Municipal Level Food Systems Planning for the Impacts of Climate Change

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ACADEMIC ABSTRACT

Climate change poses significant risks to the food system, directly impacting food security and disproportionately affecting vulnerable populations. This study examines the critical role of local municipalities in planning for the effects of climate change on food systems through the case of the New River Valley, located in Southwestern Virginia. This study utilizes a qualitative participatory research design, including semi-structured interviews and focus groups with both food system and municipality stakeholders in the New River Valley region. Guided by Stroh's Systemic Change Process, the study seeks to advance climate adaptation planning in the region through the implementation of the first stage of the process, called "building a foundation for change." This stage involves identifying key stakeholders, getting them involved in the process, and establishing common ground. Through facilitation, stakeholders build capacity for systems thinking with a focus on collaboration. The findings of this study will inform the ongoing efforts of the Blacksburg Sustainability Department in planning for climate change transformation at a local level. This research is significant in that it addresses the gap in the literature around how municipalities are planning for climate resiliency in the food system, provides insight into the use of interviews and focus groups to bridge the creative tension gap in collaborative problem-solving through a systems thinking approach, and informs policy decisions made by local government. This study's findings have the potential to inform community-engaged efforts to plan for climate change while envisioning a more resilient and fair food system.

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GENERAL ABSTRACT

In this study, researchers explore how climate change affects our food system and the steps local communities can take to address these challenges, with a focus on the New River Valley in Southwestern Virginia. By using interviews and group discussions with various stakeholders, including those involved in the food system and local government, we aim to enhance climate adaptation planning in the region. To achieve this, we focus on "building a foundation for change," which involves identifying key stakeholders, getting them involved, and finding common ground for collaboration. Through this approach, we promote systems thinking and cooperation among stakeholders. The insights from this research will be valuable for the Blacksburg Sustainability Department as they work towards climate change resiliency at the local level. This study addresses a gap in the existing literature by examining how municipalities plan for climate resilience in the food system. It also sheds light on the benefits of using interviews and group discussions to foster creative problem-solving through a systems thinking perspective. The findings of this study can contribute to community efforts in planning for climate change, with a vision for a more vibrant and equitable food system. Climate change impacts us all and understanding how local communities can respond and adapt is essential for a sustainable future.

Dedication

I dedicate this master's thesis research to the remarkable community of the New River Valley, a special place I've had the privilege to call home for well over a decade. I’d especially like to thank the people who chose to show up and engage authentically, generously, and wholeheartedly in this research as the study participants.

This dedication, too, extends to climate changemakers across the world. Your devotion to protecting the earth and our food systems gives me hope. You are a reminder that even in the face of daunting challenges, humanity's spirit of resilience and innovation shines through, and that we can all take proactive steps towards a more sustainable future.

Lastly, I dedicate this work to those committed to the pursuit of justice and equity, who work tirelessly to dismantle the systems of oppression at the heart of the social and ecological problems we face. You are all the inspiration for this work. Thank you!

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Chapter 1: Introduction

Climate change is one of the most significant issues facing our planet, with wide-reaching detrimental impacts on both the natural world and humans and is in large part caused by human behavior. According to public ecology, a framework for addressing sustainability issues, community dynamics, and social issues at the intersection of science and policy, climate change is an unnatural disaster that needs to be combatted and planned for immediately (Luke, 2015). Humans have so greatly changed and impacted our planet Earth that scientists have proposed acknowledging that we may have entered into, or be on the precipice of entering, a new geological epoch called the Anthropocene. The Anthropocene means the age of man and evokes the human-centeredness that is at the root of our current ecological system (Steffen et al., 2011).

The Anthropocene does not validate the alternative paths forward, the paths that do not involve human dominion over nature. We can abolish a way of life founded on the domination of nature and scale down our human presence and impact on the natural world so that both the natural world and human life can flourish (Cadman et al., 2022). In the 19th century, Karl Marx introduced a concept that John Bellamy Foster coined as the *metabolic rift.* There is a rift in the universal metabolism of nature, and this metabolic rift "is the change in the nature of the metabolism between a particular animal—humans—and the rest of the ecosystem (including other species) that is at the heart of the ecological problems we face" (Foster, 2013). Metabolic rift highlights a critical disconnect and disruption between human society and the natural environment and is caused by specific modes of production and consumption, particularly within capitalist economic systems. Human civilization heavily relies on the Earth's ecosystems to extract resources, convert them into goods and services, and absorb the waste generated during these processes (Foster, 2013; Foster 2020).

Profit-driven and unchecked growth within capitalist systems results in an unbalanced and unsustainable metabolic relationship. Capitalist systems, motivated by short-term profits, often exploit natural resources without consideration for the long-term consequences. This leads to the depletion of vital resources such as fossil fuels, forests, and prime agricultural land. The rate of resource extraction and waste generation surpasses nature's ability to absorb and regenerate, causing an ecological imbalance. This imbalance is responsible for contributing to climate change, as well as loss of biodiversity. The metabolic rift also impacts social areas by exacerbating existing inequalities. The bulk of environmental degradation and resource depletion falls disproportionately on vulnerable communities and future generations. This highlights the social injustices that are a byproduct of an unconstrained pursuit of economic growth without consideration for the environment (Foster, 2013; Foster 2020).

Capitalist systems often facilitate a geographic disconnection between production and consumption, for example, in the industrialized global food system. Resources are extracted in one place of the world, processed in another, and then consumed elsewhere. This spatial fragmentation causes the ecological consequences of production and consumption to worsen, but also makes it challenging to grasp the full extent of the environmental damage caused since it is away, or out of sight out of mind. Capitalist systems also generate significant waste without regard for circular waste streams, and the Earth's natural systems are often not able to break down or digest these artificial waste products effectively, leading to more pollution and ecological damage as well as furthering the metabolic rift (Foster, 2013; Foster 2020).

The concept of the metabolic rift shows the importance of recognizing the interconnectedness between human society and the natural environment, and the harms that happen when we ignore this interconnectedness. It uplifts the need for sustainable practices, more equitable use and distribution of resources, a reevaluation of our economic systems, and the exploration of alternative paths forward in order to protect both human well-being and the well-being of the Earth that so graciously provides for us. Communities can help bridge this fracture between the natural and human world through deliberate and intentional planning processes that mitigate the harmful impacts of climate change (Foster, 2013; Foster 2020).

In *Slow Violence and the Environmentalism of the Poor,* Rob Nixon names climate change as *slow violence,* a type of violence that, "occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all" (Nixon, 2013, p.2). Nixon argues that traditional notions of violence tend to focus on immediate, visible, and spectacular events such as conflicts, wars, or major natural disasters. In contrast, slow violence brings attention to violence that occurs gradually over time and that is often beyond immediate perception. Climate change, deforestation, soil degradation, air pollution, water pollution, loss of biodiversity, and the displacement of marginalized communities are all examples of slow violence. While just as harmful or even more damaging than the more immediate and exciting types of violence sensationalized by the media, slow violence is often overlooked or downplayed because of its gradual nature (Nixon, 2013).

Slow violence also disproportionately affects vulnerable communities especially those who are low-income and marginalized populations. These communities often lack the resources and political power to address or mitigate the slow violence they experience, even though they may be the most harmed. Nixon emphasizes the interconnectedness of global processes and how slow violence is often linked to global economic systems and patterns of resource extraction, consumption, and waste disposal. The consequences of these processes are felt globally, affecting both present and future generations, though disproportionately. We need ethical and political shifts in how we address environmental and social issues (Nixon, 2013).

One of the ways to combat slow violence that takes place out of sight is to bring it to the foreground and gather around it, to bring light to it through engaged dialogue and actions, in community with others. Nixon emphasizes the importance of bringing slow violence to the foreground and shedding light on it as a critical step in addressing the issue. He argues that slow violence is often overlooked or obscured in mainstream discourse and media coverage because it unfolds gradually over time and lacks the immediate impact of more sensational events. Public awareness is essential for generating empathy, mobilizing support, and demanding action from governments, corporations, and communities. Building a shared understanding of what is happening and how it is impacting nature and people, such as climate change impacting food security at the local levels, is essential to naming the violence and working toward reestablishing peace or equilibrium through a restorative process (Nixon, 2013).

This restorative process could come in the form of ecological justice, which takes environmental and social justice issues a step further by focusing on the intersection of and relationship between the environment and people. "It's been a shift from…considering injustice factors that are external to a community to considering injustice factors as embedded inside and within communities, even as those same systems can't be thought of as isolated from external forces and being part of larger scale systems" (Bermel & Maranda, 2020). Ecological justice is an approach to not only address environmental issues, but also the many social problems that underly environmental inequities (Bermel & Maranda, 2020).

Background

According to the United Nations, climate change "refers to long-term shifts in temperatures and weather patterns" and while it may be natural occurring in some ways, human activities have been the driving factors of climate change, in large part due to the burning of fossil fuels (United Nations, 2021). The last decade was the warmest on global record, and the consequences of climate change include but are not limited to droughts, water scarcity, fires, rising sea levels, flooding, melting polar ice, storms, and a loss of biodiversity (IPCC, 2022). Climate change means more than just warmer temperatures—Earth is a system of interconnectedness and changes to one area may have an impact or influence changes many other areas. In a 2018 UN report "thousands of scientists and government reviewers agreed that limiting global temperature rise to no more than 1.5°C would help us avoid the worst climate impacts and maintain a livable climate. Yet the current path of carbon dioxide emissions could increase global temperatures by as much as 4.4°C by the end of the century" (United Nations, 2021). From the year 1850 to present, the United States has produced more carbon dioxide emissions than any other country in the world. We have an enormous responsibility to curb our contributions to climate change and safeguard the planet for future generations (IPCC, 2022).

Adapting to climate change consequences and planning in ways to mitigate the detrimental effects of climate change will help protect people, livelihoods, infrastructure, the environment, and our food systems (Food, 2015). Climate change adaptation planning focuses on both current and possible future impacts of climate change and should focus on prioritizing mitigating the impacts on the most vulnerable people and systems that have the least number of resources to cope with climate hazards (Suri & Ray, 2022). Climate action and planning requires substantial investments of finances and time by governments and businesses but will yield a high return on the investment. Climate change can impact many facets of our wellbeing, such as health, housing, safety, employment, and the ability to produce or secure food, contributing to rates of food insecurity, and climate action can help offset negative impacts to these areas of wellbeing (United Nations, 2021).

The World Health Organization states that, “the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human” and defines health as, “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization, 1995, p. 1). Climate change is a global crisis, and the well-being of Americans has already been impacted by climate change, with negative health consequences projected to worsen in correlation with climate change and increased greenhouse gas emissions (Ziska et al., 2016). Climate change impacts health in a variety of ways, particularly through exposure to heat waves, floods, droughts, food and waterborne disease, stress to mental health, and changes to the quality and safety of natural resources such as water, air, and food (Ebi et al., 2018). It is very likely that climate change will impact food systems at all levels across the globe by negatively affecting food availability and food access and will continue to cause detrimental disruptions as climate change accelerates.

Climate change risks not only impact agricultural production, but also other elements of food security, such as food processing, storage, transportation, and consumption (Mbow et al., 2019). While adaptive changes can help reduce vulnerability to climate change in the food system and reduce negative impacts to food security, many technically feasible adaptation options are costly, and not all communities can afford to make these changes (Lawler et al., 2013). The food system is complex, especially within the context of climate change, which allows for multiple food-security intervention or leverage points such as trade decisions, transportation systems, research investment, and improvements in techniques and materials such as packaging and storage. The lower the greenhouse gas emissions, the less adaptation is necessary (Brown et al., 2015). Leverage points are defined as, "places in the system where a small change could lead to a large shift in behavior" (Meadows, 2015, p. 145). This leads me to ask, what are the potential leverage points, or most critical places to intervene, in our current local food systems when it comes to addressing climate change? How do we determine what these are and identify how to plan for climate change mitigation or adaptation based on these leverage points?

There are many factors to consider, and the negative effects of climate change on food security is a complex issue with a variety of dimensions and consequences. For example, climate change can reduce production rates in the field of agriculture and change the suitability of land for growing food crops. Climate change also impacts precipitation patters, and some agricultural systems rely on predictable rain patterns to provide most of the water for their crops. Increasing temperatures will likely impact what crops are suitable to be grown in various regions. These factors will all impact the availability of food (Krishnamurthy et al., 2012).

Regarding the effects of climate change on food access, lower crop yields can lead to higher food prices. There will be an increased risk of harm to agricultural production in the form of heat waves, floods, and irregular weather patterns, which will lead to loss of income for farmers and those working in agricultural production jobs (United States, 2016). Stability at all levels the food system will also be impacted by climate change since an increase of extreme events will lead to unstable food supplies and unstable revenues in the field of agriculture (Krishnamurthy et al., 2012).

The last dimension of food security that will be impacted by climate change is utilization. Climate change will lead to changes in pests and water pollution, which can impact food safety and sanitation in the food system (Tirado et al., 2010). Additionally, a decrease in water availability and quality can lead to increased rates of diseases, which can impact the capacity for people to utilize food (Wheeler & Von Braun, 2013). The health and food security of the most vulnerable populations and those with the lowest incomes will be disproportionately impacted, leaving them at risk of increased malnutrition and other dangerous consequences (Centers for Disease, 2022).

Problem Statement

Scaling down from a global perspective on climate change to a municipal level, the New River and Roanoke valleys have made commitments to address climate change. Some of the largest contributing factors and impacts on the food system have only recently been named through the Blacksburg Climate Vulnerability Assessment Report. Published in 2020, the Blacksburg Climate Vulnerability Assessment Report identifies food security as one of the top community systems at risk due to the effects of climate change. The town of Blacksburg recommends that local municipalities should convene expert and equity-centered policy development teams to investigate the best strategies, options, and adaptations necessary to address current and future climate resiliency issues, and more specifically, convening a local climate food resiliency team to develop a resiliency plan (Blacksburg, 2020).

Blacksburg found that the town needs to prioritize climate resilient food systems, as well as emergent feeding programs, and invest in becoming self-sufficient. The town of Blacksburg also acknowledges that there will be an eventual event of crop shortages due to climate change that we need to plan for, and the county needs to adopt good food purchasing policy. Blacksburg also identified exploring how to incentivize regenerative practices as a goal for climate change mitigation and adaptation (Blacksburg, 2020). While reports such as this one highlight the concerns and potential next steps to addressing climate resiliency in the local food system, there does not seem to be consensus on how municipalities are planning for or should be planning for the effects of climate change in the local food systems. For example, it is unclear how municipal level food systems planners consider climate change in their planning process. Taken further, how can we bring local food producers and consumers together in ways that address barriers to food security while mitigating climate change in our region?

In a report on the state of local climate planning, City Scale highlights that there are inadequate governance structures and equitable community partnerships, with practitioners desiring to put people and equity at the center of climate work, but with no clear path forward for what this looks like in practice (City Scale, 2021). Local government climate work has not established a practice yet or a mechanism for collective learning from experience. The team of local climate action practitioners recommends focusing on effects rather than causes, since the root causes of most local greenhouse gas emissions are embedded in systems that are larger than individual jurisdictions, so taking a systems thinking approach is necessary. Local governments are positioned uniquely with advantages to nurture community organization and unity, as well as to support democratic institutions necessary for dealing with the extractive systems at the root of climate change, rather than only the end of greenhouse gas emissions. Local governments recognize that they likely cannot achieve their greenhouse gas emission or climate change mitigation goals utilizing their own authorities alone, so a multi-level stakeholder approach is necessary (City Scale, 2021).

In this research, I will investigate how the Blacksburg and New River Valley community is planning for the impacts of climate change and reducing greenhouse gas emissions. Additionally, I will explore which changes are most important to and feasible for our community to increase climate-resilient food system practices in Southwestern Virginia, and at the local municipality level in general. There is a gap in the literature around how municipalities are planning for climate-resiliency, and I propose that this topic could best be explored through participatory and collaborative qualitative research methods (City Scale, 2021; Dhar & Khirfan, 2017; Filho & Keenan, 2018; Schmidt-Thomé Klein, 2013). While I would not be conducting an intervention for the New River Valley, my time and space would fill in data of key stakeholders to inform next steps if there was a convening session to discuss climate change policy and planning, particularly related to food systems and food security, as well as inform policy choices around these issues at the local level.

Research Purpose and Questions

The effects of climate change pose a myriad of risks to the food system, directly impacting food security and affecting low-income and BIPOC (Black, Indigenous, (and) People of Color) populations in the most significant ways. We need to not just resist the current neoliberal corporate food regime and capitalistic systems, but also invest in creating and supporting alternative food spaces and systems, particularly those led by marginalized folks (Garth & Reese, 2020). Some local level municipalities are planning for attempts to mitigate or adapt to climate change, yet there seems to be no consensus on how to best plan for climate change, especially with impacts on the local food system. There is a gap in the literature on how local level municipalities are planning for and making policy regarding the impacts of climate change in the United States at a local level. A review of research examining climate change planning identified participatory and collaborative methods and strategies as most effective for this topic (City Scale, 2021; Dhar & Khirfan, 2017; Filho & Keenan, 2018; Schmidt-Thomé Klein, 2013).

Drawing upon these threads pertaining to municipal level food systems planning for climate change, the purpose of this research is to bring together diverse stakeholders to establish common ground around the issue of climate change and its impacts on the local food system. In bringing stakeholders together, I aim to facilitate systems thinking amongst participants that will generate dialogue addressing which potential leverage points they believe are most critical to address. From these potential leverage points, stakeholders will help inform and guide next steps for community climate change adaptation and mitigation planning (City Scale, 2021; Blacksburg Climate, 2020; Meadows, 2015; Stroh, 2015).

The resulting questions that are most pertinent to advancing climate adaptation planning in the New River Valley are:

- How do local municipality stakeholders understand climate change and its impacts on the food system?

- How do NRV food system stakeholders (e.g., farmers, food security professionals, food system organizations) understand climate change and its impacts on the sustainability of the local food system in our region?
- What are the potential leverage points, or most critical places to intervene, in our current local food system to address climate change transformation in the New River Valley?

Theoretical Framework

The theoretical framework of this study is comprised of systems thinking and Stroh's systemic change process (Stroh, 2015). A systems perspective is crucial to making sure that climate mitigation measures make constructive contributions to the outcomes of sustainable food systems (Niles et al., 2017). Systems thinking involves making sense of the world instead of simply describing it. Through thinking systematically, we are able to take tangled messes in the world and organize them in a way that makes them more understandable.

I have utilized Stroh's Four-Step Systemic Change Process to develop protocol for my focus group questions, which is explained in Systems Thinking for Social Change by David Peter Stroh (Stroh, 2015). This four-stage process by Stroh aims to collectively engage stakeholders across a system in systemic change by harnessing the energy and sense of urgency that generates from creative tension, which is the gap between current reality and vision for the future. These four stages are iterative and nonlinear, and include building a foundation for change, facing current reality, making an explicit choice about the future, and bridging the gap between the current reality and the future. The purpose of this process is to align diverse stakeholders around a shared understanding of why a complex social problem persists and identify potential leverage points that might improve system-wide performance in sustainable ways.

Methodology

This study utilizes a qualitative research design, combining both individual participant interviews and focus groups as a way to explore the research questions. The project is a case study examining the case of the New River Valley region of Southwestern Virginia and emphasizes participatory, community-based research methods to guide data collection and analysis through a critical constructivist philosophical stance. The principal methods of data collection include semi-structured individual interviews, followed by focus group discussions based on the major themes identified in the interviews. A gallery walk utilizing anonymous quotes from the interviews will precede the group discussion within the focus groups so as to prime the participants for sharing their thoughts, and also so that they can view other participants' ideas around the topics of climate change and the food system and make new connections that they would like to explore or respond to within the group setting.

The interview and focus group questions are designed in line with systems thinking and Stroh's systemic change process, with the aim to establish common ground among participants and build a strong foundation for social change. The epistemological foundation of this study rests on the assumption that knowledge is contextual and cogenerated. The participants in this study are diverse and multi-sectoral, ranging from local food system stakeholders to municipal leaders. In this study research participants have engaged in the active process of qualitative, empirical inquiry into the case of the New River Valley to make meaning of their perspectives of, lived experiences with, and dreams for the local food system in the face of climate transformation.

Significance

The contribution of this study is rooted in its capacity to build common ground and a shared understanding amongst food system stakeholders in a regional climate change mitigation planning process. This study will contribute to the body of literature around participatory research approaches and consciousness raising, will provide insight into bringing together diverse, cross-sectoral stakeholders, and the use of focus groups and interviews to bridge the creative tension gap in collaborative problem-solving through a systems thinking approach. Since there is not a clear consensus in the literature around how to plan for climate change mitigation at a municipal level in the United States, this research will contribute to addressing that gap.

