awareness to be positively associated with community integration in farming decisions.

We acknowledge that while awareness and ICC may appear closely related, they represent different constructs within our framework. Awareness is conceptualized as the recognition of the impacts that farming practices have on the community and environment, reflecting a farmer's knowledge about the consequences of their actions. Conversely, ICC is operationalized as the actual integration of community considerations into farming practices. The literature supports this distinction by demonstrating that increased awareness does not guarantee actions or changes in behavior (Chang et al., 2020; Collins et al., 2003; Hendel et al., 2024).

Willingness to coordinate. Community issues associated with agriculture are challenging because the farmer cannot contain the consequences of their management practices within their fences. Many of the cumulative impacts of farm management practices touch the broader community or extend across landscapes (McGonigle et al., 2020). This transboundary nature of farming impacts can be qualified as a common-pool resource management problem (Ostrom, 1990; Partelow, 2016), which requires the coordination and cooperation of multiple actors to work together to address the negative consequences of farming. Coordination needs reciprocal trust among actors; therefore, we classify this variable as a third-tier variable for “Norms (trust-reciprocity)/social capital (A6).” We retained the item from the survey, which measures the willingness to coordinate farm management decisions with neighbors: “I am willing to coordinate farm management decisions with my neighbors.” The item was recorded on a five-point scale ranging from strongly disagreeing to strongly agreeing. We expected that the willingness to cooperate with neighbors would be positively associated with community integration.

Profit-seeking and community values: Most research on farmer identity has focused on identifying effective strategies to encourage the adoption of specific agricultural management practices (McGuire et al., 2013; Wilson et al., 2013). Prior studies demonstrate that an individual’s identity can influence their behavior (McGuire et al., 2013; McGuire et al., 2015; Prokopy et al., 2019). Since Burton’s (2004) article proposing the concept of “the good farmer identity”, studies have often examined farmers’ perspectives on what constitutes a good farmer from a dichotomous viewpoint (McGuire et al., 2013), encompassing profit-seeking values and/or sustainability values with a great emphasis on conservation and environmental sustainability. In the present study, we have emphasized this dualistic perspective by employing two items from the survey: one to account for high profit-seeking values asking farmers to rate the extent to which “high profit” is an attribute to being a good farmer. The other item asked farmers to rate the importance of considering the health of their community as an attribute of being a good farmer. Both questions were framed on a 5-point importance scale from unimportant to important. We anticipated that profit-seeking values would have a negative association, while community values would exhibit a positive association with the inclusion of community concerns in farming decision-making.

Competitive attitudes. Johnson et al. (2012) underscore that a competitive mindset teaches the necessity of surpassing others to obtain a greater share of resources. In other words, achieving success relies on outperforming others and ensuring that others do not do better than oneself. The farming context is competitive (Herron et al., 2020; Singer, 2002), although with varying degrees across contexts. This competition among actors is fertile terrain for potentially unsustainable resource usage (Liu et al., 2017), which could discourage community cooperation and generate pressure on ecosystems. We anticipated that competition would be negatively associated with the integration of community in farming decisions. Johnson et al. (2012) emphasized that a competitive culture is linked to less generosity and less willingness to consider others' perspectives. To account for competition, we retained the survey item asking farmers the extent to which they agree or disagree (5-point agreement) with the statement "My livelihood depends on outperforming my neighbors."

5.4.2.3 Socio-economic variables

We selected a second set of variables to include in our analysis as controls, such as education, gender, years of farming experience, and farming dependence. In their review of the factors influencing the adoption of agricultural conservation practices in the U.S., Prokopy et al. (2019) identified these variables as standard determinants of farmers' decision-making processes. For instance, their findings indicate that higher levels of education are more often positively and significantly correlated with the adoption of conservation practices. Conversely, the number of years of farming experience often shows a negative correlation with adoption. Farming dependence, employed to account for the second-tier variable in the SESF "Importance of resource (A8)", generally exhibits a positive relationship with the adoption of conservation measures.

5.4.2.4 Context variables

We incorporated two context variables in our analysis, defined at both the county landscape and regional levels. We used the USDA-FRR to account for the regional context (Heimlich, 2000). This variable captures diverse regional characteristics which align with the social, economic, and political settings (S) component within the SESF. Using this regional-level variable in their analysis, Burchfield and Nelson (2021) emphasized the important variability captured in “farm size, farmer demographics, cropping patterns, sociocultural context, land management norms, and market access across the US” (p.3). For the county landscape level, we employed Nelson and Burchfield’s (2023) county typology, which was developed based on distinctive characteristics (RU6) of county agricultural landscapes, such as the distinct levels of crop diversity and crop productivity, as detailed in section 3.1 in the main text. The types of counties identified through this typology exhibit variations in management approaches (e.g., heavy reliance on chemicals in low diversity – high productive regime), biophysical conditions, land use, and landscape characteristics, as well as regional socioeconomic conditions and livelihoods (Nelson & Burchfield, 2023). Along the same lines, it is expected that various agricultural production regimes assign differential importance to ICC in farming decisions, reflecting their distinct contexts.

5.4.3 Analysis

The primary goal of this analysis is to identify important associations between ICC and the core independent variables (CIV), both with and without the influence of socioeconomic controls and the inclusion of context variables. With the inclusion and exclusion of socioeconomic controls and contextual variables, we aim to assess the robustness of the relationships between farmers' attributes and their decisions to integrate community considerations into farm management. This approach allows us to explore how additional variables, particularly the broader economic and environmental contexts, might modify or influence these associations.

After selecting the survey data, we ensured that only cases with complete responses for all the variables were included in our analysis. We converted the five-point Likert-type responses into numerical values for quantitative analysis (Table 5.1). We use descriptive statistics to present the socio-economic characteristics of the sample and the distribution of responses for both ICC and CIV (Table 5.2, Appendix Tables C1 & C2). We used mapping tools to visually represent the geographic distribution of survey responses, providing insights into contextual patterns. We utilized a correlation matrix and Variance Inflation Factor (VIF) analysis to assess the relationships between independent variables and determine their suitability for regression modeling. VIF is a widely used measure for assessing multicollinearity among the independent variables in a regression model (O'brien, 2007). High VIF values indicate a significant correlation between predictors, which can inflate the variance of the regression coefficients, leading to unreliable and unstable estimates of the effects (Akinwande et al., 2015). We also performed sensitivity analyses by systematically including and excluding specific variables in the model to assess the robustness of our findings (Appendix Tables C3-C5). The Bayesian Information Criterion (BIC) was also used to compare model performance (Cavanaugh & Neath, 2019).

Multivariate regression techniques[6] were used to model relationships between ICC and the independent variables. We developed three distinct models to analyze our data: the Base

---

[6] We acknowledge the longstanding and ongoing debate surrounding the use of Likert-type data in linear regression analyses, which has drawn staunch defenders and strong detractors alike (Carifio & Perla, 2008; Jamieson, 2004; Liddell & Kruschke, 2018; Winship & Mare, 1984). Initially, we employed

Model, which examines the relationships between ICC and the CIV; a second model, which extends the analysis to include both ICC and CIV along with socioeconomic control variables; and a third model, which accounts for contextual interactions with county types. This approach was employed to describe how socio-economic backgrounds of farmers and their farming contexts can enhance or modify the influence of CIVs on ICC. These models are expressed as:

$$\text{Model 1: ICC} = b_0 + b_{1i}\text{CIV}_i + \varepsilon$$
$$\text{Model 2: ICC} = b_0 + b_{1i}\text{CIV}_i + b_{2j}\text{CONTROL}_i + \varepsilon$$
$$\text{Model 3: ICC} = b_0 + b_{1i}\text{CIV}_i * \text{CONTEXT} + \varepsilon$$

where ICC represents the dependent variable we aim to predict, CIV_i are the primary factors hypothesized to influence ICC directly, $CONTROL_i$ includes additional socioeconomic variables in Model 2, and CONTEXT accounts for interactions with the landscape variable in model 3. b_0 is the intercept of the model, and b_{1i} and b_{2j} represent the different coefficients of each i^{th} CIV and j^{th} control variable. ε denotes the error term.

5.5 Results

5.5.1 Socioeconomic characteristics of the sample

Among the 114 valid responses retained for this study, only 6.14% were female. Most crop producers (57.01%) were over 65 years old with farming experience ranging from 0 to 70 years

---

linear regression to examine the relationships between variables, favoring its simplicity in analysis and interpretation. However, the ordinal nature of the dependent variable prompted reconsideration of this approach, as linear regression does not inherently account for the ordered nature of the response categories. To address this concern, we also employed ordinal logistic regression, which accounts for the ordinal structure of the dependent variable and estimates the probability of each category as a function of independent variables. The results obtained from this analysis are consistent with those from the linear regression model. We report the findings from this analysis in the supplementary material (SI Table 7).

(Mean = 36.88, SD = 15.32). A great majority (78.94%) have higher education beyond high school. Our sample included a mix of small to very large farming operations with an average size of 1,129 acres but with very few full-time employees (Mean = 2.23, SD = 2173.66). On average, about 31% of the farmland is rented (SD = 29.45), with some farmers not renting any land and others renting all their farmland. Many of the respondents (88.6%) supplement their farming income with other economic activities. Appendix Table C1 provides a more detailed description of the sample profile.

Our survey sample was compared with county-level agricultural statistics, detailed in the appendix section (Appendix Table C2), to assess its representativeness. The comparison indicates that, compared to the county averages, our sample tends to include farmers with more years of farming experience and larger farms, as well as higher educational attainment. Additionally, it comprises a greater proportion of older farmers but fewer women. With this comparison, we want to acknowledge the potential limitations in the generalizability of our findings.

5.5.2 Distribution and descriptive statistics of inclusion of community considerations and its core influencing variables

Over 70% of crop producers agreed with the statement on the importance of considering the health and safety of communities in their farming decisions, which represents our dependent variable (Table 5.2). The core independent variables (CIV) we identified to conduct this analysis based on the SES framework include competitive attitude, willingness to coordinate, knowledge of community impacts of farming, profit-seeking values, and community values. Results in Table 2 show that most crop producers (~59%) disagree to some extent that their livelihood depends on outperforming neighbors, as the mean score of response options was 2.10 (SD = 1.07). A majority of farmers either strongly agreed (20.18%) or somewhat agreed (34.21%) with the notion of coordinating farm management decisions with their neighbors (Mean = 3.62, SD = 0.96). However, we should highlight that a good number of respondents remained neutral with the idea of coordination. More than 64% of crop producers agreed to some extent that their management decisions affect the local community and environment (Mean = 3.78, SD = 0.87). Both profit and community health are considered important attributes of being a good farmer, with slightly more emphasis on community health (Table 5.2).

Table 5.2 Means and percentage distribution of the community consideration item and the core independent variables

Variable name	Item	Percent respondents					Mean	Std Dev
		Option 1	Option 2	Option 3	Option 4	Option 5		
ICC	I take the health and safety of my community into account when making decisions about my farm.	1.75	4.39	22.81	44.74	26.32	3.89	0.90
Competition	My livelihood depends on outperforming my neighbors.	40.35	18.42	34.21	4.39	2.63	2.10	1.07
Coordination	I am willing to coordinate farm management decisions with my neighbors.	1.75	8.77	35.09	34.21	20.18	3.62	0.96
Awareness	My management decisions affect the local community and environment.	1.75	3.51	29.82	43.86	21.05	3.78	0.87
ProfitValues	High profit	2.63	1.75	15.79	44.74	35.09	4.07	0.90
Community Values	Considers the health of their community.	1.75	2.63	12.28	40.35	42.98	4.20	0.88

The instruction for the first three attributes (Competition, Coordination, Awareness) was “To what extent do you agree with the following statements” with option 1: Strongly disagree, option 2: Somewhat disagree, option 3:

Neither agree nor disagree, option 4: Somewhat agree, and option 5: Strongly agree. The instruction for the last two attributes in the table (ProfitValues and CommunityValues) was “Please rate the following attributes by how important you think they are to being a good farmer”) with option 1: Unimportant, option 2: Somewhat unimportant, option 3: Neither important nor unimportant, option 4: Somewhat important, and option 5: Important.

To visualize these responses geographically, we mapped average scores by county diversity-productivity type to identify areas with higher levels of community consideration in farm management decisions. We opted for county-type mapping instead of using Farm Resource Regions (FRR) due to the limited number of responses at the regional level, where averaging such sparse data could potentially misrepresent the true regional characteristics. The minimum and maximum number of responses across the FRR are 6 and 34, respectively, with an average response count of 15.22 per region. In contrast, the responses across different county types range from 20 to 31, with an average of 27.2 responses per type. To clearly illustrate the geographic distribution of our data, we mapped the counties, each colored based on its average diversity-productivity type (Figure 5.3).

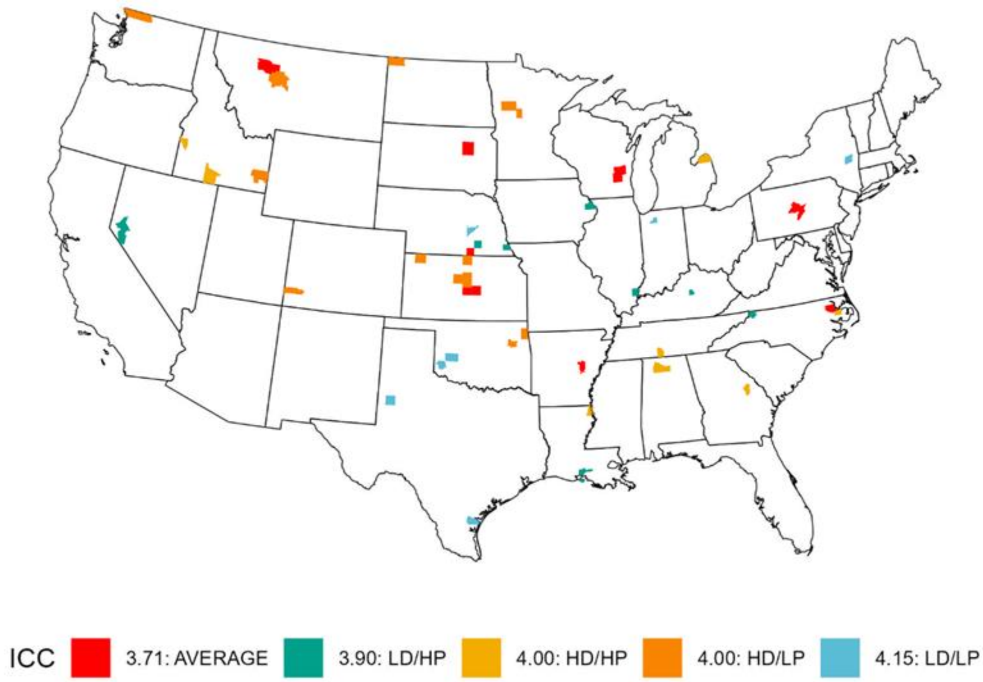


Figure 5.3 Average of respondents' ICC by county diversity-productivity type. Counties grouped by similar diversity-productivity characteristics are represented in consistent colors.

Figure 5.3 shows that counties categorized as LD/LP report a higher degree of incorporation of community concerns in farming decisions. In counties characterized by high productivity, crop producers in areas with high diversity demonstrate greater levels of ICC compared to their counterparts in low diversity areas. This landscape-scale disparity highlights potentially varying priorities and perhaps different socio-economic influences that shape farming decisions across the nation. We provide similar maps for each of the core independent variables in the supplementary material (Appendix Figures C2-C6).

5.5.3 Association of crop producers' attributes with the inclusion of community consideration in their farm management decisions

The initial objective of this study was to explore crop producers' attributes that are important for explaining the inclusion of community considerations (ICC) in on-farm management decisions, which we consider as a key social outcome for sustainable farming systems. Referring to the SESF, we hypothesized that these attributes, primarily identified as norms/social capital along with knowledge of SES, significantly influence ICC through the farming action situation. We conducted regression analyses to explore these relationships, with or without controlling for other socio-economic characteristics.

Multiple regression models were developed, progressively incorporating additional variables to assess the stability and robustness of the relationships between the dependent and independent variables. We employed correlation analysis to perform a preliminary assessment of the relationships between pairs of independent variables. Most correlations observed are weak, suggesting that these variables exhibit relative independence from each other in terms of linear relationships. To further evaluate multicollinearity among the CIVs, we employed Variance Inflation Factor (VIF) analysis. The VIF results indicate that multicollinearity is not a significant issue, as values for most of the variables remained below 5, ensuring that the regression coefficients are both stable and interpretable (Akinwande et al., 2015). Additionally, the differences in the scores of the Bayesian Information Criterion (BIC) used to compare model performance, are relatively small among the models (Appendix Tables C3-C4), which indicates that the inclusion or exclusion of specific independent variables does not dramatically alter the model's explanatory power.

Table 5.3 presents the results of two models, one with the CIV only (the base model) and the other with the addition of socio-economic variables. The results show that the action situation around farming is influenced by the attributes of the actors. Several variables emerged as significant factors that influence ICC in farming decisions. For example, awareness about the impact of farming practices on the community and environment (variable used to represent knowledge of the SES) is a major determinant, with a strong and positive association with inclusion of community considerations. This indicates that farmers who are more conscious of the repercussions of their decisions on the surrounding community are more likely to incorporate these considerations into their practices. Similarly, the willingness to coordinate farm management decisions with neighbors also holds a significant positive influence. Community values themselves, representing the importance farmers place on considering community health, positively affect community considerations.

Table 5.3 Linear regression models explaining ICC in farming decisions.

Predictors	Base model			Base model + socio-economics		
	Estimates	Std Errors	*P*-value	Estimates	Std Errors	*P*-value
Core attributes						
Awareness	0.3658 ***	0.0865	**<0.001**	0.3531 ***	0.0866	**<0.001**
ProfitValues	-0.1314	0.0712	0.068	-0.1475 *	0.0705	**0.039**
CommunityValues	0.2068 **	0.0786	**0.010**	0.2130 **	0.0779	**0.007**
Competition	0.0362	0.0608	0.553	0.0203	0.0613	0.742
Coordination	0.3202 ***	0.0766	**<0.001**	0.3328 ***	0.0781	**<0.001**
Socio-economic variables						
Gender [1]				0.2358	0.2784	0.399
Education [1]				-0.0953	0.1604	0.554
Experience				-0.0079	0.0043	0.069
FarmingDep [1]				0.3589	0.2116	0.093
Observations	114			114		
R^2 / R^2 adjusted	0.477 / 0.452			0.510 / 0.468		

When farmers' socio-economic attributes are introduced into the regression model, the explanatory power of the model slightly increases. However, these socio-economic variables individually do not show strong statistical significance. This highlights that while socio-economic factors such as gender, education, experience, and farming dependence play roles in the landscape of farming decisions, they do not directly exert a strong impact on ICC as the farmers' awareness, willingness to coordinate, and intrinsic values towards the community. We should highlight that the addition of, specifically, the farming dependence (the importance of resource) variable enhances the significance of profit-seeking values (Appendix Table C4), indicating that the economic reliance on farming may strengthen the impact of profit motives on ICC. It is also important to emphasize the robustness of the effects for the primary predictors, which remain consistent regardless of the inclusion or exclusion of various predictors and control variables in the models.

5.5.4 Interactions between landscape characteristics, regional contexts, and crop producers' attributes with the inclusion of community considerations

The second objective of the study was to examine how the distinctive characteristics of the landscape and the regional social, economic, and political settings shape the explanations of the relationships between farmers' attributes and ICC. To achieve this, we focused on two levels of context: the county landscape level, which we characterized through diversity and productivity traits of the counties, and the regional level, represented by the farm resource region variable. Table 5.4 details the findings from two linear regression models that examine these relationships between the dependent and independent variables within specific contexts. This analysis helps illuminate how local and regional dynamics impact the decision-making processes of crop producers regarding sustainability practices (Appendix Table C5). Specifically, it evaluates how variations across different county types and resource regions influence the relationships between core independent variables (CIV) and ICC.

Results presented in Table 5.4 demonstrate that, despite accounting for variations across different county types and resource regions, the impact of the CIVs on ICC remains robust.

These CIVs consistently show significant effects on ICC, underscoring their importance regardless of geographical differences. Meanwhile, the socio-economic variables remain statistically insignificant. None of the FRR or diversity–productivity types of counties show significant direct effects in the models (Appendix Table C7).

Table 5.4 Linear regression models with context variables explaining ICC in farming decisions.

Predictors	Base model			Base model + socio-economics			Model with interactions		
	Estimates	Std Errors	*P*-value	Estimates	Std Errors	*P*-value	Estimates	Std Errors	*P*-value
Core attributes									
Awareness	0.3562 ***	0.0926	**<0.001**	0.3590 ***	0.0925	**<0.001**	0.3020 *	0.1409	**0.035**
ProfitValues	-0.1494	0.0793	0.063	-0.1586 *	0.0782	**0.045**	-0.3469	0.2269	0.130
CommunityValues	0.2282 **	0.0868	**0.010**	0.2110 *	0.0874	**0.018**	0.5584**	0.2054	**0.008**
Competition	0.0385	0.0632	0.544	0.0192	0.0642	0.766	0.0125	0.1381	0.928
Coordination	0.2709 **	0.0851	**0.002**	0.2715 **	0.0868	**0.002**	0.4958***	0.1223	**<0.001**
Socio-economic variables									
Gender [1]				0.2786	0.2878	0.336			
Education [1]				-0.1405	0.1789	0.434			
Experience				-0.0090	0.0046	0.053			
FarmingDep [1]				0.3495	0.2223	0.119			
Context variables									
CountyType	X†			X			X		
Observations	114			114			114		
R^2 / R^2 adjusted	0.529 / 0.445			0.562 / 0.463			0.641 / 0.518		

†X indicates that a landscape context variable was included in the model.

We incorporated interaction terms between the core independent variables and the county typology variable, to determine whether the impact of CIV on ICC changes with the distinctive characteristics of the landscape settings. While the main (average) direct effects remain consistent, the results show significant interactions, particularly where landscape contexts change the strength or direction of these associations (Appendix Table C**7**). It is important to note that interpreting the parameters of the model with interaction terms should be in reference to the base category, which in this case, is the AVERAGE county type (Appendix Table C**7**).

For instance, based on the model estimated coefficients (Appendix Table C**7**), the knowledge of community impacts of farming (defined as awareness) significantly improves ICC in LD/HP areas but not in HD/HP areas. A significant negative impact of competition is observed in LD/LP areas, potentially because of limited agricultural resources for farming, which intensifies competition in maintaining livelihoods in these areas with thinner profit margins. Although the willingness to coordinate farm management decisions generally has a positive and significant effect on ICC, it exhibits a negative and significant interaction with the LD/HP county type. This type is characterized by highly productive simplified cropping systems where efficiency often takes precedence. The high emphasis on productivity may overshadow the potential for cooperative practices, making it challenging to integrate community considerations into decision-making.

Additional nuances were observed with the predictive graphs (Figure 5.4, Appendix Figures C7-C8). Despite some interaction terms not showing statistical significance in the regression outputs, the predictive plots illustrate some more substantial importance of specific variables in influencing ICC across landscape contexts. For example, increasing awareness of the impacts farming activities have on communities and ecosystems strongly influences ICC in low diversity – high productivity systems but not in high diversity-high productivity systems (Figure 5.4a). On the other hand, profit-seeking values significantly decrease ICC in low diversity-high productivity systems but not in high diversity-high productivity systems (Figure 5.4b). A willingness to coordinate shows a potential to enhance ICC specifically within low diversity – low productivity zones (Figure 5.4c).