The significance of this study to systems thinking lies in the application of this theoretical framework to the examination of climate transformation planning and food systems. By utilizing systems thinking, the study analyzes the complex relationships and feedbacks within the system, uncovering interconnected challenges and opportunities, and helps participants to realize these connections and think about the issue more holistically. This approach helps them identify systemic leverage points, where interventions can have the most significant impact on promoting resilience and equity in the face of climate change. By involving stakeholders in the engagement process of this project, the study will demonstrate how systems thinking can empower collective visioning and decision-making, fostering a sense of ownership and buy-in for the resulting plans and policies.

This is important, because the study's findings will contribute to the ongoing climate transformation planning process led by the Sustainability Department in the Town of Blacksburg for the New River Valley. The Blacksburg Climate Vulnerability Report, which this study builds upon, recommended forming expert and equity-centered policy development teams to address climate resilience issues in the region. This study fosters collaboration among key food system and municipality stakeholders in Montgomery County, laying the groundwork for a potential climate food resiliency team. The information gained from the study will also inform the development of a resiliency plan for the region, considering community perspectives, future visions, and potential leverage points for community-driven change, whether stakeholders from this project ultimately join the resiliency team or not. Participants will have established a relationship and foundation for future collaboration with one another through this study and will identify tangible actions and steps that they can take towards the future they would like to see, whether individually or collectively.

This study's findings also offer valuable insights for other communities wishing to plan for climate transformation and build resilient and equitable food systems at a local level. By examining strengths, vulnerabilities, and potential areas of intervention in this region, other communities can identify similar issues and understand the importance of addressing them in their own unique context. The collaborative approach used in this study, involving key multi-sectoral stakeholders and community perspectives, sets a precedent for engaging diverse voices in the planning process. Other communities can use this study's methodology and outcomes as a guide to conduct their own assessments of how their community is understanding the intersection of climate change and the food system, as well as potential paths of action to make changes that move them towards greater climate resiliency. They can adapt the approach to gather community-specific data to their own desired targets. The focus on community-driven change and identifying leverage points can inspire other regions to prioritize local solutions and ensure that resilience plans align with community aspirations.

This study serves as a valuable model for other communities to explore their unique needs, assets, and challenges, fostering inclusive and effective climate planning tailored to the unique context of their own region.

At the community partner's request, the project findings will be summarized in a public report, with the goal of involving the wider community in the ongoing climate transformation planning process. The report will be shared through multiple channels, including a public forum, which will provide an opportunity for individuals to contribute ideas and engage in discussions about the next steps in local climate change adaptation planning. This approach ensures that the planning process remains inclusive, participatory, and collaborative. The findings of this study, along with the public-friendly report that will be created from it, can lead to policy change at the local government level by providing evidence-based insights into climate transformation and resilient food systems. By sharing the report that will be generated from this study's findings with the broader community, local policymakers can better understand information on community perceptions, needs, and aspirations regarding climate adaptation and mitigation planning. The potential influence of the report also extends beyond the local level, allowing multi-level government policymakers to access valuable information about community needs and priorities, which could influence their decision-making processes and lead to the potential incorporation of community-driven ideas and solutions into broader policy initiatives. This study's findings and accompanying report will play a vital role in empowering our community and informing policymaker choices at various levels to create effective and inclusive climate policies that impact the food system.

Chapter 2: Literature Review

Climate Change and the Food System

According to the United Nations, climate change “refers to long-term shifts in temperatures and weather patterns” and while it may be natural occurring in some ways, human activities have been the driving factors of climate change, in large part due to the burning of fossil fuels (United Nations, 2021). The last decade was the warmest on global record, and the consequences of climate change include but are not limited to intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms, and declining biodiversity. Climate change means more than just warmer temperatures—Earth is a system of interconnectedness and changes to one area may have an impact or influence changes many other areas. In a 2018 UN report “thousands of scientists and government reviewers agreed that limiting global temperature rise to no more than 1.5°C would help us avoid the worst climate impacts and maintain a livable climate. Yet the current path of carbon dioxide emissions could increase global temperatures by as much as 4.4°C by the end of the century” (United Nations, 2021). There is a timely need for lowering our global temperature rise to avoid catastrophic consequences that would negatively impact the food system.

Climate Change Impacts on Food Production

Each component of a food system, from the farm to waste, contributes to climate change. Our current food systems are responsible for up to 34 percent of global emissions—the status quo is no longer working and must be challenged to shape transformation within our food systems and to deliver more sustainable diets that mitigate the effects of climate change (Fanzo et al., 2020). Local production and distribution methods, plant-based diets, and food systems that minimize food waste are becoming recognized as more sustainable and healthier choices for the planet and for people than our current industrialized and animal-based food system and help to lower greenhouse gas emissions (Dixon et al., 2009).

Climate impacts on food production have become a growing concern in recent years as climate change continues to influence weather patterns and agricultural conditions globally. Rising temperatures, changing precipitation patterns, and more frequent extreme weather events such as droughts and floods, all have significant implications for production methods and outcomes. Some regions may experience reduced agricultural productivity due to water scarcity and heat stress, leading to decreased crop yields and potential crop failures. On the other hand, other areas might have shifts in growing seasons and the introduction of new crop pests and diseases that they need to adapt to. Changes in climate can also disrupt pollination patterns and reduce the availability of water resources for irrigation, which further challenge food production. International cooperation and innovation will be crucial to address these challenges and protect global food supplies for future generations (Fanzo et al., 2020).

Climate Change Effects on Food Insecurity

Climate change also has negative impacts on food security, and marginalized communities are often the most impacted by the harmful impacts of climate change as it destabilizes the food system. As temperatures rise and weather patterns become more unpredictable, agricultural production is increasingly vulnerable to disruptions. Extreme weather events can lead to crop failures and livestock losses, reducing food availability and driving up prices that result in food insecurity (Firdaus et al., 2019).

Changing climatic conditions can alter the suitability of certain regions for agriculture, leading to shifts in growing seasons and the migration of pests and diseases, which can further compromise crop yields. Small-scale farmers, particularly in developing countries, are disproportionately affected since they often lack the resources and infrastructure to adapt to these changes. Climate change impacts on natural resources like freshwater availability and marine ecosystems can also disrupt food supply chains, affecting fisheries and food production systems that rely on healthy ecosystems. Climate change most detrimentally impacts food access and utilization, the main pillars of food security. In order to reduce greenhouse gas emissions and enhance the climate resiliency of our food system, it is essential to address both the supply and the demand side of the food system, such as changing policy and practices around production, transport, processing, food choices, food loss, and food waste. This could look like comprehensive strategies that combine climate adaptation and mitigation efforts with sustainable agricultural practices and social safety nets. Action is essential to mitigate food insecurity and ensure food access for vulnerable populations in the face of climate change (Mbow et al., 2019).

Food Movements and Climate Change

Food movements are comprised of many diverse efforts addressing the various economic, environmental, and other unsustainable aspects of the global food system, but with very little unity across movements. While there is much recognition that the food system is unsustainable and significant changes need to be made to address food security issues, the various food movements are fragmented and divided (Kropp, 2021). The food justice and food sovereignty social movements were born in response to the inequity in the global food system in response to the burgeoning of diet-related illnesses in low-income or BIPOC communities, and focus on empowerment and the redistribution of resources, particularly those that people were unfairly dispossessed of (Garth & Reese, 2020).

Food justice can be defined as, “The struggle against racism, exploitation, and oppression taking place within the food system that addresses inequality’s root causes both within and beyond the food chain (Alkon, 2014; Hislop. 2014, p. 19). Food justice encompasses many issues, including the opportunity to grow or purchase healthy food, diet related health disparities, access to land, and wages and working conditions in agriculture, food processing and restaurant work (Glennie & Alkon, 2018). While some of the food movements to combat food insecurity focus only on the surface level solutions, food justice aims to combat hunger at the root of the issue (Holt-Giménez, E., & Shattuck, 2011).

The food sovereignty movement stands in contrast to the dominant food movement narrative, which embodies the neoliberal concept that unregulated capitalist markets should guide the distribution or allocation of resources, and that the food system can be changed through individual acts rather than collective actions and mobilization (Ruelle, 2016). The pervasive food movement call to remedy issues in the food system by voting with your fork is an example of a strategy that assumes that the food system can be transformed through consumer choices in the market (Holt-Gimenez, 2011). Voting with your fork is a strategy that caters to white elites and does not acknowledge the fact that not all people have the resources or ability to vote with their fork through purchasing power, and additionally does not acknowledge the alternative strategies that have historically been led by working-class folks and BIPOC populations to bring about positive social change. As one Slow Food leader suggests, “If dinner is a democratic election. . . in many electoral districts . . . there are no polling stations and there is only one candidate, the incumbent: fast food” (Holt-Giménez & Wang, 2011, p. 85 - 86). Food sovereignty allows folks to step outside of the dominant marketplace system rather than resisting it since marginalized populations oftentimes cannot resist it in traditional ways such as voting with their fork, and instead creates their own alternative food systems instead. The notion that food system change happens through individual acts privileges those who already benefit from the capitalist market system, while simultaneously disavowing the collective mobilization efforts that those most directly impacted by food insecurity have used to bring about positive social change in other spaces of their lives (Holt-Giménez & Wang, 2011).

The food sovereignty movement began in the Global South with peasant struggles but has been adopted in the United States and other parts of the world. Food sovereignty aims to break up the global markets and concentration of power by corporations and to reinvest power at the local level while more equitably redistributing land and resources (Nettle, 2013). Gottlieb describes the connection between food sovereignty and food security by stating: As the food sovereignty movement has grown, it has become linked to the struggle against hunger and food insecurity, seeking new strategies for rural development, environmental integrity, and the maintenance of sustainable livelihoods. It has also become a counterpoint to global food interests and various neoliberal government and political strategies to promote the continuing penetration of markets and agro-industrial policies. (Gottlieb, 2010, p. 116) While the global markets and movements addressing food insecurity at a food access and food aid reformative level have been destructive to or disconnected from the environment, the food justice movement was born from a reverence for nature and environmentalism, and as such food sovereignty values the protection of natural resources and is a proponent of more sustainable food production practices.

The global food systems are part of a corporate food regime that exploits land, labor, and capital, which has led to a crisis in the health and wellbeing of people around the world.

Markets are inherently undemocratic, in that they are: Favoring those with more economic power and responding less, if at all, to those who lack it. However, in the past several years, new strategies have emerged that push back against neoliberalism and seek to address racial and economic inequalities. These include a small but growing number of worker-owned co-ops, mobilizations to improve the lives of workers throughout the food system, and campaigns to restrict some of the most harmful practices of chemically intensive industrial agriculture (Alkon, 2014, p. 38). New strategies based on loopholes in the market system can fill temporary roles until a new and alternative food regime is created. While some food system reforms are necessary to improve food access and the quality of life of people right now, it is a surface level or branch solution that does not address the deep roots of food insecurity. The corporate food regime needs to be dismantled to address food insecurity at the root of the issue, and to address the uneven distribution of power in which there is neoliberal control over our current food system (Kropp, 2021).

Empowerment and liberation in the United States food system needs to come from a reckoning with past traumas, such as the enslavement, discrimination, and dispossession of land that African Americans faced, or the colonization of Native American culture and foodways and the theft of Native lands. Black-led, Indigenous-led, and Womxn-led food justice organizations have become increasingly more common within food movements (Alkon & Agyeman, 2011). Leah Penniman, leader of one such Black-led food justice organization called Soulfire Farm states that, “The most important action that white people can take to uproot racism is to enact reparations, to quite literally give back what was stolen” (Penniman, 2018, p.390).

Those most directly impacted by an issue should be the figureheads and leaders of a movement, so that they may reclaim their autonomy and power in the fight for their rights, health, wellbeing, resources, or livelihoods and make change that most closely matches their culturally informed needs. The food justice movement can work to dismantle the current corporate food regime by starting with dismantling the structures of oppression that hold it in place—namely racism, classism, and sexism (Alkon & Guthman, 2017). The food justice movement can achieve this goal and work towards liberation in the food system by forming alliances between its splintered parts, so that equitable and sustainable practices are put into practice now and collective mobilizing for redistribution of resources such as land and markets can begin that will lead to a healthier and more just future. Food justice activism will not succeed if we operate individually or in silos, but rather through forming alliances and increasing power by collective agency (Clendenning et al., 2016).

According to Feeding America, more than 35 million people in the United States grappled with hunger in 2019; children, seniors, low-income populations, those in rural communities, African Americans, and Latinos were disproportionately impacted by the negative effects of food insecurity in our country (Hunger, 2020). Addressing food insecurity requires engaging with the structural aspects of food justice such as addressing race, gender, and class in relation to the control over land, labor, and capital in the food system. Food justice activism is an important driver of social change that should be allied with other social movements to challenge the corporate food regime's structural inequities, with a focus on liberation, healing, and the redistribution of dispossessed resources such as land, rights, and markets (Garth & Reese, 2020). The evolving food justice movement has a unique position in the social and political influence of the direction of food systems change in the United States and can either weaken its meaning by limiting the food justice focus to the concept of food access or move our food systems forward by upholding a structural focus on the redistribution of resources as integral to food justice (Holt-Giménez Wang, 2011).

In the United States, food insecurity is connected to a wide range of health risks and diseases such as obesity, diabetes, cancer, and heart disease. Grocery stores and access to fresh, affordable, and healthy food in low-income communities are very limited, while inexpensive alternatives that are unhealthy and heavily processed are abundantly available at the nearest corner stores, gas stations, or fast-food restaurants (Swinburn et al., 2019). A wide variety of efforts to address the disparities in food security have emerged in the United States, with some who seek to uphold the political economy of our globalized food system, and those who seek to radically transform it. Those alternative food movements led by Black, Indigenous, and low-income folks tend to advocate for the transformation of our food system, while those movements that are led by people who benefit from or are not harmed by market economies such as middle to upper class white folks typically uphold the current political economy of our food system (Garth & Reese, 2020).

Food Systems Planning for Climate Change Adaptation

Adapting to climate change consequences and planning in ways to mitigate the detrimental effects of climate change will help protect people, livelihoods, infrastructure, the environment, and our food systems. Climate change adaptation planning focuses on both current and possible future impacts of climate change and should focus on prioritizing mitigating the impacts on the most vulnerable people and systems that have the least number of resources to cope with climate hazards. Climate action and planning requires substantial investments of finances and time by governments and businesses but will yield a high return on the investment. Climate change can impact many facets of our wellbeing, such as health, housing, safety, employment, and the ability to produce or secure food, contributing to rates of food insecurity, and climate action can help offset negative impacts to these areas of wellbeing (United Nations, 2021).

Local Government Climate Work

Across the United States and world, from urban to rural communities, local level governments have recognized the urgent need to address the challenges posed by climate change. A variety of factors impact whether some communities are engaging with climate change, including social and political willpower and buy-in among community members or elected officials, resources, staffing, and other considerations. Among those communities that are addressing climate change, local governments have often established climate action committees or task forces in response to the complex and unique climate challenges faced by different regions. These bodies bring together experts, stakeholders, and community representatives to assess the specific vulnerabilities and opportunities presented by climate change (Bulkeley, 2023; Gaborit, 2022; Moloney et al., 2018; US EPA, 2017).

To effectively plan for climate change, these committees often conduct climate vulnerability assessments. To do this, they analyze historical climate data, study local weather patterns, and collaborate with scientists or research institutions to understand the potential risks faced by their communities. This data-driven approach helps inform their decision-making and ensures that strategies are tailored to the region's specific needs. Local level climate planning typically focuses on aspects of both adaptation and mitigation. One of the primary goals for local level climate work is to reduce greenhouse gas emissions. Local governments often adopt emission reduction targets and develop action plans to achieve them. They encourage the adoption of renewable energy sources, implement energy efficiency measures, and promote sustainable transportation options such as electric vehicles and public transit (Bulkeley, 2023; Gaborit, 2022; Moloney et al., 2018; US EPA, 2017).

Another crucial aspect of local climate work is enhancing resilience. Local governments invest in infrastructure improvements to withstand extreme weather events, like floods, hurricanes, droughts, heat spikes, and wildfires. They may develop green spaces and floodplain restoration projects to manage stormwater and protect against flooding. Additionally, some communities explore ecology-based solutions like wetland restoration to mitigate the impacts of climate change on ecosystems and wildlife (Bulkeley, 2023; Gaborit, 2022; Moloney et al., 2018; US EPA, 2017).

Engagement with the community is a key pillar of successful local climate work. Local governments may organize town hall meetings, workshops, and public consultations to involve residents in the decision-making process. Public awareness campaigns encourage individuals and businesses to adopt sustainable practices and contribute to broader climate efforts. Financing and resources also play a crucial role in implementing climate initiatives at the local level. Local governments often seek federal grants, public-private partnerships, and budget allocations to fund climate projects and infrastructure improvements. One study on climate change adaptation in U.S. cities found that, “the level of collaborative activity is positively associated with higher policy outputs and outcomes” (Kalesnikaite, 2019, p. 864). As local governments across the United States continue their climate planning and action efforts, successes, failures, and lessons learned can be shared amongst neighboring communities and cities. The sharing of knowledge fosters a collaborative approach to climate work, with best practices being replicated and adapted to suit different contexts and the unique needs of individual communities (Bulkeley, 2023; Gaborit, 2022; Moloney et al., 2018; US EPA, 2017).

Collaboration across Sectors

While there seems to be a lot of international research focused on planning processes for mitigating the impacts of climate change, there is a noticeable, "need for a better understanding of how climate change affects North America and for the identification of processes, methods and tools that may help countries and communities to develop an adaptive capacity" (Filho & Keenan, 2018, p. V). Research on this topic regarding the United States is not abundant, but we might take note from methods that have been effective in neighboring Canada. Regional Service Commissions (RSC) play a significant role in local level climate change adaptation in Canada, and one study looked at determining how RSCs are planning for and effecting regional adaptation measures. The data was collected through interviews with RSC Directors and researchers tried to draw themes out of the transcripts to make meaning rather than trying to force a theoretical framework onto them. These interviews revealed power struggles between RSCs and municipalities, and a need for greater collaboration across sectors and levels of actors. Collaborative methods in the planning process such as workshops could help to bridge these relational gaps between stakeholders (Filho & Keenan, 2018).

Stakeholder Involvement

Another study in Denmark focused on climate change adaptations at a municipal level. The specific methods chosen were a scenario workshop and a citizen summit. Combining these two methods allowed the study to collect a greater variety of perspectives and inputs, in that the workshop involved stakeholders with work connected to climate change and backgrounds in environmentalism, and the summit involved any citizens from the municipality with any background. This inclusive and combined approach required more time and effort than merely choosing either a workshop or a summit, but there were some benefits to this choice in methodology. While the workshop stakeholders can provide innovative ideas and more expert solutions, the summit participants do not have the biases and personal stake in the adaptations solutions that the experts do, and would provide a different set of responses, ideas, and preferences (Schmidt-Thomé Klein, 2013).

This study emphasizes the factors that must be considered when utilizing participatory processes for climate change adaptation planning. While it can be time and effort intensive to implement participatory methods, involving stakeholders and community members in the decision-making democratizes the policy-making process as well as lifts and empowers the voices of those who are most directly impacted by the issue. Participatory and collaborative methods also lead to a multiplicity of diverse ideas, thoughts, perspectives, and solutions, as well as a sharing and co-generation of knowledge that makes the investment of time and energy worth it. The decisions that come from a participatory process are more likely to be sustainable and have easier implementation than those decisions made without community collaboration (Schmidt-Thomé Klein, 2013).

Nonprofit organizations and regional planning associations such as the San Francisco Planning and Urban Research Association (SPUR) are beginning to publish reports with policy recommendations regarding climate change adaptation planning as well. The SPUR report details the projected impacts that climate change will have on the Bay Area region. The report was generated using a task force convened with stakeholders in the community and conducted focused workshops to evaluate adaption recommendations. The workshops were used to identify local government planning suggestions that were then published in the report. The SPUR report notes that, “climate change adaptation will need to be dealt with at all levels of government. Yet it is at the local and regional levels where vulnerability can best be understood and addressed” (SPUR, 2011, p. 29). Planning at a local level requires insider, or community input, rather than just outsider solutions. The task force collaborating with community stakeholders and generating ideas through workshops created buy-in and resulted in an action plan with stakeholders committing to specific goals and tasks (SPUR, 2011). This seems like a particularly effective strategy that will lead to community action.

In one study regarding climate change policy with local officials in the Intermountain West of the United States, researchers utilized focus groups and phone interviews to gather information about local land use planning. These were broken into two phases, with phase one involving a pair of two-hour focus groups, and phase two involving a 30-minute individual interview. The focus groups included stakeholders and representatives from 18 different towns, cities, or counties in Colorado and Arizona. The phone interviews included 31 different cities, towns, or counties in Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming (Metz Below, 2009).

While I appreciate the fact that both collaborative and individual data collection methods were used in this study to elicit notable opinions around climate change mitigation planning at a local government level, I am thoughtful of the fact that only two states were represented in the focus groups. The remaining states in the Intermountain West were able to give voice to their opinions through the one-on-one interviews but missed the opportunity for collaborative idea generation in the focus groups and limited the scope of diversity of opinions and experiences within the focus groups. The study does not explain this limitation (Metz Below, 2009).

In a study on climate change scenario planning in Alaska's National Park, participatory strategies were chosen because they, "help us understand relationships and behaviors between institutions and actors, and the context within which the decision-making process takes place" (Van Riemsdijk ORNL, 2013, p. 23). Climate change planning workshops were held, and researchers conducted observations of the participants, as well as interviews that were semi-structured in format. The researchers attempted to increase the credibility of the results through triangulation, in which two case studies and two research methods were used. 23 interviews were conducted in this study, and each interview varied in length from 20 minutes to an hour with topics focusing on the participants' experiences in the climate change planning workshops. Notes were taken before and after the interviews, and then compiled for coding and analysis (Van Riemsdijk ORNL, 2013).

During the workshops, researchers observed participants and recorded information about both individual and group behavior. Researchers took fieldnotes during these observations using a holistic approach that allowed natural themes to form, and then summarized these notes in a document for coding and analysis as well. The data was coded by the researchers using both etic and emic themes—the etic themes were identified by researchers, but the emic themes emerged from the participants themselves. Last, the researchers reviewed the data and coding and combined the data into one document. The results and data were triangulated with the case studies to identify patterns (Van Riemsdijk ORNL, 2013).

One finding from this research that was pertinent to climate change planning at local levels was that stakeholder involvement actually varies significantly, even when it is emphasized and prioritized as a crucial component of the planning process. This leads me to the question, what are the best practices for the involvement of stakeholders when planning for climate change adaptation? This article suggests that stakeholder participation in qualitative research strategies for climate change planning are lowest in municipalities that have little cooperation or collaboration, so researchers need to figure out how to increase stakeholder participation in climate change planning if they hope to create truly participatory plans for their research (Van Riemsdijk ORNL, 2013). I am left here with the question; how does a researcher determine the existing level of cooperation in a community and what strategies can increase participation rates?

One aspect that most varied across all of these articles on food systems planning for climate change or climate change adaptation planning at a local level was the definition of a stakeholder. When considering participatory and collaborative approaches to research, defining who is a key stakeholder in the process is pertinent. “The key to a successful involvement process is to consider carefully, when and how to involve who and to communicate precisely and up front about, what kind of influence those involved will have on the decision-making process” (Schmidt-Thomé Klein, 2013, p.16). The most commonly used definition of key stakeholder in these studies involved local individuals who held background, investment, or expertise in climate change or environmental issues through their roles in the community. I don’t think the definition of stakeholders should be constrained by age, status, identity, or other traditionally limiting factors.

There seems to be a scarcity of research methods, and this is acknowledged as one gap or limitation in the literature around climate change adaptation planning. While adaptation studies frequently recommend participatory based methods and tools for planning processes, many of the documented methods in the planning literature still utilize a top-down approach. Additionally, the choice of stakeholders within participatory and collaborative approaches is oftentimes limited to government officials and institutional partners at the expense of creating space at the table for vulnerable stakeholder groups and general community members to participate in the planning process (Dhar & Khirfan, 2017). Dhar and Khirfan note that, “in addition, a very small number of planning studies involve participatory methods that identify or acknowledge indigenous adaptation approaches in the planning process” (Dhar & Khirfan, 2017, p. 620). The literature reveals that within climate change adaptation and mitigation planning, we need to figure out why participatory strategies are not often being utilized, who needs to be included in this participation beyond traditionally defined key stakeholders, and how we can incorporate indigenous adaptation actions into planning policies at the local level (Dhar & Khirfan, 2017).

Stakeholders who are often left out of conversations and community endeavors on climate change planning but who will be most impacted by the future consequences of climate change are children and youth. A child-centered project in the Philippines based in the community evaluated climate change adaptation in practice and made empowering the voices of youth a priority in the design and focus of their research. Focus group discussions, interview methods, and indicators of local-level adaptation with participatory foundations were developed and utilized. The evaluation sought to help implementers understand how the project was supporting communities as they adapt to climate change, and also posed the question: “what does successful adaptation look like from the perspective of children, youth, and their communities?” (Uitto et al., 2017, p. 291)

Children participated in focus groups with the researchers, and adults from the community were not present at the focus groups to prevent imbalances in power that might inhibit children from expressing their thoughts and ideas freely. A rights-based approach was utilized in the methods and evaluation, which addresses, “inclusion and power imbalances and ensure poor, marginalized, and vulnerable have opportunities to participate” (Uitto et al., 2017, p. 294).

Bi-directional Flow of Power

There seems to be a debate within the literature about whether planning in climate change should be top-down or bottom-up regarding the concentration of power. While a bottom-up approach was given merits, the literature also revealed critiques and critical considerations around relying too heavily on participatory and collaborative methods at the local level when planning for climate change policy, particularly in small or rural municipalities that may face community limitations, such as their technical knowledge within the community or the fiscal resources. Homsy and Warner note the tension between choosing methods that respect local knowledge, diversity, and action, and also acknowledging situational context in scaling up these findings to a global level issue like climate change. They suggest that: “Linking the knowledge of local stakeholders, including the general public, to higher level technical expertise allows for joint knowledge creation and effective policy action. This co-production approach creates tensions, but also opens the possibility for coordinated polycentric action on global issues—action that is owned and respected at the local level” (Homsy Warner, 2013, p. 292) The co-production of knowledge involving a bidirectional flow rather than an entirely bottom-up or top-down hierarchical power structure is uplifted as the most effective way of planning for climate change within United States municipalities (Homsy Warner, 2013).

These critiques brought up a question for me that was not resolved in all of the sources I read for this paper, regarding which strategies or methods are most effectively allow collaboration between multiple levels of government in planning for climate change. How can researchers effectively link and allow for the co-production of knowledge and strategy between the local level government and the state and federal government? Or is that even the right approach? While larger government has access to greater expertise and financial resources, you do not want to disempower the local level or discredit local or community knowledge either. Can focus groups, workshops, group interviews, etc. like those mentioned above be scaled large enough to effectively include multi-level stakeholder participation and collaboration? Or should those be conducted at the local level and other strategies be used to scale and connect local knowledge to other levels? Whose voices might be left out or need lifted in these spaces? The literature seemed to focus on either local level planning methods or state and national level planning, and I did not find studies that combined them. Starting with building a foundation for change at the local level can later lead to expanded collaboration and insight with government stakeholders who have higher level technical expertise. Communities likely need to identify their own knowledge, priorities, and visions before bringing in outsiders who can assist with joint knowledge creation and effective policy action, but as Homsy and Warner demonstrate, multi-level stakeholders should eventually be brought into the process.

Participatory Approach

Participatory action research methods have also proven effective in Atlantic Canadian coastal communities, where methods like semi-directed interviews, focus groups, participant observation, public meetings, kitchen assemblies, and collaborative mapping, among others, are used for climate change adaption planning. These strategies are described as a co-construction of knowledge, wherein the researcher does not have a hierarchical power differential over the community, but rather there is horizontal reciprocity in these methods. These methods are described as intentionally chosen to engage in dialogue with the community rather than approaching the community with prescriptive ideas or solutions. Participatory action research methods involve leaving something useful behind for the community rather than just extracting data from them, and in this case the research results were shared through public reports and meetings, media, and websites. While participatory action research can oftentimes be time and cost intensive compared to other methods, it can lead to community empowerment that lays the foundation for sustainable, long-term change (Filho & Keenan, 2018).

In preparing for climate change and making adaptations at a local level in Finland, researchers utilized workshops and group discussions. The workshops involved stakeholders from a multitude of different backgrounds, with aims of sharing diverse ideas and increasing mutual understanding among participants. The workshops simultaneously provided information about the impacts of climate change and what types of adaptation are necessary, as well as collected information from the stakeholders to gather their ideas and input on climate adaptation strategies (Schmidt-Thomé Klein, 2013).

This study found that it was beneficial to the climate-resiliency planning process to bring stakeholders from different backgrounds and fields into the workshops, but also found a challenge in getting the stakeholders involved. Stakeholders who did not have a direct connection to or expertise in environmental issues were less likely to be involved in the workshops, while those with a background in climate change or environmentalism were the most engaged in the workshops (Schmidt-Thomé Klein, 2013).

Stakeholders who were connected to climate change adaptation at regional or local levels were also interviewed. The interviews filled the gaps from the workshops, as the researchers were able to involve stakeholders who would not have participated in workshops, thus capturing more information. The downside of the interviews was that they only provided one-way communication and did not allow for collaboration among the stakeholders or the cross-pollination style sharing of ideas. One way to overcome this barrier would be to facilitate group interviews in addition to workshops. The workshops and interviews allowed the facilitators to develop new climate change adaptation strategies and to determine stakeholder needs and barriers to implementing these changes at the local and regional level (Schmidt-Thomé Klein, 2013).

A study on the climate change adaptation municipality planning process in the Inuvialuit Settlement Region of Canada emphasizes using participatory, community-led strategies for climate change adaptation planning. The process for climate change adaptation planning in this Inuit community followed the stages of analyzing secondary sources of information, community collaboration and relationship building, adaptation planning workshops, developing an adaption plan from the workshops, review by informants, stakeholders, and the general community, and piloting the proposed plan. This participatory research involved both stakeholders and general community members in the workshops, where they collaborated on developing climate change risk cards and proposing potential adaptive solutions to these risks (Pearce et al., 2012).

Another participatory method implemented in municipal climate adaption planning in the Inuit community of Paulatuk involved photovoice, wherein community members were given digital cameras and asked to take photos that told a story of their lived experiences of things they value and things they associated with climate change. Adding photovoice as a way to collect data in addition to the workshops increased the inclusivity and diversity of responses, because members of the community who would not have been able to participate in the workshops, such as children or people with limited communication or literacy abilities, were able to provide their perspectives and narratives around the meaning of their photographs. The photographs were used to facilitate conversations about the participants' concerns regarding climate change and their ideas for adaptation strategies, as well as presented to the community as a whole and made into a community calendar (Pearce et al., 2012).

Shortcomings with Local Municipality Planning

In a report on the state of local climate planning, climate work practitioners acknowledge that the local climate action movement has plateaued since the current model is not adequate to bring change as quickly as it is needed. The current paradigm does not center community, does not focus on systems change, and is not helping community reach their climate change targets or community goals. Climate change is a consequence of failing systems and an extractive economic model that consolidates power and money for a few and negatively impacts those who have the least. Climate impacts most detrimentally impact those who have done the least to cause the issues, and the next iterations of climate action should be a collective, participatory effort centralized around systems change, community, people, and values (City Scale, 2021).

The Case of the New River Valley Addressing Climate Change

The case within this study is the community of the New River Valley, as it serves as the main focus of inquiry regarding climate transformation planning through a food systems lens. The New River Valley is home to approximately 180,000 people and is a naturally scenic and culturally rich region located in Southwestern Virginia in the United States. It encompasses several counties and cities, including Montgomery, Pulaski, Floyd, Giles, and Radford. The name of the region comes from the New River, which is one of the oldest rivers in the world, and it flows north through the valley. The New River Valley is known for its natural beauty, with rolling hills, lush forests, and numerous outdoor recreational opportunities along the Appalachian Mountains (About NRVRC, 2023; DCR, 2023; New River Valley Virginia Economic Development Partnership, 2023; Virginia's New River Valley a Natural Fit, 2023).

Looking at food insecurity and food systems in the New River Valley, according to Feeding America Southwest Virginia, 1 in 8 Southwest Virginia residents do not know where their next meal will come from, and 1 in 5 children in our region faces hunger. A lack of transportation within these rural communities is one of the largest barriers to food security in the region (Hunger in Our Region, 2020). The 2018 New River Valley Community Health Assessment survey finds transportation to be the primary barrier to accessing nutritious food in the New River Valley region (New, 2018). "37.5 percent or greater than 50,000 individuals who reside in Pulaski, Radford and Montgomery counties live more than 10 miles from a grocery store, supermarket or food retailer" (NRV, 2019, p.7).

The New River Valley is also home to several colleges and universities, including Virginia Tech in Blacksburg and Radford University in Radford. Economically, the New River Valley has a mix of industries, including agriculture, manufacturing, technology, and healthcare, among others. Culturally, the New River Valley has a thriving arts and music scene, with local art galleries, craft shops, and music venues hosting events and festivals throughout the year. The region's Appalachian heritage is also celebrated through traditional music and cultural events (About NRVRC, 2023; DCR, 2023; New River Valley Virginia Economic Development Partnership, 2023; Virginia’s New River Valley a Natural Fit, 2023).

Using the data provided by the National Oceanic and Atmospheric Administration of the United States, which is available on their Climate Mapping for Resilience and Adaptation government website, we can see through climate modeling projections that the New River Valley region of Virginia will be less impacted by climate change than many other surrounding areas on the East Coast and even across the United States (CMRA, 2023). The notion that the New River Valley is a more climate optimal zone in the face of climate change is a consideration of this case. Additionally, when considering climate change, many places within the New River Valley are in close proximity to water sources including a variety of rivers, lakes, creeks, and streams. (About NRVRC, 2023; DCR, 2023; New River Valley Virginia Economic Development Partnership, 2023; Virginia’s New River Valley a Natural Fit, 2023).

Town of Blacksburg Sustainability

In 2007, Blacksburg made a formal commitment to reduce greenhouse gas emissions. From this commitment, Blacksburg designed a climate action plan, published in 2016, to address greenhouse gas emissions and climate change impacts. The plan outlines specific strategies and actions to reduce the town's carbon footprint and increase resilience to climate-related challenges. Some of these strategies include areas of renewable energy, waste management, transportation, and sustainable building and development. The town has been exploring renewable energy options to transition towards cleaner energy sources. This includes exploring possibilities to use solar other sustainable energy solutions to power municipal facilities and services. Blacksburg has implemented recycling programs and waste management practices to reduce landfill waste. The town encourages sustainable transportation options and incentivizes walking, biking, and public transit to reduce reliance on vehicles. Blacksburg promotes sustainable building practices and green development standards to ensure new constructions and developments are more energy efficient than past practices (Climate Action Plan Working Group, 2016).

Overall, the climate action plan outlined some strategies and goals for mitigating climate change, but not adapting to climate change, especially regarding the food system. There is a need for formalized plans to adapt to impending climate change impacts on the food system. According to Carol Davis, the Sustainability Manager for the Town of Blacksburg, there has been an ongoing and active effort to progress climate vulnerability and adaptation planning in the New River Valley. So far, the following steps have been taken: the convening of a climate vulnerability advisory team, completing a local climate data and modeling analysis, the development of preliminary climate adaptation strategies, and the completion and release of a climate vulnerability report. Currently, next steps for climate vulnerability and adaptation planning include forming climate adaptation and resiliency strategy teams and developing a climate adaptation and resiliency plan (Blacksburg Climate, 2020). It is my hope that this research project will contribute to moving the climate vulnerability and adaptation planning for the New River Valley forward by bringing together stakeholders who will contribute information, perspectives, and priorities to the future strategy teams and resiliency plan.

Climate Vulnerability Assessment Report

The Blacksburg Climate Vulnerability Assessment Report highlights the importance of planning for the impacts of climate change at the local food systems level in a timely manner by stating that, "Communities are built over a long time. Buildings and infrastructure are constructed to perform within a predictable range of conditions and are expected to be around for many decades, if not centuries. Similarly, natural systems, which contribute diverse and incalculable value to the surrounding community, are highly tied to a predictable set of climatic conditions for that region. Whole economies like agriculture and tourism revolve around predictability of the seasons. All of these systems become vulnerable and potentially unstable if climatic conditions change substantially" (Blacksburg Climate, 2020, pg. 5). If our local food system and municipality stakeholders look at the climate vulnerabilities we will be facing in the coming years, our community will be better equipped and prepared to handle and plan for the challenges that come with climate change.

The Blacksburg Climate Vulnerability Assessment Report is broken into several major sections identified by climate hazards of concern: hotter summers, warmer winters, and changing precipitation patterns. Under each of these climate hazard sections, food security and agriculture were both identified as areas of high vulnerability within the matrix of critical community systems listed. Anticipated impacts of climate change on the food and agriculture systems in the New River Valley are reduced agricultural output and quality, rising food prices, and reduced predictability of rainfall. To combat these impacts, the report recommends convening a regional climate food resiliency and security stakeholder team, developing a food resiliency plan, and identifying as well as supporting agricultural climate adaptation best practices, potentially through collaboration with Extension (Blacksburg Climate, 2020).

Theoretical Framework

The conceptual lens or perspective that guides my approach to understanding and interpreting the data of this study draws on two key concepts: systems thinking and Stroh's systemic change process. Systems thinking is a holistic approach that views entities as interconnected systems, understanding how changes in one part can impact the whole. Stroh's systemic change process provides a structured methodology for driving transformative change within complex systems. By combining these connected frameworks, the study aims to analyze and guide systemic change initiatives, considering the interdependencies inherent in addressing complex challenges such as climate transformation planning at a local level (Meadows, 2015; Stroh, 2015).

Systems Thinking

An important aspect of addressing equity and sustainability in the food system is climate change, and local action is necessary to address the global climate change crisis. This can be addressed through local food systems, by changing the way that food is produced, distributed, processed, and related to (McMichael, 2007). A systems perspective is crucial to making sure that climate mitigation measures make constructive contributions to the outcomes of sustainable food systems (Niles et al., 2017). Systems thinking involves making sense of the world instead of simply describing it. Through thinking systematically, we are able to take tangled messes in the world and organize them in a way that makes them more understandable. The three main concepts of systems thinking are interrelationships, boundaries, and perspectives (Meadows, 2015; Williams & Hummelbrunner, 2011).

Interrelationships focuses not only on how things are connected, but also the consequences of those various connections. In boundaries, systems thinking involves drawing lines or setting borders around limiting our thinking, since we cannot think about everything, and makes situations more manageable. Boundaries in systems thinking are often connected to power issues and ethical aspects, such as the marginalization of anyone or anything outside of a drawn boundary. Perspectives entail how you look at the picture in systems thinking, and the way a thinker views or interprets information and interrelationships. There are different ways of understanding based on a variety of factors including lived experiences, motivations, and mental schema (Meadows, 2015; Williams & Hummelbrunner, 2011).

Systems thinking is both a complex and adaptive system and can highlight the misalignment between the way systems work in the real world and the way we think that they work with the wicked problems that we face. One example of a wicked problem is global hunger, despite the fact that there is enough food in the world to feed all people, which in theory makes it a resolvable problem. However, Cabrera and Cabrera note that: The solution requires a deeper understanding of the varied systems that contribute to world hunger, and that can be difficult, but it is not the case that we need to transgress the laws of physics in order to solve the problem of world hunger. The reason we can't solve world hunger is because we don't have a mental model that accounts for the social, economic, political, motivational, and cultural issues that shape the problem. Someday we will develop this mental model and world hunger will no longer be a wicked problem. (Cabrera, 2018, p. 35). To address complex issues such as the effects of climate change on the food system, we need an approach that prioritizes more deeply understanding the many systems that contribute to these issues and align with these interrelationships and systems in the real world, not just an understanding of the way we think they work.

The Barilla Center for Food and Nutrition advocates for collaborative relationships and systems thinking to transform the food system, stating that, “everything is based on creating collaborative relationships focused on a wide variety of skills and experiences and on analyzing multiple criteria rather single causes” (Systems thinking, 2020). Food systems transformation requires social movements, more localized economies, and collaborative networks, not a focus on single causes or isolated issues (Kropp et al., 2020). Enhanced collaboration and community-based practices such as interviews and community based participatory research in a systems approach can bring about greater food security (Knezevic et al., 2018).

Modern dominant food systems are based on a productionist and extractive model, and we need to move to more local food systems that embrace alternative models that are restorative in nature, both to people and to the environment. However, sometimes local food systems are not always the most environmentally sustainable options, so we need to design a local food system that also addresses concerns of climate change (Clancy, 2015). Redesigning this local food system in an innovative and holistic way will require multi-sector involvement and participatory-based network cooperation to re-envision a more sustainable and just regional food system.

Stroh’s Four-Step Systemic Change Process

I have utilized Stroh’s Four-Step Systemic Change Process to develop protocol for my focus group, which is explained in *Systems Thinking for Social Change* by David Peter Stroh. This four-stage process by Stroh aims to collectively engage stakeholders across a system in systemic change by harnessing the energy and sense of urgency that generates from creative tension, which is the gap between current reality and vision for the future (Stroh, 2015). These four stages are iterative and nonlinear, and include building a foundation for change, facing current reality, making an explicit choice about the future, and bridging the gap between the current reality and the future. The purpose of this process is to align diverse stakeholders around a shared understanding of why a complex social problem persists and identify potential leverage points that might improve system-wide performance in sustainable ways (Stroh, 2015).