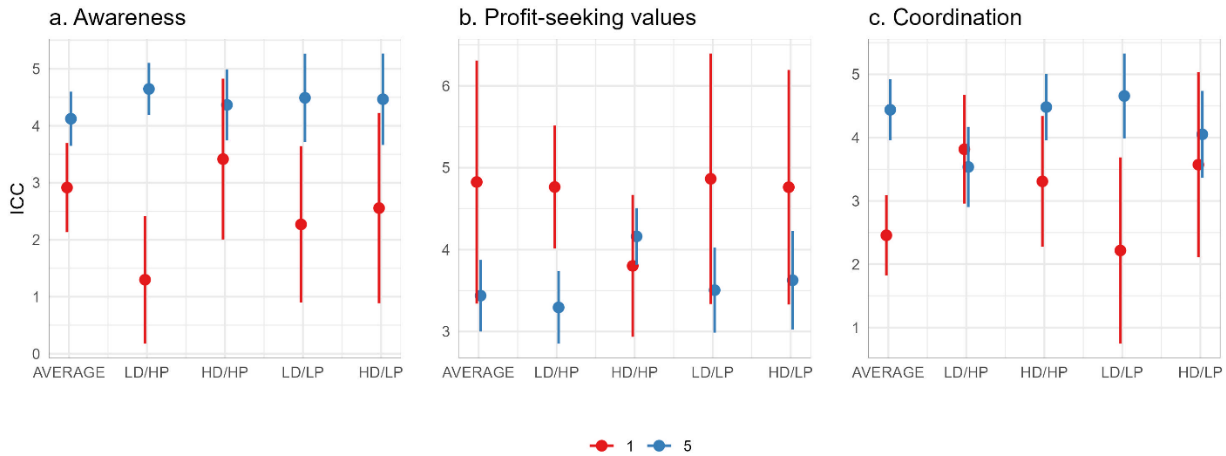


Figure 5.4 Predicted influence of core attribute variables Awareness (a), Profit-seeking values (b), and Coordination (c) on the Inclusion of Community Considerations (ICC) by County Type. The minimum value (red) and the maximum value (blue) of variables are chosen as grouping levels. The dots indicate the average predicted ICC. The vertical bars are error bars that show the 95% confidence intervals for these predictions.

5.6 Discussions

In this study, our objective was to explore the attributes of farmers and farming contexts that either facilitate or hinder the incorporation of community considerations into on-farm decisions. The results of this research add to ongoing efforts to develop more sustainable interactions between farming systems and their surrounding communities. Our main findings stem from model estimations that analyze the associations between the inclusion of community considerations in farming decisions (ICC) and the core independent variables (CIV), both in the presence and absence of socioeconomic controls and context variables.

The majority of CIVs demonstrate significant relationships with ICC, and these associations align with the expected directions. Specifically, our results suggest that crop producers are more likely to incorporate community considerations into their decision-making process if they have higher levels of awareness about the impacts of their industry on community life, place a high value on community health and well-being and are willing to collaborate with neighbors and other stakeholders. These results corroborate prior research, such as studies by McGuire et al. (2013) and Smith et al. (2023) which emphasize the role of awareness of the negative impacts of farming in the adoption of sustainable agricultural practices. Moreover, the positive and significant impact of the willingness to coordinate farm management decisions supports Ostrom’s theories, specifically the idea that collaborative approaches enhance the governance and sustainability of common-pool resources by fostering mutual trust and reciprocity among actors (Ostrom, 1990, 2000, 2009).

Both profit-seeking values and community values that define a ‘good farmer identity’ show significant associations with ICC. Our analysis reveals that valuing community health contributes positively to ICC, whereas a strong focus on profitability may potentially conflict with the inclusion of community considerations in farming decisions. Despite the complexity of associations between individuals’ values and farm management style (Allen & Bernhardt, 1995; Austin et al., 1996; Walter, 1997), the values that farmers hold remain an important behavioral factor in the farming decision-making literature (Maybery et al., 2005; McGuire et al., 2015). Our results align with prior research demonstrating that agricultural producers committed to supporting their communities are more willing to adopt sustainable management practices (Goldberger, 2011; Smith et al., 2023).

The socioeconomic controls integrated into our models show no significant direct effects on ICC. However, the farming dependence variable activates the significance of profit-seeking values (Appendix Table C4). Specifically, our results suggest that the extent of financial dependence on farming sharpens the conflict between making a profit and considering community needs. Overall, while socioeconomic variables are important characteristics of the farming population (Comer et al., 1999), our analyses reveal that they do not strongly predict ICC within our sample. The lack of significance for these variables is a frequently observed trend in literature. For instance, in their review, Prokopy et al. (2019) demonstrate that these variables more often lack significance in the adoption of agricultural conservation practices. It is possible that other factors overshadow the subtle effects of these socio-economic variables on decision-making in agriculture.

Our findings suggest that farmers' attributes are more consistently important than the contextual variables in explaining ICC in farming decisions. Though we included context variables, such as the diversity–productivity types of county landscapes and the USDA Farm Resource Regions, based on prior research suggesting that they capture significant variability in the structure and organization of agricultural production across different counties and regions in the U.S. (Burchfield & Nelson, 2021; Nelson & Burchfield, 2023), none of them demonstrated significant direct effects in the models. This lack of significance may stem from the nature of the data, wherein there is a more direct correlation between ICC and CIVs, which are inherently individual-level, as opposed to the more landscape– and regional– level variables.

However, when averaging responses of farmers by FRR, we identified some regions of concern (Appendix Table C8). In the Northern Great Plains region, the inclusion of community considerations is seen as less important. This same region also ranks among the lowest for two significant independent variables, the willingness to coordinate farm management decisions with neighbors and community values. It also shows the lowest average in terms of awareness of the community impacts of farming. In addition, the models with interaction effects between CIVs and county diversity-productivity typology indicate that some of the effects of the CIVs are significantly moderated by the type of agricultural system in which farmers are embedded, as reported in the results section.

A potential limitation of this research stems from the low response rate we experienced in both the online and the mail surveys, despite the use of a pre-survey postcard invitation and two subsequent reminders. Our analysis was conducted using a relatively small sample of crop producers, which was not representative of the broader population. This restricts the external validity and generalizability of our findings despite acknowledging that low response rates are a known issue in current survey research, particularly in agricultural communities (Eggleston, 2024; Pennings et al., 2002; Shiyab et al., 2023; Stedman et al., 2019; Ulrich-Schad et al., 2022; Wu et al., 2022). However, future research should focus on securing larger and more representative samples, which would improve the reliability and applicability of the findings. Additionally, our sampling strategy may overrepresent large-scale agricultural operations, given the wide range of farm sizes in our sample, with an average managed acreage of 1,129 acres and a minimum and maximum of 4 and 13,600 acres respectively (Appendix Table C1). This skew potentially overlooks smaller farms or those in less agriculturally intensive areas, which could further affect the generalizability of our results across diverse farming contexts. Despite these limitations, the data provides important perspectives into the farmers' attributes and farming contexts that influence the inclusion of community considerations in farming decisions and, most of the time, aligns with the literature on the topic.

5.7 Conclusions

Our findings underscore that awareness of the community impacts of farming practices, willingness to coordinate farm management decisions with neighbors, and the value placed on community health for being a good farmer are the core independent variables that are strongly and significantly associated with the inclusion of community considerations in farming decisions. Even after accounting for a variety of socio-economic and contextual variables in our analyses, these core independent variables consistently demonstrated significant impacts across all regression models, though these effects varied across different county types.

Without making causal claims from the findings, this study carries implications not only for farmers but also for other relevant agricultural stakeholders, including policy-makers, community development leaders, and land grant universities through research and extension programs. Understanding the relationships between the core independent variables and the inclusion of community considerations in farming decisions is important for designing and implementing policies and programs that promote more sustainable interactions between agricultural systems and communities. This includes, for example, investing in educational and outreach activities designed to increase farmers' knowledge of the community impacts of their enterprises. Additionally, engaged parties can facilitate the creation of spaces for interactions where farmers, other community members, and local government officials can engage in meaningful dialogue. These discussions can facilitate a greater understanding of community concerns, the exploration of potential benefits of coordination among actors, and the development of strategies for addressing community issues more effectively.

Although context variables such as landscape and regional characteristics did not show direct statistical significance in the models, they remain important for understanding the inclusion of community considerations in farm management decisions. For instance, when exploring how interactions of independent variables with contextual variables influence the relationships in the models, awareness significantly enhances the inclusion of community considerations only in low diversity – high productivity areas. Similarly, compared to the base category in the model with interaction, we noted a significant negative interaction of the willingness to collaborate farm management decisions with neighbors only in these highly productive simplified cropping systems. In this region, competition is high, willingness to collaborate is diminished, and this occurs despite a high level of awareness of the impacts of farming on the community (Appendix Figures C2-C6).

While these findings are limited, they provide a foundation for designing targeted interventions aimed at enhancing the integration of community well-being concerns into agricultural decision-making processes. First, despite ongoing efforts by various agencies, such as the Sustainable Agriculture Research and Education program, to promote sustainable practices, the need for a greater focus remains critical. Educational agencies should direct more efforts toward the integration of community considerations into farm management decisions with, for example, specialized training programs, field days, and workshops, that address the social-ecological impacts of agricultural practices on local communities. Such initiatives would aim to increase farmers' awareness of both the impacts of their management practices and the benefits of including community concerns in their decision-making processes. By doing so, educational efforts can bridge the gap between awareness and action, especially in regions characterized by low diversity and high productivity.

Second, enhancing collaboration among farmers can lead to significant behavior changes. Initiatives that create spaces for farmers to exchange ideas and discuss their practices can enhance trust and the spirit of cooperation, particularly in highly productive monocultural systems. These efforts could mitigate competitive pressures over resource usage that often disadvantage community interests. Finally, while current programs (e.g., conservation stewardship programs and environmental quality incentives programs) have a strong focus on ecological health, initiatives aimed at enhancing community well-being often lack a structured approach when presented to farmers. For example, direct incentives specifically targeting the improvement of community well-being – such as supporting local economies, improving rural livelihoods, or enhancing social justice and equity – are less common and not as particularly structured within agricultural programs and policies. Designing and implementing such packages is critical to promoting management practices that account for community concerns, especially for marginalized farming communities with limited resources.

Chapter 6 - Summary and Conclusions

This dissertation encompasses three studies focused on the agriculture–community interface, investigating the dynamic interactions between agricultural systems, human decision-making, and social-ecological outcomes. This chapter provides a summary of the key findings from each study and discusses their implications for action and research before concluding the dissertation.

6.1 Summary of the main findings

The first study (Chapter 3) of this dissertation highlights several findings about the relationship between the diversity–productivity characteristics of farming systems and community well-being (CWB). Using a comprehensive CWB index that considers multiple social and economic dimensions, the analysis reveals that while most diversity–productivity types exhibit relatively high levels of community well-being, areas characterized by high diversity and high productivity (HD/HP) show a notable prevalence of low CWB scores. This suggests that, despite their potential for ecological and economic benefits, HD/HP areas may confront challenges in translating agricultural productivity and the benefits of diversity into tangible improvements in community well-being.

The study finds that low-diversity and high-productivity (LD/HP) counties generally have higher levels of community well-being compared to other diversity-productivity types. These counties often represent commercially and materially significant farming systems, which contribute positively to local GDP and employment. However, the variability within these groups underscores the importance of contextual factors, such as social infrastructure and non-agricultural economic opportunities, in shaping community well-being outcomes. Overall, the results suggest that the impacts of agricultural systems on community well-being are mediated by interactions between agricultural characteristics and broader social and economic contexts.

In the second study (Chapter 4), the dissertation focuses on how farmers consider community well-being (CWB) in their on-farm management decisions within diversifying and simplifying farming contexts. The findings demonstrate that farmers are generally aware of how their practices impact their communities, with a stronger emphasis on environmental rather than social or economic aspects. Farmers acknowledge issues such as herbicide drift and soil erosion as affecting community health, but less attention is paid to the broader economic and social implications without further probing questions during the interviews.

Farmers integrate CWB considerations into their decision-making processes in four key dimensions: community economics, public health, education, and community care/cohesion. For instance, farmers emphasize supporting local businesses and engaging with community institutions like schools, as well as avoiding practices perceived as harmful to neighbors. However, the findings highlight a gap between farmers' awareness of CWB issues and their ability to act on these concerns, with structural barriers like economic pressures often preventing meaningful implementation. Interestingly, there is no significant difference in the levels of CWB awareness or action between diversifying and simplifying contexts, suggesting that such considerations may be more universally influenced by socio-economic factors than by diversity levels in agricultural systems.

The analysis of core attributes of farmers and the contexts influencing the inclusion of community considerations (ICC) into farm management decisions in study 3 (Chapter 5) revealed that key farmer attributes, such as awareness of community impacts of management practices, willingness to coordinate with neighbors, and valuing community health, are strong predictors of ICC. These attributes positively influence the likelihood that farmers will integrate community concerns into their practices, with awareness and coordination emerging as the most significant factors. Conversely, a profit-driven mindset tends to conflict with ICC decisions, especially when farming dependence increases.

Contextual factors, including county diversity-productivity characteristics and USDA Farm Resource Regions, were analyzed but did not exhibit significant direct effects on ICC. However, the interplay between farmer attributes and context revealed some nuanced relationships. For instance, awareness enhances ICC more effectively in low-diversity, high-productivity counties, while coordination is less impactful in highly productive monocultural systems. Overall, the study underscores the importance of farmer attributes and landscape and regional variables, providing insights for designing targeted interventions to promote community well-being through farm management decisions.

6.2 Implications for action

Taken together, the findings across the studies of this dissertation highlight several implications for broadly advancing sustainability in agricultural systems, particularly the inclusion of community considerations in farming decisions. First, the findings of the dissertation emphasize the need for context-specific interventions aimed at enhancing the well-being of agricultural communities. For instance, in high diversity – high productivity areas, the results suggest that agricultural employment, rather than profitability alone, plays a more critical role in enhancing community well-being. Additionally, while promoting the diversification of farming systems, strategies must account for regional socio-economic and historical legacies, addressing structural inequities, such as limited access to healthcare, education, and economic opportunities, to ensure that tangible community outcomes accompany the integration of ecological benefits.

Second, there is a need for policies and programs that address the gap between farmers' awareness of community well-being issues associated with farming practices and their ability to act on these concerns. While many farmers recognize the impacts of their practices on communities, external barriers often hinder their capacity to incorporate these considerations into decision-making. Policies and educational programs aimed at raising awareness about both the social and ecological impacts of farming should also emphasize actionable strategies for addressing these concerns.

Third, the findings highlight the importance of collective action and coordination at the landscape scale. Community well-being often depends on collaborative efforts among farmers, neighbors, and other stakeholders. Policies that promote cooperative agreements and create spaces for farmers to share their management decisions and strategies and, at the same time, learn from others can help facilitate these collaborations. For instance, providing financial support for farmers to participate in seasonal or annual conferences on sustainable agriculture can help create momentum toward sustainability.

6.3 Much work remains to be done!

While these studies improve our understanding of the inclusion of community concerns in agricultural decision-making, they also highlight several directions for future research. First, there is a need to examine the relationships among producer-reported well-being, community well-being, and the inclusion of community considerations in farming decisions. Such research would address the implicit assumption that considerations for community in agricultural decision-making enhance community well-being.

Second, this dissertation argues for the need to explore the structural, cultural, and economic barriers that limit farmers' ability to incorporate community considerations despite their awareness and willingness to do so. One example of research focus could be on the role of education and outreach in bridging the gap between awareness and action, particularly for farmers in regions with low diversity or highly industrialized systems.

Third, future research should capture the voices of marginalized and underrepresented groups within agricultural communities, such as small-scale farmers, women, and minority populations. This can help understand the challenges and perspectives of these groups on the topic and potentially inform the development of equitable and inclusive interventions that address the specific needs of different groups of farmers to promote better the inclusion of community concerns across all farming contexts.

6.4 Conclusion

Despite their critical role in supporting life on this planet, agriculture, and communities, particularly in rural places, face significant threats on multiple fronts. Sustaining agricultural systems and communities is rapidly becoming a shared responsibility in our dynamic and increasingly complex world. What does it take to be part of this movement? This dissertation demonstrates that it takes awareness, collaboration, and commitment from individuals, communities, and institutions to implement actions and ensure that agricultural practices align with both ecological sustainability and community well-being.

References

Abaidoo, S., & Dickinson, H. (2002). Alternative and conventional agricultural paradigms: Evidence from farming in Southwest Saskatchewan. *Rural Sociology*, *67*(1), 114–131. https://doi.org/10.1111/j.1549-0831.2002.tb00096.x

Ackoff, R. L., & Emery, F. E. (1972). *On purposeful systems*. Aldine-Atherton.

Acosta, R. V., & Carpenter, L. J. (1985). Status of women in athletics—Changes and causes. *Journal of Physical Education, Recreation & Dance*, *56*(6), 35–37. https://doi.org/10.1080/07303084.1985.10603790

Ahearn, M. C., Yee, J., Ball, V. E., & Nehring, R. F. (1998). *Agricultural productivity in the United States* (No. 740). US Department of Agriculture, Economic Research Service.

Akinwande, M. O., Dikko, H. G., & Samson, A. (2015). Variance inflation factor: As a condition for the inclusion of suppressor variable(s) in regression analysis. *Open Journal of Statistics*, *05*(07), 754–767. https://doi.org/10.4236/ojs.2015.57075

Alam, M. S., Janzen, B., Karunanayake, C., Dosman, J., & Pahwa, P. (2024). Prevalence and predictors of self-rated mental health among farm and non-farm adult rural residents of Saskatchewan. *Current Psychology*, *43*(8), 7347–7361. https://doi.org/10.1007/s12144-023-04915-4

Albizua, A., Bennett, E. M., Larocque, G., Krause, R. W., & Pascual, U. (2021). Social networks influence farming practices and agrarian sustainability. *PLOS ONE*, *16*(1), e0244619. https://doi.org/10.1371/journal.pone.0244619

Alexandratos, N., & Bruinsma, J. (2012). *World agriculture towards 2030/2050: the 2012 revision.* (12–03; ESA Working Paper).

Allen, J. C., & Bernhardt, K. (1995). Farming practices and adherence to an alternative-conventional agricultural paradigm. *Rural Sociology*, *60*(2), 297–309. https://doi.org/10.1111/j.1549-0831.1995.tb00574.x

Almstedt, Å. (2013). Post-productivism in rural areas: A contested concept. In L. Lundmark & C. Sandström (Eds.), *Natural resources and regional development theory* (1st edition, pp. 8–22).

Amin, R. W., Rivera-Muñiz, B., & Guttmann, R. P. (2021). A spatial study of quality of life in the USA. *SN Social Sciences*, *1*(110), 1–19. https://doi.org/10.1007/S43545-021-00111-Y

Arbuckle, J. G., Morton, L. W., & Hobbs, J. (2013). Farmer beliefs and concerns about climate change and attitudes toward adaptation and mitigation: Evidence from Iowa. *Climatic Change*, *118*(3–4), 551–563. https://doi.org/10.1007/s10584-013-0700-0

Arbuckle, J., & Kast, C. (2007). Quality of life on the agricultural treadmill: Individual and community determinants of farm family well-being. *Journal of Rural Social Sciences*, *27*(1), 84–113. https://egrove.olemiss.edu/jrss/vol27/iss1/4

Ashwood, L., Canfield, J., Fairbairn, M., & De Master, K. (2022). What owns the land: the corporate organization of farmland investment. *The Journal of Peasant Studies*, *49*(2), 233–262. https://doi.org/10.1080/03066150.2020.1786813

Atkinson, S., Bagnall, A. M., Corcoran, R., South, J., & Curtis, S. (2020). Being well together: Individual subjective and community wellbeing. In *Journal of Happiness Studies* (Vol. 21, Issue 5, pp. 1903–1921). Springer. https://doi.org/10.1007/s10902-019-00146-2

Austin, E. J., Deary, I. J., Gibson, G. J., McGregor, M. J., & Dent, J. B. (1996). Attitudes and values of Scottish farmers: “Yeoman” and “Entrepreneur” as factors, not distinct types. *Rural Sociology*, *61*(3), 464–474. https://doi.org/10.1111/j.1549-0831.1996.tb00629.x

Bacon, C. M., Getz, C., Kraus, S., Montenegro, M., & Holland, K. (2012). The social dimensions of sustainability and change in diversified farming systems. *Ecology and Society*, *17*(4). https://doi.org/10.5751/ES-05226-170441

Bagdonis, J. M., Hinrichs, C. C., & Schafft, K. A. (2009). The emergence and framing of farm-to-school initiatives: civic engagement, health and local agriculture. *Agriculture and Human Values*, *26*(1–2), 107–119. https://doi.org/10.1007/s10460-008-9173-6

Bailey, C., Gopaul, A., Thomson, R., & Gunnoe, A. (2021). Taking Goldschmidt to the woods: Timberland ownership and quality of life in Alabama. *Rural Sociology*, *86*(1), 50–80. https://doi.org/10.1111/ruso.12344

Baines, J. (2017). Accumulating through food crisis? Farmers, commodity traders and the distributional politics of financialization. *Review of International Political Economy*, *24*(3), 497–537. https://doi.org/10.1080/09692290.2017.1304434

Baldos, U. L. C., & Hertel, T. W. (2018). Productivity growth is key to achieving long run agricultural sustainability. In *Policy Briefs* (Vol. 4, Issue 1, p. 8). Purdue Policy Research Institute (PPRI).

Baraibar Norberg, M. (2020). Introduction to the political economy of agrarian change in Latin America. In *The political economy of agrarian change in Latin America. Governance, development, and social inclusion in Latin America.* (pp. 1–56). Palgrave Macmillan. https://doi.org/10.1007/978-3-030-24586-3_1

Barnes, D., & Blevins, A. (2010). Farm structure and the economic well-being of nonmetropolitan counties. *Rural Sociology*, *57*(3), 333–346. https://doi.org/10.1111/j.1549-0831.1992.tb00468.x

Beacham, J. D., Jackson, P., Jaworski, C. C., Krzywoszynska, A., & Dicks, L. V. (2023). Contextualising farmer perspectives on regenerative agriculture: A post-productivist future? *Journal of Rural Studies*, *102*, 103100. https://doi.org/10.1016/j.jrurstud.2023.103100

Bellon, M. R., Kotu, B. H., Azzarri, C., & Caracciolo, F. (2020). To diversify or not to diversify, that is the question. Pursuing agricultural development for smallholder farmers in marginal areas of Ghana. *World Development*, *125*, 104682. https://doi.org/10.1016/j.worlddev.2019.104682

Bentley Brymer, A. L., Toledo, D., Spiegal, S., Pierson, F., Clark, P. E., & Wulfhorst, J. D. (2020a). Social-ecological processes and impacts affect individual and social well-being in a rural Western U.S. landscape. *Frontiers in Sustainable Food Systems*, *4*, 38. https://doi.org/https://doi.org/10.3389/fsufs.2020.00038

Benton, T. (2012). Managing agricultural landscapes for production of multiple services: the policy challenge. *Politica Agricola Internazionale - International Agricultural Policy*, *2012*(1), 7–17.

Berkes, F., & Folke, C. (1998). *Linking social and ecological systems. Management practices and social mechanisms for building resilience*. Cambridge University Press.

Besser, T., Jurt, C., & Mann, S. (2017). Agricultural structure and farmers' interconnections with rural communities. *International Journal of Social Economics*, *44*(3), 362–376. https://doi.org/10.1108/IJSE-09-2015-0237/FULL/PDF

Beus, C. E., & Dunlap, R. E. (1990). Conventional versus alternative agriculture: The paradigmatic roots of the debate. *Rural Sociology*, *55*(4), 590–616. https://doi.org/10.1111/j.1549-0831.1990.tb00699.x

Beus, C. E., & Dunlap, R. E. (1991). Measuring adherence to alternative vs. conventional agricultural paradigms: A proposed scale. *Rural Sociology*, *56*(3), 432–460. https://doi.org/10.1111/j.1549-0831.1991.tb00442.x

Bidwell, P. W., & Falconer, J. I. (1925). *History of agriculture in the northern United States, 1620-1860*. Carnegie Institution of Washington.