This process is particularly useful when stakeholders have trouble seeing how they contribute to the problem and what they can do to optimize the whole system instead of just their part of it, as well as to identify potential leverage points and integrate them into a systemic theory of change, and when systems are bound by a social change issue that can be addressed at a local, state, or regional level. In the first stage of the process, the goals are to: engage key stakeholders, create a shared initial picture of people's vision and where they are now, and build capacity to collaborate. The goal of the second stage is to develop a deep understanding of the current reality. In the third stage, people commit to moving toward their envisioned future by understanding and comparing the payoffs of the status quo with the payoffs for change and creating solutions that maximize the benefits of both states or make conscious trade-offs in support of what they care about most deeply. In the final stage, stakeholders work to bridge the gap between their current reality and their commitment to the future. This includes identifying potential leverage points (such as those proposed by Donella Meadows) to shift a system archetype, integrating these into a systemic theory of change, and developing new mental models. It also includes creating a process for ongoing learning and engagement to recalibrate plans based on what the group is learning (Stroh, 2015).

The first stage, called" building a foundation for change," starts by identifying all of the key stakeholders and getting them involved in the process. It is then necessary to establish common ground in terms of what everyone hopes to achieve and where they think they are now. The facilitator then helps them build capacity for systems thinking with a focus on collaboration (Stroh, 2015). In addition to the framing around the perspectives that they bring as people who are active in different sectors, how diverse is the stakeholders' knowledge of the intersections of different issues? I would like to identify how much common ground building needs to be done, based on the focus groups going one of two ways. Either everyone agrees on a fundamental level that this is a systems issue, and everything is connected, or they have never thought about these interconnections and will need more common ground building facilitated with them. I have utilized Stroh's process to develop stakeholder interview and focus group questions to determine the following: How diverse is the stakeholders' knowledge of the intersections of different elements of climate change and the food system? What is their perspective on and prior experience with the issue of climate change? Do the stakeholders agree on a fundamental level that this is a systems issue, and everything is connected, or have they never thought about these interconnections?

Using the process of Understanding by Design, a form of backwards design approach, I have identified goals, understandings, essential questions, and potential interview questions for facilitating the focus groups (Wiggins & McTighe, 2005). Specific goals include identify diversity of stakeholder knowledge, establish consensus or shared understanding among stakeholders that climate change is a systems issue, build a foundation for change, help the stakeholders build capacity for systems thinking with a focus on collaboration, and generate creative tension with the stakeholders to promote creative problem-solving. Broad goals include climate change literacy, consciousness raising, creating a vision to work towards, and progression of planning steps for local climate change mitigation/driving momentum.

From the focus groups, I aim to facilitate understanding of the following ideas: climate change and the food system are deeply interconnected, and this is a systems issue. We need to be engaging with policy and planning for climate change mitigation and adaptation in the New River Valley and the time to act is now. There is a diversity of stakeholder knowledge on the intersections of different elements of climate change and the food system in this space, and we can use this knowledge to plan and act collaboratively. After the focus groups, participants will know: The content and findings of the NRV climate vulnerability assessment, how to identify a systems issue and identify the interconnectedness of the issues discussed, the perspectives of a variety of stakeholders connected to this issue, potential contacts and points of collaboration, potential next steps for themselves as individuals as well as collaboratively for the group or community, and the urgency with which this issue needs to be addressed.

After engaging in the focus groups, participants should be able to identify that climate change will have impacts on the local food system, name that this is a systems issue and needs to be able to be addressed accordingly, find potential points of collaboration with stakeholders across sectors, acknowledge and empathetically consider the diverse knowledge and perspectives of other stakeholders, collaboratively develop potential next steps or intervention points for local climate change mitigation and adaptation planning, and understand the time-sensitive nature of addressing these issues. Participant responses will reflect making connections between climate change, the food system, and other interconnections. Participants will have a vision for how they would like to proceed with addressing these issues clearly expressed through their responses, and their responses will show that they allowed the diversity of perspectives and experiences in the room to influence their thoughts, as well as are open to collaboration.

The approach will be to bring diverse stakeholders together and conduct interviews and hold focus groups with them in a public engaged process with interviews and focus groups. In the focus groups, they would have a chance to hear from one another, and build on collaborative understanding. This process would bring together issue leaders with one-on-one interviews and wrap up with focus groups. The focus groups take those themes further to figure out what people would want to see, not only regarding the content of the issues of the food system and climate, but also the process.

Chapter 3: Methodology

Introduction

The purpose of this research is to bring together diverse stakeholders to establish common ground around the issue of climate change and its impacts on the local food system and facilitate systems thinking amongst participants to generate and co-create dialogue that addresses which potential leverage points they believe are most critical to address and identifying next steps for community climate change mitigation planning. To better understand the perspectives on what a resilient food system looks like and climate change and its impacts on the sustainability of the local food system in our region from the lens of food systems practitioners and municipality stakeholders who perform their work in the New River Valley region of Virginia, we will see an increase in climate change mitigation planning in the region.

The outcome of this research is two-fold: 1) to explore the perspectives and experiences of food system and municipality stakeholders in the region around climate change and its impact on the food system, and 2) bring together these perspectives and voices to identify potential leverage points and avenues of cooperation to address climate change mitigation in the local food system. We are also interested in producing a report and possible presentations to highlight these findings. The risks associated with participating in this study are minimal. They include potential emotional discomfort during the interviews or focus groups if the topic of the conversation is about food system issues, such as food insecurity in the region. However, steps will be taken to mitigate these potential risks. The project team will especially minimize any potential risks by giving participants the option to opt out of any questions or participation at any point. This qualitative study will include 20-30 semi-structured appreciative inquiry interviews and 2 focus groups of adult food system practitioners and municipality stakeholders in the New River Valley region of Southwestern Virginia to describe their perspectives, knowledge, and visions for a more vibrant future as practitioners addressing food systems change work and the impacts of climate change on the local food system. We will conduct a line-by-line analysis of the interview transcripts. Thus, audio-recordings are necessary. Transcripts from the audio-recordings will be coded and used to identify themes through a line-by-line reading and coding process. Pseudonyms will be assigned to participants.

Philosophical Stance

Understanding paradigms is crucial for researchers, since they impact how research is designed, conducted, and presented. The type of relationship formed between researchers and participants also depends on the guiding paradigm. Although different paradigms share some methodology, their methodological differences have significant implications (Bailey, 2007).

I will approach this work through a philosophical stance utilizing the critical constructivism paradigm, which posits that the world is noble through interrelationships and is critical of power dynamics. Critical constructivism is an extension of constructivism, which states that nothing has a neutral or objective perspective. When constructivism is merged with critical epistemology, criticality is encouraged in the research process. Critical constructivism argues that knowledge is a subjective interpretation between people and factors such as context, time, and culture all impact the construction of knowledge (Critical, 2014). The ontology, or nature of reality, within the critical constructivist paradigm is questioning how social and historic dynamics impact and influence an entity of inquiry. The epistemology, or the way knowledge is constructed, within the critical constructivist paradigm explores how the foundations of knowledge of a particular context frame an entity of inquiry. Critical constructivism suggests that our perspectives of the world are constructed by political, cultural, economic, social, historical, and other contexts, and it encourages creating dialogue concerned with reaching mutual understanding. In critical constructivism, knowledge is co-constructed with participants, aligning with my participatory approach. (Kincheloe, 2005).

Critical paradigms are aimed at empowering people in a setting and driving meaningful social change. Researchers following this approach focus on understanding and challenging how groups with more power oppress groups with less power. Researchers guided by a critical philosophical stance adopt an interpretive ontological position, recognizing that there is no single objective reality. They believe that social reality is shaped by historical, social, political, cultural, economic, and other factors. Epistemologically, they acknowledge that researchers' values influence their findings, and values are openly communicated in their work and to participants. Methodologically, critical researchers take a macro approach, considering factors beyond individuals, such as oppressive policies, laws, and distribution of resources such as funding. They emphasize analyzing negative effects of racism, gender inequality, capitalism, imperialism, and unequal power relationships. Different subsets of the critical paradigm focus on specific critical stances, like feminism and Marxism (Bailey, 2007).

Critical constructivism is heavily influenced by the work of Joe Kincheloe, and Kincheloe’s work was based on the idea of critical pedagogy from Paulo Freire (Freire, 2000). From these influences, critical constructivism promotes increased social consciousness and helps participants to develop greater consciousness and freedom in their thinking around connecting knowledge to power, analyzing authoritarian tendencies or dynamics. Following this expansion of consciousness, people are intrinsically motivated to take productive actions with the intent for positive change. Critical constructivism analyzes the relationship between knowledge and power, highlighting that certain groups and institutions have greater privilege and power, leading them to be regarded as proprietors of knowledge. This knowledge construction from dominant groups maintains predominant status through undermining and discrediting alternative knowledge constructions (Critical, 2014; Bentley et al., 2007). A critical constructivist approach attempts to dismantle the dominant practices and knowledge within research that are implicit in oppression of marginalized groups. Critical constructivism searches for new ways of imagining and thinking and brings forward suppressed knowledge—simultaneously privileged assumptions embedded in existing knowledge are questioned and examined critically (Kincheloe, 2005).

Qualitative Research Methods

Qualitative research is a method used to gain an in-depth understanding of human behavior, experiences, and phenomena from a subjective perspective. It relies on non-numerical data, such as interviews, observations, and focus groups to explore complex social processes, attitudes, beliefs, and the meanings people attach to their experiences. Researchers immerse themselves in the context that is being studied, analyzing data thematically to identify patterns and insights. Although qualitative research provides valuable depth and context, its findings may not be very generalizable due to smaller sample sizes. It is widely used in social sciences and other disciplines to explore complex social issues (Bailey, 2007). The value of qualitative research lies in the fact that, “Qualitative research methods are valuable in providing rich descriptions of complex phenomena; tracking unique or unexpected events; illuminating the experience and interpretation of events by actors with widely differing stakes and roles;

giving voice to those whose views are rarely heard; conducting initial explorations to develop theories and to generate and even test hypotheses; and moving toward explanations" (Sofaer, 1999, p. 1101). This study will involve diverse stakeholders from a variety of food systems and municipal roles and backgrounds, and qualitative research is well suited to highlight and synthesize the experiences, voices, and ideas of these participants regarding the topics of climate change and the food system.

Qualitative research often relies on in-depth interviewing or discussions with participants and requires both the researcher and the participant to have a willingness to engage in deep conversation around the topic of interest. A successful researcher relationship in qualitative research entails, "respect, interest, attention, and good manners" among other qualities (Marshall & Rossman, p. 148). While systematic procedures and ethical guidelines are crucial to any form of research, flexibility is also needed to address unpredictable factors when conducting qualitative research. This form of research requires spending a considerable amount of time with participants during data collection and reading textual data such as transcripts numerous times during the analysis phase. To analyze the extensive data collected, researchers use coding to organize the information and remove any irrelevant aspects unrelated to the research questions. During the analysis, qualitative researchers identify and examine themes in the text, instead of the statistical analysis used in quantitative research. The results of this process yield patterns and detailed descriptions. The findings are then explained and interpreted using relevant theory (Bailey, 2007).

Methodology and Study Design

This study includes conducting semi-structured interviews and focus groups with adults. Participants for this study are food systems and municipality level community stakeholders. Following the project's community-based approach, community stakeholders with the Sustainability Department for the Town of Blacksburg have already identified this research project as a need. The following details will outline participants, recruitment, data collection, and analysis.

To invite stakeholders to participate and proceed with the process, I sent a recruitment email, which can be reviewed in Appendix A, to the community stakeholders. The consent form, found in Appendix B, was sent via email at least 48 hours in advance of any scheduled interview or focus group. The research team members were available to answer any questions via email, phone, or Zoom call at the time of the interview or focus group. Once the community stakeholder voluntarily submitted a consent form to the researcher, the interviews and focus groups were scheduled. Interview location options included either in-person or electronically through a platform such as Zoom. The location was the participant's choice, such as their place of work or home. The option for an office to be made available on Virginia Tech's campus was available to maximize participant comfort. For the focus groups, I utilized a neutral and easily accessible public space, which was the Blacksburg Public Library.

The interviews addressed the individual participants' perspectives, which were broken down into themes and then connected to other stakeholders' perspectives in the focus groups. Interviews were audio recorded and transcribed. Transcripts and recordings of the interview remained confidential, and all identities were kept confidential. I utilized an interview guide that includes a pool of questions for the semi-structured interviews, which are listed in Appendix C. I also utilized a focus group facilitation guide for the focus group gallery walk and discussion based on the themes identified from the semi-structured interviews. The gallery walk and focus group discussion layout can be found in Appendix D.

Audio recordings were necessary in order to pull out quotes from study participants and served as a basis for accuracy of the themes used for discussion in the focus groups. Additionally, I utilized the flipcharts that participants generated ideas on together—photos of these charts can be found in Appendix E. Transcripts from the audio-recordings were coded by themes, which are found in the codebook in Appendix F. The study data will be retained for a minimum of 3 years before being deleted from my files.

The community partner and key informant for this project has requested a public-facing report detailing findings at the completion of this study, as well as a public forum to discuss the report that will be open to anyone in the community. I will utilize the report and a public forum to engage the community in discussing the key themes and ideas identified during the project, as well as create a space where individuals can share their ideas around next steps in the ongoing local climate change adaptation planning process. The public report will also be shared with study participants. Participants will not receive a direct copy of interview transcript materials or focus group notes, only post-analyzed data in the form of the public report.

Pseudonyms have been assigned to any individual interview and focus group participants. Pseudonyms, as an ID/code, have been used for all transcripts in storing and analyzing the data. The research team has access to the audio files, transcripts, and focus group notes, which are stored in a Google Drive, a Virginia Tech secured and managed site. Each device used in the project to transcribe the data (computer) was either a Virginia Tech secured and managed device or a personal laptop device that meets Virginia Tech’s security requirements for low-risk data.

Research participants were able to discontinue at any time from the interview or focus groups or choose not to answer questions as they see fit. The research team members have skills and practice in rapport with human subjects and emphasized this rapport as part of the semi-structured interview process and focus groups. It was also made clear during the interview that participants could discontinue at any time. I did not ask questions about private or sensitive issues, which would not be necessary for the research.

Informed consent forms were sent out prior to the interviews and focus groups so participants were fully informed of what participation entails before the interviews and focus groups occurred. The informed consent form was also reviewed verbally prior to the interviews and focus groups by the researcher. Consent occurred once the community stakeholder voluntarily submitted a signed consent form to the researcher and verbally agreed to conduct the research with the researcher. In the case of a Zoom call, I asked at the beginning of the interview if the person has read the consent form, understands it, and/or has questions. Then, I asked the person if they verbally consent and had them sign and submit the consent form electronically through email.

The interview followed a semi-structured script. A prepared statement was read at the beginning of each interview to inform participants that the sessions were being audio recorded and written consent forms were collected. Each semi-structured interview lasted around 60 minutes depending on the natural ebb and flow of the conversation and how much the participant chose to share. Each focus group will last no more than 90 minutes and identities within the notes from the focus groups will remain confidential. I did not intend to recruit non-English speaking subjects. I anticipated successful recruitment of at least 15 participants.

All members of the research team completed the IRB research with human subjects training. The intended approach was to bring diverse stakeholders together to conduct interviews and hold focus groups in a public engaged process. In the focus groups, they would have a chance to hear from one another, and build on collaborative understanding. This process aimed to bring together issue leaders. The focus groups were intended to figure out what people would want to see happen and how they would like to see it happen.

I planned to utilize Stroh's systemic change process as the facilitator to align diverse stakeholders around a shared understanding of why a complex social problem such as climate change and its impact on the food system persists and identify potential leverage points that might improve system-wide performance in sustainable ways. I believed this approach could help the stakeholders think about how we might improve the whole system instead of just their individual parts in it, as well as identify areas of potential intervention that can be used for planning efforts to address the issues of climate change on the food system systemically.

While the focus groups touch on the goals of several of Stroh's steps, my primary focus was designed to focus on stage 1 of Stroh's process, particularly around engaging key stakeholders, creating a shared initial picture of where they are now and people's vision for the future, and building the capacity to collaborate. Building a foundation for change involves establishing common ground in terms of what the stakeholders hope to achieve and where they think they are now. As the facilitator, I chose this process to help participants build capacity for systems thinking with a focus on collaboration.

Case Studies

A case study can be defined as, "A social science research method, generally used to investigate a contemporary phenomenon in depth and in its real-world context" (Yin & Campbell, 2018, p. 280). The case within a case study is, "Usually the main focus of inquiry in a case study—a concrete entity (e.g., a person or group, organization, community, program, process, policy, practice, or institution, or events such as decisions)" (Yin & Campbell, 2018, p.

280). The case within this study is the community of the New River Valley, as it serves as the main focus of inquiry regarding climate transformation planning through a food systems lens.

Case studies are popular in qualitative research because they focus explicitly on context and dynamic interactions, often spanning over time. While some critics challenge the value of case studies as a qualitative genre, many methodologists have defended their importance. Despite variations in definitions, the central aspect of case studies is recognized as contextualized deep understanding. They prioritize intensity and depth of exploration, along with analyzing the interaction between the case and its context. Defining the unit of analysis and setting boundaries around the case are essential steps, especially when multiple cases are available for study. Researchers should provide rationales for their selection criteria based on the study's purpose and intended use, including factors like the researcher's familiarity with the case and its intrinsic significance (Marshall & Rossman, 2021). Part of the rationale for my choice in the New River Valley as the case for this study lies in my familiarity with and relationship to the case, serving as a researcher who has also been a resident of the community for 13 years.

In qualitative inquiry, researchers don't merely identify and isolate cases but actively reconstruct them. The critical and postmodern trends in qualitative research, characterized by skepticism toward “master narratives” and “grand theories,” have shifted the focus from establishing generalizations to embracing “phronesis”—practical, contextualized knowledge. This emphasis on practical wisdom and common sense has led to a resurgence of case study research as a valuable means to construct responsive and relevant practical knowledge (Marshall & Rossman, 2021, p. 24).

Interviews

Interviews for a case study can be defined as, “Collecting responses (verbal and nonverbal) from a case study participant; case study interviews are usually conversational in nature and guided by the researcher’s mental agenda, as the interview questions do not follow the exact same verbalization with every participant interviewed” (Yin & Campbell, 2018, p. 282). The interviews for this study are semi structured in nature to follow the conversational flow recommended for case studies. Semi structured interviews are scripted in that they provide specific questions, but also some flexibility in the sequence of questions. “Semi structured interviewing allows a systemic and iterative gathering of data where questions are arranged in a protocol that evokes rich data but is also focused for efficient data analysis” (Marshall & Rossman, p. 150). Interviews also have the benefit of immediate clarification or follow-up if needed. Interviews can capture the nuance and depth of participant thoughts and experiences and allow themes and patterns to emerge naturally through conversation.

Focus Groups

Focus groups are most often comprised of 7 to 10 people who share certain characteristics related to the research questions. Focus group participants in this study are a mixture of municipality and food systems stakeholders, who all are impacted by or making impacts on the local food system. The role of the facilitator in the focus groups is to ask focused questions to guide a discussion and encourage a diverse range of opinions and viewpoints. According to Marshall and Rossman, “this method assumes that an individual’s attitudes and beliefs are socially constructed: They do not form in a vacuum” (Marshall & Rossman, 2016, p. 154). Participants listen to others’ opinions as they form their own understandings. The facilitator should encourage the expression of participant views through creating a supportive, safe, and welcoming environment for open discussion to take place.

Criteria for Participant Selection

All study interview participants are food system or municipal leader stakeholders over the age of 18 residing in the New River Valley region of Virginia. Gender, health status, race, and ethnicity are not considered in inclusion criteria. The screening for eligibility of all participants will be led by Kasey Owen and Dr. Kim Niewolny. Food system and municipality stakeholders were identified with input from community partner, Carol Davis, the Sustainability Manager for the Town of Blacksburg.

To be considered for this study, potential participants must play some role in the Montgomery County food system as organizers, educators, or community-based advocates participating in food production, food systems development, local food marketing and distribution, food aid, food systems planning and community development, food security, and/or poverty relief, and/or be identified as municipality stakeholders such as paid planning staff or elected officials who impact or work in connection with the food system. Sample size was designed to be 20 to 30 adults in the region, as determined by community partner recommendations.

Data Analysis

The data analysis process occurred with the data collection process. I generated codes from the interviews and focus groups by grounding my data in existing theory. After I transcribed and edited the interviews, I began coding the transcripts, or pulling concepts and themes from the data. My process entailed reading through each individual interview, then breaking the transcript down to identify major themes, meaning related to my research questions, and other content in my literature review. I took notes and organized or grouped related topics into categories. I then abbreviated my topics into codes that comprise the codebook and used ATLAS.ti software to label excerpts of text within the transcripts with their matching code. After coding all of the transcripts, I analyzed the codes for the most pressing themes, which were used to guide the focus groups. Immediately after each focus group, I took notes on my overall impressions, as well as key insights from the focus groups. The focus group audio recordings were transcribed and coded in the same way the interview recordings were. The compilation of these themes and findings will be compiled into a public-friendly report after the full completion of this project.

A Priori Propositions

Construct	**Supporting Literature**	**Research Questions**	**Method**
Systems Thinking and Stroh’s Systemic Change Process	Meadows, D. H., & Wright, D. (2015). *Thinking in systems: a primer.* Chelsea Green Publishing. Stroh, D. P. (2015). *Systems thinking for social change: A practical guide to solving complex problems, avoiding unintended consequences, and achieving lasting results.* Chelsea Green Publishing.	How do local municipality stakeholders understand climate change and its impacts on the food system?	Stakeholder interviews and focus groups Israel, B. A., Eng, E., Schulz, A. J., & Parker, E. A. (Eds.). (2013). *Methods for Community-Based Participatory Research for Health* (2nd ed.). Jossey-Bass. Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research.* SAGE.
Systems Thinking and Stroh’s Systemic Change Process	Meadows, D. H., & Wright, D. (2015). *Thinking in systems: a primer.* Chelsea Green Publishing. Stroh, D. P. (2015). *Systems thinking for social change: A*	How do NRV food system stakeholders understand climate change and its impacts on the sustainability of the local food system in our region?	Stakeholder interviews and focus groups Israel, B. A., Eng, E., Schulz, A. J., & Parker, E. A. (Eds.). (2013). *Methods for Community-Based*

	practical guide to solving complex problems, avoiding unintended consequences, and achieving lasting results. Chelsea Green Publishing.		*Participatory Research for Health* (2nd ed.). Jossey-Bass. Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research.* SAGE.
Systems Thinking and Stroh's Systemic Change Process	Meadows, D. H., & Wright, D. (2015). *Thinking in systems: a primer.* Chelsea Green Publishing. Stroh, D. P. (2015). *Systems thinking for social change: A practical guide to solving complex problems, avoiding unintended consequences, and achieving lasting results.* Chelsea Green Publishing.	What are the potential leverage points, or most critical places to intervene, in our current local food system to address climate change transformation in the New River Valley?	Stakeholder interviews and focus groups Israel, B. A., Eng, E., Schulz, A. J., & Parker, E. A. (Eds.). (2013). *Methods for Community-Based Participatory Research for Health* (2nd ed.). Jossey-Bass. Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research.* SAGE.

Reflexivity Statement

I, as the researcher, will be primarily responsible for data collection. While I will attempt to mitigate bias, my own personal experiences, worldviews, and social positioning could influence this study. I identify as a white woman from a lower-middle class background. I grew up in rural central Virginia, just a couple of hours east of the New River Valley. I have been a resident of the New River Valley since 2010, when I moved to Blacksburg for my undergraduate studies at Virginia Tech. My roles in the local food system have been varied and range from a consumer who has utilized local food pantry services to make ends meet, to capacity-building while serving as an AmeriCorps VISTA working to reduce food waste and improve food access in the New River Valley, to serving in educational and supportive capacities with food systems work at Virginia Tech, and many other experiences in between.

When people ask me where "home" is, I respond with the New River Valley. I have spent more of my adult life in the New River Valley than anywhere else and feel most connected to the community that I find here in Southwestern Virginia. I have lived in several locations in Blacksburg, Pembroke, Elliston, and Shawsville within the New River Valley and have interacted with a diverse range of friends and neighbors in my community. I find my position as a long-term resident of the New River Valley to be an advantage to working with local food systems stakeholders and understanding some of the assets, challenges, and references that participants may describe. My motivation to pursue this project is in part tied to my desire to give back to a community that has given so much to me, and a desire for a stronger, more resilient food system in the New River Valley.

I hope that the sincerity in my intentions will benefit my relationships and acceptance with participants, as I endeavor to bring community members together to generate collective visioning and action, wherein a sense of trust is crucially important. There are also aspects of my identity that I worry may be disadvantageous to this project. There is an inherent structural power differential that comes with being a representative of Virginia Tech, as well as the associations, both positive and negative, with the university. While embedded in the local food system, I do not have the same lived experiences as the participants, such as farmers or elected officials. I want to take extra care not to misrepresent participants or their experiences for this study due to my own biases.

Being an outsider to the Appalachian community, I recognize that my perspectives and experiences may differ from that of the locals and that I can never truly put myself in their shoes. I do not share the same lived experiences, cultural background, or historical context. This disparity could lead to misunderstandings or the unintentional perpetuation of stereotypes. To address this, I will approach this research with humility and an eagerness to learn from the community's residents, recognizing them as experts on their own experiences and challenges.

The Appalachian region has a long history of resource extraction, where external entities have exploited its natural resources and human capital for economic gain, often leaving behind environmental degradation and socio-economic disparities. It is crucial to acknowledge this historical context and the potential for research to replicate extractive practices of any scale. As a researcher, I must be mindful of not contributing to this pattern of extraction, where knowledge and experiences are taken from the community without meaningful reciprocity.

To ensure a non-extractive approach, I am committed to a collaborative and participatory research process. This involves engaging my community partner as an equal in the study design and working towards the outcomes that she seeks to benefit climate transformation planning for the local food system and community. It is important to co-create research questions that align with my community partner’s priorities and interests. Furthermore, I will prioritize informed consent, transparency, and reciprocity throughout the research process with participants. This means being clear about the research objectives, potential benefits, and risks associated with participation. I want this study to benefit the community and am committed to compiling a public-friendly report and other ways of sharing the findings that are useful to the community. I would like this report to center the voices and experiences of the participants, not mine.

Understanding the potential for power imbalances, I will actively work to bridge the researcher-participant divide. This will involve actively listening to participants' voices, engaging in reflexive dialogue with them, and being open to critical feedback. I will be conscious of my language and actions, aiming to create a safe and welcoming environment where participants feel comfortable sharing their experiences authentically. Throughout every phase of this study, I will engage in continuous self-reflection to examine how my own biases, assumptions, and privileges may shape the research process. By acknowledging these influences, I can strive to minimize their impact on data interpretation and maintain the study's integrity. My goal is to conduct research that respects the history of the region while contributing positive change without perpetuating harm or extraction.

Limitations

There are some limitations in this study design. Interviewing has limitations in that there must be trust between the interviewer and interviewee for the participant to feel comfortable and willing to share their thoughts and experiences openly. While a lot of data can be collected quickly through interviewing, it is time-consuming to analyze all of this data. With focus groups, there are potential issues around power dynamics within a group setting. Staying on track with time and topics can be challenging for a facilitator, since the interviewer has less control over a group interview than individual interview dynamics. The data in focus groups can be more difficult to analyze, due to the need for context or room arrangements that accurately capture the nuances of participant interactions. The study design also lends itself to some biases in who is willing and able to show up and participate. There is no compensation or incentive to participate in this study apart from intrinsic motivation and interest to do so. This may lead to the self-selection of participants who are already interested in these topics or participants who share similar values or ideals, which may skew the findings, or rather lend findings that represent only to a select group within the population, rather than more diversely representing perspectives across the community. Without financial compensation, some participants may be able to participate in the interviews but not the focus group component of this project. The interviews include virtual meeting options or for the interviewer to come to the participants, whereas the focus groups require the participants to travel to the focus group site to take part. This requires time away from work and the cost of gas to get there and back. Participants who are already on the clock for attending, such as municipality leaders, would be more easily able to attend focus groups compared to farmers who would have to take time away from their work to take part.

Chapter 4: Findings

Introduction

In this study there were a total of 23 participants. I conducted 21 semi-structured interviews and facilitated 2 focus groups as a way to advance climate change transformation planning in Montgomery County, Virginia and better understand how communities can plan for climate transformation at a local level. More specifically, my goal was to better understand how both food system and municipality stakeholders are thinking about what a resilient food system looks like, the impacts of climate change on the sustainability of the local food system in our region, and potential leverage points they believe are most critical to address these issues. I partnered with Carol Davis, the Sustainability Manager for the Town of Blacksburg for this project. Carol is committed to a participatory approach and oriented towards sustainable development in the space of local climate transformation planning.

For the interviews, participants were interviewed individually, with the exception of one interview capturing a married couple who farm together. For one of the focus groups, the male participant from this same couple chose to bring his adult daughter in place of his wife who was unable to attend that day. The remainder of the study participants chose to show up to the focus groups as individuals. Participants were only asked to participate in one focus group each, but two focus groups identical in design were held to better accommodate participant availability. For the interviews, n=21, the composition of participants included 12 food systems stakeholders, and 9 municipal leader stakeholders. Focus group one, n=8, was attended by 3 food system stakeholders and 5 municipal leader stakeholders. Focus group two, n=5, was attended by 2 food system stakeholders and 3 municipal leader stakeholders.

Below you will find excerpts of text pulled from the recording transcriptions of the full-length participant interviews and focus group dialogues. The quotes have been woven together to better connect ideas across conversations into the themes that comprise the findings of this study and framed my interpretation of the qualitative data. The themes represented here are those that arose as either most significant to understanding the context of the study or the most relevant to the questions that drove the data analysis.

Through this case study, I was able to gain valuable insight into the research questions that drove this study:

- How do local municipality stakeholders understand climate change and its impacts on the food system?
- How do NRV food system stakeholders (e.g., farmers, food security professionals, food system organizations) understand climate change and its impacts on the sustainability of the local food system in our region?
- What are the potential leverage points, or most critical places to intervene, in our current local food system to address climate change transformation in the New River Valley?

The following commentary of study participants reveals how diverse food system and municipal leader stakeholders are understanding climate change and its impacts on the sustainability of the local food system here in the New River Valley of Virginia, as well as what participants believe are the most critical places to intervene to address climate change transformation from a food systems lens. Using the lens outlined in my theoretical framework and informed by my literature review and my onto-epistemological position outlined in Chapter Three, study findings are rooted in the domains of *climate change defined, climate impacts on* *the food system, sustainable development and climate change, potential leverage points for intervention,* and *Stroh's creative tension gap.* Referring to the codebook in Appendix F, we can see that *climate change defined, potential leverage points for intervention,* and *Stroh's creative tension gap* are family codes rooted in the a priori table constructs of systems thinking and Stroh's systemic change process, while the other codes are emergent and based in the constructs of climate change and sustainability.

Anonymized Introduction to Study Participants

Stakeholders invited to participate in this study included both food systems stakeholders who are impacted by and/or have an impact on the food system for Montgomery County, as well as municipal leader stakeholders who are impacted by and/or have an impact on the food system for Montgomery County. Food system stakeholder recruitment invitations were sent to farmers (both those who participate at the Blacksburg and Christiansburg farmers markets as vendors, as well as some who do not participate at the farmers markets), food security advocates, representatives from hunger relief organizations, Montgomery County Extension agents, nonprofits focused on bolstering the local food system, community garden management, and farmers market managers.

Municipality stakeholder recruitment invitations were sent to the members of Montgomery County Board of Supervisors, Montgomery County planning staff, Montgomery County Sustainability, Town of Blacksburg Sustainability, Mayor and Vice Mayor for the Town of Blacksburg, Blacksburg Town Council members, Town of Blacksburg Planning Department, Town of Blacksburg Office of Housing and Community Wellbeing, Mayor and Vice Mayor for the Town of Christiansburg, Christiansburg Town Council members, Christiansburg planning staff, Christiansburg Planning Commission, and the New River Valley Regional Commission.

Participants will be organized into two groups within each stakeholder type. Food system stakeholders will be sorted into either food producers or organizations, nonprofits, and educators that work within the food systems sector. Municipality stakeholders will be sorted into those with a paid planning role or elected officials. Participants have been assigned a pseudonym which will be used for their quote excerpt attributions in this analysis.

Food producers	Food system organizations/educators	Paid planning roles	Elected officials
Coriander	Alfredo	Hazel	Kobe
Basil	Harissa	Rosemary	Julienne
Malina	Miel	Sherry	Rye
Olive	Pomona	Ginger	Sage
Juniper	Amandine		Colby
Nori	Brie		
Bran	Clementine		

Climate Change Defined

The first major theme coded for was how participants were understanding or defining climate change. The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as change that can be attributed "directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (United Nations, 2022). If we look at geological records from tree rings, glacial ice cores, and ocean sediment, we know that the world has warmed before. However, the earth has never warmed this quickly, and it is in large part due to human activities that have contributed unnatural levels of greenhouse gas emissions, which the natural carbon cycle is not equipped to handle. People in most parts of the world, particularly people who are in the Global South or poorer, as well as BIPOC people in the Global North, are already seeing and feeling the impacts of climate change. It is not too late for us to limit global temperature rise to below 2 degrees Celsius if we take drastic action now. All countries in the world and all sectors of society need to act together and act quickly, as eventually everyone will be impacted by the effects of climate change. We would need to implement aggressive, urgent, and long-term greenhouse gas emissions reductions in all sectors globally during this decade if we want to keep temperatures to 1.5 degrees Celsius above pre-industrial levels, which would help minimize the worst impacts of climate change on the livability of people and other living beings. Climate change is an urgent global issue, as we need to bring emissions levels down now, and essentially cut them in half by 2030 if we want to achieve this goal. Climate change is already impacting every region of Earth in a multitude of ways, whether humans have noticed it or not (IPCC, 2022; United in Science, 2022; United Nations, 2021). This theme was further broken down into the following codes: *attributed to human activity, attributed to natural climate variability, urgent, not urgent, too late to change, not too late to change, will impact our community,* and *will not impact our community.*

Attributed to Human Activity

Scientific research indicates that the increased concentration of greenhouse gasses in the atmosphere is primarily due to human activities. These activities include the burning of fossil fuels, deforestation, industrial processes, and agriculture, which release these greenhouse gasses into the atmosphere. More greenhouse gasses in the atmosphere leads to an amplified greenhouse effect and global warming. Human activities have significantly contributed to the accelerated pace of climate change observed over the past century and beyond (IPCC, 2022; National Academy of Sciences, 2020; United in Science, 2022). This category of findings refers to the understanding that human actions, particularly the release of greenhouse gasses and other anthropogenic activities, are major drivers of observed changes in Earth's climate systems. Participants acknowledged an understanding of climate change as related to human activity, naming fossil fuel consumption, changes in human behavior since the industrial revolution, or general human interference as the contributors. Clementine shared, “I would just see it as gradual changes to the entire ecosystem and climate caused by a lot of things, but mainly human interference.” Colby stated, “I think of climate change, I think of the changes that are happening to our environment and our climate that are brought out by humanity.” Other participants echoed these sentiments:

> I mean, since the 1880s and industrial revolution we have been one of the worst. We've been the worst and you know, burning fossil fuels and vapor that encompasses the earth that they're talking about. I would hope that there would be some kind of a breakthrough, do we need to go less towards fossil fuels and more toward, you know, the sun and wind and, and you know, of course you can't produce more water but you know, if you can, if you go more towards solar, and wind as far as energy production, then there's a lot less demand on those fossil fuels. -Rye

> I guess initially, it would be the change in climate that is occurring, that has been observed and is occurring around the world as a result of our use of fossil fuels and other activities, that's adding CO2 and methane and other greenhouse gasses to the atmosphere and raising global temperature and causing all kinds of havoc. -Alfredo

> Yeah, I would say, you know, it's the rising global temperature. It's largely affected by human activity, whether that'd be our industry, greenhouse gas emissions, pollution, anything like that. But I do believe that it's a human driven force. -Bran

Modern agriculture and the transportation of food involved in global food systems were named as other major contributors of human induced climate change:

> I feel like agriculture…is a big part of climate change, I mean agriculture produces nonpoint source pollution, I mean it's very high up on the... I don't know what it is. Not only you know from nitrogen leaching, but you know, we use a lot of fossil fuels, just in general. -Coriander

> So, I remember when I was writing about that article, I learned a lot about our local food systems, and just how much of our food comes from other locations all around the world, as opposed to even though there's lots of resources locally that we can use. And the fact that we get a lot of our food from other places is probably exasperating climate change because of using fossil fuels for the transportation of those food items. -Colby

Though most participants either attributed climate change to nature or human activity, some acknowledged the duality of both natural causes of climate changes in addition to human activity exacerbating climate change. One mentioned the role of humans as disrupting natural relationships:

> Changes in weather patterns and temperature ranges that are happening both naturally over time and as a result of human activities. I don't know how it makes me feel, I think it is just a reality that we all exist with. And it is a little bit concerning, I guess, the realities and how quickly those changes are happening. And like the volatility it's bringing to a lot of landscapes. But yeah, I mean, it's just how it is. I'm just like, well, this is the world we live in. And it's out there. It's happening. We're a part of it. -Harissa

> I think about the different ways that humans mess with the climate through atmospheric releases. I know, a lot of people will argue that climate change is part of a natural cycle, like, there's always gonna be changes. And I agree with that. And there are always going to be new changes. But I also think of the way that our activities as humans have had negative impacts on our climate. -Miel

> When I think about climate change a lot, we're doing planning work, we're asked to vision out 5 or 10 years to write these plans and this idea about climate change just filters in through a lot of that thinking and that process, and I've come to realize that I relate to climate change in a way that that is just a recognition of something that's always been happening. And we're at this cultural shifting point where we're all collectively starting to recognize our human impacts on the environment. And the extremes that we're seeing are in direct response to a lot of the ways we exist and the paradigm in which we exist, and I no longer think that it's something that's new and happening to us now. -Hazel

> I look at it from like, an environmental standpoint of things that like, you know, each thing is in symbiotic relationship with something else, and that relationship is being disrupted by human activity, you know, warming of the climate. -Bran

Others mentioned or questioned how human-caused impacts on climate change are intricately connected to our resources and wellbeing:

> Oh, I mean, I think when we think of climate change, I think of our effects on the climate and the world we live in and our environment and how our actions today are going to impact the actions tomorrow and our resources, resource availability. And I guess just like the overall health of not only the world as far as food systems and soil health and all of the interconnected environmental issues, but as well as our, the health of our communities, our businesses, I don't know that's just climate change is a holistic issue that is complex and reaching into everyone's lives in every part. -Pomona

> So, to me it, I start to think about sort of how the ways that you know, humans interact with the planet is kind of affecting climate in general. So, in what ways are manufacturing or the way that we live and work? How do those affect the world around us and that can be air quality, water quality, temperature, just all the things that come with, you know, what we've seen as sort of a change in climate over time? -Brie

Several participants acknowledged temporality, and how human behavior has contributed to exponential climate change in a shortened timescale as compared to natural climate cycles:

> When you read about civilizations that have been doing this for a long time, right? The Middle East used to be, you know, the fertile crescent. We turned it into a desert, China, same thing. Their breadbasket was turned into a desert. And so, in some ways, it's nothing new. But we just have so much more power and so much technology now that we're doing it so incredibly fast, it just feels like things are going to explode. And on such a scale. Now we're, how many billions of people, so it's like, in some ways, there's continuity in what we've been doing, and we have been destroying. But another way is, this is exponential. -Basil

> What comes to mind for me is while the climate of the Earth over geologic time has varied quite a bit, the current experience that we're having of climate change seems to be entirely anthropogenically created rather than some of the prior systems that had to do with, you know, angle of the, you know, the Earth and other types of sort of both external and external factors with this, this, this current phase of climate change that we're in the burning of fossil fuels has fundamentally altered our atmosphere in a way that is truly unprecedented, both in terms of scale of what's happening, but also the incredibly shortened timescale. -Ginger

Attributed to Natural Climate Variability

Natural climate variability has been a characteristic feature of Earth's history. Over geological timescales, the planet has experienced numerous climate shifts caused by natural processes including volcanic activity, changes in solar radiation, natural greenhouse gas emissions, ocean circulation changes, and variations in Earth's orbit. The current rate and scale of climate change are significantly accelerated by human activities, but climate change would still exist without human interference. (IPCC, 2022; National Academy of Sciences, 2020). This category of findings highlights participants' views of how natural variations influence the climate as opposed to emphasizing human activities as major drivers. Some participants related their understanding of climate change with scientific explanations that acknowledged only the natural process of climate change, without mention of any connection to human activity. One related the cause of climate change to increased CO_2, but do not explain where that increase comes from, only what it leads to:

> I definitely think of warming, you know, changing or general warming of the climate, as we move through time, and primarily, you know, I'm not a climate change denier. And so, you know, I understand that that warming is caused by increased CO_2 in the atmosphere, which is causing the greenhouse effect, which is warming our planet. In general, warmer temperatures also cause different and more extreme weather patterns. And I think that probably also means increased precipitation in a lot of areas, as the tropics that are warmer, have higher precipitation in general, unless it's a desert. So, when I think about climate change, I think of just a general warming and changing and more extreme weather. That's what I would say. -Nori

Another explained the scientific basis for climate change, as well as feelings of confusion and mixed information from the media about climate change in general. This participant did not mention any human-related factors in their understanding of climate change:

> It's basically a long-term shift in temperature and climate and weather patterns. And climate change is, I've read several articles, trying to prepare myself. But I think I've gotten more confused than anything else. Because some of the articles that I read just scare you to death. Yeah, the last article I read just almost debunked the whole theory. So, it had facts and figures and things that would make you think, you know, that they talked about the polar bears, and they're not in trouble, as everybody says they are. And they referenced the moose population in Minnesota over the years that it was dying out and their theory and I think they said they proved it that yeah, they had been dying out at one point, but they were all being killed by the wolves. -Rye

Not Too Late to Change

The IPCC stresses that taking urgent and ambitious climate action can still make a substantial difference in mitigating the worst consequences of climate change. Despite the seriousness of the current climate situation, effective and immediate efforts to reduce greenhouse gas emissions and build resilience remain crucial in limiting global warming and protecting our planet's future (IPCC, 2022). This category of findings refers to the belief that through deliberate action to mitigate greenhouse gas emissions and implement sustainable practices, humanity can still avert the most detrimental consequences of climate change and restore ecological balance.