Bigelow, D., & Borchers, A. (2017). Major uses of land in the United States, 2012. In *Journal of the Association of Environmental and Resource Economists* (Vol. 3, Issue 3). University of Chicago Press. https://doi.org/10.22004/ag.econ.263079

Bigelow, D., Borchers, A., & Hubbs, T. (2016). *U.S. farmland ownership, tenure, and transfer*. https://www.ers.usda.gov/webdocs/publications/74672/eib-161.pdf?v=7790.2

Binder, C. R., Hinkel, J., Bots, P. W. G., & Pahl-wostl, C. (2013). Comparison of frameworks for analyzing social-ecological systems. *Ecology and society, 18*(4).

Birch, K. (2015). *We have never been neoliberal: a manifesto for a doomed youth*. John Hunt Publishing.

Blesh, J., Hoey, L., Jones, A. D., Friedmann, H., & Perfecto, I. (2019). Development pathways toward “zero hunger.” *World Development*, *118*, 1–14. https://doi.org/10.1016/j.worlddev.2019.02.004

Blesh, J., Mehrabi, Z., Wittman, H., Kerr, R. B., James, D., Madsen, S., Smith, O. M., Snapp, S., Stratton, A. E., Bakarr, M., Bicksler, A. J., Galt, R., Garibaldi, L. A., Gemmill-Herren, B., Grass, I., Isaac, M. E., John, I., Jones, S. K., Kennedy, C. M., … Kremen, C. (2023). Against the odds: Network and institutional pathways enabling agricultural diversification. *One Earth*, *6*(5), 479–491. https://doi.org/10.1016/j.oneear.2023.03.004

Bommarco, R., Vico, G., & Hallin, S. (2018). Exploiting ecosystem services in agriculture for increased food security. *Global Food Security, 17*, 57–63. https://doi.org/10.1016/j.gfs.2018.04.001

Bonfanti, J., Langridge, J., & Beillouin, D. (2023). A global database to catalogue the impacts of agricultural management practices on terrestrial biodiversity. *Data in Brief*, *50,* 109555. https://doi.org/10.1016/j.dib.2023.109555

Bongaarts, J. (2009). Human population growth and the demographic transition. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *364*(1532), 2985–2990. https://doi.org/10.1098/rstb.2009.0137

Boone, H. N., & Boone, D. A. (2012). Analyzing Likert data. *Journal of Extension*, *50*(2). https://archives.joe.org/joe/2012april/pdf/JOE_v50_2tt2.pdf

Bowman, M. S., & Zilberman, D. (2013). Economic factors affecting diversified farming systems. *Ecology and Society*, *18*(1). https://doi.org/10.5751/ES-05574-180133

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brown, D. G., Johnson, K. M., Loveland, T. R., & Theobald, D. M. (2005). Rural land-use trends in the conterminous United States, 1950-2000. *Ecological Applications*, *15*(6), 1851–1863. https://doi.org/10.1890/03-5220

Brown, K., Schirmer, J., & Upton, P. (2021). Regenerative farming and human wellbeing: Are subjective wellbeing measures useful indicators for sustainable farming systems? *Environmental and Sustainability Indicators*, *11*. https://doi.org/10.1016/j.indic.2021.100132

Bruni, L. (2020). Economics, wellbeing and happiness: a historical perspective. In D. Maddison, K. Rehdanz, & H. Welsch (Eds.), *Handbook on wellbeing, happiness and the environment* (pp. 13–24). Edward Elgar Publishing. https://doi.org/10.4337/9781788119344.00008

Buck, K. D., Kevin Summers, J., Smith, L. M., & Harwell, L. C. (2018). Application of the human well-being index to sensitive population divisions: A children's well-being index development. *Child Indicators Research*, *11*(4), 1249–1280. https://doi.org/10.1007/s12187-017-9469-4

Burchfield, E. K., & Nelson, K. S. (2021). Agricultural yield geographies in the United States. *Environmental Research Letters*, *16*(5), 054051. https://doi.org/10.1088/1748-9326/ABE88D

Burchfield, E. K., Nelson, K. S., & Spangler, K. (2019). The impact of agricultural landscape diversification on U.S. crop production. *Agriculture, Ecosystems & Environment, 285*, 106615. https://doi.org/10.1016/j.agee.2019.106615

Burchfield, E. K., Schumacher, B. L., Spangler, K., & Rissing, A. (2022). The state of US farm operator livelihoods. *Frontiers in Sustainable Food Systems, 5*. https://doi.org/10.3389/fsufs.2021.795901

Burton, J., & World Health Organization. (2010). *WHO healthy workplace framework and model: Background and supporting literature and practices*.

https://apps.who.int/iris/bitstream/handle/10665/113144/9789241500241_eng.pdf?sequence=1&isAllowed=y

Burton, R. J. F. (2004). Seeing through the 'good farmer's' eyes: Towards developing an understanding of the social symbolic value of 'productivist' behaviour. *Sociologia Ruralis*, *44*(2), 195–215. https://doi.org/10.1111/J.1467-9523.2004.00270.X

Callaghan, E. G., & Colton, J. (2008). Building sustainable and resilient communities: a balancing of community capital. *Environment, Development and Sustainability*, *10*(6), 931–942. https://doi.org/10.1007/s10668-007-9093-4

Canavan, G., & Hageman, A. (2016). Introduction: Global weirding. *Paradoxa*, *28*(3), 7–13.

Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., Narwani, A., Mace, G. M., Tilman, D., Wardle, D. A., Kinzig, A. P., Daily, G. C., Loreau, M., Grace, J. B., Larigauderie, A., Srivastava, D. S., & Naeem, S. (2012). Biodiversity loss and its impact on humanity. *Nature*, *486*(7401), 59–67. https://doi.org/10.1038/nature11148

Carifio, J., & Perla, R. (2008). Resolving the 50-year debate around using and misusing Likert scales. *Medical Education*, *42*(12), 1150–1152. https://doi.org/10.1111/j.1365-2923.2008.03172.x

Carolan, M. S. (2005). Barriers to the adoption of sustainable agriculture on rented land: An examination of contesting social fields. *Rural Sociology*, *70*(3), 387–413. https://doi.org/10.1526/0036011054831233

Cavanaugh, J. E., & Neath, A. A. (2019). The Akaike information criterion: Background, derivation, properties, application, interpretation, and refinements. *WIREs Computational Statistics*, *11*(3). https://doi.org/10.1002/wics.1460

Centner, T. J. (2021). Pesticide usage is compromising people's health in the United States: Ideas for reducing damages. *Agriculture*, *11*(6), 486–497. https://doi.org/10.3390/AGRICULTURE11060486

Chang, C.-H., Kidman, G., & Wi, A. (2020). Education for sustainability: Where do you go from here? In C.-H. Chang, G. Kidman, & A. Wi (Eds.), *Issues in teaching and learning of education for sustainability: Theory into practice* (pp. 180–190). Routledge. https://doi.org/10.4324/9780429450433

Chatrchyan, A. M., Erlebacher, R. C., Chaopricha, N. T., Chan, J., Tobin, D., & Allred, S. B. (2017). United States agricultural stakeholder views and decisions on climate change. *WIREs Climate Change*, *8*(5), e469. https://doi.org/10.1002/wcc.469

Chen, S., Wang, W., Xu, W., Wang, Y., Wan, H., Chen, D., Tang, Z., Tang, X., Zhou, G., Xie, Z., Zhou, D., Shangguan, Z., Huang, J., He, J.-S., Wang, Y., Sheng, J., Tang, L., Li, X., Dong, M., … Bai, Y. (2018). Plant diversity enhances productivity and soil carbon storage. *Proceedings of the National Academy of Sciences*, *115*(16), 4027–4032. https://doi.org/10.1073/pnas.1700298114

Clapp, J. (2014). Financialization, distance and global food politics. *The Journal of Peasant Studies*, *41*(5), 797–814. https://doi.org/10.1080/03066150.2013.875536

Clapp, J. (2015). Distant agricultural landscapes. *Sustainability Science*, *10*(2), 305–316. https://doi.org/10.1007/s11625-014-0278-0

Clark, W. C., & Harley, A. G. (2020). Sustainability science: Toward a synthesis. *Annual Review of Environment and Resources*, *45*, 331–386. https://doi.org/10.1146/annurev-environ-012420-043621

Clements, R. S., Birthisel, S. K., Daigneault, A., Gallandt, E., Johnson, D., Wentworth, T., & Niles, M. T. (2021). Climate change in the context of whole-farming systems: Opportunities for improved outreach. *Climatic Change*, *166*(3–4), 40. https://doi.org/10.1007/s10584-021-03101-4

Colding, J., & Barthel, S. (2019). Exploring the social-ecological systems discourse 20 years later. *Ecology and Society*, *24*(1), art2. https://doi.org/10.5751/ES-10598-240102

Collins, A. M. (2019). Financialization, resistance, and the question of women’s land rights. *International Feminist Journal of Politics*, *21*(3), 454–476. https://doi.org/10.1080/14616742.2018.1532805

Collins, J., Thomas, G., Willis, R., & Wilsdon, J. (2003). *Carrots, sticks and sermons: influencing public behaviour for environmental goals. A Demos/Green Alliance report produced for Defra*. https://demos.co.uk/wp-content/uploads/files/CarrotsSticksSermons.pdf

Comer, S., Ekanem, E., Muhammad, S., Singh, S. P., & Tegegne, F. (1999). Sustainable and conventional farmers: A comparison of socio-economic characteristics, attitude, and beliefs. *Journal of Sustainable Agriculture*, *15*(1), 29–45. https://doi.org/10.1300/J064v15n01_04

Congress.gov. (1990, November 28). *S.2830 - 101st Congress (1989-1990): Food, Agriculture, Conservation, and Trade Act of 1990*. https://www.congress.gov/bill/101st-congress/senate-bill/2830

Constance, D. H., & Tuinstra, R. (2005). Corporate chickens and community conflict in East Texas: Growers' and neighbors' views on the impacts of industrial broiler production. *Culture and Agriculture*, *27*(1), 45–60. https://doi.org/10.1525/cag.2005.27.1.45

Cope, M., & Kurtz, H. (2016). Organizing, coding, and analyzing qualitative data. In N. Clifford, M. Cope, T. Gillespie, & S. French (Eds.), *Key Methods in Geography* (3rd ed., pp. 647–664). SAGE.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334. https://doi.org/10.1007/BF02310555

Crossley, M. S., Burke, K. D., Schoville, S. D., & Radeloff, V. C. (2021). Recent collapse of crop belts and declining diversity of US agriculture since 1840. *Global Change Biology*, *27*(1), 151–164. https://doi.org/10.1111/gcb.15396

Crowley, M., & Stainback, K. (2019). Retail sector concentration, local economic structure, and community well-being. *Annual Review of Sociology*, *45*(1), 321–343. https://doi.org/10.1146/annurev-soc-073018-022449

Cunha, M. C., Serpa, D., Marques, J., Keizer, J. J., & Abrantes, N. (2023). On sustainable improvements of agricultural practices in the Bairrada region (Portugal). *Environment, Development and Sustainability*, *25*(3), 2735–2757. https://doi.org/10.1007/s10668-022-02155-3

Curtis White, K. J. (2008). Population change and farm dependence: Temporal and spatial variation in the U.S. great plains, 1900–2000. *Demography*, *45*(2), 363–386. https://doi.org/10.1353/DEM.0.0010

Cutler, D. M., & Lleras-Muney, A. (2010). Understanding differences in health behaviors by education. *Journal of Health Economics*, *29*(1), 1–28. https://doi.org/10.1016/J.JHEALECO.2009.10.003

Cutter, S. L., Ash, K. D., & Emrich, C. T. (2014). The geographies of community disaster resilience. *Global Environmental Change*, *29*, 65–77. https://doi.org/10.1016/j.gloenvcha.2014.08.005

Czajka, J. L., & Beyler, A. (2016). *Declining Response Rates in Federal Surveys: Trends and Implications*. U.S. Department of Health & Human Services.

Dainese, M., Martin, E. A., Aizen, M. A., Albrecht, M., Bartomeus, I., Bommarco, R., Carvalheiro, L. G., Chaplin-Kramer, R., Gagic, V., Garibaldi, L. A., Ghazoul, J., Grab, H., Jonsson, M., Karp, D. S., Kennedy, C. M., Kleijn, D., Kremen, C., Landis, D. A., Letourneau, D. K., … Steffan-Dewenter, I. (2019). A global synthesis reveals biodiversity-mediated benefits for crop production. *Science Advances*, *5*(10). https://doi.org/10.1126/SCIADV.AAX0121/SUPPL_FILE/AAX0121_SM.PDF

Dale, V. H., Kline, K. L., Kaffka, S. R., & Langeveld, J. W. A. (2013). A landscape perspective on sustainability of agricultural systems. *Landscape Ecology*, *28*(6), 1111–1123. https://doi.org/10.1007/s10980-012-9814-4

Dancette, R., & Sebastien, L. (2019). The actor in 4 dimensions: A relevant methodology to analyze local environmental governance and inform Ostrom's social-ecological systems framework. *MethodsX*, *6*, 1798–1811. https://doi.org/10.1016/j.mex.2019.07.025

Davis, A. S., Hill, J. D., Chase, C. A., Johanns, A. M., & Liebman, M. (2012). Increasing cropping system diversity balances productivity, profitability and environmental health. *PLoS ONE*, *7*(10), e47149. https://doi.org/10.1371/journal.pone.0047149

de Boon, A., Dressel, S., Sandström, C., & Rose, D. C. (2022). Addressing the political nature of agricultural sustainability transitions: lessons for governance. In D. Bruce & A. Bruce (Eds.), *Transforming food systems: ethics, innovation and responsibility* (pp. 34–39). Wageningen Academic Publishers. https://doi.org/10.3920/978-90-8686-939-8_3

Deller, S. C., Tsai, T. (Sue), Marcouiller, D. W., & English, D. B. K. (2001). The Role of amenities and quality of life in rural economic growth. *American Journal of Agricultural Economics*, *83*(2), 352–365. https://doi.org/10.1111/0002-9092.00161

Dhillon, D. (2019). *US education - student teacher ratios*. National Center for Education Statistics - Institute of Education Sciences. https://odn.data.socrata.com/Education/US-Education-Student-Teacher-Ratios/xngt-jpn3

Díaz, S., Fargione, J., Chapin, F. S., & Tilman, D. (2006). Biodiversity loss threatens human well-being. *PLoS Biology*, *4*(8), e277. https://doi.org/10.1371/journal.pbio.0040277

Dimitri, C., & Effland, A. (2020). From farming to food systems: the evolution of US agricultural production and policy into the 21st century. *Renewable Agriculture and Food Systems*, *35*(4), 391–406. https://doi.org/10.1017/S1742170518000522

Duarte, G. T., Santos, P. M., Cornelissen, T. G., Ribeiro, M. C., & Paglia, A. P. (2018). The effects of landscape patterns on ecosystem services: meta-analyses of landscape services. *Landscape Ecology*, *33*(8), 1247–1257. https://doi.org/10.1007/s10980-018-0673-5

Duff, A. J., Zedler, P. H., Barzen, J. A., & Knuteson, D. L. (2017). The capacity-building stewardship model: Assessment of an agricultural network as a mechanism for improving regional agroecosystem sustainability. *Ecology and Society*, *22*(1), art45. https://doi.org/10.5751/ES-09146-220145

Duncan, E., Rotz, S., Magnan, A., & Bronson, K. (2022). Disciplining land through data: The role of agricultural technologies in farmland assetisation. *Sociologia Ruralis*, *62*(2), 231–249. https://doi.org/10.1111/soru.12369

Dwivedi, P., Huang, D., Yu, W., & Nguyen, Q. (2019). Predicting geographical variation in health-related quality of life. *Preventive Medicine*, *126*, 105742. https://doi.org/10.1016/j.ypmed.2019.05.030

Edmonds, J. A., & Rosenberg, N. J. (2005). Climate change impacts for the conterminous USA: An integrated assessment summary. *Climatic Change 2005 69:1*, *69*(1), 151–162. https://doi.org/10.1007/S10584-005-3613-8

Eggleston, J. (2024). Frequent survey requests and declining response rates: Evidence from the 2020 Census and household surveys. *Journal of Survey Statistics and Methodology*, *00*, 1–19. https://doi.org/10.1093/jssam/smae022

Ekström, H., Droste, N., & Brady, M. (2024). Modelling forests as social-ecological systems: A systematic comparison of agent-based approaches. *Environmental Modelling & Software*, *175*, 105998. https://doi.org/10.1016/j.envsoft.2024.105998

Evans, N., Morris, C., & Winter, M. (2002). Conceptualizing agriculture: a critique of post-productivism as the new orthodoxy. *Progress in Human Geography*, *26*(3), 313–332. https://doi.org/10.1191/0309132502ph372ra

Fairbairn, M. (2014). 'Like gold with yield': evolving intersections between farmland and finance. *The Journal of Peasant Studies*, *41*(5), 777–795. https://doi.org/10.1080/03066150.2013.873977

Fairbairn, M. (2015). Foreignization, financialization, and land grab regulation. *Journal of Agrarian Change*, *15*(4), 581–591. https://doi.org/10.1111/joac.12112

Fairbairn, M. (2020). *Fields of gold: Financing the global land rush*. Cornell University Press.

Feliciano, D. (2019). A review on the contribution of crop diversification to Sustainable Development Goal 1 “No poverty” in different world regions. *Sustainable Development*, *27*(4), 795–808. https://doi.org/10.1002/sd.1923

Findlater, K. M., Satterfield, T., Kandlikar, M., & Donner, S. D. (2018). Six languages for a risky climate: how farmers react to weather and climate change. *Climatic Change*, *148*(4), 451–465. https://doi.org/10.1007/s10584-018-2217-z

Fischer, A., Hutchinson, J. M. S., & Nelson, K. S. (2024). Where is rural? An analysis of the agreement between quantitative measures of rurality. *Journal of Rural Studies*, *111*, 103424. https://doi.org/10.1016/j.jrurstud.2024.103424

Fischer, J., Abson, D. J., Butsic, V., Chappell, M. J., Ekroos, J., Hanspach, J., Kuemmerle, T., Smith, H. G., & von Wehrden, H. (2014). Land sparing versus land sharing: Moving forward. *Conservation Letters*, *7*(3), 149–157. https://doi.org/10.1111/conl.12084

Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach* (1st ed.). Psychology Press. https://doi.org/10.4324/9780203838020

Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., Mueller, N. D., O’Connell, C., Ray, D. K., West, P. C., Balzer, C., Bennett, E. M., Carpenter, S. R., Hill, J., Monfreda, C., Polasky, S., Rockström, J., Sheehan, J., Siebert, S., … Zaks, D. P. M. (2011). Solutions for a cultivated planet. *Nature*, *478*(7369), 337–342. https://doi.org/10.1038/nature10452

Foltz, J., & Zeuli, K. (2005). The role of community and farm characteristics in farm input purchasing patterns. *Review of Agricultural Economics*, *27*(4), 508–525. https://doi.org/10.1111/j.1467-9353.2005.00261.x

Francois, J. R. (2024). Angela N. H. Creager and Jean-Paul Gaudillière: Risk on the table: food production, health, and the environment. *Agriculture and Human Values*, *41*(3), 1303–1304. https://doi.org/10.1007/s10460-024-10553-8

Francois, J. R., & Nelson, K. S. (2024). Examining the state of community well-being at the intersection of rurality and agricultural engagement in the contiguous United States.

International Journal of Community Well-Being. https://doi.org/10.1007/s42413-024-00210-7

Francois, J. R., Nelson, K. S., & Burchfield, E. K. (2024). Linking diversity–productivity conditions of farming systems with the well-being of agricultural communities. *Sustainability*, *16*(16), 6826. https://doi.org/10.3390/su16166826

Friedman, T. L. (2010, February 17). Global weirding is here. *The New York Times*. https://www.nytimes.com/2010/02/17/opinion/17friedman.html

Frison, E. A., Cherfas, J., & Hodgkin, T. (2011). Agricultural biodiversity is essential for a sustainable improvement in food and nutrition security. *Sustainability*, *3*(1), 238–253. https://doi.org/10.3390/su3010238

Garibaldi, L. A., Carvalheiro, L. G., Vaissière, B. E., Gemmill-Herren, B., Hipólito, J., Freitas, B. M., Ngo, H. T., Azzu, N., Sáez, A., Åström, J., An, J., Blochtein, B., Buchori, D., García, F. J. C., Oliveira da Silva, F., Devkota, K., Ribeiro, M. de F., Freitas, L., Gaglianone, M. C., … Zhang, H. (2016). Mutually beneficial pollinator diversity and crop yield outcomes in small and large farms. *Science*, *351*(6271), 388–391. https://doi.org/10.1126/science.aac7287

Garibaldi, L. A., Gemmill-Herren, B., D'Annolfo, R., Graeub, B. E., Cunningham, S. A., & Breeze, T. D. (2017). Farming approaches for greater biodiversity, livelihoods, and food security. *Trends in Ecology & Evolution*, *32*(1), 68–80. https://doi.org/10.1016/j.tree.2016.10.001

Garibaldi, L. A., & Pérez-Méndez, N. (2019). Positive outcomes between crop diversity and agricultural employment worldwide. *Ecological Economics*, *164*, 106358. https://doi.org/10.1016/j.ecolecon.2019.106358

Gasic, I. (2024). Disentangling land financialisation: Insights from Santiago de Chile's land lease-purchase contracts. *Tijdschrift Voor Economische En Sociale Geografie*, *115*(1), 28–41. https://doi.org/10.1111/tesg.12579

Gaskin, D. J., Thorpe, R. J., McGinty, E. E., Bower, K., Rohde, C., Young, J. H., LaVeist, T. A., & Dubay, L. (2014). Disparities in diabetes: The nexus of race, poverty, and place. *American Journal of Public Health*, *104*(11), 2147–2155. https://doi.org/10.2105/AJPH.2013.301420

Gebska, M., Grontkowska, A., Swiderek, W., & Golebiewska, B. (2020). Farmer awareness and implementation of sustainable agriculture practices in different types of farms in Poland. *Sustainability*, *12*(19), 8022. https://doi.org/10.3390/su12198022

Gibson, J. W., & Gray, B. J. (2016). Regulating the Ogallala: Paradox and ambiguity in Western Kansas. In *The economics of ecology, exchange, and adaptation: anthropological explorations* (Vol. 36, pp. 3–32). Emerald Group Publishing Limited. https://doi.org/10.1108/S0190-128120160000036001

Gill, D. S., Moerth, C. A., Bauer, L., & Lacuna-Richman, C. (1992). *Social, economic, and psychological factors in decisions of Alberta farmers*.

Gillespie-Marthaler, L., Nelson, K., Baroud, H., & Abkowitz, M. (2019). Selecting indicators for assessing community sustainable resilience. *Risk Analysis*, *39*(11), 2479–2498. https://doi.org/10.1111/RISA.13344

Gliessman, S. (2018). Toward a political economy of sustainable food systems. *Agroecology and Sustainable Food Systems*, *42*(10), 1077–1078. https://doi.org/10.1080/21683565.2018.1497399

Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., Pretty, J., Robinson, S., Thomas, S. M., & Toulmin, C. (2010). Food security: The challenge of feeding 9 billion people. *Science*, *327*(5967), 812–818. https://doi.org/10.1126/science.1185383

Goldberger, J. R. (2011). Conventionalization, civic engagement, and the sustainability of organic agriculture. *Journal of Rural Studies*, *27*(3), 288–296. https://doi.org/10.1016/j.jrurstud.2011.03.002

Goldschmidt, W. (1946). *As you sow: Three studies into the social consequences of agribusiness*. Allanheld, Osmun and Company.