Participants mentioned the concept of a narrative that plays out in our mainstream movies and culture, in which the future is bleak and destroyed, as if it is an inevitability. Bran captures this when stating, “The narrative is like, it's like all done. Why are we trying anymore? But we need hopeful action around us wanting to do something, and I think maybe that shuts people down.” Yet many participants combatted this fatalistic narrative with the idea that some circumstances are still able to be fixed, and while we have surpassed some thresholds or tipping points, every increment of climate change and warming makes a difference. They highlight how our actions now can change our trajectory:

> Every time you get a movie that's in the future, like the world is destroyed, and we're living on like a space station, or like there are no good depictions of the future of humanity. And I don't think that we're necessarily there yet. I think some things are irreversible, some things we cannot change, it's too late. But a lot of things are still fixable. So, I just think that there are enough. I honestly, in my lifetime, like the amount of people who've considered this important has changed massively. Like because it used to be around here…the majority of people thought that it was all bullshit. Just the amount of people, even within the last 20 years that have started to talk about this is huge. -Clementine

Participants referenced collaboration, collective recognition, and cooperative innovation as ways forward that give them hope that it is not too late to make meaningful change with our current climate crisis:

> How old will I be? I'll be 50 something. Okay. I think in ways, I think in ways we could get there. If we could just not be so extreme. Because some things are just out of spite. I mean, really, I wish for a climate sustainable world. Well, I would hope for more, I think collaboration, honestly, I think that's the only way we can really do it. And I think that also is like addressing the whole extreme, like if we could actually collaborate, I think we could get to a more sustainable world. -Pomona

> We're coming to this collective recognition. So, wherever you are, in that level of understanding, we're starting to recognize that it is, in fact, something that is also still

> within our control to change, to tip the scales the other direction. And so that gives me courage and, you know, a little bit of hope. -Hazel

> I think some of the challenges are rooted in bigger things like poverty. I think that, um, I think some of it's rooted in a system that we've created that is going to be hard to undo. I think that we, I believe in people and innovation of people, though, and I believe in the goodwill of people. I think that we can solve these problems, and it's going to mean we need to open doors to learn from other communities. -Amandine

Some participants recognized difficult truths, such as the fact that we have likely already gotten to a 1.5-degree Celsius increase with our human actions, or that some of the ideas generated in the discussions seemed lofty or idealistic. They still circled back to the idea that it’s not too late to at least reach a plateau in our global surface air temperature rise or to bring some of their ideas or changes to fruition:

> So, you know, I don't know, I would hope that we could at least reach a plateau as to where we are now at about, I think global warming has increased to maybe 1.5 degrees, or maybe that's the, that's the cap that they want. So, if we can contain it within that margin, we're at a status quo…I mean, we can do a lot of things. -Rye

> But I got so energized over on this last one kind of in envisioning, even though the ideas that were kind of preloaded on the wall and the things we were throwing out there seem like big and impossible and idealistic, and you know, all of those words, but I found myself thinking, getting into like, an activated space like, "but yeah, we could, we could do part of that." -Ginger

Urgent

Climate change is an urgent issue because it poses severe and escalating threats to the Earth’s ecosystems and human societies, with clear deadlines and parameters around how drastically and soon we need to act to avoid potentially irreversible consequences. Climate change is progressing rapidly and poses a critical threat to all life on our planet, requiring immediate action to address its causes and impacts (IPCC, 2022; United in Science, 2022; United Nations, 2021). Participants noted generational differences in views on the urgency or even reality of climate change, with younger generations feeling distress and a sense of obsessing over acting on climate change:

> And it's troubling and concerning. And definitely one of the issues that people my age have started obsessing over and the generation below us is obsessed over as well. The people above us, half of them still don't even believe that it is something that exists. So, I think it's important to do something. -Clementine

> Next, I read this offline about the like, 1.5 degrees by 2030. I don't have kids, my partner has kids but it's like, how disempowering is that you've got this end date and you're a child, and you're like, I have no agency or autonomy over these adult actions that are like, trickling down to things that I'm going to have to worry about when I'm their age. -Hazel

Others commented on climate impacts already happening outside of our community and expressed a sense of urgency in their motivation to act and avoid similar consequences, to be proactive rather than reactive:

> So, we gotta get our act together now before really that, you know, I mean, the shit is hitting the fan in other places, right? Over in Africa, these people have already been completely taken advantage of and they've been completely dispossessed, right. And what do you do about that? That's maybe a whole other question. But here, we actually have the ability, we still have enough infrastructure that we could be resilient. So yeah, we have to figure out our food web, we have to right here, we could do it, we have enough ecology still intact, we have enough water, the diversity of species we have, but not nearly enough is happening. -Basil

> So, I think big picture, what I heard is like, there are systems that are in place that feel very big and tractable, hard to move, and we're recognizing that, ultimately, we won't have a choice, we're going to have to dismantle some of these systems. And I guess the question is, what will it take? I think I would assume everyone in this room would like to see that happen proactively, and not wait for catastrophe. -Ginger

Participants expressed an awareness of imminent deadlines needed to mitigate severe climate consequences as driving a sense of urgency. Alfredo shared that, “By 2030 doesn't seem like very far away to me.” Kobe echoed the urgency of making changes now and how quickly time is passing:

> A report just came out, I think, a couple of weeks ago. That said, keeping it at one-and-a-half-degree change is almost going to be impossible if we don't really make some major changes between now and 2030, I think was the date, which is now less than seven years away. -Kobe

Ginger shared that, “It's going to be a really rough set of dynamic changes that that we're currently in and will only accelerate from here.” This highlights how stakeholders used phrases denoting a sense of stress or pressure around the time sensitivity of the climate crisis:

> And my reading of the political situation, particularly in this country, is that we're still not grown up about that, we have we have one party that seems dedicated to the proposition that none of that is true. Or even if they don't think about the veracity of the of, of what the science is telling us, then they either don't care, or they don't want to make the changes that would be necessary. They're not on board with that. And since so much of that party is dedicated to the representation of fossil fuel interests, of varying kinds. That's going to be hard for them to change. Their political fortunes are tied up with those same folks. And we're sort of in a stalemate. We're not moving fast enough. -Kobe
> So, I think it's great that you're doing this. This session, as well as this research, and you too, and hopefully, in our lifetime, we'll see a step change. But I'm a pessimist about this topic within a 20-year timeframe. But it doesn't mean we can’t make it better than it would be if we didn't do anything. So, we just need to get to work. -Sage

> But I would also say, I'm energized by this conversation, because ever since we did the climate vulnerability assessment, like a little part of my brain has been on fire about, I feel like I'm like, guys, it's kind of bad. -Ginger

There is also a tension between balancing the sense of urgency to act on the climate crisis with the important of taking the time required to build trust and relationships that are necessary for effective collaboration:

> And it's hard too, setting the space for collaboration requires a lot of trust and relationship building. And that takes time. And it's critical, yet we're still faced with all these critical issues that, you know, will have serious and are having serious impact on people today and in the future. And so, there's definitely a balance between urgency and moving forward and building the trust and relationships necessary to collaborate to move forward. -Amandine

Not Urgent

While the majority of climate scientists and the Intergovernmental Panel on Climate Change consider climate change an urgent global issue that requires immediate action to avoid severe consequences, not everyone views climate change as an urgent issue or one of the most urgent issues in their lives. This category of findings characterizes a perspective among participants that, while acknowledging the reality of climate change, does not view it as an imminent or pressing threat requiring immediate action. It also highlights a belief that there is sufficient time to address climate change gradually, without an immediate need for drastic measures, or that there are more urgent everyday issues that need to be dealt with. Consequently, some individuals may prioritize what they deem to be more urgent personal, economic, or social issues, leading climate change action to be deprioritized or placed on the backburner in the face of more immediate threats or needs.

For some participants in this study, dealing with climate change felt much bigger than anything they could handle or deal with, so they had decided they would not focus on it unless they had to. For example, Juniper shared that, “Change in climate. I accept that it is real. It is happening. Yeah. And I'd like to do something to help with it, but it's also over my head. It's bigger and needs bigger problem solvers. I don't, I don't think too hard about it because it's over my head.” Juniper also shared a sense of focusing on getting through each day rather than feeling a capacity to look ahead: “I'm trying to get through like today. You know, like, I don't think about climate change. I just go with what we have. And try it. I've got to admit, I'm very reactionary. I'm not exactly proactive.” Similarly, other participants expressed a desire to, or only having the capacity to, focus on more tangible, day to day operations or issues that felt more urgent to them:

> So, what can we do right now and just let it be imperfect and grow from there. And so, climate change feels like such a daunting issue. And it feels like there's not a lot that we as individuals can do, like I said earlier, aside from small, day to day changes. So, it feels like everything has to be reactive, it doesn't feel like there's much room to think of the big picture. It's like, okay, how's climate change going to affect me 30 years from now, when I don't even know where I'm gonna be 30 years from now? I don't know if I'll be working in this work for 30 years from now. Some of our folks will literally be candid and be like, I don't think I'll be alive 30 years from now, because like, they're elderly. And it's like, Okay, I just want to get the work done today to make sure people are fed, and to make sure that all my networks are good, and all my people are fed. Climate change is like the back of the mind, sometimes it feels like, what am I going to do about it, I just have to be reactive to the situation and go from there. It is more reactive, because proactive, to be

> proactive means to really, really make a difference means one, you have to have funding upfront, to make the changes that will address climate change in the future. And we just don't have that, and a lot of people don't have the either don't have the funding or don't, when they do have, funding don't want to put it towards proactive measures. -Miel

> And I think there are those, there are also a lot of people that have a lot of challenges in front of them. And this is not like pressing on them at the moment. So, they're not able to dedicate as much energy to it at the moment. And then I'm sure there are people that just don't actually think it's going to be a problem. -Amandine

> I don't think the priority is like, necessarily, like, climate friendly operations, really. And we're also just operating on a small enough scale where I feel like people, and maybe rightly so feel like that their individual choices don't have much of an impact on that. And so if you're like one person driving a van delivering meals, it's like, well, yeah, technically you are, like, exhibiting behaviors that like have an effect or are affected by climate change, but like, that's probably not something you're gonna consider when you're going to like fire up the van on any given day. So, I don't know how much climate is really, like, on the minds of like those types of practitioners. -Harissa

Will Impact Our Community

Climate change will impact all communities across the globe to varying degrees. This may look like intensifying extreme weather events, leading to more frequent and severe natural disasters. Additionally, rising sea levels and changing precipitation patterns will affect access to clean water and agricultural productivity, which can cause food and water scarcity. The health and well-being of many communities will also be at risk due to increased heat stress, the spread of diseases and pests among people, crops, and livestock, and disruptions to essential infrastructure (IPCC, 2022; United in Science, 2022; United Nations, 2021). The Blacksburg Climate Vulnerability Report identified increased temperatures, changes in precipitation patterns, impacts on agriculture, water resources, ecosystem and biodiversity concerns, community health impacts, and infrastructure vulnerabilities as factors in our region that may be impacted by climate change (Blacksburg Climate, 2020).

This category of findings refers to the understanding among participants that climate change poses a direct and identifiable threat to the New River Valley, and that we will face climate impacts to our food system and other aspects of community wellbeing. In addition to the notion of climate change as a direct threat, participants in this study also mentioned how our region is expected to fare better as a more climate optimal zone and what related positive and negative opportunities may arise from that. The implications they discussed included an increased growing season, increase in climate refugees, and potential threat from outside powers seeking to exploit our resources in the New River Valley when climate impacts become too destabilizing elsewhere:

> Well, I'm not profoundly knowledgeable. But you know, as I mentioned earlier, everything I've read says that Southern Appalachian Mountains are actually going to be greener and more fertile, maybe isn't quite the right word. And I'm not talking about the agronomy of our soils or anything, I'm just talking about how the climate will increase our growing season. So, in theory, we should be able to grow a lot more of our own food, but a lot of the exotic foods that we kind of like bananas, things that we are sort of used to eating may not be as practical for us to consume on a regular basis. It may be we need to start looking at more seasonal food consumption and looking closer to home to growing and producing our own food. -Julienne

> I was actually interested to see if you guys agree with this or not, but one thing I think is unique about it when thinking about it in a local context is that I think in some ways, it isn't going to be as bad here as it is in other places. I think that's part of the issue is like for the New River Valley it's like, we're going to get a lot of people who want to move here because it's not going to be as sweltering, we have like water and a whole bunch of resources here that make our area like a little more resilient. And it's not necessarily going to be as rough here. Probably. I don't know, nobody knows. So how are we gonna deal with that? -Alfredo

> This is incredibly fertile area, we could pretty much this is an area that we could actually provide our own food web there's enough variety, enough ecology, enough water here and everything that whatever you want to call it, the watershed, I don't know exactly how to define how big that area is, but rather compare that to, you know, Las Vegas or Phoenix or whatever, all these places out in dry areas that simply by where they are. They have to import everything in from the outside. And rather than there could be a case that you could import all the stuff from the outside and then begin to build fertility there. But that's not what they're doing. They're just using shipping and food and eating it and then taking their waste and dumping it. There's no cycling of nutrients. There's no ecology going on anywhere there. So, I think things are going to fall apart. And if we don't get these local food webs intact, we're going to be taken advantage of by those in power as always, whenever there's disruption, whenever there's unrest, whenever there's destability. Those who are in places where they can leverage their power are gonna do it. -Basil

Climate change is already impacting and changing what crops and varietals people are able to grow in many places in the world. The types of crops and how we grow them here will likely be impacted by the effects of climate change as well:

> Yeah, all the growers I know... I was on vacation last week. And I met some grape growers from California. 500 acres. So, some of the longer season varietals, they're like, "We can't grow that anymore because we're getting more frost and it's getting colder." Just the climate is all mixed up. They're going back to varieties that are more like a hybrid, but you get less money for it. They're more tolerant, but you can't sell it at the price that you could for the other varieties. So, they're taking a loss to grow something that it's not as desirable, but it's something you can predict the outcome better. We might be growing grapefruit here one day. I don't know. Avocados? Unfortunately, who knows what's gonna happen. We might just be growing things in the greenhouse. That would be sad. -Coriander

> But on a broad level, it feels like okay, that this has to be unprecedented, and if it's happening every single year, it feels like that's a sign of something that is definitely wrong and maybe that's climate change. So that obviously affects what people are able to produce. I think I'm a little nervous to see, like 20 years from now, what can grow in this region. And what the growing season is in this region, and how that's going to be affected. I'm nervous about our cycles, and what that looks like, right now we're in our wet season, winter is our wet season. And we really rely on having this wet season, right? What's that look like in the future? We don't know. And so that is a little bit scary. For a lot of people on the larger scale. -Miel

Long time residents of the region have taken notice shifts in temperature over time, weather events, and seasons that they attribute to climate change. Impacts on the community that were noted here primarily had to do with growing crops and impacts to the food system.

> And also, just massive groups of people being pushed out of their homes into other areas, so you get a lot of refugees of climate change. Again, I'm sure that it's affecting the food systems around here and in the United States. I just don't know of any examples off the top of my head. Where we are, might be a little less touched. I mean, I think obviously, like the lowlands, the places closest to the coasts are going to be affected more immediately. And yeah, there's just going to be general movement inwards. But I mean, I think even since I moved back here, the seasons are a lot less pronounced than they used to be when I was little like that was the thing I loved the most about this place, it is so obvious what season it is. And the transitions are really beautiful and slow. And now it seems we have hot and less hot and those are the seasons now. So yeah, definitely noticeable already. -Clementine

> But he's, he's really into, like looking at archival weather like the Roanoke and NRV, and one of the things that he's mentioned is that like, we've had these, you know, most of the warmest total years we have been recent, like since 2000. Like if you look at the majority of them were in the last 20 years, like of the top 10, like 8 of them were in the last 20 years or something like that. But one of the things he says it's interesting is that it's not like a lot of it is like higher nighttime temperatures. So, like in the summer, where we used to be really hot, and then really cold. But then like, I'll notice a lot of people will be like, oh, you know, this February is really warm. That's because of climate change, or whatever. But it's like, you can see all these, you know, going back into like, so I don't know what the specific, it seems like, it's really hard to attribute like specific things here to climate change. Although, I think people do that a lot. It definitely seems to be doing something. -Alfredo

> So, I think, you know, we certainly do some work related to the local food system, or sort of the food system, I think, in broader southwest Virginia. And so, we'll hear occasionally from some of our Community Garden partners, or farm community about just how temperature or storms or something might be influencing their ability to grow different crops, that in one way or another, are either sold or donated to folks in our community. So, we hear about those direct impacts on our local food system. -Brie

> Well, I have been able to tell just anecdotally, that it's getting hotter here in Virginia, in southwestern Virginia, you know, earlier springs, later summers, fruit trees are blooming earlier. And then if we get a cold snap, it's gonna kill all the fruit on them. Right now, we're worried about that. My wife works in Extension, so she's in contact with a lot of Extension agents up and down the corridor between say, Abington and Winchester. And so, you know, she's aware of some of the issues that are happening with the climate and the fruit growing, folks, as well as just crops in general, I mean, we're going to need more water, and we're gonna need maybe even to change what it is we're growing, as, as the Virginia climate gets warmer. I don't think we can stop that, from what I understand that is sort of already baked in. No pun intended. -Kobe

Generational responsibility and impacts are a consideration of climate change. As youth in our community become adults, climate change will influence how they make major life decisions, which may also impact the community:

> I mean, the most recent conversation I had was with my teenage son last night, who basically said, Mom, you're the last generation that won't be impacted by climate change. Well, interestingly, and until we were talking about time and responsibility and the unfortunate part of my generation passing on the responsibility in many ways to the next generation for having to manage it, you know, and we can manage it from, we can think about it from an agricultural perspective, but also from a land use population growth, you know, and how that and how climate change makes, you know, you make decisions about where you want to live and what you want to do based on it. I think that's where we're headed with the next generation, at least it's on my son's mind. It will become a factor and

> decision of how he prioritizes things in his life, which is kind of crazy to think about. -
> Rosemary

Climate Change Impacts on the Food System

This category delves into the intricate interplay between shifting climatic conditions and food production, distribution, and consumption processes. The UN Food and Agricultural Organization (FAO) describes food systems as, “encompassing the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal, and natural environments in which they are embedded. The food system is composed of sub-systems (e.g., farming system, waste management system, input supply system, etc.) and interacts with other key systems (e.g., energy system, trade system, health system, etc.)” (FAO, 2018, p. 1). More specifically, the FAO defines a sustainable food system as “a food system that delivers food security and nutrition for all in such a way that the economic, social, and environmental bases to generate food security and nutrition for future generations are not compromised” (FAO, 2018, p. 1).

Within sustainable food systems, food security is directly tied to a predictable climate and healthy ecosystems. On the other hand, climate change and its resultant severe weather, pest outbreaks, and diseases are already threatening the production of food around the world (Climate Change and the Future of Food, 2020). Climate change may lead to a global food crisis, food is predicted to cost more, there will be food shortages, and global famines are predicted by the year 2040. There will be more heat-related illness and death, a predicted 1 billion climate refugees by the year 2050 (internally displaced and within different countries), there will be economic crises due to damages and lost work hours, more violence when people can’t buy food to eat, and other negative impacts on the food system and human health and wellness caused by climate change

(IPCC, 2022; United in Science, 2022; United Nations, 2021). This theme is broken down into the following codes: *unpredictable weather patterns, extreme weather patterns, crop damage or loss, pest outbreaks, increasing inequity, food insecurity, food prices, food access, nutrition, and climate refugees.*

Unpredictable Weather Patterns

Climate change causes unpredictable weather patterns by disrupting the Earth's climate system. This disruption leads to changes in atmospheric circulation, ocean currents, and temperature. These changes create shifts in weather patterns, resulting in more frequent and severe extreme weather events, which are difficult to forecast accurately, and which often disrupt predictable patterns of the past (IPCC, 2022; United in Science, 2022; United Nations, 2021).