Goldschmidt, W. (1978). Large-scale farming and the rural social structure. *Rural Sociology*, *43*(3), 362–366.

Gomiero, T., Paoletti, M. G., & Pimentel, D. (2008). Energy and environmental issues in organic and conventional agriculture. *Critical Reviews in Plant Sciences*, *27*(4), 239–254. https://doi.org/10.1080/07352680802225456

Gragson, T. L., Bolstad, P. V., & Welch-Devine, M. (2008). Agricultural transformation of Southern Appalachia. In C. L. Redman & D. R. Foster (Eds.), *Agrarian landscapes in* *transition: Comparisons of long-term ecological and cultural change* (pp. 89–121). Oxford University Press, Inc.

Gray, B. J., & Gibson, J. W. (2013). Actor–networks, farmer decisions, and identity. *Culture, Agriculture, Food and Environment*, *35*(2), 82–101. https://doi.org/10.1111/cuag.12013

Green, G. P. (1985). Large-scale farming and the quality of life in rural communities: Further specification of the Goldschmidt hypothesis. *Rural Sociology Society*, *50*(2), 262–274.

Grover, S., & Gruver, J. (2017). 'Slow to change': Farmers' perceptions of place-based barriers to sustainable agriculture. *Renewable Agriculture and Food Systems*, *32*(6), 511–523. https://doi.org/10.1017/S1742170516000442

Habibi, M. (2022). *Capitalism and agrarian change* (1st Edition). Routledge. https://doi.org/10.4324/9781003267348

Hallam, A. (1993). *Size, structure, and the changing face of American agriculture* (1st ed.). CRC Press.

Halloran, J. M., & Archer, D. W. (2008). External economic drivers and US agricultural production systems. *Renewable Agriculture and Food Systems*, *23*(04), 296–303. https://doi.org/10.1017/S1742170508002287

Hardi, P., & Pintér, L. (2006). City of Winnipeg quality-of-life indicators. In M. J. Sirgy, D. Rahtz, & D. Swain (Eds.), *Community Quality-of-Life Indicators.* (Vol. 28, pp. 127–176). Springer. https://doi.org/10.1007/978-1-4020-4625-4_6

Harp, P. R. (2010). Dicamba. In *Hayes' Handbook of pesticide toxicology* (3rd ed., pp. 1849–1852). Academic Press. https://doi.org/10.1016/B978-0-12-374367-1.00085-9

Harrington, L. M. B. (2016). Sustainability theory and conceptual considerations: A review of key ideas for sustainability, and the rural context. *Papers in Applied Geography*, *2*(4), 365–382. https://doi.org/10.1080/23754931.2016.1239222

Harrington, R., Anton, C., Dawson, T. P., de Bello, F., Feld, C. K., Haslett, J. R., Kluvánkova-Oravská, T., Kontogianni, A., Lavorel, S., Luck, G. W., Rounsevell, M. D. A., Samways, M. J., Settele, J., Skourtos, M., Spangenberg, J. H., Vandewalle, M., Zobel, M., & Harrison, P. A. (2010). Ecosystem services and biodiversity conservation: concepts and a glossary. *Biodiversity and Conservation*, *19*(10), 2773–2790. https://doi.org/10.1007/s10531-010-9834-9

Harrison, J. L., & Getz, C. (2015). Farm size and job quality: mixed-methods studies of hired farm work in California and Wisconsin. *Agriculture and Human Values*, *32*(4), 617–634. https://doi.org/10.1007/s10460-014-9575-6

Heimlich, R. E. (2000). *Farm resource regions* (No. 33625). Agricultural Information Bulletins. Economic Research Service. United States Department of Agriculture. https://doi.org/10.22004/ag.econ.33625

Hemond, O., Butsic, V., Moanga, D., & Wartenberg, A. C. (2023). Farm consolidation and turnover dynamics linked to increased crop diversity and higher agricultural input use. *Agricultural Systems*, *210*, 103708. https://doi.org/10.1016/j.agsy.2023.103708

Hendel, K. R., Vaughan, E., Kirschmann, J. M., & Johnston, C. A. (2024). Moving beyond raising awareness: Addressing barriers. *American Journal of Lifestyle Medicine*, *18*(6), 740–743. https://doi.org/10.1177/15598276241274114

Hendrickson, M. K., Howard, P. H., Miller, E. M., & Constance, D. H. (2020). *The food system: Concentration and its impacts. A special report to the Family Farm Action Alliance*.

Henn, J. (2015). The Relationship between income and well-being, an Irish study. *MOJ Public Health*, *2*(2). https://doi.org/10.15406/mojph.2015.02.00017

Herron, R. V., Ahmadu, M., Allan, J. A., Waddell, C. M., & Roger, K. (2020). "Talk about it:" Changing masculinities and mental health in rural places? *Social Science & Medicine*, *258*, 113099. https://doi.org/10.1016/j.socscimed.2020.113099

Hoffman, M., Lubell, M., & Hillis, V. (2014). Linking knowledge and action through mental models of sustainable agriculture. *Proceedings of the National Academy of Sciences*, *111*(36), 13016–13021. https://doi.org/10.1073/pnas.1400435111

Hoggart, K., & Paniagua, A. (2001). What rural restructuring? *Journal of Rural Studies*, *17*(1), 41–62. https://doi.org/10.1016/S0743-0167(00)00036-X

Hou, B., & Wu, L. (2010). Safety impact and farmer awareness of pesticide residues. *Food and Agricultural Immunology*, *21*(3), 191–200. https://doi.org/10.1080/09540105.2010.484858

Hufnagel, J., Reckling, M., & Ewert, F. (2020). Diverse approaches to crop diversification in agricultural research. A review. *Agronomy for Sustainable Development*, *40*(2), 14. https://doi.org/10.1007/s13593-020-00617-4

Hunt, M. L., Blackburn, G. A., & Rowland, C. S. (2019). Monitoring the sustainable intensification of arable agriculture: the potential role of Earth Observation. *International*

Journal of Applied Earth Observation and Geoinformation, *81*, 125–136. https://doi.org/10.1016/j.jag.2019.05.013

Ikerd, J. (2019). Place-based food and farming systems: Reconnecting people with purpose and place. *Journal of Agriculture, Food Systems, and Community Development*, *9*(Suppl. 1), 67–76. https://doi.org/10.5304/jafscd.2019.091.017

Institute for Health Metrics and Evaluation (IHME). (2022). *United States mortality rates and life expectancy by county, race, and ethnicity, 2000-2019*. Institute for Health Metrics and Evaluation (IHME). https://doi.org/10.6069/B15B-0S14

Intergovernmental Panel on Climate Change. (2022). *Climate change and land: IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. Cambridge University Press. https://doi.org/10.1017/9781009157988

Isakson, S. R. (2014). Food and finance: The financial transformation of agro-food supply chains. *The Journal of Peasant Studies*, *41*(5), 749–775. https://doi.org/10.1080/03066150.2013.874340

Isett, C., & Miller, S. (2016). *The social history of agriculture: From the origins to the current crisis*. Rowman & Littlefield.

Izumi, B. T., Wynne Wright, D., & Hamm, M. W. (2010). Market diversification and social benefits: Motivations of farmers participating in farm-to-school programs. *Journal of Rural Studies*, *26*(4), 374–382. https://doi.org/10.1016/j.jrurstud.2010.02.002

Jackson, L. L. (2008). Who “designs” the agricultural landscape? *Landscape Journal*, *27*(1), 23–40. https://doi.org/10.3368/LJ.27.1.23

Jackson-Smith, D. B., & Jensen, E. (2009). Finding farms: Comparing indicators of farming dependence and agricultural importance in the United States. *Rural Sociology*, *74*(1), 37–55. https://doi.org/https://doi.org/10.1526/003601109787524016

Jackson-Smith, D., & Gillespie, G. W. (2005). Impacts of farm structural change on farmers’ social ties. *Society and Natural Resources*, *18*(3), 215–240. https://doi.org/10.1080/08941920590908042

Jamieson, S. (2004). Likert scales: how to (ab)use them. *Medical Education*, *38*(12), 1217–1218. https://doi.org/10.1111/j.1365-2929.2004.02012.x

Jemison, J., Hall, D., Welcomer, S., & Haskell, J. (2014). How to communicate with farmers about climate change: Farmers' perceptions and adaptations to increasingly variable weather patterns in Maine (USA). *Journal of Agriculture, Food Systems, and Community Development*, *4*(4), 1–14. https://doi.org/10.5304/jafscd.2014.044.001

Johansson, R., Effland, A., & Coble, K. (2017). Falling response rates to USDA crop surveys: why it matters. In *Farmdoc Daily* (Vol. 7, Issue 9). Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign.

Johnson, D. W., Johnson, R. T., & Monson, V. (2012). Cooperation-competition and constructive controversy in developing professional ethics in law school classes. *University of St. Thomas Law Journal*, *10*(1), 317–351.

Johnston, A. S. A., Sibly, R. M., Hodson, M. E., Alvarez, T., & Thorbek, P. (2015). Effects of agricultural management practices on earthworm populations and crop yield: validation and application of a mechanistic modelling approach. *Journal of Applied Ecology*, *52*(5), 1334–1342. https://doi.org/10.1111/1365-2664.12501

Jordan, J., & Constance, D. (2008). Sustainable agriculture and the social sciences: Getting beyond best management practices and into food systems. *Journal of Rural Social Sciences*, *23*(1). https://egrove.olemiss.edu/jrss/vol23/iss1/1

Joshanloo, M., Jovanović, V., & Taylor, T. (2019). A multidimensional understanding of prosperity and well-being at country level: Data-driven explorations. *PLOS ONE*, *14*(10), e0223221. https://doi.org/10.1371/journal.pone.0223221

Jussaume, R. A., Dentzman, K., Frisvold, G., Ervin, D., & Owen, M. (2022). Factors that influence on-farm decision-making: Evidence from weed management. *Society & Natural Resources*, *35*(5), 527–546. https://doi.org/10.1080/08941920.2021.2001123

Kahn, A. E. (1966). The tyranny of small decisions: market failures, imperfections, and the limits of economics. *Kyklos*, *19*(1), 23–47. https://doi.org/10.1111/j.1467-6435.1966.tb02491.x

Kaika, A., & Racelis, A. (2021). Civic agriculture in review: Then, now, and future directions. *Journal of Agriculture, Food Systems, and Community Development*, *10*(2), 551–572. https://doi.org/10.5304/jafscd.2021.102.030

Kaplan, J. (2021). *Jacob Kaplan's concatenated files: Uniform crime reporting program data: offenses known and clearances by arrest (Return A), 1960-2020:*

ucr_offenses_known_yearly_1960_2020_dta.zip. https://doi.org/https://doi.org/10.3886/E100707V17-100180

Kee, Y., Kim, Y., & Phillips, R. (2015). Modeling community well-being: A multi-dimensional approach. In Y. Kee, Y. Kim, & R. Phillips (Eds.), *Learning and community approaches for promoting well-being*. Springer International. https://doi.org/10.1007/978-3-319-12439-1_1

Keesing, F., Belden, L. K., Daszak, P., Dobson, A., Harvell, C. D., Holt, R. D., Hudson, P., Jolles, A., Jones, K. E., Mitchell, C. E., Myers, S. S., Bogich, T., & Ostfeld, R. S. (2010). Impacts of biodiversity on the emergence and transmission of infectious diseases. *Nature*, *468*(7324), 647–652. https://doi.org/10.1038/nature09575

Khan, D., Hamilton, B., Rossen, L. M., He, Y., Wei, R., & Dienes, E. (2022). *NCHS data visualization gallery - Teen birth rates for age group 15-19 in the United States by county, 2003–2020*. CDC/National Center for Health Statistics. https://www.cdc.gov/nchs/data-visualization/county-teen-births/

Kim, S., & Koh, K. (2022). Health insurance and subjective well-being: Evidence from two healthcare reforms in the United States. *Health Economics*, *31*(1), 233–249. https://doi.org/10.1002/hec.4448

Kimball, S. T. (1949). Rural social organization and co-operative labor. *American Journal of Sociology*, *55*(1), 38–49. https://doi.org/10.1086/220450

Kodras, J. E. (1997). The changing map of American poverty in an era of economic restructuring and political realignment. *Economic Geography*, *73*(1), 67. https://doi.org/10.2307/144411

Krieg, E. J. (2014). The social and environmental costs of milk production: Trends and resistance in Vermont. *American Journal of Economics and Sociology*, *73*(1), 210–236. https://doi.org/10.1111/ajes.12063

Kyne, D., & Aldrich, D. P. (2020). Capturing bonding, bridging, and linking social capital through publicly available data. *Risk, Hazards & Crisis in Public Policy*, *11*(1), 61–86. https://doi.org/10.1002/rhc3.12183

Lancaster, N. A., & Torres, A. P. (2019). Investigating the drivers of farm diversification among U.S. fruit and vegetable operations. *Sustainability*, *11*(12), 3380. https://doi.org/10.3390/su11123380

Landis, D. A. (2017). Designing agricultural landscapes for biodiversity-based ecosystem services. *Basic and Applied Ecology*, *18*, 1–12. https://doi.org/10.1016/j.baae.2016.07.005

Lauer, S., & Sanderson, M. (2020). Irrigated agriculture and human development: a county-level analysis 1980–2010. *Environment, Development and Sustainability*, *22*(5), 4407–4423. https://doi.org/10.1007/S10668-019-00390-9/TABLES/2

Lavoie, A., & Wardropper, C. B. (2021). Engagement with conservation tillage shaped by "good farmer" identity. *Agriculture and Human Values*, *38*(4), 975–985. https://doi.org/10.1007/s10460-021-10205-1

Lee, S. J., & Kim, Y. (2015). Searching for the meaning of community well-being. In S. J. Lee, Y. Kim, & R. Phillips (Eds.), *In Community well-being and community development* (pp. 9–23). Springer, Cham. https://doi.org/10.1007/978-3-319-12421-6_2

Leitschuh, B., Stewart, W. P., & van Riper, C. J. (2022). Place-making in the Corn Belt: The productivist landscapes of the "good farmer." *Journal of Rural Studies*, *92*, 415–424. https://doi.org/10.1016/j.jrurstud.2022.05.002

Lencucha, R., Pal, N. E., Appau, A., Thow, A.-M., & Drope, J. (2020). Government policy and agricultural production: a scoping review to inform research and policy on healthy agricultural commodities. *Globalization and Health*, *16*(1), 11. https://doi.org/10.1186/s12992-020-0542-2

Lerro, C. C., Hofmann, J. N., Andreotti, G., Koutros, S., Parks, C. G., Blair, A., Albert, P. S., Lubin, J. H., Sandler, D. P., & Beane Freeman, L. E. (2020). Dicamba use and cancer incidence in the agricultural health study: an updated analysis. *International Journal of Epidemiology*, *49*(4), 1326–1337. https://doi.org/10.1093/ije/dyaa066

Liddell, T. M., & Kruschke, J. K. (2018). Analyzing ordinal data with metric models: What could possibly go wrong? *Journal of Experimental Social Psychology*, *79*, 328–348. https://doi.org/10.1016/j.jesp.2018.08.009

Liebman, M., Helmers, M. J., Schulte, L. A., & Chase, C. A. (2013). Using biodiversity to link agricultural productivity with environmental quality: Results from three field experiments in Iowa. *Renewable Agriculture and Food Systems*, *28*(2), 115–128. https://doi.org/10.1017/S1742170512000300

Lincoln, N. K., & Ardoin, N. M. (2016). Cultivating values: environmental values and sense of place as correlates of sustainable agricultural practices. *Agriculture and Human Values*, *33*(2), 389–401. https://doi.org/10.1007/s10460-015-9613-z

Linder, S. H., & Peters, B. G. (1984). From social theory to policy design. *Public Policy*, *4*(3), 237–259. https://www.jstor.org/stable/3998318?seq=1&cid=pdf-

Liu, J., Hertel, T. W., Lammers, R. B., Prusevich, A., Baldos, U. L. C., Grogan, D. S., & Frolking, S. (2017). Achieving sustainable irrigation water withdrawals: global impacts on food security and land use. *Environmental Research Letters*, *12*(10), 104009. https://doi.org/10.1088/1748-9326/aa88db

Lobao, L. (1990). *Locality and inequality: Farm and industry structure and socioeconomic conditions*. SUNY Press.

Lobao, L. M., Schulman, M. D., & Swanson, L. E. (1993). Still going: Recent debates on the Goldschmidt hypothesis. *Rural Sociology*, *58*(2), 277–288. https://doi.org/10.1111/j.1549-0831.1993.tb00495.x

Lobao, L., & Meyer, K. (2001). The great agricultural transition: Crisis, change, and social consequences of twentieth-century US farming. *Annual Review of Sociology*, *27*, 103–124.

Lobao, L., & Stofferahn, C. W. (2008). The community effects of industrialized farming: Social science research and challenges to corporate farming laws. *Agriculture and Human Values*, *25*(2), 219–240. https://doi.org/10.1007/s10460-007-9107-8

Lowe, P., Murdoch, J., Marsden, T., Munton, R., & Flynn, A. (1993). Regulating the new rural spaces: the uneven development of land. *Journal of Rural Studies*, *9*(3), 205–222. https://doi.org/10.1016/0743-0167(93)90067-T

Lubell, M. N., Cutts, B. B., Roche, L. M., Hamilton, M., Derner, J. D., Kachergis, E., & Tate, K. W. (2013). Conservation program participation and adaptive rangeland decision-making. *Rangeland Ecology & Management*, *66*(6), 609–620. https://doi.org/10.2111/REM-D-13-00025.1

Lyons, C., Blount, B., Carothers, C., Marchioni, M., Davis, R., & Loring, P. (2016). Considering communities in fisheries management. *Marine Policy*, *74*, 288–291. https://doi.org/10.1016/j.marpol.2016.05.006

Lyson, T. A. (2000). Moving toward civic agriculture. *Choices: The Magazine of Food, Farm, and Resource Issues*, *15*(3), 1–4.

Lyson, T. A. (2004). *Civic agriculture: Reconnecting farm, food, and community*. Tufts University Press.

Lyson, T. A. (2005). Civic agriculture and community problem solving. *Culture & Agriculture*, *27*(2), 92–98. https://doi.org/10.1525/cag.2005.27.2.92

Lyson, T. A., & Gillespie, G. W. (2010). Producing more milk on fewer farms: Neoclassical and neostructural explanations of changes in dairy farming. *Rural Sociology*, *60*(3), 493–504. https://doi.org/10.1111/j.1549-0831.1995.tb00586.x

Lyson, T. A., Torres, R. J., & Welsh, R. (2001). Scale of agricultural production, civic engagement, and community welfare. *Social Forces*, *80*(1), 311–327.

Lyson, T. A., & Welsh, R. (2005). Agricultural industrialization, anticorporate farming laws, and rural community welfare. *Environment and Planning A*, *37*(8), 1479–1491. https://doi.org/10.1068/a37142

MacDonald, J. M. (2020). Tracking the consolidation of U.S. agriculture. *Applied Economic Perspectives and Policy*, *42*(3), 361–379. https://doi.org/10.1002/aepp.13056

Madin, M. B., & Nelson, K. S. (2023). Effects of landscape simplicity on crop yield: A reanalysis of a global database. *PLOS ONE*, *18*(12), e0289799. https://doi.org/10.1371/journal.pone.0289799

Magnan, A., & Sunley, S. (2017). Farmland investment and financialization in Saskatchewan, 2003–2014: An empirical analysis of farmland transactions. *Journal of Rural Studies*, *49*, 92–103. https://doi.org/10.1016/j.jrurstud.2016.11.007

Mann, S. A., & Dickinson, J. M. (1978). Obstacles to the development of a capitalist agriculture. *The Journal of Peasant Studies*, *5*(4), 466–481. https://doi.org/10.1080/03066157808438058

Marshall, A. (1890). *Principles of economics* (8th ed.). Macmillan, 1920.

Marshall, E. J. P. (2004). Agricultural Landscapes: field margin habitats and their interaction with crop production. *Journal of Crop Improvement*, *12*(1–2), 365–404. https://doi.org/10.1300/J411v12n01_05

Mather, A. S., Hill, G., & Nijnik, M. (2006). Post-productivism and rural land use: Cul de sac or challenge for theorization? *Journal of Rural Studies*, *22*(4), 441–455. https://doi.org/10.1016/j.jrurstud.2006.01.004

Matson, P. A., Clark, W. C., & Andersson, K. P. (2016). Pursuing sustainability: A guide to the science and practice. In *Pursuing sustainability: A guide to the science and practice*. Princeton University Press.

Matson, P. A., Parton, W. J., Power, A. G., & Swift, M. J. (1997). Agricultural intensification and ecosystem properties. *Science*, *277*(5325), 504–509. https://doi.org/10.1126/science.277.5325.504

Maybery, D., Crase, L., & Gullifer, C. (2005). Categorising farming values as economic, conservation and lifestyle. *Journal of Economic Psychology*, *26*(1), 59–72. https://doi.org/10.1016/j.joep.2003.10.001

McCarthy, J., Meredith, D., & Bonnin, C. (2023). 'You have to keep it going': Relational values and social sustainability in upland agriculture. *Sociologia Ruralis*, *63*(3), 588–610. https://doi.org/10.1111/soru.12402

McCown, R. L. (2005). New Thinking about farmer decision makers. In J. L. Hatfield (Ed.), *The farmer's decision: Balancing economic successful agriculture production with environmental quality* (pp. 11–44). Soil and Water Conservation Society.

McDaniel, M. D., Tiemann, L. K., & Grandy, A. S. (2014). Does agricultural crop diversity enhance soil microbial biomass and organic matter dynamics? A meta-analysis. *Ecological Applications*, *24*(3), 560–570. https://doi.org/10.1890/13-0616.1

Mcginnis, M. D., & Ostrom, E. (2014). Social-ecological system framework: initial changes and continuing challenges. *Ecology and Society*, *19*(2).

McGonigle, D. F., Rota Nodari, G., Phillips, R. L., Aynekulu, E., Estrada-Carmona, N., Jones, S. K., Koziell, I., Luedeling, E., Remans, R., Shepherd, K., Wiberg, D., Whitney, C., & Zhang, W. (2020). A knowledge brokering framework for integrated landscape management. *Frontiers in Sustainable Food Systems*, *4*, 13. https://doi.org/10.3389/fsufs.2020.00013

McGuire, J. M., Morton, L. W., Arbuckle, J. G., & Cast, A. D. (2015). Farmer identities and responses to the social–biophysical environment. *Journal of Rural Studies*, *39*, 145–155. https://doi.org/10.1016/j.jrurstud.2015.03.011

McGuire, J., Morton, L. W., & Cast, A. D. (2013). Reconstructing the good farmer identity: shifts in farmer identities and farm management practices to improve water quality. *Agriculture and Human Values*, *30*(1), 57–69. https://doi.org/10.1007/s10460-012-9381-y

Meert, H., Van Huylenbroeck, G., Vernimmen, T., Bourgeois, M., & van Hecke, E. (2005). Farm household survival strategies and diversification on marginal farms. *Journal of Rural Studies*, *21*(1), 81–97. https://doi.org/10.1016/j.jrurstud.2004.08.007

Melander, B. (2003). *Visit to Australia and New Zealand* (pp. 1–17). https://orgprints.org/id/eprint/1494/1/AUS_NZ_report.pdf

Membiela-Pollán, M., Alló-Pazos, M., Pateiro-Rodríguez, C., & Blázquez-Lozano, F. (2019). The inefficiency of the neoclassical paradigm in the promotion of subjective well-being and socioeconomic and environmental sustainability: An empirical test for the Spanish case. *Sustainability*, *11*(24), 7102. https://doi.org/10.3390/su11247102

Meredith, B. G., Bean, A., Brymer, A. B., Friedrichsen, C., & Hurst, Z. (2021). Integrating human dimensions within the LTAR Network to achieve agroecological system transformation. *Rangelands*. https://doi.org/10.1016/J.RALA.2021.05.002

Mhadhbi, F., & Napoléone, C. (2022). Does agricultural intensification enhance rural wellbeing? a structural model assessment at the sub-communal level: a case study in Tunisia. *Sustainability*, *14*(23), 16054. https://doi.org/10.3390/su142316054

Miaris, G., Löfgren, S., & Hansson, H. (2024). Values underlying farmers' business development decisions: evidence from Swedish agriculture using Zaltman metaphor elicitation technique. *The Journal of Agricultural Education and Extension*, *30*(1), 21–42. https://doi.org/10.1080/1389224X.2022.2143828

Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being: Synthesis*.

Mills, C. W., & Ulmer, M. (1946). *Small business and civic welfare. Report of the smaller war plants corporation to the special committee to study problems of American small business.*

MIT Election Data and Science Lab. (2018). *County presidential election returns 2000-2020*. U.S. Presidential Elections. https://doi.org/10.7910/DVN/VOQCHQ

Mosimane, A. W., Breen, C., & Nkhata, B. A. (2012). Collective identity and resilience in the management of common-pool resources. *International Journal of the Commons*, *6*(2), 344–362.

Nagel, B., & Partelow, S. (2022). A methodological guide for applying the social-ecological system (SES) framework: a review of quantitative approaches. *Ecology and Society*, *27*(4), art39. https://doi.org/10.5751/ES-13493-270439

National Center for Health Statistics. (2018). *NVSS - United States Small-Area Life Expectancy Estimates Project*. Life Expectancy Estimates File for {Jurisdiction}, 2010-2015. https://www.cdc.gov/nchs/nvss/usaleep/usaleep.html

National Research Council. (2010). *Toward sustainable agricultural systems in the 21st century*. The National Academies Press. https://doi.org/10.17226/12832

Nelson, K. S., & Burchfield, E. K. (2023). Defining features of diverse and productive agricultural systems: An archetype analysis of U.S. agricultural counties. *Frontiers in Sustainable Food Systems, 7*, 76. https://doi.org/10.3389/FSUFS.2023.1081079

Nelson, K. S., Nguyen, T. D., Brownstein, N. A., Garcia, D., Walker, H. C., Watson, J. T., & Xin, A. (2021). Definitions, measures, and uses of rurality: A systematic review of the empirical and quantitative literature. *Journal of Rural Studies*, *82*, 351–365. https://doi.org/10.1016/J.JRURSTUD.2021.01.035

Nelson, K. S., Nguyen, T. D., Francois, J. R., & Ojha, S. (2023). Rural sustainability methods, drivers, and outcomes: A systematic review. *Sustainable Development*, *31*(3), 1226–1249. https://doi.org/10.1002/sd.2471

Nelson, K. S., Patalee, B., & Yao, B. (2022). Higher landscape diversity associated with improved crop production resilience in Kansas, USA. *Environmental Research Letters*, *17*(8), 084011. https://doi.org/10.1088/1748-9326/AC7E5F

Niles, M. T., Brown, M., & Dynes, R. (2016). Farmer's intended and actual adoption of climate change mitigation and adaptation strategies. *Climatic Change*, *135*(2), 277–295. https://doi.org/10.1007/s10584-015-1558-0

Norman, D., Bloomquist, L., Janke, R., Freyenberger, S., Jost, J., Schurle, B., & Kok, H. (2000). The meaning of sustainable agriculture: Reflections of some Kansas practitioners. *American Journal of Alternative Agriculture*, *15*(3), 129–136. https://doi.org/10.1017/S088918930000864X

Obach, B. K., & Tobin, K. (2014). Civic agriculture and community engagement. *Agriculture and Human Values*, *31*(2), 307–322. https://doi.org/10.1007/s10460-013-9477-z

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*(5), 673–690. https://doi.org/10.1007/s11135-006-9018-6

Odum, W. E. (1982). Environmental degradation and the tyranny of small decisions. *BioScience*, *32*(9), 728–729. https://doi.org/10.2307/1308718

Oliver, C. D., Covey, K., Hohl, A., Larsen, D., McCarter, J. B., Niccolai, A., & Wilson, J. (2012). Landscape management. In J. Stanturf, D. Lamb, & P. Madsen (Eds.), *Forest*

Landscape Restoration (World Forests, Vol. 15, pp. 39–65). https://doi.org/10.1007/978-94-007-5326-6_3

Opie, J., Miller, C., & Archer, K. L. (2018). *Ogallala: Water for a Dry Land* (3rd ed.). University of Nebraska Press. https://doi.org/10.2307/j.ctv1ntfbc

Ostrom, E. (1990). Governing the commons: The evolution of institutions for collective action. In *Resources J*. Cambridge University Press.

Ostrom, E. (2000). Collective action and the evolution of social norms. *The Journal of Economic Perspectives*, *14*(3), 137–158.

Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences*, *104*(39), 15181–15187. https://doi.org/10.1073/pnas.0702288104

Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science*, *325*(5939), 419–422. https://doi.org/10.1126/science.1172133

Ostrom, E., & Cox, M. (2010). Moving beyond panaceas: a multi-tiered diagnostic approach for social-ecological analysis. *Environmental Conservation*, *37*(4), 451–463. https://doi.org/10.1017/S0376892910000834

Ouma, S. (2020). *Farming as a financial asset: global finance and the making of institutional landscapes*. Agenda Publishing.

Park, S. J., & Deller, S. (2021). Effect of farm structure on rural community well-being. *Journal of Rural Studies*, *87*, 300–313. https://doi.org/10.1016/J.JRURSTUD.2021.09.014

Parker, J., & Moore, R. (2008). Conservation use and quality of life in a rural community: an extension of Goldschmidt's findings. *Journal of Rural Social Sciences*, *23*(1), Art. 10. https://egrove.olemiss.edu/jrss/vol23/iss1/10

Partelow, S. (2016). Coevolving Ostrom's social–ecological systems (SES) framework and sustainability science: four key co-benefits. *Sustainability Science*, *11*(3), 399–410. https://doi.org/10.1007/s11625-015-0351-3

Partelow, S. (2018). A review of the social-ecological systems framework: applications, methods, modifications, and challenges. *Ecology and Society*, *23*(4), art36. https://doi.org/10.5751/ES-10594-230436

Partelow, S., Jäger, A., & Schlüter, A. (2021). Linking fisher perceptions to social-ecological context: Mixed method application of the SES framework in Costa Rica. *Human Ecology*, *49*(2), 187–203. https://doi.org/10.1007/s10745-021-00228-x

Pauling, J. S. D. (2001). *The politics of food: urban agriculture as a radical green alternative to the political economy of agriculture.* University of Canterbury.

Pellegrini, L., & Tasciotti, L. (2014). Crop diversification, dietary diversity and agricultural income: empirical evidence from eight developing countries. *Canadian Journal of Development Studies / Revue Canadienne d'études Du Développement*, *35*(2), 211–227. https://doi.org/10.1080/02255189.2014.898580

Pennings, J. M. E., Irwin, S. H., & Good, D. L. (2002). Surveying farmers: A case study. *Review of Agricultural Economics*, *24*(1), 266–277. https://doi.org/10.1111/1467-9353.00096

Peters, D. J. (2019). Community resiliency in declining small towns: Impact of population loss on quality of life over 20 years. *Rural Sociology*, *84*(4), 635–668. https://doi.org/10.1111/ruso.12261

Porter, M. E., & Kramer, M. R. (2011). Creating shared value: How to reinvent capitalism-and unleash a wave of innovation and growth. *Harvard Business Review*, *89*(1/2), 62–77.

Poulsen, M. N. (2017). Cultivating citizenship, equity, and social inclusion? Putting civic agriculture into practice through urban farming. *Agriculture and Human Values*, *34*(1), 135–148. https://doi.org/10.1007/s10460-016-9699-y

Power, A. G. (2010). Ecosystem services and agriculture: tradeoffs and synergies. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 2959–2971. https://doi.org/10.1098/rstb.2010.0143

Primdahl, J., Kristensen, L. S., & Busck, A. G. (2013). The farmer and landscape management: different roles, different policy approaches. *Geography Compass*, *7*(4), 300–314. https://doi.org/10.1111/gec3.12040

Pritchard, B., Welch, E., Restrepo, G. U., & Mitchell, L. (2023). How do financialised agri-corporate investors acquire farmland? Analysing land investment in an Australian agricultural region, 2004–2019. *Journal of Economic Geography*, *23*(5), 1037–1058. https://doi.org/10.1093/jeg/lbad008

Prokopy, L. S., Floress, K., Arbuckle, J. G., Church, S. P., Eanes, F. R., Gao, Y., Gramig, B. M., Ranjan, P., & Singh, A. S. (2019). Adoption of agricultural conservation practices in the

United States: Evidence from 35 years of quantitative literature. *Journal of Soil and Water Conservation*, *74*(5), 520–534. https://doi.org/10.2489/jswc.74.5.520

Prokopy, L. S., Floress, K., Klotthor-Weinkauf, D., & Baumgart-Getz, A. (2008). Determinants of agricultural best management practice adoption: Evidence from the literature. *Journal of Soil and Water Conservation*, *63*(5), 300–311. https://doi.org/10.2489/jswc.63.5.300

Pulver, S., Ulibarri, N., Sobocinski, K. L., Alexander, S. M., Johnson, M. L., McCord, P. F., & Dell'Angelo, J. (2018). Frontiers in socio-environmental research: components, connections, scale, and context. *Ecology and Society*, *23*(3), art23. https://doi.org/10.5751/ES-10280-230323

R Core Team. (2022). *R: A language and environment for statistical computing. R Foundation for Statistical Computing*. https://www.r-project.org/

Raedeke, A. H., Green, J. J., Hodge, S. S., & Valdivia, C. (2003). Farmers, the practice of farming and the future of agroforestry: An application of Bourdieu's concepts of field and habitus. *Rural Sociology*, *68*(1), 64–86. https://doi.org/10.1111/j.1549-0831.2003.tb00129.x

Rampin, R., & Rampin, V. (2021). Taguette: open-source qualitative data analysis. *Journal of Open Source Software*, *6*(68), 3522. https://doi.org/10.21105/joss.03522

Ramsey, D., & Smit, B. (2002). Rural community well-being: models and application to changes in the tobacco-belt in Ontario, Canada. *Geoforum*, *33*, 367–384. www.elsevier.com/locate/geoforum

Ranjha, M. M. A. N., Shafique, B., Khalid, W., Nadeem, H. R., Mueen-ud-Din, G., & Khalid, M. Z. (2022). Applications of biotechnology in food and agriculture: A mini-review. *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, *92*(1), 11–15. https://doi.org/10.1007/s40011-021-01320-4

Rasmussen, L. V., Grass, I., Mehrabi, Z., Smith, O. M., Bezner-Kerr, R., Blesh, J., Garibaldi, L. A., Isaac, M. E., Kennedy, C. M., Wittman, H., Batáry, P., Buchori, D., Cerda, R., Chará, J., Crowder, D. W., Darras, K., DeMaster, K., Garcia, K., Gómez, M., … Kremen, C. (2024). Joint environmental and social benefits from diversified agriculture. *Science*, *384*(6691), 87–93. https://doi.org/10.1126/science.adj1914

Reganold, J. P., Jackson-Smith, D., Batie, S. S., Harwood, R. R., Kornegay, J. L., Bucks, D., Flora, C. B., Hanson, J. C., Jury, W. A., Meyer, D., Schumacher, A., Sehmsdorf, H., Shennan, C., Thrupp, L. A., & Willis, P. (2011). Transforming U.S. agriculture. *Science*, *332*(6030), 670–671. https://doi.org/10.1126/SCIENCE.1202462

Regmi, M., Tack, J., & Featherstone, A. M. (2023). Does crop insurance influence crop yield impacts of warming temperatures? A farm-level analysis. *Journal of the Agricultural and Applied Economics Association*, *2*(4), 808–822. https://doi.org/10.1002/jaa2.92

Ren, C., Liu, S., van Grinsven, H., Reis, S., Jin, S., Liu, H., & Gu, B. (2019). The impact of farm size on agricultural sustainability. *Journal of Cleaner Production*, *220*, 357–367. https://doi.org/10.1016/j.jclepro.2019.02.151

Renard, D., & Tilman, D. (2019). National food production stabilized by crop diversity. *Nature*, *571*(7764), 257–260. https://doi.org/10.1038/s41586-019-1316-y

Richardson, E., Hughes, E., McLennan, S., & Meo-Sewabu, L. (2019). Indigenous well-being and development: Connections to large-scale mining and tourism in the Pacific. *The Contemporary Pacific*, *31*(1), 1–34.

Rissing, A., & Burchfield, E. (2024). Crop diversification as landscape change: using land systems science to understand agricultural trajectories in North Carolina. *Regional Environmental Change*, *24*(1), 3. https://doi.org/10.1007/s10113-023-02162-8

Roesch-Mcnally, G. E., Basche, A. D., Arbuckle, J. G., Tyndall, J. C., Miguez, F. E., Bowman, T., & Clay, R. (2018). The trouble with cover crops: Farmers' experiences with overcoming barriers to adoption. *Renewable Agriculture and Food Systems*, *33*(4), 322–333. https://doi.org/10.1017/S1742170517000096

Rogers, E. M. (2010). *Diffusion of innovations*. Simon & Schuster.

Rosburg, A., & Grebitus, C. (2021). Sustainable development in the craft brewing industry: A case study of Iowa brewers. *Business Strategy and the Environment*, *30*(7), 2966–2979. https://doi.org/10.1002/bse.2782

Rupasingha, A., Goetz, S. J., & Freshwater, D. (2006). The production of social capital in US counties. *The Journal of Socio-Economics*, *35*(1), 83–101. https://doi.org/10.1016/j.socec.2005.11.001

Rural School and Community Trust. (2003). *Building strong rural schools in South Carolina: The foundations we need*.

Rusch, A., Chaplin-Kramer, R., Gardiner, M. M., Hawro, V., Holland, J., Landis, D., Thies, C., Tscharntke, T., Weisser, W. W., Winqvist, C., Woltz, M., & Bommarco, R. (2016).

Agricultural landscape simplification reduces natural pest control: A quantitative synthesis. *Agriculture, Ecosystems & Environment*, *221*, 198–204. https://doi.org/10.1016/J.AGEE.2016.01.039

Rushton, G. (1993). Human behavior in spatial analysis. *Urban Geography*, *14*(5), 447–456. https://doi.org/10.2747/0272-3638.14.5.447

Sainju, U. M. (2018). Agricultural management impact on greenhouse gas emissions. In A. K. Shanker, C. Shanker, & S. Ch. Rao (Eds.), *Climate resilient agriculture - Strategies and perspectives*. InTech. https://doi.org/10.5772/intechopen.72368

Sampson, D. (2018). Productivism, agroecology, and the challenge of feeding the world. *Gastronomica*, *18*(4), 41–53. https://doi.org/10.1525/gfc.2018.18.4.41

Sanderson, M. R., Bergtold, J. S., Heier Stamm, J. L., Caldas, M. M., Ramsey, S. M., & Aistrup, J. (2018). Climate change beliefs in an agricultural context: what is the role of values held by farming and non-farming groups? *Climatic Change*, *150*(3–4), 259–272. https://doi.org/10.1007/s10584-018-2283-2

Santos-Martín, F., Zorrilla-Miras, P., García-Llorente, M., Quintas-Soriano, C., Montes, C., Benayas, J., Gómez Sal, A., & Paracchini, M. L. (2019). Identifying win–win situations in agricultural landscapes: an integrated ecosystem services assessment for Spain. *Landscape Ecology*, *34*(7), 1789–1805. https://doi.org/10.1007/s10980-019-00852-5

SARE. (n.d.). *Sustainable Agriculture Research and Education (SARE)*. Https://Www.Sare.Org/.

Šarković, A., Cvejić, S., & Bogdanov, N. (2016). The environmental awareness of agricultural producers in Serbia: Attitudes and practices. *TEME: Casopis Za Društvene Nauke*, *40*(2), 729–745.

Schlüter, M., Haider, L. J., Lade, S. J., Lindkvist, E., Martin, R., Orach, K., Wijermans, N., & Folke, C. (2019). Capturing emergent phenomena in social-ecological systems: an analytical framework. *Ecology and Society*, *24*(3), art11. https://doi.org/10.5751/ES-11012-240311

Schneider, F., Feurer, M., Lundsgaard-Hansen, L. M., Win Myint, Cing Don Nuam, Nydegger, K., Oberlack, C., Nwe Nwe Tun, Zähringer, J. G., Aung Myin Tun, & Messerli, P. (2020). Sustainable development under competing claims on land: Three pathways between land-use changes, ecosystem services, and human well-being. *The European Journal of Development Research*, *32*(2), 316–337. https://doi.org/10.1057/s41287-020-00268-x

Schneider, J. M., Zabel, F., & Mauser, W. (2022). Global inventory of suitable, cultivable and available cropland under different scenarios and policies. *Scientific Data*, *9*(1), 527. https://doi.org/10.1038/s41597-022-01632-8

Schoolman, E. D. (2020). Local food and civic engagement: Do farmers who market local food feel more responsible for their communities? *Rural Sociology*, *85*(3), 806–839. https://doi.org/10.1111/ruso.12326

Schoolman, E. D., Morton, L. W., Arbuckle, J. G., & Han, G. (2021). Marketing to the foodshed: Why do farmers participate in local food systems? *Journal of Rural Studies*, *84*, 240–253. https://doi.org/10.1016/j.jrurstud.2020.08.055

Sechzer, J. A., Griffin, A., & Pfafflin, S. M. (1994). Women's health and paradigm change. *Annals of the New York Academy of Sciences*, *736*(1), 2–20. https://doi.org/10.1111/j.1749-6632.1994.tb12815.x

Selman, P. (2006). Planning at the landscape scale. In *Planning at the landscape scale* (1st Edition). Routledge. https://doi.org/10.4324/9780203696903/

Shiyab, W., Ferguson, C., Rolls, K., & Halcomb, E. (2023). Solutions to address low response rates in online surveys. *European Journal of Cardiovascular Nursing*, *22*(4), 441–444. https://doi.org/10.1093/eurjcn/zvad030

Shreck, A., Getz, C., & Feenstra, G. (2006). Social sustainability, farm labor, and organic agriculture: Findings from an exploratory analysis. *Agriculture and Human Values*, *23*(4), 439–449. https://doi.org/10.1007/s10460-006-9016-2

Singer, P. (2002). *Animal liberation*. HarperCollins. https://doi.org/10.4324/9780203495667

Sippel, S. R. (2023). Tackling land's 'stubborn materiality': the interplay of imaginaries, data and digital technologies within farmland assetization. *Agriculture and Human Values*, *40*(3), 849–863. https://doi.org/10.1007/s10460-023-10453-3

Smith, G. R., Strachan, G., & Gibbon, D. (2018). Rural well-being: the push and pull and the diversity in-between. *International Journal of Sustainable Development & World Ecology*, *25*(7), 592–601. https://doi.org/10.1080/13504509.2018.1446369

Smith, M., Lal, P., & Vedwan, N. (2023). Motivations underlying farmers' management decisions and willingness to adopt sustainable practices: A case study of the northeastern United States. *Journal of Rural Studies*, *103*, 103138. https://doi.org/10.1016/j.jrurstud.2023.103138

Soubry, B., Sherren, K., & Thornton, T. F. (2020). Are we taking farmers seriously? A review of the literature on farmer perceptions and climate change, 2007–2018. *Journal of Rural Studies*, *74*, 210–222. https://doi.org/10.1016/j.jrurstud.2019.09.005

Spangler, K., Burchfield, E. K., Radel, C., Jackson-Smith, D., & Johnson, R. (2022). Crop diversification in Idaho's Magic Valley: the present and the imaginary. *Agronomy for Sustainable Development 2022 42:5*, *42*(5), 1–16. https://doi.org/10.1007/S13593-022-00833-0

Stedman, R. C., Connelly, N. A., Heberlein, T. A., Decker, D. J., & Allred, S. B. (2019). The end of the (research) world as we know it? Understanding and coping with declining response rates to mail surveys. *Society & Natural Resources*, *32*(10), 1139–1154. https://doi.org/10.1080/08941920.2019.1587127

Stone, G. D. (2001). Agricultural change theory. In N. J. Smelser & P. B. Baltes (Eds.), *International Encyclopedia of the Social & Behavioral Sciences* (pp. 329–333). Elsevier. https://doi.org/10.1016/B0-08-043076-7/04143-7

Streimikis, J., Bathaei, A., & Štreimikienė, D. (2024). Sustainability assessment of the agriculture sector using best worst method: Case study of Baltic states. *Sustainable Development*, 1–16. https://doi.org/10.1002/sd.2993

Subedi, B. P. (2016). Using Likert type data in social science research: Confusion, issues and challenges. *International Journal of Contemporary Applied Sciences*, *3*(2), 36–49.

Sulewski, P., & Gołaś, M. (2019). Environmental awareness of farmers and farms' characteristics. *Problems of Agricultural Economics*, *361*(4), 55–81. https://doi.org/10.30858/zer/115186

Summers, J. K., Smith, L. M., Case, J. L., & Linthurst, R. A. (2012). A review of the elements of human well-being with an emphasis on the contribution of ecosystem services. *AMBIO*, *41*(4), 327–340. https://doi.org/10.1007/s13280-012-0256-7

Sumner, J. (2005). Value wars in the new periphery: Sustainability, rural communities and agriculture. *Agriculture and Human Values*, *22*(3), 303–312. https://doi.org/10.1007/s10460-005-6047-z

Sung, H., & Phillips, R. G. (2018). Indicators and community well-being: Exploring a relational framework. *International Journal of Community Well-Being*, *1*(1), 63–79. https://doi.org/10.1007/s42413-018-0006-0

Swift, M. J., Izac, A.-M. N., & van Noordwijk, M. (2004). Biodiversity and ecosystem services in agricultural landscapes—are we asking the right questions? *Agriculture, Ecosystems & Environment*, *104*(1), 113–134. https://doi.org/10.1016/j.agee.2004.01.013

Tate, E. (2013). Uncertainty analysis for a social vulnerability index. *Annals of the Association of American Geographers*, *103*(3), 526–543. https://doi.org/10.1080/00045608.2012.700616

Theodori, G. L. (2001). Examining the effects of community satisfaction and attachment on individual well-being. *Rural Sociology*, *66*(4), 618–628. https://doi.org/10.1111/J.1549-0831.2001.TB00087.X

Theodori, G. L. (2005). Community and community development in resource-based areas: Operational definitions rooted in an interactional perspective. *Society and Natural Resources*, *18*(7), 661–669. https://doi.org/10.1080/08941920590959640

Tilzey, M. (2018). The rise and demise of the 'third' or 'political productivist' food regime (1930s–1980s). In *Political ecology, food regimes, and food sovereignty: Crisis, resistance, and resilience* (pp. 127–143). Palgrave Macmillan. https://doi.org/10.1007/978-3-319-64556-8_5

Tolbert, C. M., Lyson, T. A., & Irwin, M. D. (1998). Local capitalism, civic engagement, and socioeconomic well-being. *Social Forces*, *77*(2), 401–429.

Trauger, A. (2001). Women farmers in Minnesota and the post-productivist transition. *The Great Lakes Geographer*, *8*(2), 66.