Participants explain their understanding of how weather used to be more predictable, but that has changed over time, and the associated consequences of that volatility on agricultural land and livability. Rye notes that we are not in control, but rather at the mercy of Mother Nature: “But you know, climate is, and weather is so unpredictable, it's like, someone said once, if you don't like the weather in New Hampshire, just wait a few minutes. We're at, we're at the mercy of Mother Nature.” Alfredo also notes this volatility:

> What used to be sort of predictable patterns of weather and water supplies and things like that are changing in ways that we don't fully understand…And then in some places, you know, large agricultural areas are, you know, literally either disappearing or becoming seemingly uninhabitable because of storms and rising sea levels and stuff like that. -Alfredo

More specifically, some stakeholders noted either firsthand experiences or shared what they have been told by farmers around the increase in unpredictability of weather patterns. Participants tended to view those growing food as paying more attention or noticing these things first because they will be more impacted or likely to notice changes in the natural world that they work with daily. As Coriander notes, "I think it's more unpredictable weather patterns, especially as far as climate is concerned... the outcome of your production is not as predictable." The instability of weather patterns was linked to an inability to securely plan for or predict farming outcomes, making a notoriously difficult profession even more challenging:

> I know I mean, one thing, I guess that I do hear from a lot of farmers and stuff is just like the general like an increase in just more chaos and unpredictability. So, like, I don't know if that's true or not, but I mean, I've had people say that and I believe them, because they pay really close attention to all this stuff. But that like, you know, we have these big, more of these big rain, like, we'll get the maybe the same amount of liquid over the season, but it'll come in like three huge storm events or, like, you know, we will have these weird warmup periods, and then it will freeze again. -Alfredo

> Because of this unclear weather pattern, you don't know what's going to happen. So last year, we couldn't, we should have had rain, you know, April and May and we had zero rain in our areas at the end of the year. It's kind of difficult to predict farming outcomes. -Coriander

> What comes up for me from this is, I'm not a farmer. But, you know, farming is kind of famously not easy. Everything's just getting so much harder with the lack of predictability of just the temperature and precipitation and then bringing in new novel pests. -Ginger

Participants referred to planning strategies based on dates and seasons that growers can no longer rely on:

> You know, like in the 1960's and 1970's all the farmers went by the May 15th date as the date to plant and you know, you're gonna harvest July 25th. But now you know, you have later, later, later frosts. -Coriander

> Yeah, I think in planning too I mean, you know, we plan our grass rotations around a certain season. So, in February, we were having warmer temperatures, the grass was growing, but it wasn't growing at a fact that we could put the cattle on it. So, we were still kind of having to supplement between like, what do we do hay, or, you know, take advantage of this grass. But if we take advantage of this grass, are we going to use it and lose it once the real spring comes on? You know, all those decision-making things going into thinking about. -Bran

Some food producers see this instability as an opportunity for taking chances that will either result in a loss or a payoff:

> We take a lot of chances. Because if we do it right, it pays off. So, like, it's really warm now, it's been warm, that doesn't mean we're not going to get a frost. But my husband is planting like crazy right now because if it stays warm, we'll make more money. If it doesn't, we'll just plant again, you know. But, as you can see, we have a lot of products here today, maybe because it has been so warm this spring specifically. But other years we do get hard freezes and we don't get as much. One of the reasons we don't have a CSA this week is because in the past it stays so cold this time of year. It would be a gamble to have a CSA and have all of those people relying on you to provide, but you know, this year we certainly could have. And you know, it was a little bit of a lost opportunity banking on it to be cold when it wasn't cold. -Juniper

Others don’t see it as having a potential payoff, only as a potential point of stress or disadvantage for small farmers:

> Like do you think people feel like there are, even though like your average frost date might be getting later that the instability of it means it's hard to take advantage of that because like, it's still like it seems like a weird stuff happening. There's always been weird stuff that happens but like the frequency of like, freak frosts or like or a big storm, like more big storms at the end of a growing season or something like that is something that people worried about? -Alfredo

> And I noticed a lot of folks who are working in community gardens who are like, okay, like it's almost time to start planting, but they're concerned that we're gonna have a random late frost or snow in April and May and they're not going to be able to predict that. I think when we think of agriculture specifically, it's so hard for small scale farmers who don't have the flexibility always to just say, well, if we lose part of this crop, we'll just restart. It's not always possible. And I think that's been something that I've seen is a little bit of a stressor in some of the folks who are working in the community garden, but also have small scale farming operations. They're like, when do we start planting, and when do we start prepping the garden spaces? And I think everyone's kind of just going like, okay, let's just keep going kind of as normal. But also, I know, there's that underlying stress of like, is this going to be the year that we get a snowstorm randomly in like late April, because it's like, at this point, it feels like anything is possible. -Miel

Several stakeholders share direct examples of unpredictable weather leading to loss, whether it be fruit trees or honeybees:

> Well, I mean, again, thinking about this year, you know, if, if, right now, it's, you know, it's been pretty warm, if we have a hard freeze, because, you know, the freeze date isn't really until mid-May typically. So, let's say, you know, we've got all these fruit trees that are blooming, and then we have a hard freeze. What is that going to mean for the apple producers at Doe Creek Farm, just as an example. -Amandine

> We've seen honey production on how, you know, keeping beehives alive. And like when we have a warm February and a red maple flower opens up, which is generally the first nectar available to honeybees, they are going after it because in their mind, it's signaling that it's springtime, and I'm ready to go. And then as soon as they bust their cluster, and do that, then we get hit in March with like, you know, zero-degree temperatures and then like killing the entire hive because they weren't prepared for that. -Bran

While most participants linked the unpredictability of the weather patterns to climate change, some stakeholders mentioned the unpredictability in weather patterns but are not sure whether they are attributed to climate change, or how to determine that. However, some are making efforts to buffer and prepare for further increases in unpredictability should it continue to worsen:

> And it's also like, okay we are seeing impacts of a hurricane in a season when we don't typically get hurricanes, but maybe more recently there have been a lot of hurricanes that impact the supply chains and it's like, well, we can't technically prove that that was climate change. But on a broad level, it feels like okay, that this has to be unprecedented, and if it's happening every single year, it feels like that's a sign of something that is definitely wrong and maybe that's climate change. -Miel

> I think the main thing is it's going to include or introduce more variability and change. And that will materialize in different ways in different places…And it seems anecdotal for me to be like, oh, well, we had a late frost this year. And this year, we had an early frost. On a day like today, it feels warmer. You know, but if it was like it was yesterday, we might certainly not say that. Yeah. I don't know. We're also in Blacksburg, and the weather here is always weird and windy and variable. So, I don't know so much what's going on, but I know some things that we are trying to do to help us in case there is more change. -Juniper

Participants noted that growers in areas currently more impacted by climate change have already started adapting to weather unpredictability by changing the crop varieties that they grow, even if it means taking a loss in profitability to gain a greater sense of security:

> I was on vacation last week. And I met some grape growers from California. 500 acres. So, some of the longer season varietals, they're like, "We can't grow that anymore because we're getting more frost and it's getting colder." Just the climate is all mixed up. They're going back to varieties that are more like a hybrid, but you get less money for it. They're more tolerant, but you can't sell it at the price that you could for the other varieties. So, they're taking a loss to grow something that it's not as desirable, but it's something you can predict the outcome better. -Coriander

Extreme Weather Patterns

Extreme weather events are caused by climate change, which is primarily driven by human activities releasing greenhouse gasses into the atmosphere. The accumulation of these gasses, such as carbon dioxide and methane, traps heat from the sun and results in global warming. This warming alters atmospheric and oceanic circulation patterns, leading to an increased frequency and intensity of extreme weather phenomena, including but not limited to hurricanes, heatwaves, droughts, floods, and wildfires (IPCC, 2022; United in Science, 2022; United Nations, 2021). Participants shared that there are many examples of extreme weather globally, and that they link this extreme weather to climate change caused by human behavior. Brie shares, “Increasingly, I think about, you know, how many examples we have of this kind of extreme weather in one way or another. That, to me, is kind of an indication of how we're impacting the planet.” Some participants described noticing a change in the extremity of weather patterns over their lifetime, even specifically to the New River Valley, as well as how that may impact those growing food in our area and their need to adapt to more extreme weather:

> Well, a disruption of you know, so I'm an older person, the disruption of the weather patterns that I have recognized all my life, we will have more severe weather, more severe summers, more severe storms, more severe winters, even that's part of the climate change. -Julienne

> You know, I mean, I've lived here now since 1984. And you never needed air conditioning. Really didn't need it in this town. And if you did, it was maybe August. The nights were cool, days warmed up, nights cool down again, and now that's

> changing. And there's just little things like that, that you wouldn't think would be that big a deal but since we're at 2000 feet and situated in such a way that the you know, the westerly winds basically cool things off as they come up that that, that valley, then you know, we have more sun exposure now it's hotter it's getting hotter and I think people understand that so the folks that are growing foods and vegetables and stuff have to understand that too. They have to adapt to that. -Kobe

Others did not describe noticing a change over their lifetime but mentioned more recent changes. For example, Rye notes, "Our trends, I mean, we have had extremely cold winters, we've had, you know, almost no winter at all, like we had this year." And Miel seconds this, "Yeah, I think we've seen, I don't want to say unprecedented, that always sounds dramatic, but this winter has been very warm." Amandine also notes the recent changes:

> I mean, I think that when I think about climate change, I think about how essentially the world as we know it is going to continue to look different in ways that we don't necessarily imagine. And, you know, people talk about even the weather we're experiencing this year with the ground not really freezing, and what that might mean for insects. -Amandine

Local food producers are beginning to feel the impacts of extreme weather in a myriad of ways:

> But yeah. As far as our local farmers talking to them directly. I haven't talked to them directly about climate change very much. You know, they're always dealing with different issues, drought, too much rain or whatever, like our neighbor who has a CSA vegetable farm down there. And I'm sure she has continuously changing pest issues and whatnot with her with her stuff. And that's obviously one that's climate related, too. -Malina

Participants are also thinking about how agricultural production will be impacted by extreme weather nationally and globally, noticing that the shift in the growth belt will be moving north as temperatures rise:

> And it's going to create, there will be winners and losers, in a sense, because there are some people as the growth belt moves north areas that could not be as productive agriculturally, will now be able to do that. -Julienne

> But obviously, like food systems and climate are intimately related, you start changing the climate, certain foods can't be produced anymore. You know,

> hurricanes knocking out land that would have been used to grow food, they're just intimately related. So, start having problems with one, you get massive increases in issues with the other. -Clementine

Some stakeholders observed that droughts are a facet of climate change that are affecting the food system, but in other areas rather than in the New River Valley. Alfredo captures this idea well by stating, “And in a lot of places that's causing more chaos and instability in the food system, whether it's like, you know, increasing storms or droughts or, you know, out west where they seem to be having troubles with everything, but especially water supply.” Stakeholders share a sense of “here” versus “there” with climate impacts:

> So, I can't relate to what's going on. I can by watching the news, but I can't relate to what's going on with the droughts in Texas that affect the cattle industry, droughts in the Midwest that affect the corn and the crops out there. So, but here in Virginia, I think we've got a pretty good balance so far. -Rye

One producer is preparing for when dry periods do begin to impact the food system locally, and shares the importance of water security:

> Our main thing, well we've got a lot of things going on, but one thing we're worried about or want to have more security in is water availability. So right now, all of our water comes from wells. There's a well here and a well where our greenhouses are. And they go dry. So, we want to have a pond to have more, collect more surface water, and have more water available to irrigate with. But that's extensive and a long-term project and we're already a year into trying to get it off the ground and it hasn't yet, so water security is one thing. And that will help with times of dry, dry periods and stuff. -Juniper

Participants mentioned floods as a consequence of climate change, with the range of impact varying. Clementine shares, “I would say that's global, like most of the examples that I hear about on a regular basis are like island nations where a lot of their landmass is being lost to rising oceans and hurricanes and things like that,” While some believed it to be a global issue impacting island nations, others saw it as impacting coastal regions of the United States, and one planner mentioned that it is impacting our region of Virginia:

> But that also means we've got rising sea levels, we're going to have problems on our coasts, particularly the cities that are going to be, you know like Miami and Tidewater, Virginia now frequently have flooding that they didn't have 20, 30 years ago. -Julienne

> A little bit except for a few things like we do handle floodplain management. And that's in our realm of responsibilities. And those things have changed. There's more intense rain and more intense flooding here than in previous years, whereas for California it's completely opposite. -Sherry

A grower mentioned that it will be difficult to adapt to flooding, as compared to other climate impacts such as frosts caused by unpredictable or extreme weather. Bran stated, "We found out how to adapt to things like frosts. Like watch the weather, cover your crops. But the huge rain and flooding and stuff, that's certainly going to have an impact."

Some participants mentioned fires caused by climate change, but in regard to the threat they pose other side of the United States or developing countries globally. Julienne stated, "And there will be growing deserts, growing, you know, you look at the wildfires in the West. That's a real danger for people who live in that part of the country. And certainly in developing countries." Similar to the reference to being at the mercy of Mother Nature mentioned above, Kobe pointed out the indifferent natural rhythm of extreme weather such as fires, and how the natural processes and patterns of the Earth operate independently of human consciousness: "And as I said earlier, you know, the rising tides and winds and the fires, they don't care, we're talking about human issues, right."

Crop Damage or Loss

Climate change causes crop damage or loss by altering temperature and precipitation patterns. These changes can lead to heat stress, reduced photosynthesis, water scarcity, physical damage from flooding and other extreme weather, planting or harvesting schedule errors due to unpredictable weather patterns, and increased pest and disease pressure, all of which negatively impact crop yields. These issues caused by climate change pose significant challenges to global food security and require adaptive measures to safeguard crop production. (IPCC, 2022; United in Science, 2022; United Nations, 2021). Participants commented on how climate change is likely to and has already resulted in crop loss or damage. Alfredo stated, “And that might increase risk for some people that grow things and stuff like that. So, kind of like catastrophic crop loss events and things like that might be more common.” Crop loss has a multitude of effects on the food system and food security, as well as the economic viability of farmers. Diversification and local food systems were highlighted by participants as being more climate resilient as opposed to large scale monocultures regarding crop security:

> And so those red maple blooms did open, and the fruit trees did open. Yeah, fruit production, like our buds are coming open. And then you know, they're exposing themselves to the weather. And then once the frost hits those internal organs within the buds of fruit trees, especially apples, pears, peaches, things like that they're dead and your crop has gone for that year. -Bran
>
> Like, if we had a CSA running like, that would have been $2,500 today. You know, and $2,500 next week. So, you know, it kind of hurts when you have that lost opportunity. But at the same time, if we'd had freezing weather and lost a lot over the winter, like if we had that weather like we had over Christmas for two weeks straight, we would have lost a lot. And we would have been happy that we didn't have these two weeks committed to CSA. -Juniper
>
> Having a crop failure is more likely. Especially a crop that you put in all your, you know, it's a high dollar crop you think you're gonna get in. Because of this unclear weather pattern, you don't know what's going to happen. So last year, we couldn't, we should have had rain, you know, April and May and we had zero rain in our areas at the end of the year. It's kind of difficult to predict farming outcomes. -Coriander
>
> And I'll bring it back to that larger system, again, rather than local is also the fragility of large-scale monoculture. You know, those are inherently fragile, in a changing climate. So, diversification, incentivizing strategies that don't leave your whole crop vulnerable to a loss if there are freak events. -Ginger

Pest Outbreaks

Climate change contributes to pest outbreaks by creating more favorable conditions for pests to thrive. Warmer temperatures and altered precipitation patterns can promote the reproduction and survival of pests, while also allowing them to expand into new geographical regions previously unsuitable for their survival, leading to increased pest pressures on crops and ecosystems. Climate change can also cause pest outbreaks in livestock by affecting the distribution and abundance of disease-carrying vectors, such as ticks and mosquitoes (IPCC, 2022; United in Science, 2022; United Nations, 2021).

Some of the participants who do not work directly with agriculture have still heard about pest issues changing and becoming more difficult to deal with due to climate change:

> This probably means you know, I'm not an entomologist, but the entomology guys are in Price Hall, so I know a few of them and cycle with some of them they probably mean some of the pests and stuff is going to be different and harder to control. You know, there's the spotted lantern fly. Have you seen that? It's coming down, coming down from the Winchester area towards us. -Kobe

Stakeholders more directly involved in food production have already begun experiencing issues with pest outbreaks related to climate change firsthand, noting not only the damage done to their crops from the pests, but also the difficulty in determining how to control them using practices that align with their sustainable methods. Kobe noted that, "We had pickle worm on our squash last year" while Coriander, who also dealt with invasive pickle worm, shared that, "I think organically you can't really control them. Like inorganic, there are some control measures which they took. But on my side, I can't do much." The impacts of pests are impacting many facets of the food system and altering the way that farmers are producing food:

> There is anywhere from you know, more pest pressure, to you know, crop production, lack of reliability has really decreased because of that…So last year we had a storm come in and it brought a pickle worm, which has never been seen here

> before. They're from the tropical areas, like south of Florida. The storm brought them in, and they just started eating on the cantaloupe and everything. -Coriander

> We're seeing increases in different pests and diseases that we haven't seen before. And they're all directly related to climate change. In our ecological world, we see lots of changes in species dying out. We see different pressures, extinctions, habitat loss, all these functions…Well, like I said before, I mean, it's affecting what we plant, how we plant, when we plant, it's affecting your livestock needs on grasses, growing rotations. It's affecting the, you know, the pests, more disease coming in. It's having a huge impact on the food system in how we produce the food. Yeah, we've seen an increase in I mean, I think in some of the studies we've done is focused mostly on things like corn earworm, and aphids, and mites and things like that. And we've definitely seen an increase in that. -Bran

These climate-induced pest issues are not only impacting crops, but also livestock animals, leading to infection and loss:

> In cattle, we've seen increases in anaplasmosis, that's directly related to tick populations growing, they're not getting killed off enough during the winter to suppress them. And so, then their populations are expanding, which is encouraging them to carry more disease. We were affected by that at the Catawba Sustainability Center. We had an infection in one of our herds. We had to cull one of our steers out. -Bran

Ginger shared that, "If things are being pushed in the direction towards increasing pest management, that kind of by definition, is a downward pressure on the sustainable business." This highlights that while farmers are doing their best to adapt, participants worry about how pest pressures may increase the use of already harmful pesticides that erode the sustainability of the food system:

> I just think that we don't know what the common impact is going to be on the food system. And I guess farmers we're adapting every year to try to figure it out. I mean, I see some good things, some bad things. The bad things of course, like pest pressure that's coming in, that's really gonna decimate things and reach that point, especially if our production practices are relying on pesticides in general that's driving that industry. -Bran

Those using more sustainable practices without chemical adjustments are seeing an increase in pest pressure and may be noticing it earlier than those growers who use chemical sprays:

> A lot of the entomology studies we've done at Catawba they want to come there because we don't spray and there's no spray on the property. And so, we are attracting bugs and so you're gonna get a you know, more realistic feel of kind of what the insect pressure is, without, you know, those chemical adjustments. -Bran

Increasing Inequity

Climate change increases inequity by disproportionately impacting vulnerable communities and exacerbating existing socio-economic disparities. Marginalized populations such as low-income individuals and disadvantaged groups often face the worst of climate-related issues. They often encounter greater exposure to extreme weather events, reduced access to resources, and limited capacity to adapt to changing environmental conditions. Meanwhile, wealthier and more privileged communities tend to have better resources and infrastructure to cope with the impacts of climate change (IPCC, 2022; United in Science, 2022; United Nations, 2021).