Troughton, M. J. (1986). Farming systems in the modern world. In M. Pacione (Ed.), *Progress in Agricultural Geography (Routledge Revivals)* (1st edition, pp. 93–123). Routledge.

Turnbull, J., Platt, B., & Searle, A. (2022). For a new weird geography. *Progress in Human Geography*, *46*(5), 1207–1231. https://doi.org/10.1177/03091325221116873

Turner, B., Meyfroidt, P., Kuemmerle, T., Müller, D., & Roy Chowdhury, R. (2020). Framing the search for a theory of land use. *Journal of Land Use Science*, *15*(4), 489–508. https://doi.org/10.1080/1747423X.2020.1811792

Ulrich-Schad, J. D., Li, S., Arbuckle, J. G., Avemegah, E., Brasier, K. J., Burnham, M., Kumar Chaudhary, A., Eaton, W. M., Gu, W., Haigh, T., Jackson-Smith, D., Metcalf, A. L., Pradhananga, A., Prokopy, L. S., Sanderson, M., Wade, E., & Wilke, A. (2022). An inventory and assessment of sample sources for survey research with agricultural producers in the U.S. *Society & Natural Resources*, *35*(7), 804–812. https://doi.org/10.1080/08941920.2022.2081392

VanderWeele, T. J. (2019). Measures of community well-being: A template. *International Journal of Community Well-Being*, *2*(3–4), 253–275. https://doi.org/10.1007/s42413-019-00036-8

Wagner, C. R. H., Greenhalgh, S., Niles, M. T., Zia, A., & Bowden, W. B. (2020b). Evaluating water quality regulation as a driver of farmer behavior: A social-ecological systems approach. *Ecology and Society*, *25*(4), 1–38. https://doi.org/10.5751/ES-12034-250435

Walker, K., & Herman, M. (2023). *tidycensus: Load US Census boundary and attribute data as "tidyverse" and 'sf'-ready data frames_. R package version 1.5*. https://walker-data.com/tidycensus/

Walter, G. (1997). Images of success: How Illinois farmers define the successful farmer. *Rural Sociology*, *62*(1), 48–68. https://doi.org/10.1111/j.1549-0831.1997.tb00644.x

Wang, S. L., Heisey, P., Schimmelpfennig, D., & Ball, V. E. (2015). *Agricultural productivity growth in the United States: Measurement, trends, and drivers*.

Wilson, G. A. (2001). From productivism to post-productivism ... and back again? Exploring the (un)changed natural and mental landscapes of European agriculture. *Transactions of the Institute of British Geographers*, *26*(1), 77–102. https://doi.org/10.1111/1475-5661.00007

Wilson, G. A., & Rigg, J. (2003). 'Post-productivist' agricultural regimes and the South: discordant concepts? *Progress in Human Geography*, *27*(6), 681–707. https://doi.org/10.1191/0309132503ph450oa

Wilson, P., Harper, N., & Darling, R. (2013). Explaining variation in farm and farm business performance in respect to farmer behavioural segmentation analysis: Implications for land use policies. *Land Use Policy*, *30*(1), 147–156. https://doi.org/10.1016/j.landusepol.2012.03.006

Winders, B. (2017). *Grains*. Polity Press.

Wing, S., Horton, R. A., Marshall, S. W., Thu, K., Tajik, M., Schinasi, L., & Schiffman, S. S. (2008). Air pollution and odor in communities near industrial swine operations. *Environmental Health Perspectives*, *116*(10), 1362–1368. https://doi.org/10.1289/ehp.11250

Winship, C., & Mare, R. D. (1984). Regression models with ordinal variables. *American Sociological Review*, *49*(4), 512. https://doi.org/10.2307/2095465

Winterton, R., Hulme Chambers, A., Farmer, J., & Munoz, S.-A. (2014). Considering the implications of place-based approaches for improving rural community wellbeing: The value of a relational lens. *Rural Society*, *23*(3), 283–295. https://doi.org/10.1080/10371656.2014.11082071

Wiseman, J., & Brasher, K. (2008). Community wellbeing in an unwell world: Trends, challenges, and possibilities. *Public Health Policy*, *29*(3), 353–366.

Wittman, H., Chappell, M. J., Abson, D. J., Kerr, R. B., Blesh, J., Hanspach, J., Perfecto, I., & Fischer, J. (2017). A social–ecological perspective on harmonizing food security and biodiversity conservation. *Regional Environmental Change*, *17*(5), 1291–1301. https://doi.org/10.1007/s10113-016-1045-9

Woods, M. (2007). Engaging the global countryside: globalization, hybridity and the reconstitution of rural place. *Progress in Human Geography*, *31*(4), 485–507. https://doi.org/10.1177/0309132507079503

Woods, M. (2009a). Rural geography. In R. Kitchin & N. Thrift (Eds.), *International Encyclopedia of Human Geography* (Vol. 9, pp. 429–441). Elsevier. https://doi.org/10.1016/B978-008044910-4.00900-7

Woods, M. (2009b). Rural geography: blurring boundaries and making connections. *Progress in Human Geography*, *33*(6), 849–858. https://doi.org/10.1177/0309132508105001

Woods, M. (2010). Rural. In *Rural* (1st ed.). Routledge. https://doi.org/10.4324/9780203844304

Woods, M. (2011). Rural geography: Processes, responses and experiences in rural restructuring. In *Rural Geography: Processes, Responses and Experiences in Rural Restructuring*. SAGE Publications Inc. https://doi.org/10.4135/9781446216415

Woods, M. (2012). Rural geography III: Rural futures and the future of rural geography. *Progress in Human Geography*, *36*(1), 125–134. https://doi.org/10.1177/0309132510393135

Wu, M.-J., Zhao, K., & Fils-Aime, F. (2022). Response rates of online surveys in published research: A meta-analysis. *Computers in Human Behavior Reports*, *7*, 100206. https://doi.org/10.1016/j.chbr.2022.100206

Yee, S. H., Paulukonis, E., Simmons, C., Russell, M., Fulford, R., Harwell, L., & Smith, L. M. (2021). Projecting effects of land use change on human well-being through changes in ecosystem services. *Ecological Modelling*, *440*. https://doi.org/10.1016/j.ecolmodel.2020.109358

Yim, N.-H., Kim, S.-H., Kim, H.-W., & Kwahk, K.-Y. (2004). Knowledge-based decision making on higher-level strategic concerns: system dynamics approach. *Expert Systems with Applications*, *27*(1), 143–158. https://doi.org/10.1016/j.eswa.2003.12.019

Zahl-Thanem, A., Burton, R. J. F., & Vik, J. (2021). Should we use email for farm surveys? A comparative study of email and postal survey response rate and non-response bias. *Journal of Rural Studies*, *87*, 352–360. https://doi.org/10.1016/j.jrurstud.2021.09.029

Zango-Palau, A., Jolivet, A., Lurgi, M., & Claramunt-López, B. (2024). A quantitative approach to the understanding of social-ecological systems: a case study from the Pyrenees. *Regional Environmental Change*, *24*(1), 9. https://doi.org/10.1007/s10113-023-02177-1

Zapata-Ramos, M. L., & Kim, Y. (2018). Is the impact of CSR similar across borders? An exploratory study comparing young adults' perceptions of CSR between Puerto Rico and United States. *Journal of Promotion Management*, *24*(1), 128–151. https://doi.org/10.1080/10496491.2017.1346538

Zhang, W., Ricketts, T. H., Kremen, C., Carney, K., & Swinton, S. M. (2007). Ecosystem services and dis-services to agriculture. *Ecological Economics*, *64*(2), 253–260. https://doi.org/https://doi.org/10.1016/j.ecolecon.2007.02.024

Zhang, Y. (2020). How did the lost Shangri-La get lost? The tragedy of the groundwater commons in Lijiang, China. *Water*, *12*(11), 3131. https://doi.org/10.3390/w12113131

Zhou, L., Lu, H., & Wu, B. (2022). Identifying the effects of the stability of farmland transfer management rights on the use of organic fertilizer with different farmland scales and crop types. *Frontiers in Environmental Science*, *10*. https://doi.org/10.3389/fenvs.2022.1006405

Appendix A - Supplementary materials for Chapter 1

Data Repository & Scripts

The code used to clean the data collected for this project, as well as the cleaned version of the data, can be found at https://github.com/jeanribert/diversity-productivity-cwb.

Appendix Table A.1 Variables used in the construction of the community well-being index

Indicator	Variable description	Data source	Time period
Material needs			
Food security	Percent of SNAP households participating in cash public assistance or Food Stamps in total family households (not account for the non-family households) (-)	Census	2010-2019
Housing cost burden	Proportion of household income that is allocated toward housing expenses. It is calculated by dividing median housing costs by median household income (-)	Census	2010-2019
Housing overcrowding	Percent of housing units with more than one occupant per room (-)	Census	2010-2019
Clean water	Percent of occupied housing units lacking plumbing facilities (-)	Census	2010-2019
Health			
Health insurance	Percent of the population without health insurance coverage (-)	Census	2010-2019
Life expectancy	Average number of years a person is expected to live, based on current mortality rates (+)	National Center for Health Statistics (2018)	2010-2015
Infant mortality	Infants dying within the first year after birth per 1,000 live births (-)	Institute for Health Metrics and Evaluation (IHME) (2022)	2010-2019
Teenage fertility	Teen Birth Rates for Age Group 15–19 in the United States by County, 2003-2020 (-)	Khan et al. (2022)	2010-2019

Education			
Educational attainment	Percent of the population 25 years and over with no high school degree (-)	Census	2010-2019
School enrollment	Percent of the population that is not enrolled in school in the total estimate of population 3 years and over (-)	Census	2010-2019
Resource allocation	Student-teacher ratio (-)	Dhillon (2019)	2010-2014
Opportunity			
Unemployment rate	Percent of the total count of civilian labor force unemployed in the total count of the civilian labor force (-)	Census	2010-2019
Income inequality	Gini coefficient (difference between the Lorenz curve (the observed cumulative income distribution) and the notion of a perfectly equal income distribution) (-)	Census	2010-2019
Female market participation	Proportion of women aged 16 years and older who are either employed or actively looking for work, out of the total female population of the same age range. (+)	Census	2010-2019
Community safety	Serious crimes reported to police per 1,000 individuals (-)	Kaplan (2021)	2010-2019
Homeownership	Proportion of owner-occupied housing units (+)	Census	2010-2019
Population movement	Net migration per 1000 population (+)	Census	2010-2019
Housing vacancy	Percent of vacant properties (-)	Census	2010-2019
Social community			
Election turnout	Voter turnout of presidential elections (+)	MIT Election Data and Science Lab (2018)	2012; 2016
Age dependency ratio	Proportion of dependents (people younger than 15 and older than 64) to the working-age population (those aged 15-64) (-)	Census	2010-2019
Establishment rate	Associational density of 10 types of organizations (religious, civic and social, business, political, professional, labor, bowling	Rupasingha et al. (2006)	2014

	center, fitness and recreational sports centers, golf courses and county clubs, and sports teams and clubs) per 1000 people (+)		
Census rate	Census response rate (+)	Census	2010

The signs + or – shows the theoretical directionality (the impact) of the variables on the index. A positive sign indicates that the variable increases the index, while a negative direction shows the opposite.

Appendix Table A.2 Kruskal-Wallis multiple comparisons of CWBI scores between diversity-productivity types with post-hoc pairwise comparisons. The table shows the observed differences (obs.dif), critical differences (critical.dif), and statistical significance (stat.signif) for each pair of diversity-productivity types.

Group1	Group2	obs.dif	critical.dif	stat.signif
LD-LP	LD-HP	96.90985	132.9807	FALSE
LD-LP	AVERAGE	123.2445	133.9362	FALSE
LD-LP	HD-LP	124.0367	147.2926	FALSE
LD-LP	HD-HP	686.1037	160.8274	TRUE
LD-HP	AVERAGE	220.1543	109.4075	TRUE
LD-HP	HD-LP	27.12688	125.4042	FALSE
LD-HP	HD-HP	783.0136	141.0551	TRUE
AVERAGE	HD-LP	247.2812	126.4169	TRUE
AVERAGE	HD-HP	562.8593	141.9562	TRUE
HD-LP	HD-HP	810.1405	154.6214	TRUE

Appendix Table A.3 Kruskal-Wallis multiple comparisons of CWBI scores between agricultural intensity categories with post-hoc pairwise comparisons.

Group1	Group2	obs.dif	critical.dif	stat.signif
FD/AI	FD/Non-AI	240.2377	203.4727	TRUE
FD/AI	Non-FD/AI	344.0661	174.7824	TRUE
FD/AI	Non-FD/Non-AI	552.6985	165.0517	TRUE
FD/Non-AI	Non-FD/AI	103.8284	153.2331	FALSE
FD/Non-AI	Non-FD/Non-AI	312.4608	142.0337	TRUE
Non-FD/AI	Non-FD/Non-AI	208.6324	96.54685	TRUE

Note: We have conducted the Kruskal-Wallis test and the post hoc test of multiple comparisons of means to analyze interactions between diversity-productivity types and agricultural intensity categories. However, due to the extensive results, they are not included here. These results may be reproduced with the scripts provided online at https://github.com/jeanribert/diversity-productivity-cwb.

Appendix Table A.4 State variability in CWBI scores

State_Name	mean_cwbi	min_cwbi	max_cwbi	cwbi_range
Alabama	3.2	2.79	3.74	0.95
Arizona	3.11	2.74	3.32	0.58
Arkansas	3.18	2.81	3.45	0.64
California	3.27	2.85	3.69	0.84
Colorado	3.5	3.07	3.96	0.89
Connecticut	3.68	3.47	3.84	0.37
Delaware	3.42	3.34	3.51	0.17
Florida	3.26	2.62	3.72	1.1
Georgia	3.16	2.68	3.93	1.25
Idaho	3.4	3.07	3.71	0.64
Illinois	3.57	2.96	3.88	0.92
Indiana	3.49	2.99	3.87	0.88
Iowa	3.74	3.4	3.98	0.58
Kansas	3.58	3.13	3.88	0.75
Kentucky	3.27	2.8	3.72	0.92
Louisiana	3.17	2.69	3.62	0.93
Maine	3.57	3.27	3.8	0.53
Maryland	3.52	2.91	3.86	0.95
Massachusetts	3.65	3.21	3.86	0.65
Michigan	3.5	3.09	3.87	0.78
Minnesota	3.75	3.4	3.94	0.54
Mississippi	3.08	2.4	3.41	1.01
Missouri	3.38	2.84	3.75	0.91
Montana	3.53	3.08	3.78	0.7
Nebraska	3.7	3.39	4.05	0.66
Nevada	3.36	2.98	3.65	0.67
New Hampshire	3.68	3.52	3.87	0.35

New Jersey	3.51	3.1	4.01	0.91
New Mexico	3.18	2.45	4.11	1.66
New York	3.51	2.83	3.85	1.02
North Carolina	3.31	2.79	3.66	0.87
North Dakota	3.61	2.86	3.88	1.02
Ohio	3.49	3.06	3.95	0.89
Oklahoma	3.27	2.86	3.6	0.74
Oregon	3.39	3.21	3.57	0.36
Pennsylvania	3.56	3.03	3.82	0.79
Rhode Island	3.58	3.31	3.81	0.5
South Carolina	3.21	2.82	3.52	0.7
South Dakota	3.48	2.25	3.97	1.72
Tennessee	3.24	2.8	3.63	0.83
Texas	3.22	2.44	3.74	1.3
Utah	3.47	3.07	3.67	0.6
Vermont	3.64	3.46	3.75	0.29
Virginia	3.46	2.81	3.88	1.07
Washington	3.42	2.96	3.7	0.74
West Virginia	3.31	2.76	3.59	0.83
Wisconsin	3.75	3.18	4.1	0.92
Wyoming	3.6	3.35	3.74	0.39

Appendix Table A.5 Distribution of counties by CWBI level and diversity – productivity types (*Italics are the percent of county types in each CWBI level*)

CWBI Levels	Sample	LD/LP	LD/HP	AVERAGE	HD/LP	HD/HP
Very low	351 *(13.64)*	36 *(9.78)*	54 *(7.27)*	104 *(14.61)*	41 *(9.30)*	116 *(37.42)*
Low	371 *(14.41)*	37 *(10.05)*	99 *(13.32)*	116 *(16.29)*	40 *(9.07)*	79 *(25.48)*
Moderate	916 *(35.59)*	160 *(43.48)*	262 *(35.26)*	258 *(36.24)*	144 *(32.65)*	92 *(29.68)*
High	449 *(17.44)*	*77 (20.92)*	138 *(18.57)*	109 *(15.31)*	109 *(24.72)*	16 *(5.16)*
Very high	487 *(18.92)*	*58 (15.76)*	190 *(25.57)*	125 *(17.56)*	107 *(24.26)*	7 *(2.26)*

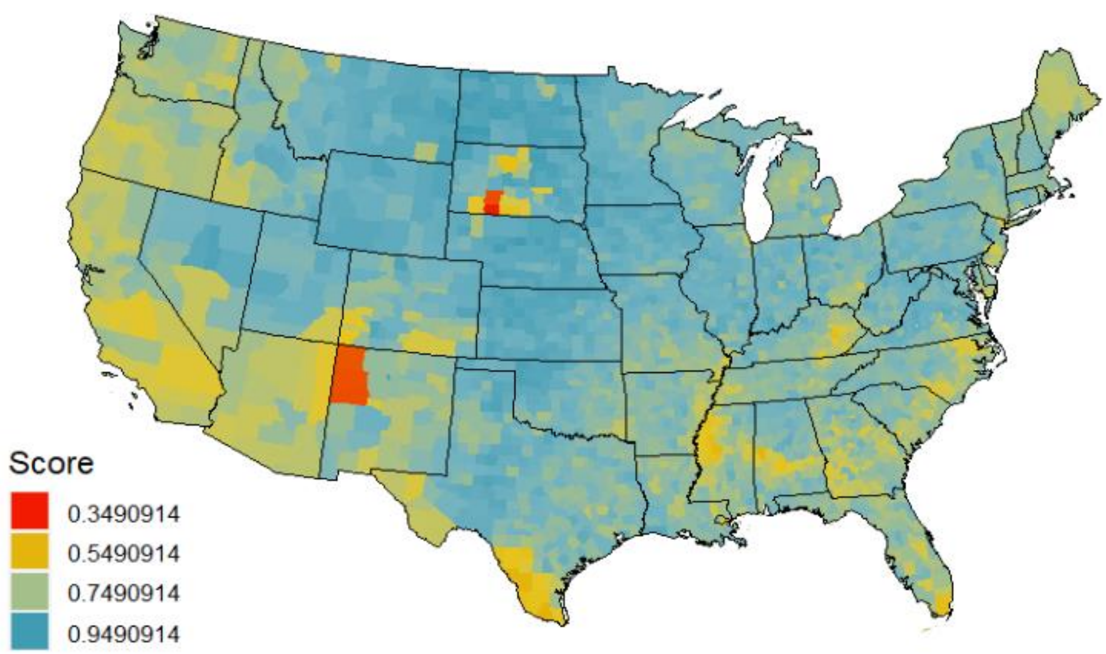
Total observations	2574*	368	743	712	441	310

* The typology has 2575 counties. But one is dropped because of a lack of data to build the index.

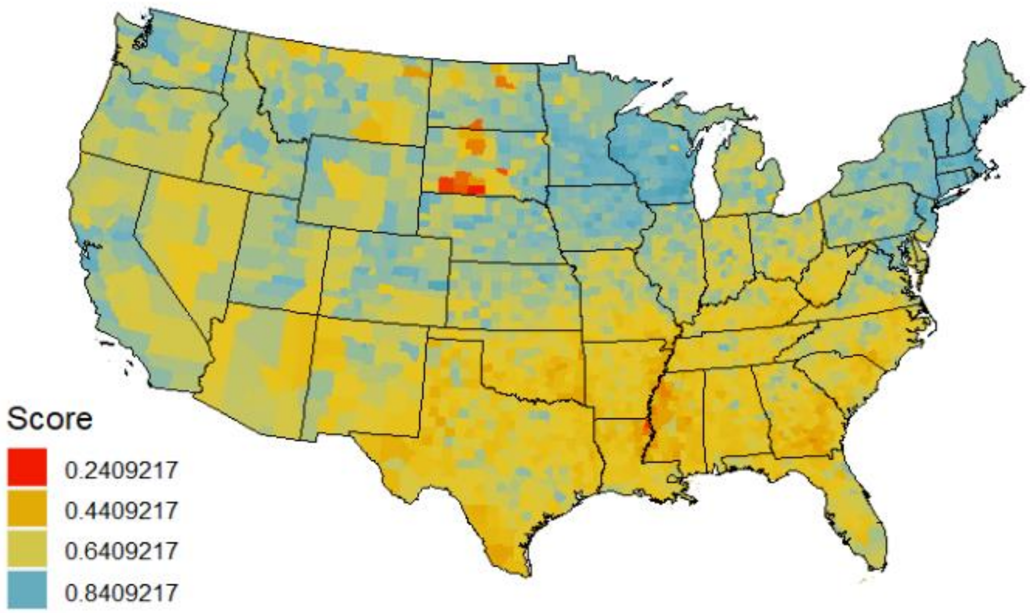
Appendix Table A.6 Variability in diversity – productivity types

TYPE	mean_cwbi	min_cwbi	max_cwbi	cwbi_range
LD/LP	3.45	2.94	3.95	1.01
LD/HP	3.48	2.79	3.98	1.19
AVERAGE	3.41	2.5	4.1	1.6
HD/LP	3.48	2.25	3.97	1.72
HD/HP	3.2	2.4	4.05	1.65

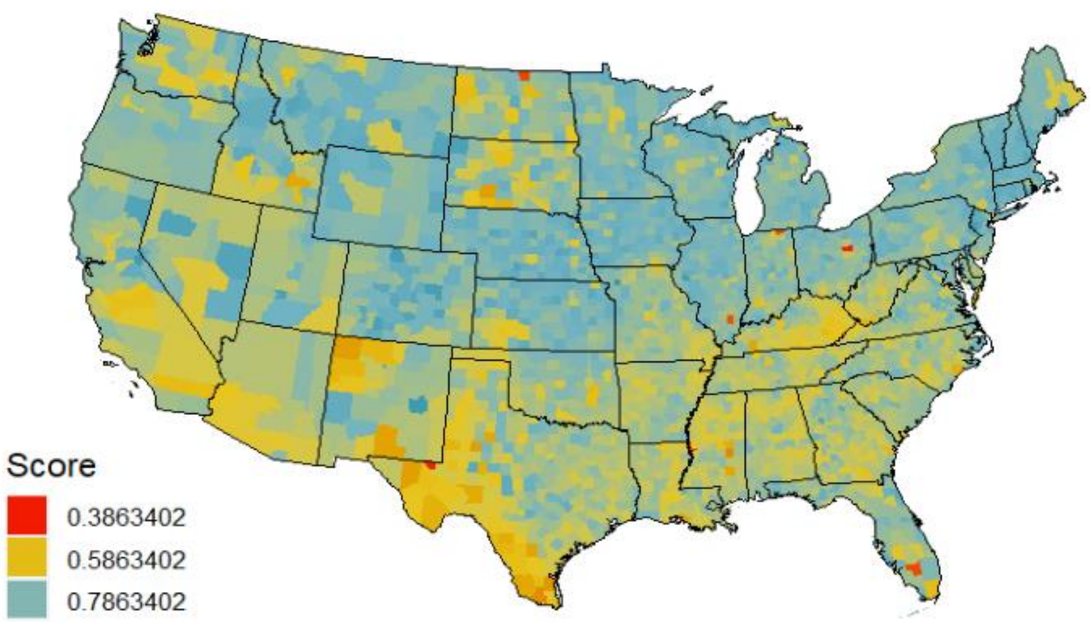
Appendix Figure A.1 Map of the score for the dimension of Material Needs



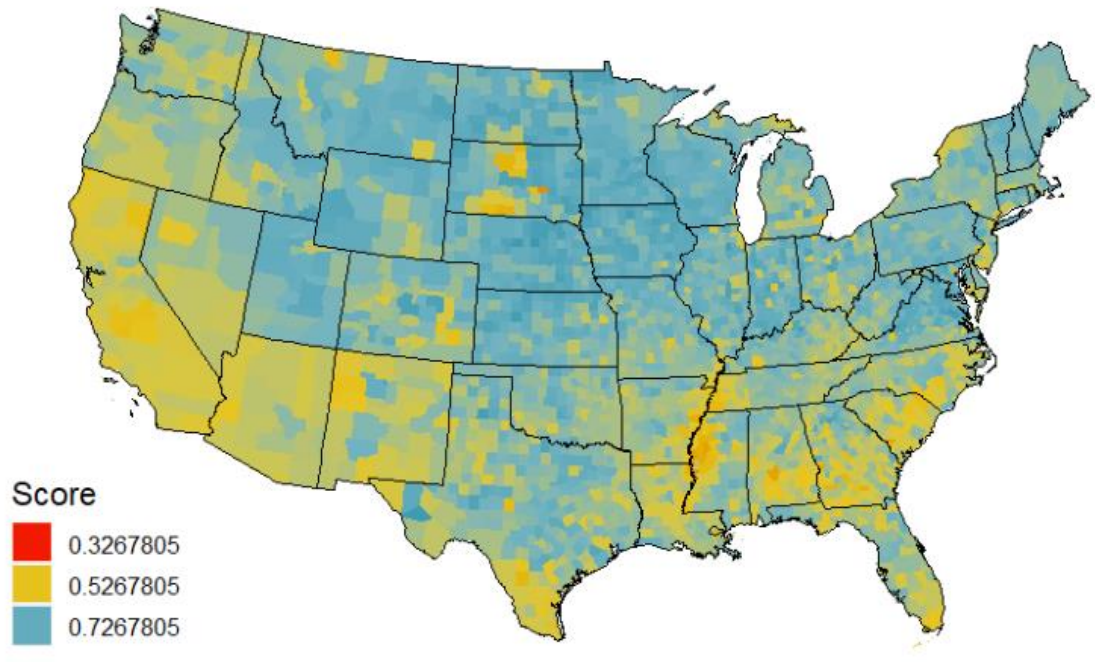
Appendix Figure A.2 Map of the score for the dimension of Health



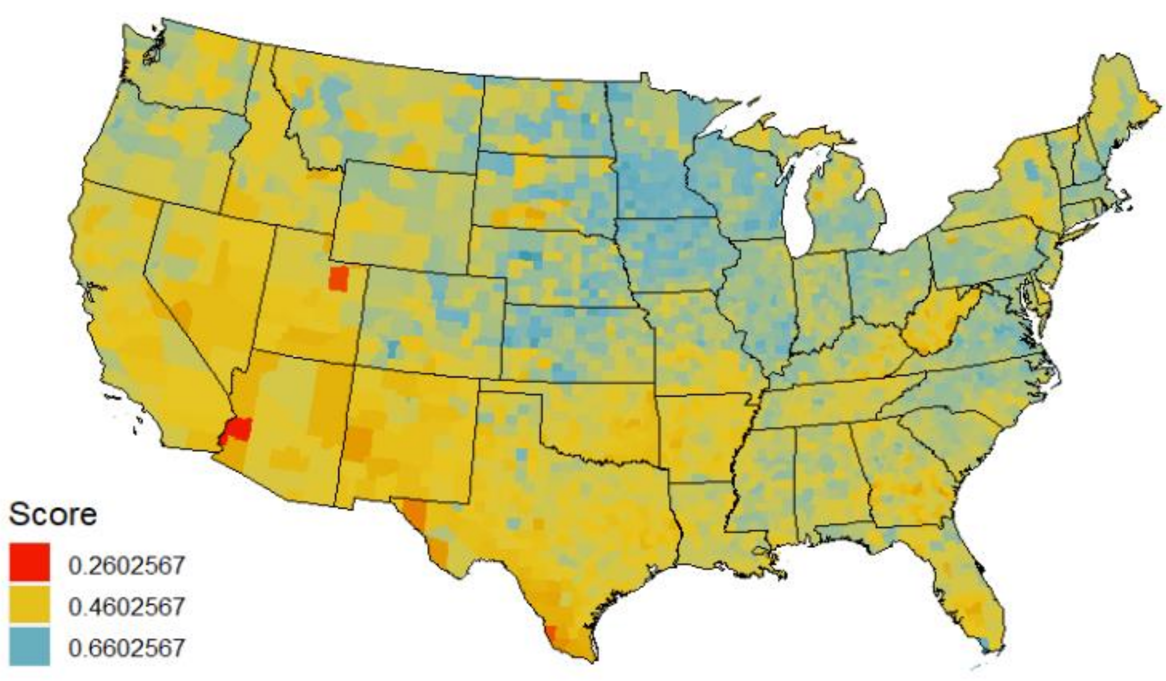
Appendix Figure A.3 Map of the score for the dimension of Education



Appendix Figure A.4 Map of the score for the dimension of Opportunity



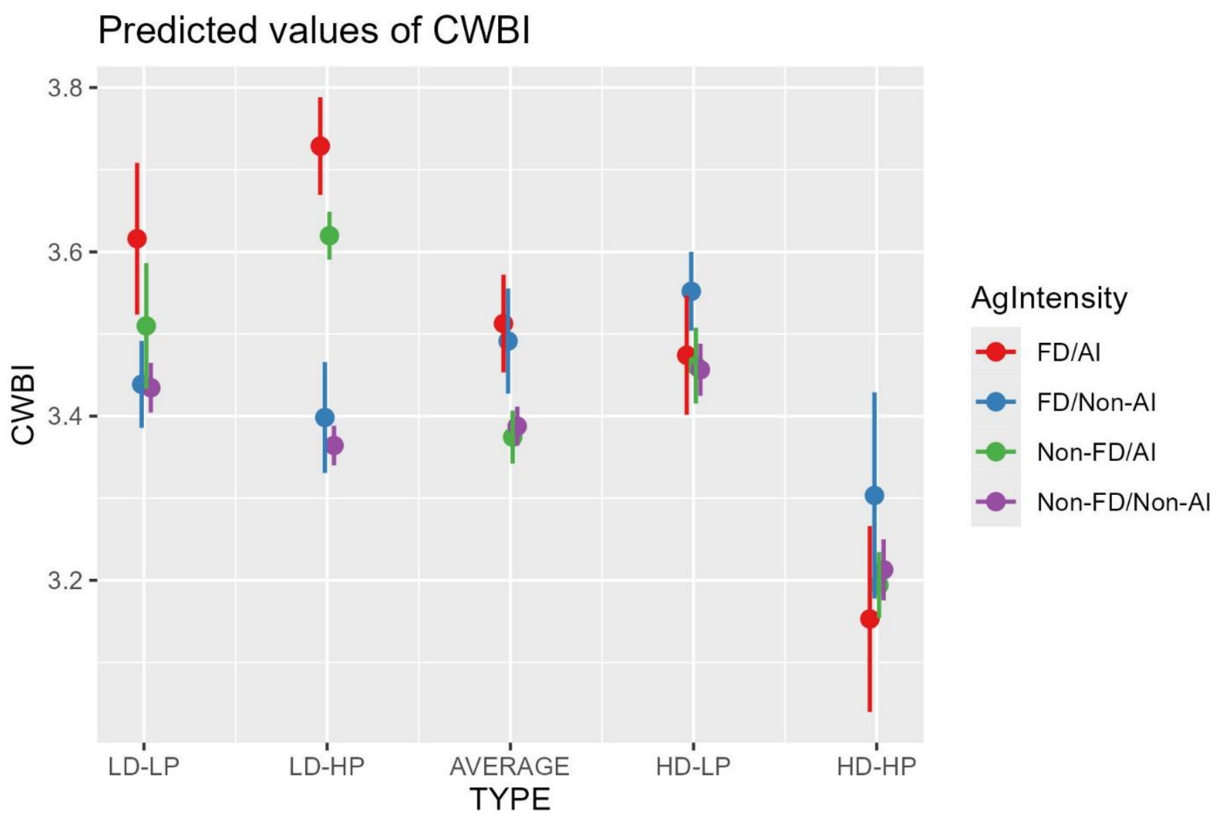
Appendix Figure A.5 Map of the score for the dimension of Social Community



Appendix Figure A.6 Predicted values of CWBI from the linear regression model expressed as:

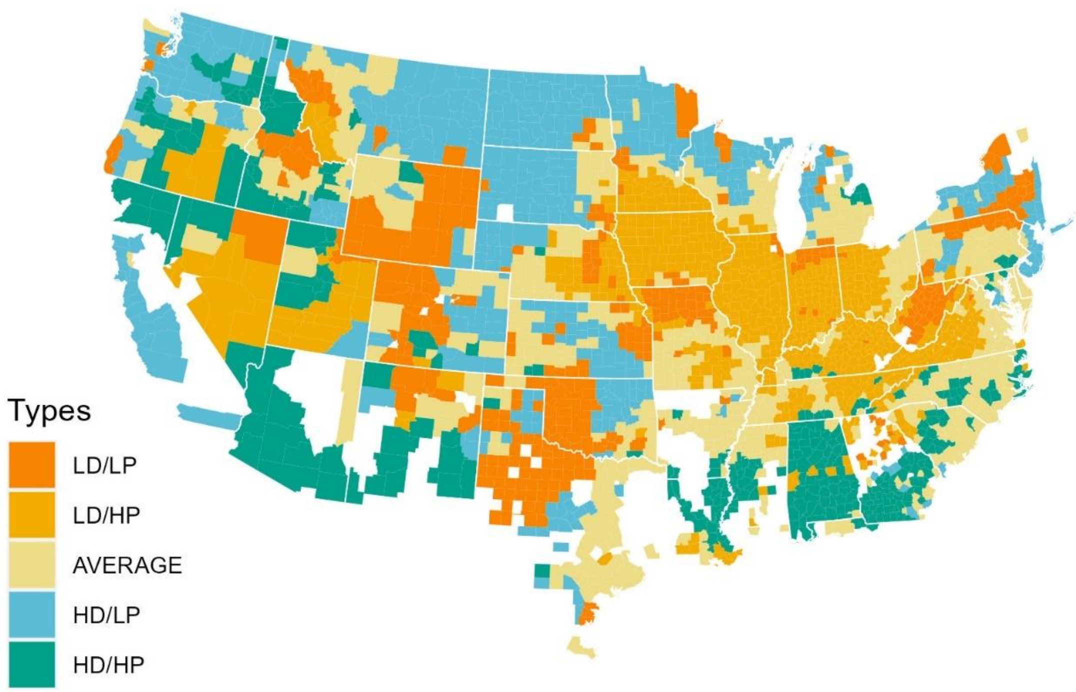
$CWBI_i = \beta 0 + \beta 1 \times TYPE_i + \beta 2 \times AgIntensity_i + \beta 3 \times (TYPE_i \times AgIntensity_i) + \epsilon_i$

The dots indicate the average predicted CWBI. The vertical bars are error bars that show the 95% confidence intervals for these predictions. The complete results may be reproduced with the scripts provided online at https://github.com/jeanribert/diversity-productivity-cwb.



Appendix B - Supplementary materials for Chapter 2

Appendix Figure B.1 Spatial distribution of county types specified using *k*-means cluster analysis of diversity and productivity for each class. For the purpose of this study, LD/LP and LD/HP are grouped into an LD type and HD/LP and HD/HP are grouped into an HD type.



Appendix Table B.1 County profile

		Interview counties	Survey counties
Average number of operators		319.75	765.61
Gender	*Male*	297.25	682.54
	Female	75.5	269.16
Age (average)		58.15	58.42

Data from USDA-NASS, 2017.

Appendix Table B.2 Median distribution of the select survey items

Survey questions	All participants	Median (Mean) of county types		
		LD	AVE	HD
	n = 151	*n* = 59	*n* = 30	*n* = 62
What happens in neighboring operations affects my cultivation decisions	3 (2.98)	3 (2.76)	3 (2.60)	3 (3.36)
What happens in neighboring operations affects the productivity of my farm	3 (3.05)	3 (2.92)	3 (2.78)	3 (3.29)
My livelihood depends on outperforming my neighbors	2 (2.11)	2 (2.12)	1 (1.78)	3 (2.25)
I am concerned about herbicide drift or cross-pollination from my neighbor's farm	4 (3.38)	4 (3.6)	4 (3.27)	3.5 (3.25)
My management decisions affect the local environment	4 (3.76)	4 (3.78)	4 (3.68)	4 (3.78)
I take the health and safety of my community into account when making decisions about my farm	4 (3.94)	4 (4.00)	4 (3.72)	4 (4.00)
[A good farmer] Considers the health of their community	4 (4.26)	5 (4.44)	4 (4.35)	4 (4.06)

Appendix Table B.3 Kruskal-Wallis multiple comparisons of select survey items across all county types

Select survey items	chi-squared	P value
What happens in neighboring operations affects my cultivation decisions	9.99	0.006*
What happens in neighboring operations affects the productivity of my farm	3.86	0.14
My livelihood depends on outperforming my neighbors	3.44	0.17
I am concerned about herbicide drift or cross-pollination from my neighbor's farm	2.41	0.29
My management decisions affect the local community and environment	0.17	0.91
I take the health and safety of my community into account when making decisions about my farm	2.52	0.28
[A good farmer] Considers the health of their community	5.05	0.07

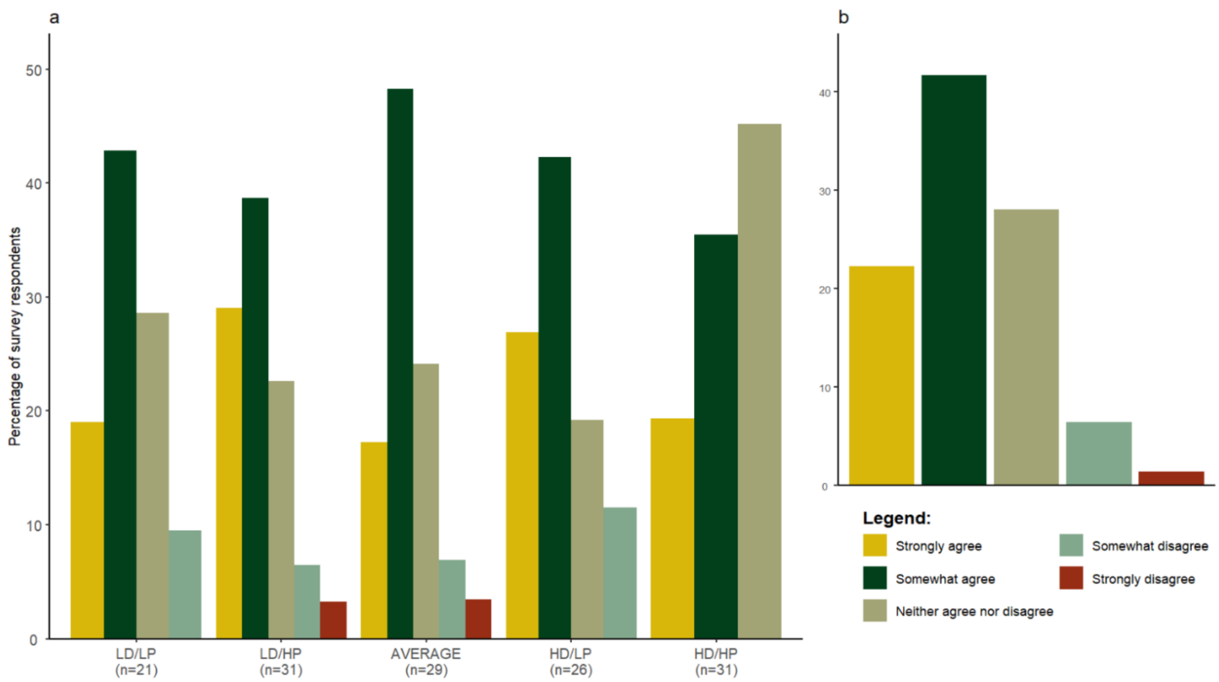
Appendix Table B.4 Key Community Considerations Reported by Farmers in Making Farming Decisions

Key community considerations	Specific practices or decisions	Illustrative Quote
Community impact of pesticide use	Avoids using harmful pesticides like dicamba due to community health concerns	"Yeah, I've tried to avoid using dicamba soybeans as much as possible because just watching what that stuff did to other plants, it really made open my eyes to how long that stuff stays in the air. And if you live out here, I mean, people are breathing it in, and they don't even know." (Ellsworth County, KS)
Water resource management	Discontinues irrigation due to community needs	"Sometimes, I don't like watering because we have three pivots here and they all come out of the Smoky Hill River and our local community actually pumps out the river for the water in Ellsworth. So, sometimes it's hard to pump water when it's dry like this, knowing that Ellsworth is going to have to use the same water, you know. We haven't ever had to stop. But sometimes, yeah." (Ellsworth County, KS)
Community engagement/ Education	Engages in educational activities with local schools to promote agricultural awareness	"The thing there is getting young people involved in that [agriculture] is difficult. So, what we are trying to do on the farm here is get young people involved in this. I would like for this farm to be a demonstration farm...as a matter of fact, we built this to be a classroom and teach young people about agriculture." (Washington County, NC)
Community engagement/ Agricultural consulting	Offers free consulting services at farm shows and engages in educational talks to share knowledge and support others	"I do a lot of business with [people], and I don't want somebody to pay me. I had an older man in the western part of the state that I helped him with some soybeans. His son called me, and he said man I just want to thank you…he got out the combine, looked at his son, he was like just a little bit extra. But it [the help provided] made him fall back in love with it [farming] again." (Washington County, NC)
Broader environmental impact	Practices no-till farming to avoid soil erosion and reduce chemical runoff, benefiting local wildlife and landscapes	"It's not like we have no care for our neighbors. There's not really a whole lot we could do that would really affect them, you

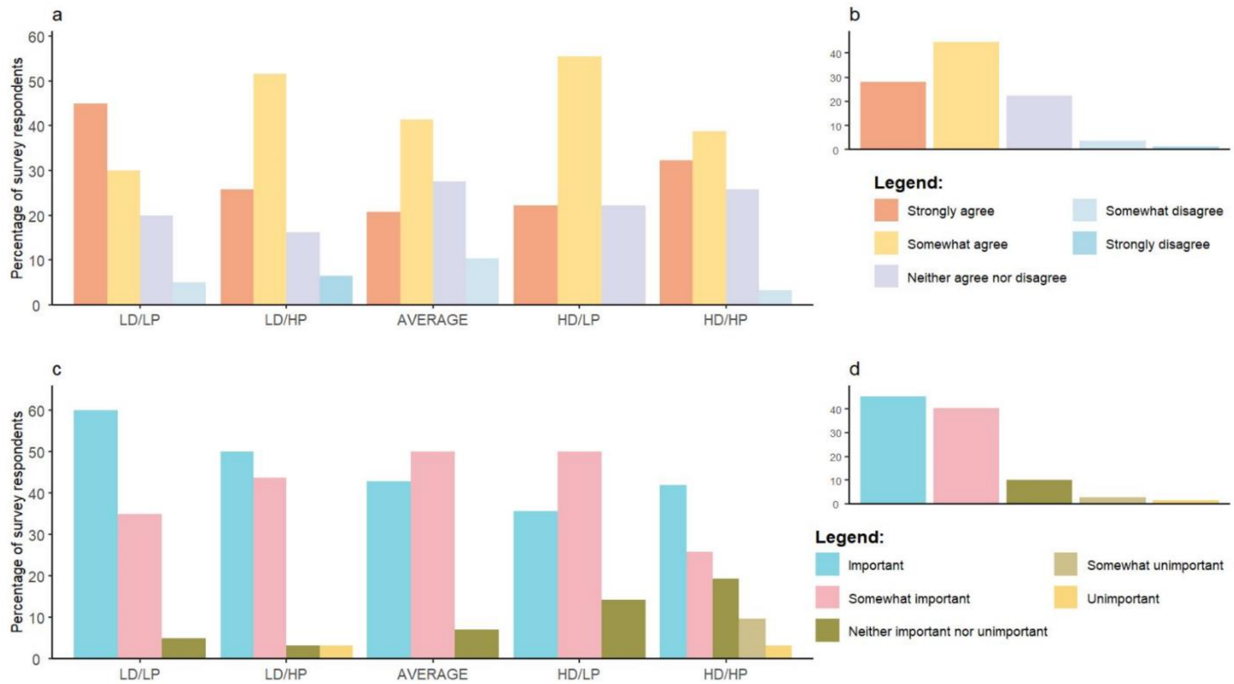
		know, since we're not really turning the soil too much now." (Nuckolls County, NE)
Environmental concern	Avoids using synthetic fertilizers and herbicides, despite challenges, to minimize environmental impact	"I try to work with nature, but I know that I'm failing. When it doesn't rain, it's kind of like, every time I have to use synthetic fertilizers or herbicides, I know it just goes against everything I want to do." (Ellsworth County, KS)
Environmental management and community relations	Manages manure to minimize smell, showing sensitivity to community preferences and health	"We do some scrubbing of manure. And so we're really cautious about where we do that. But I think that would be for the smell." (Nuckolls County, NE)
Neighboring land use considerations	Chooses not to spray certain chemicals to avoid damaging nearby sensitive crops and properties	"You know, vegetable growers, we can't spray so close to them. So that would really affect our neighbors who don't really bother us." (Bertie County, NC)
Neighborly coordination	Communicate with neighbors about spraying activities to prevent damage to their properties and plants	"I don't know. I've always got the field sprayed not when I wanted to but I've always got it done eventually. You know, we got a couple people that are far and close to that the ladies put their laundry out on the line quite often and if I show up and there's something out on the lawn or on the line I'm giving them a call that hey I'm going to be uh making some dirt fly whether it's spraying or you know you're still going to kick up some dust or something you know like that." (Ellsworth County, KS)
Support for local businesses	Buys agricultural inputs from local businesses, supports small towns	"I like to patronize the small towns and the businesses in the small towns. And I'll be honest with you; it irritates me a little bit when other people come in and gobble up all the farm ground and don't use the local facilities." (Nuckolls County, NE)
Economic contribution to the local economy	Sells commodities locally, hires local labor, buys locally	"And probably we do all of the things like purchasing inputs locally, selling locally, hiring local labor, and things like that." (Nuckolls County, NE)
Economic contribution to the local economy	Makes decisions on crop types and land use that are economically beneficial while considering the community impact	"It's been over the years corn, soybeans, and wheat. My neighbor's got into potatoes. At one time, I started growing chipping potatoes... It changes the economic dynamics in the

		neighborhood, something tremendous." (Washington County, NC)
Leadership in sustainable practices and community improvement	Implements advanced no-till farming techniques to demonstrate possible benefits to local farmers and the broader community	"Once again, this no-till farming, I think, could help the whole area. I think it just used less fuel, which helps the environment, and there was just less erosion. Better for wildlife, probably. I think that's the biggest thing that's really made this county boom in times." (Nuckolls County, NE)

Appendix Figure B.2 Percentage of survey respondents reporting their agreement/disagreement to the statement related to the impact of their management decisions on the local community and environment across the five types of counties (a) and considering all survey responde



Appendix Figure B.3 Percentage of survey respondents across the five types of counties (a) and considering all survey respondents as one group (b) reporting their agreement/disagreement to the statement “I take the health and safety of my community into account when making



Appendix C - Supplementary materials for Chapter 3

Appendix Table C.1 Socioeconomic characteristics of the sample

Variables	Min.	Max.	Mean	Std Dev.
Experiences (years of farming)	0	70	36.88	15.32
Size of farms (managed acres per operation)	4	13600	1129	2173.66
Rented acres (%)	0	100	30.62	29.45
Irrigated acres	0	5000	194.1	644.68
Number of people working full-time on the farm	0	24	2.23	3.46
Respondents with income from off-farm sources (%)			88.6	
Gender (% female)			6.14	
Percent of respondents of each age range categories				
Less than 25			0.00	
25-34 years old			1.75	
35-44 years old			7.01	
45-54 years old			7.01	
55-64 years old			27.19	
65+ years old			57.01	
Education of respondents (%)				
Less than high school			2.63	
With only a high school diploma			18.42	
More than high school			78.94	

Appendix Table C.2 County profile

Variables	Min.	Max.	Mean	Std Dev.
Experiences (years of farming)	19.20	29.70	24.49	2.46
Size of farms (managed acres per operations)	65	2023	610.4	447.88
Gender (% female in the farm population)	32.92			
Percent of farm population in each age range categories				
Less than 25			1.75	
25-34 years old			7.72	

35-44 years old	12.49
45-54 years old	15.12
55-64 years old	24.75
65+ years old	38.70
County-level education (% of adults) *	
Less than high school	11.29
With only a high school diploma	34.23
More than high school	54.48

Data is from USDA/NASS for the year of 2022

* Data is from USDA's Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census, and 2018–22 American Community Survey 5-year period county-level estimates.

Appendix Table C.3 Sensitivity analysis of model variables

Predictors	Estimates	*P*-value	Estimates	*P*-value	Estimates	*P*-value	Estimates	*P*-value	*Estimates*	*P-value*
Awareness	X	**X**	0.3489***	**<0.001**	0.4200***	**<0.001**	**0.3711*****	**<0.001**	**0.5247*****	**<0.001**
ProfitValues	-0.0995	0.194	X	X	-0.1182	**0.108**	**-0.1271**	**0.075**	**-0.1272**	**0.099**
Community Values	0.2860***	**0.001**	0.1966*	**0.015**	X	**X**	**0.1956***	**0.011**	**0.2541****	**0.003**
Competition	0.0626	0.338	0.0247	0.687	-0.0022	0.971	X	X	0.0488	0.455
Coordination	0.4626***	**<0.001**	0.3182***	**<0.001**	0.3491***	**<0.001**	**0.3224*****	**<0.001**	**X**	**X**
Observations	N= 114									
R^2 / R^2 adjusted	0.39 / 0.368		0.460 / 0.440		0.443 / 0.423		00.475 / 0.456		0.392 / 0.370	
BIC	272.05		258.10		261.65		254.94		271.67	

X: shows the absence of the variable in the model

Appendix Table C.4 Model results when incorporating each of the socioeconomic control variables into the associations of ICC and CAVs.

Predictors	Gender	Education	Experience	FarmingDep

	Estimates	*P*-value	Estimates	*P*-value	Estimates	*P*-value	Estimates	*P*-value
Awareness	0.3732***	**<0.001**	0.3599***	**<0.001**	0.3596***	**<0.001**	**0.3546*****	**<0.001**
ProfitValues	-0.1325	0.067	-0.1337	0.063	-0.1339	**0.062**	**-0.1412***	**0.049**
CommunityValues	0.2096**	**0.009**	0.2026*	**0.011**	0.2102**	**0.008**	**0.2069****	**0.009**
Competition	0.0332	0.588	0.0315	0.607	0.0444	0.467	0.0157	0.799
Coordination	0.3111***	**<0.001**	0.3244***	**<0.001**	0.3214***	**<0.001**	**0.3416*****	**<0.001**
Variable added	0.1648	0.542	-0.1660	0.287	-0.0056	0.174	0.3596	0.079
Observations	N= 114							
R^2 / R^2 adjusted	0.479 / 0.449		0.482 / 0.453		0.486 / 0.457		0.492 / 0.463	
BIC	263.64		262.83		262.06		260.73	

Appendix Table C.5 Model results when incorporating each of the contextual variables

Predictors	Base Model (BM)		BM + FRR		BM + County Type		BM + FRR + County TYPE	
	Estimates	*P*-value	Estimates	*P*-value	Estimates	*P*-value	Estimates	*P*-value
Awareness	0.3658***	**<0.001**	0.3559***	**<0.001**	0.3626***	**<0.001**	**0.3562*****	**<0.001**
ProfitValues	-0.1314	0.068	-0.1397	0.073	-0.1349	**0.068**	**-0.1494**	**0.063**
CommunityValues	0.2068**	**0.010**	0.2067*	**0.013**	0.2435**	**0.004**	**0.2282****	**0.010**
Competition	0.0362	0.553	0.0484	0.431	0.0355	0.572	0.0385	0.544
Coordination	0.3202***	**<0.001**	0.2911***	**<0.001**	0.2988***	**<0.001**	**0.2709*****	**<0.001**
Observations	N= 114							
R^2 / R^2 adjusted	0.477 / 0.452		0.516 / 0.453		0.493 / 0.449		0.529 / 0.445	
BIC	259.30		288.39		274.65		304.17	

Appendix Table C.6 Odds ratios, 95% confidence intervals, and P-values for the ordinal model

Predictors	Base Model		Base model + socio-economics	
	Odds Ratios	*P*-value	Odds Ratios	*P*-value
Intercepts				
1|2	70.2545**	**0.009**	48.7402	0.053
2|3	409.9395***	**<0.001**	342.4207**	**0.003**
3|4	5922.8405***	**<0.001**	5980.9891***	**<0.001**
4|5	150886.4728***	**<0.001**	171699.8568***	**<0.001**
Core attributes				
Awareness	3.6630***	**<0.001**	3.7008***	**<0.001**
ProfitValues	0.6923	0.104	0.6508	0.066
CommunityValues	1.9442**	**0.006**	2.0384**	**0.004**
Competition	1.1392	0.509	1.1141	0.594
Coordination	2.7706***	**<0.001**	2.9939***	**<0.001**
Socio-economic variables				
Gender [1]			2.3681	0.353
Education [1]			0.7179	0.515
Experience			0.9774	0.103
FarmingDep [1]			2.7895	0.119
Observations	114			
R^2 Nagelkerke	0.547		0.578	

Appendix Table C.7 Model checking interactions of the core attribute variables with the county typology.

Predictors	Base model		
	Estimates	Std Errors	*P*-value
Awareness	0.3020*	0.1409	**0.035**
ProfitValues	-0.3469	0.2269	0.130
CommunityValues	0.130**	0.2054	**0.008**
Competition	0.0125	0.1381	0.928
Coordination	0.4958***	0.1223	**<0.001**
CountyType [LD/HP]	0.1444	1.5457	0.926

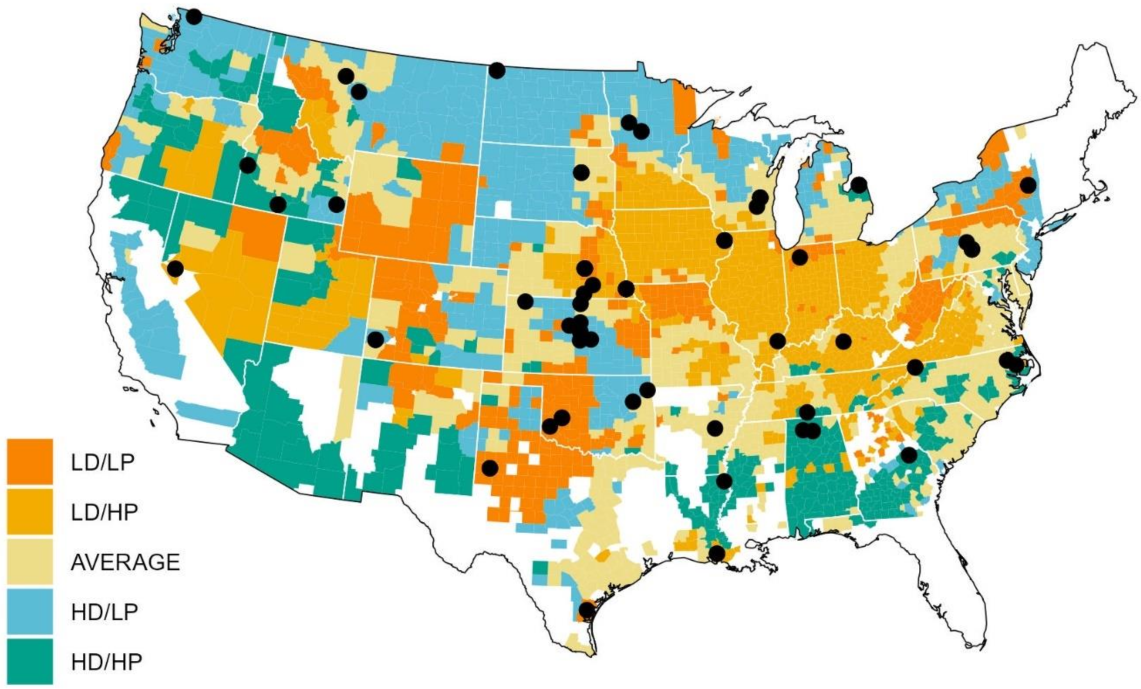
CountyType [HD/HP]	0.5572	1.5300	0.717
CountyType [LD/LP]	2.3666	2.2459	0.295
CountyType [HD/LP]	2.8115	1.8061	0.123
Awareness × CountyType [LD/HP]	0.5350*	0.2300	**0.022**
CountyType [LD/LP] × Competition	-0.4770*	0.2218	**0.034**
CountyType [LD/HP] × Coordination	-0.5658**	0.2125	**0.009**
Observations	114		
R^2 / R^2 adjusted	0.641 / 0.518		

This table presents the interactions that are significant in addition to all the direct effects.

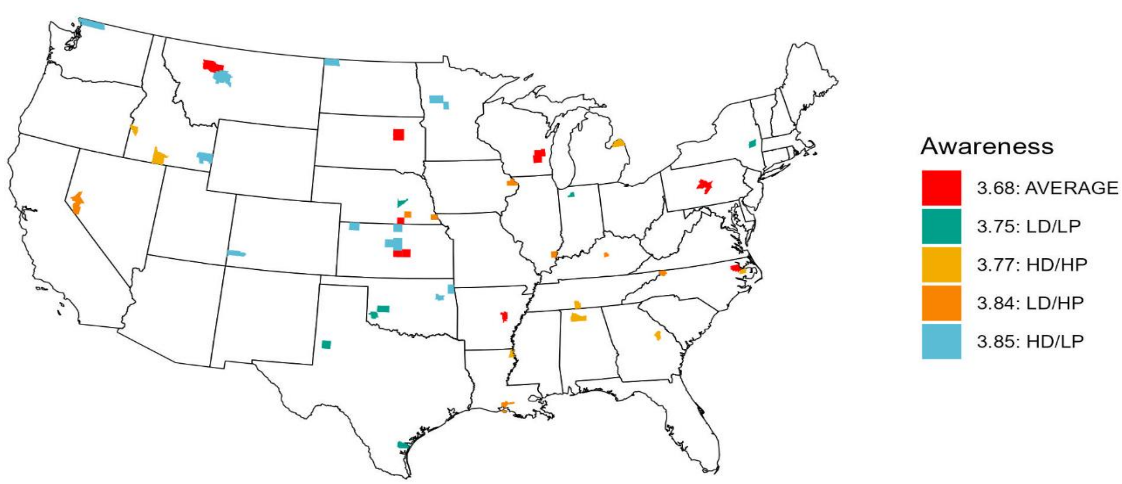
Appendix Table C.8 Average responses by Farm Resource Regions

FRR_NAME	ICC	Competition	Coordination	Awareness	ProfitValues	CommunityValues
Basin and Range	3.6	2.2	3.4	3.2	2.6	3.2
Eastern Uplands	3.86	2.43	3.71	3.86	4.14	4
Fruitful Rim	4.08	2.08	3.92	3.75	3.92	4.17
Heartland	4.38	2.15	4	4.08	4.15	4.54
Mississippi Portal	4.67	1.67	4.67	3.67	4.67	4.67
Northern Crescent	4	2.11	3.75	4	4.29	4.21
Northern Great Plains	3.27	2.09	3.27	3.09	3.82	3.82
Prairie Gateway	3.7	2.1	3.4	3.83	4.2	4.4
Southern Seaboard	4	1.8	2.8	3.8	4	4

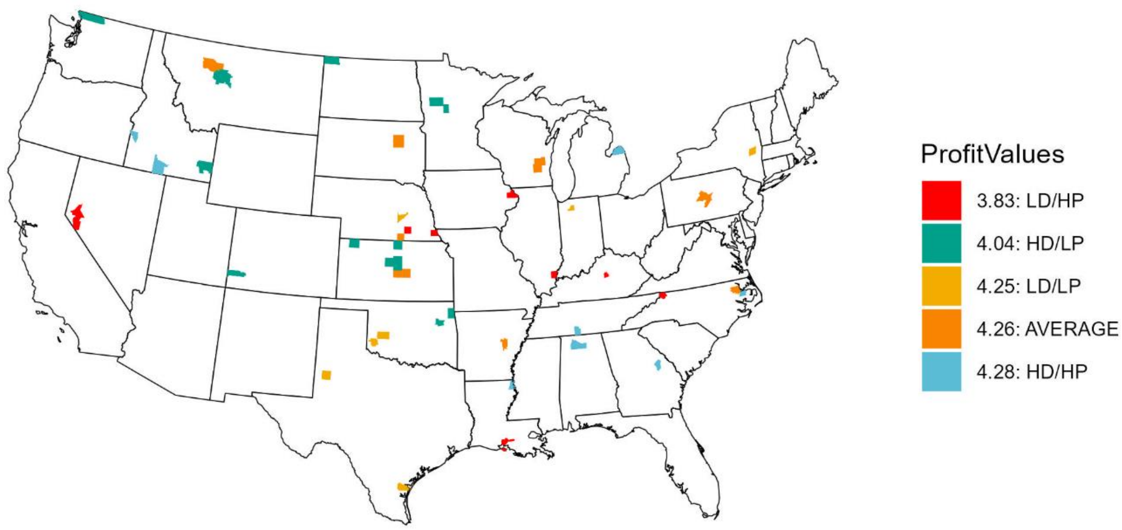
Appendix Figure C.1 Counties of survey respondents (black dots) from each of the five diversity – productivity types.



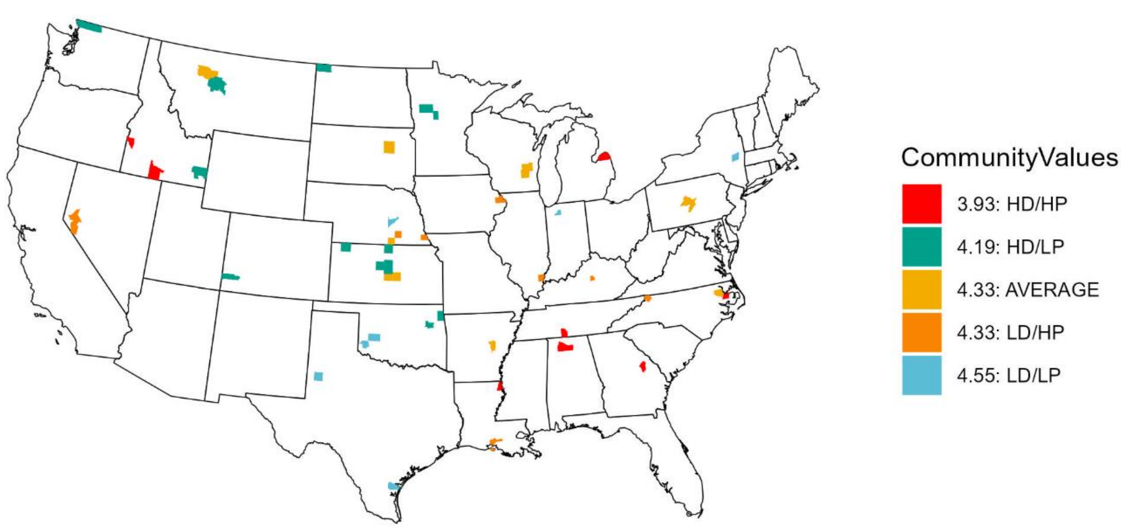
Appendix Figure C.2 Awareness across county types



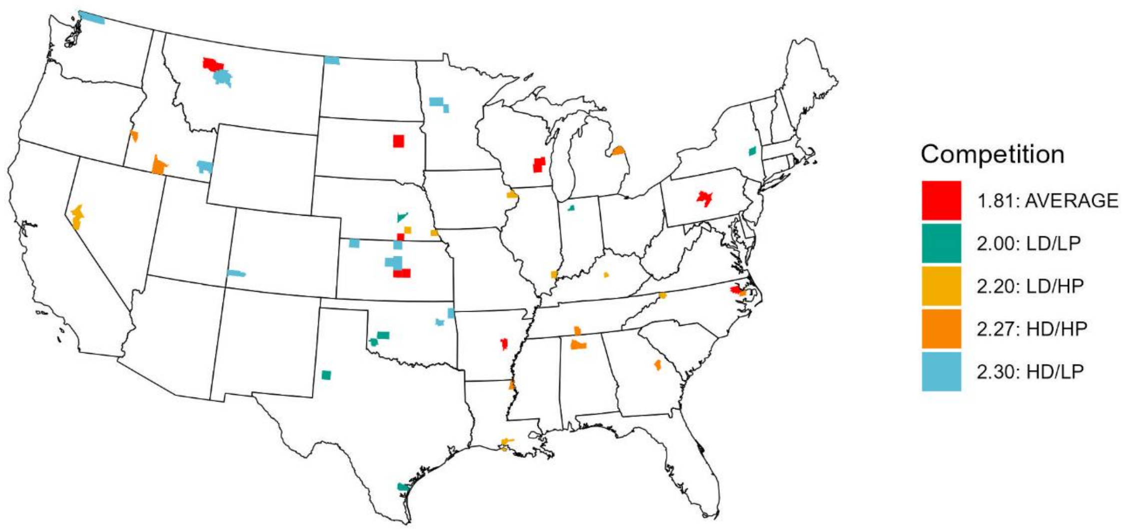
Appendix Figure C.3 Profit-seeking values across county types



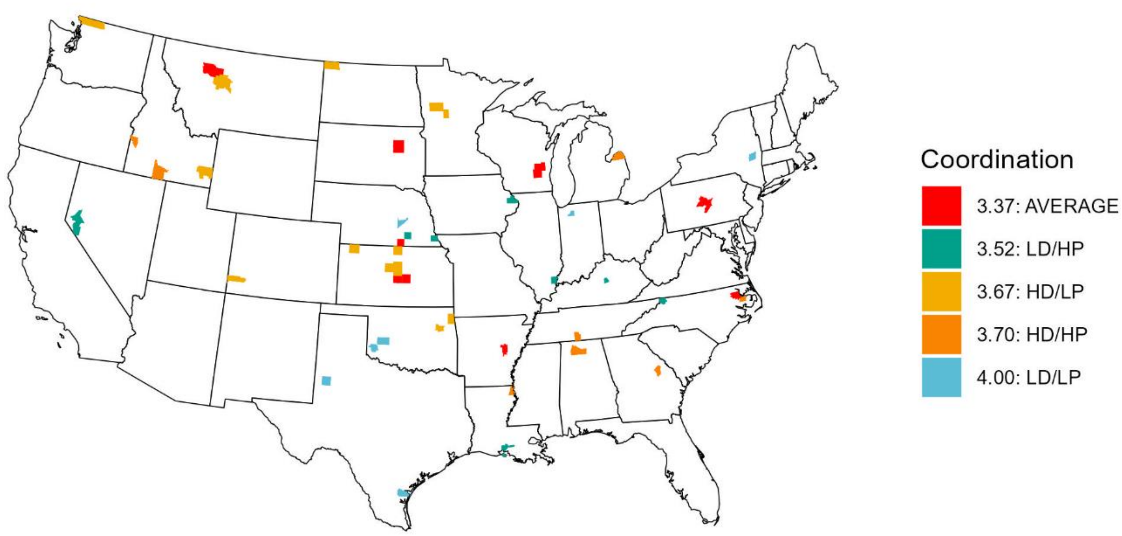
Appendix Figure C.4 Community values across county types



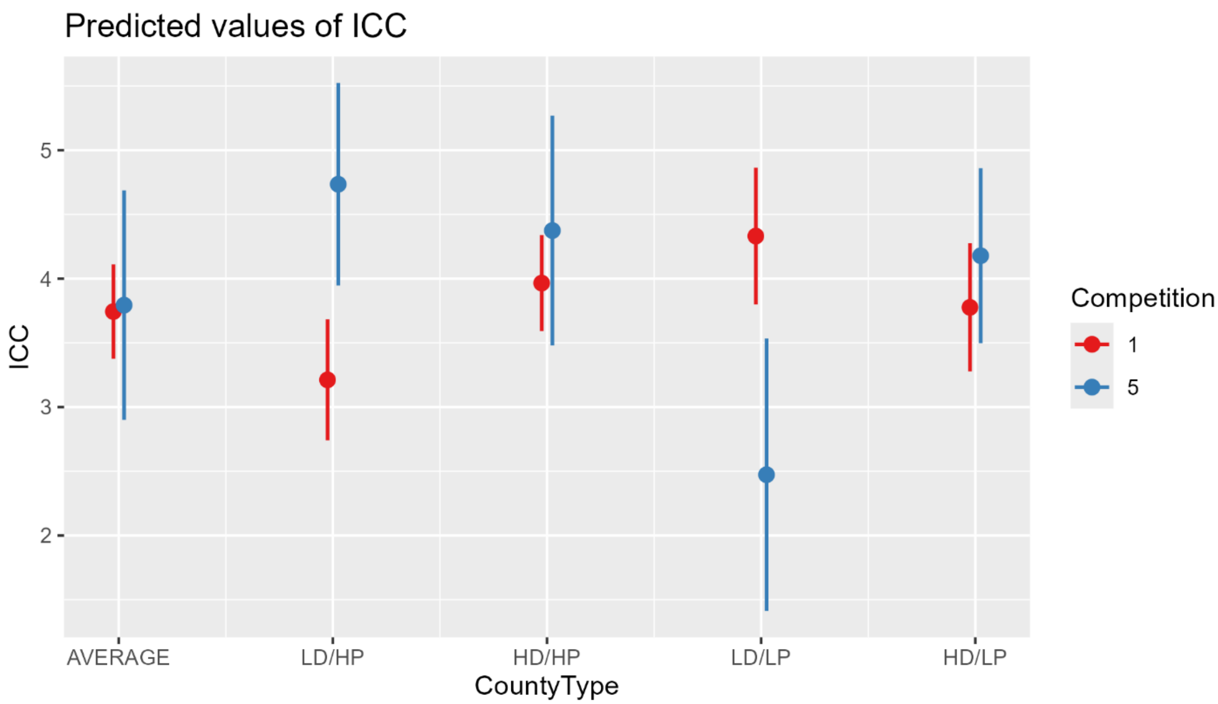
Appendix Figure C.5 Competition across county types



Appendix Figure C.6 Willingness to coordinate across county types



Appendix Figure C.7 Predicted influence of Competition on ICC by County Type. The dots indicate the average predicted ICC. The vertical bars are error bars that show the 95% confidence intervals for these predictions.



Appendix Figure C.8 Predicted influence of Community Values on ICC by County Type. The dots indicate the average predicted ICC. The vertical bars are error bars that show the 95% confidence intervals for these predictions