Most of the inequity referenced during the interviews is included in other coding sections, such as *what is not working*. Instances of inequity were frequently referenced in both interviews and focus groups, however not generally in relation to climate impacts or being attributed to climate change. Those inequities that were attributed to climate change by participants focus on how climate change will unfairly impact future generations and increase poverty both locally and globally. Additionally, current inequities such as the affordable housing shortage in our community that will be exacerbated by climate change were mentioned:

> And so, climate change means a lot to me. Many different aspects from my husband and I getting solar last year for our home to the pipeline that went through Montgomery County and is still under construction to weather change to future generations and the needs of them, and impact on poverty, etc. -Sage

> There was a study, this one wasn't specific to Blacksburg, that the New River Valley Regional Commission did. They found that we're short about 5,000 bedrooms of

> affordable housing in the entire New River Valley. Certainly, Blacksburg doesn't have to provide all of that, but we do need additional housing units in the town of Blacksburg. And I do think climate change could make that problem worse if we don't plan for how we do that sustainably. -Colby

In addition the inequities facing the New River Valley, participants discussed how climate change is disproportionately impacting island and coastal communities, especially lower income communities. Clementine highlights how, Hurricanes knocking out land that would have been used to grow food… a lot of the land that they used to live on and grow food on is no longer accessible to them." The extreme weather is pushing them off their land because they can no longer live or grow on the land that is being regularly flood or under rising coasts:

> I think specifically that the globe generally is warming, that we're gonna have more moisture in the air because of that warming, and that that change is accelerating. And that's going to put a lot of pressure both on people, especially near oceans. Island peoples are often some of the poorest communities in that regard. As well as just general infrastructure. And we're probably not doing enough to get ready for that. -Kobe

While the impacts of climate change are already getting bad for some, one stakeholder wonders what percentage of the population will need to be directly impacted before we all start to care and act on this issue, while others note that eventually it will be an issue for all of us:

> It has to get worse. And it's already really bad for people for whom it's already bad. You know, does it need to get really bad for 51 percent of the population? 70 percent? Like, right now, it's kind of really bad already for 30 percent of the population. You know, it seems bonkers to me that we are still kind of holding it together socially, at that level of desperation and despair. -Ginger

> And everyone's affected when climate change happens. You know, and eventually, it's not just going to be on the backs of the poor, it's actually going to be on the backs of all of us who are in the 1 percent. And then the 0.1 percent, and eventually affects everyone. -Basil

Others critique extraction that will only increase in the face of climate change and our need for resources to fuel developing technologies and how extraction creates inequities. Basil points out, “Whether it's, you know, even renewable energy with our lithium batteries, that's going to end up impoverishing people somewhere else, right?” We need to be careful not to develop technological solutions that are also unjustly extractive of resources in developing countries. Our climate solutions are not truly solutions if they create more inequity and problems for the poor in order to serve the wellbeing and interests of the rich:

> And so, we have this global economy that doesn't look so bad to us. We feel like it's great. We click a button on a computer. Three days later, or two days later, a truck drops a package on our front door. The reality is when you grow up in Africa, that's being extracted. So much of that stuff is being extracted straight out from their countries, leaving them destitute, so that we can have our products, whether it's cell phones, right, I grew up in the Congo. So coltan, right? Whether it's wolframite, what all these different things or whether it's diamonds, whether, you know, it used to be rubber, you know, all these different things. This global system of outside inputs not only impoverishes the local colonies here, but you're also impoverishing everywhere you extract from. -Basil

Food Insecurity

Climate change exacerbates food insecurity in multiple ways. Unpredictable weather patterns and extreme weather events can negatively affect crop yields, which disrupts agricultural production and reduces food availability. Climate-induced impacts on natural resources, like declining water availability and degraded ecosystems, further limit food production and access. These effects disproportionately impact vulnerable communities and increase global food insecurity (IPCC, 2022; United in Science, 2022; United Nations, 2021). Participants in this study acknowledged food insecurity as a climate impact on the food system, and noted that food insecurity is not being addressed through a systemic or climate change lens in the way that it should be:

> You know, if we're kind of a divided County, I mean, we are sort of half blue, half red. And I have not seen much in the way of policies from other local governments that are addressing climate change and food availability. I mean, they do address problems with hunger, but I'm not sure they're looking at it through the lens of systemic climate change. You know, let's bring Micah's Backpack to the trailer parks, which is great. I mean, it feeds the people in that immediate need, but it doesn't address the systemic problems. - Julienne

The intersection of climate change and food insecurity is becoming more notable in community conversation, not only within Blacksburg, but across the New River Valley:

> I think so. But I would say more so the nonprofit side of things or more so the businesses or organizations that serve the community, community services. Like I know we went to a meeting recently that was just talking about all of the big things happening in Floyd. And they had a couple of farmers that were talking about climate change too. So it's not just specific to Blacksburg but I think anywhere you go where you're talking about food security, around here, you're gonna get people who are willing to talk about this issue. - Clementine

Hazel points out the disconnect between the vast swaths of agricultural land in the New River Valley and the rates of food insecurity in Southwest Virginia: “At least, you know, on the surface, we have, you know, hundreds of thousands of acres of agricultural land. And yet there's people that are living in food insecurity here.” This pre-existing rate of food insecurity will only be made worse by climate change, particularly if we do not begin to think about it from a systems perspective:

> And I know that the town has invested significant resources towards addressing food insecurity. But we've already got a baseline of food insecurity here that we're not keeping up with. And then we've got this train coming at us, of like, potentially catastrophic events that would make all of us food insecure. -Ginger

Our food system relies on stable and predictable weather patterns. Extreme weather from climate change could ruin staple crops across the state, country, or world, disrupting supply chains and causing entire communities to become food insecure:

> So, our economic system is set up for, you know, food insecurity that's accelerating. And then we add on to that, that, you know, our food system is entirely reliant on predictable weather patterns and growing seasons. And we know that climate change doesn't

> necessarily just mean you know, you know, an increase of temperature by one and a half or two degrees, it's that the weather gets more unpredictable. So, the start of the growing season, the rainfall during the growing season, the cooling in the later part of the season, during harvest, all of these things are thrown into potentially chaos. And since food, particularly plant-based food, requires a full growing season, interruptions anywhere in that system can cause a catastrophic loss of that crop. Now, if we lose a pineapple harvest in Hawaii, that's problematic, people want pineapple, or we lose a peach harvest in Georgia, okay. But I think people will be okay. What concerns me is if we if the stars align, and we have enough disruptive events that we start losing major staple crops, corn, soy, wheat, things like that, that are that really are the foundation of the whole food system. If we lose those in significant swaths, where they're grown, that gets to a point of it's not just people who are food insecure currently, we all become food insecure. And I don't know how to address this problem. Because if we have a local flood, we can rebuild the roads and the towns. But if there are super regional or global food shortages, everybody needs the same thing all at once and they're non-negotiable needs, everybody needs to eat. You can't rebuild the corn crop. You have to wait till the next season. -Ginger

Our reliance on global food chains makes us more susceptible to the impacts of climate change on food security, regardless of how it is impacting crops in our own vicinity:

> And then, more broadly, you know, just sort of reading in the news, the way that sort of our global food system is affected by climate, you know, and how much we rely on food from different parts of the world and kind of staples from different parts of the world that, you know, if the if they're experiencing the effects of, of climate change, then that's impacting us here in the US. -Brie

Participants do not feel that this threat is being taken seriously by leaders and decision makers, due to the idea that food insecurity is an issue that only impacts lower income populations, as well as their inability to make crucial connections between climate change and food security:

> I don't have a strong sense that this is being very seriously contemplated. But I do think that municipal leaders often think about food insecurity as an issue of lower income households. That it's kind of a persistent problem. What I'm unaware of is, are they aware that the problem is accelerating already due to economic circumstances, and then it has the potential to get worse for literally everyone at every income level kind of suddenly. And I don't have the sense that this is being discussed. At least no one's having these conversations with me… I think governments see their role in just the traditional like food insecurity as providing funding to support those programs and you know otherwise, but if I had to guess I don't think they're thinking about it. I think they know the problem is getting worse, but I don't think that climate is part of their calculation yet. -Ginger

They worry that it will take catastrophic events impacting the bulk of population to make leaders cognizant and responsive to these threats of food insecurity that climate change poses:

> I think if you go through one hungry winter, people are gonna get really good at growing some food the subsequent year, and rethinking their relationship to their expansive lawn, or I think the town will start looking differently at its public parks. I think it has to have a really broad impact. I think right now, the impact is severe on certain members of the population who are largely invisible, and don't hold a lot of power. But when it's more than 50% of the population, that is having a tough time. You know, hunger is not a great feeling. -Ginger

Hazel suggests an effective approach to enhance food security amidst the challenges posed by climate change—which is the uplifting of farmers and other integral members of the community: "I think that when we hear and give opportunity to our community stewards and farmers and capacity builders, then we are ultimately, I think inherently, going to progress our food security, our food resiliency, and our ability to adapt to climate change in the future."

Food Prices

Climate change impacts food prices in several ways. Extreme weather events such as droughts, floods, and heatwaves can all lead to crop failures and reduced yields, which will cause a decrease in food supply. This reduced supply and rising production costs due to climate-related challenges like increased irrigation needs or higher pest pressures will increase food prices. Also, disruptions in transportation and distribution networks resulting from climate-related events can also contribute to food price fluctuations (IPCC, 2022; United in Science, 2022; United Nations, 2021). Participants mentioned food prices changing due to climate change in the context of climate affecting growing practices and economies of scale. Additionally, they speculated about how people might respond to these increasing prices, such as needing to buy food now and not having the funds for food later down the road, since food is not something people can live without:

> And then, you know, because of all of those changes, you know, systems of efficiency and economies of scale might change. So, prices are going to change, I feel like, you know, it might have always been easy for that same grower to grow broccoli, year after year after year. But if that equipment isn't moving efficiently to a new farmer who's growing broccoli, then you know, prices are going to change too from a global perspective. And diversity and variety of things will change. I don't know there's just going to be a lot of flux. -Nori

> You know, we get complaints every day about the price of tomatoes at Kroger as opposed to Food Lion, but, I mean, the fact of the matter is in this situation, in this economy, people are going to buy what they need, and it certainly impairs their ability down the road to buy the things. But the necessities are air, water, and food. So, they're gonna do what it takes for that. -Rye

Food Access

Climate change impacts food access by disrupting agricultural productivity, reducing food availability, and influencing food distribution systems. Unpredictable and extreme weather events as well as changes in natural resources can lead to crop failures, which limit the supply of food. Climate-related challenges also affect transportation and infrastructure, which can cause disruptions in food distribution, especially in vulnerable regions with limited resources (IPCC, 2022; United in Science, 2022; United Nations, 2021). Some participants referenced the uncertain weather patterns and their influences on crops impacting the availability of food that we are used to always having access to as a threat to food access at all levels:

> So, you know, when I think about climate change and food, I worry about the availability of food that we may have counted on in the past, that may not be as available now. And that might be true for food that's locally grown, but also for things that, like, oranges that come from Florida, if they if they experience a hard freeze, I just think, again, it's that uncertainty that is inserted at all different levels of the system locally, and then, and then beyond that, as well. -Amandine

A participant expressed that all people are aware to some degree of the impacts of climate change on food access, whether or not they are drawing direct connections, since it is an issue impacting everyone in different areas of the food system:

> But I think whether consciously or subconsciously, we all understand the impacts that a changing climate is having to our foods and the system, whether that's, you know, storms that are taking out power and so logistics get shut down. And so, the trucks can't make it to the Kroger or if that's farmers that are seeing hyper saturated fields or bouts of drought, you know, it's, I think it's affecting on all levels, and people are feeling those effects, whether they link the two, you know, is a different story. -Hazel

Others compared the disruption of supply chains and distribution systems during the COVID-19 pandemic to the potential impacts of climate change on the food system and food access, with a desire for people to make connections between how disasters can affect them:

> I also imagine that I could see and maybe this isn't true, maybe I hope that, just given the whole experience we just had due to COVID, and how that has impacted availability of product and distribution systems. You know, I think this was kind of an indication, or it gave us kind of an ability to glimpse at what the future might look like. And so, I'm hoping that while COVID wasn't necessarily related to climate, I'm hoping people could see the connections between some of the challenges we experience due to COVID that might also present themselves. You know, if there's another kind of disaster related to flooding or, you know, these disasters that can have impacts on our distribution system that then end up affecting local communities. -Amandine

Participants also contemplated whether global, local, or a hybrid food system would best serve the resiliency of our community in the face of a changing climate with regard to food access:

> But if there were like a natural disaster or something like that, if your food comes within 100 miles, it's easier to get it to you than if it's like, there's like a hurricane that affects a port, and then like, it completely disrupts the supply chain. If you're getting a lot of your food locally, you don't have that kind of problem. So, it's more resilient for the community. -Colby

> I think as a local farmer, we are only serving a very, very small percentage of our community. I think that the majority of people simply don't buy local food, I think it's a very small subset of people that buy local food. So, I think the understanding from a majority of people locally is that they should be able to go to the grocery store and still get whatever they want. And I don't know that they are, I think they think it's just going to come from somewhere different, that they'll always have it. And that might

> be true, you know, broccoli might always be able to be sent to the grocery store. It just has got to change where it comes from. -Nori

> So, I think that, of course, like, in a really direct sense, you know, changing temperatures and volatility are going to maybe bring more hazards into the food system, or make some foods less available. But because we are a part of a globalized food system, I think that like, in some ways, being more connected to other places can reduce some of the impacts of that volatility, because you have access to foods from other places. So, you could argue that like, oh, well, if you buy food that's from really far away, you're negatively impacting climate change by having to transport it here. But in a scenario in which, like, everyone is only eating locally, and then there's, like, some catastrophic weather event in one place, they don't have access to another food source that's equally detrimental. And so, I don't know, there's like a lot of nuance there. And I think that it's hard to sort of couch the local versus global as like, necessarily good or necessarily bad in terms of climate change, because they both are like, I don't know, interacting with it in a lot of different ways. -Harissa

Nutrition

Climate change impacts nutrition by reducing crop yields due to crop damage and loss. Climate change also degrades the nutrient content of crops and reduces the diversity of foods available. These factors can lead to malnutrition and health issues, particularly in vulnerable communities. Food insecurity and disrupted food production and distribution systems caused by climate change further worsen inequities, making it challenging for vulnerable populations to access nutritious food options (IPCC, 2022; United in Science, 2022; United Nations, 2021). Some participants in this study feel that there is a general societal misunderstanding of nutrition and how food choices impact climate change, such as sustainable, local meat being vilified in favor of produce that is not sustainably or ethically produced that has to travel across the globe. One stakeholder mentioned how they believe that meat is one of the most nutritious foods we can get to people who are struggling with malnutrition due to climate change or other factors, and yet it is disparaged as being problematic to the climate crisis:

> There is a very vegetarian emphasis on how to fix climate change. And I think to be blunt, we think that way because we're ecologically illiterate. Meat is getting vilified. Right? You brought up LEAP, right? They have this program where the SNAP dollars are doubled at market, which is a great way to help a different demographic and 90% of that is for produce, right? If you're talking about nutrition, or you're talking about ecology, we should be getting meat into people who are struggling to get good nutrients into their diet, struggling food safety wise, should be getting the highest nutritionally packed food there is for forcing them to get grains and vegetables. To me it is ridiculous. But it's also the greater issue there is that it's coming from a perspective of what is appropriate. What's appropriate for a food system. The problem is even on farms so what? What's been cool is the NRCS and the government programs are starting to realize that soil health has to include animals. -Basil

Climate Refugees

Climate change causes climate refugees due to environmental degradation and extreme weather events that make certain regions unlivable. Communities facing loss of fertile land and heightened risks of natural disasters such as flooding that affects coastal communities are then forced to leave their homes in search of safer places to live. This results in large-scale displacement and migration. People have already begun fleeing from areas where their livelihoods and living conditions are no longer sustainable because of climate change (IPCC, 2022; United in Science, 2022; United Nations, 2021).

Most participants made mention of climate refugees at some point, particularly that as climate change impacts become more severe, people will move from less livable places in the world to areas that are less impacted. Some people with more resources are beginning to move ahead of time in preparation for projected climate impacts. Malina noted, “There’s a lot of people from metropolitan areas, who are starting to realize that climate change is more and more of a threat who wants to move to a better space, and they research where and a lot of them are moving here to the Floyd area.” The New River Valley is projected to be less impacted by climate change than surrounding areas, making it a destination for people in the

United States and globally to potentially relocate. Hazel shared that, “I mean we're already seeing climate refugees. We just did a huge news push to, they're not getting any water in Colorado, this thing said that we're water wealthy communities here in the New River Valley. And so, it just adds on to that with people relocating.” Climate refugees from a variety of circumstances were mentioned, as well as considerations such as how this will impact our food system:

> We're going to see climate refugees, I mean, we are going to have, like much of Bangladesh will be underwater, or certainly not livable, and certainly not the kind of countries, you know, kind of land where you can, you know, feed your people. So yeah, I think it's going to be devastating. -Julienne

> I 100% think that an influx of people will happen, because like, you know, even just parts of Virginia, like just even looking at the state, like, it's miserable. I mean, I'm, I already want to be somewhere colder…There will be like, you know, we'll get people I mean, from the rest of the southeast, but also, like globally too, you know. -Alfredo

> So that a lot of the land that they used to live on and grow food on is no longer accessible to them. And also, just massive groups of people being pushed out of their homes into other areas, so you get a lot of refugees of climate change. Again, I'm sure that it's affecting the food systems around here and in the United States. -Clementine

> And then finally, you know, I think, again, kind of just listening to the news, thinking about the ways that climate change, you know, can affect migration and kind of how populations change as a result of climate. And so, as folks are moving to different areas, how do we ensure that the food system can support them, wherever they may be? Or maybe they're moving because the food system that they are relying on is no longer productive, I guess in where they are. So those are just kind of some of the things that globally and locally, we're seeing. -Brie

Participants also shared their hopes for a peaceful transition as climate refugees try to find their way to safer and more prosperous areas in the world:

> Well, ideally, we stop climate change, and everything goes back to normal, and it's all fine. But I don't think that's going to happen, I think we're gonna have to mitigate, like, I think it's just going to be like, I think there will be a mass movement of people to places in the world that are more easy to live within. And I just hope that that happens peacefully. -Alfredo

Sustainable Development and Climate Change

The United Nations Brundtland Commission defined sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 2023). To attain sustainable development, it is essential to balance three core elements: economic growth, social inclusion, and environmental protection. These elements are interconnected, and each is critical for the well-being of individuals and societies (United Nations, n.d.). Donella Meadows defines a system as "an interconnected set of elements that is coherently organized in a way that achieves something… A system must consist of three kinds of things: elements, interconnections and a function or purpose" (Meadows, 2015, p. 11). Sustainable development can be understood and analyzed through the lens of systems thinking. It involves considering the relationships and feedback loops between economic, social, and environmental factors. Sustainable development seeks to create a balanced and integrated system that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (United Nations, n.d.).

According to the United Nations, climate change will set back the development gains we have made over decades if left unchecked and make future gains impossible. Sustainable development helps address climate change and build climate resiliency, and taking action on climate change also reinforces sustainable development. Tackling poverty in its various forms is a vital requirement for sustainable development. Growth must be inclusive and equitable, and create better opportunities for all by reducing inequalities, creating greater opportunities for all, raising the basic standards of living, supporting equitable social development and inclusion, and supporting sustainable use of natural resources and ecosystems (UN DESA, 2022). This theme is broken down into the following codes: *economic sustainability, social sustainability,* and *environmental sustainability.*

Economic Sustainability

Economic sustainability involves producing enough for present needs without compromising the ability to meet future needs. Traditionally, economists assumed that there were unlimited natural resources or that technology would be able to replenish lost resources in time and emphasized market efficiency and economic growth over everything else. The realization that resources are finite has led to a social rethinking of the feasibility of uncontrolled growth and consumption. To achieve economic sustainability, decisions that are equitable and fiscally sound must be made. Other aspects of sustainability must be considered as well, since they do not operate independently of one another (Mensah, 2019).

One participant shares that they feel like economic sustainability is the most important limiting factor in our local food system, and that economic sustainability needs to be considered and bolstered for the resiliency of the food system, especially in the face of a changing climate:

> And like, what are the economic impacts and economic factors, which really like to me around here, I feel like that's, to me, that seems like the most important and like, kind of limiting factor in like, the integrity of our local foods, of what our local food system is. So definitely, like the economic side of it. -Alfredo

More specifically, other stakeholders delve into the paradox or tension between making a living as a farmer and having economic sustainability in producing food, and then food prices being affordable for all members of society through economic equity in their purchasing power and ability to access high quality, fresh foods.

> I feel like there's this paradox where being a local food producer, like in order to do it at the scale, most of the people are trying to do it around here. And live the kind of lifestyle that most of the people who are doing it are accustomed to and want to live,

> you have to, you kind of come up against this thing, where it's like, it's very hard to do that and make a good living, and then sell what you make to people, and have everyone be able to afford it. -Alfredo

> Like as a small farmer myself, I know I'm trying to get like the person who's gonna pay the most money for it, which makes sense because it's the only way I could make it but that's like the quality of food that I produce should not be just available to people who have the most money. -Bran

> I think producers want to get the most money, and not necessarily in this situation, because we provide food, this is like a government farm. But if I was a private grower, I would want to sell my organic carrots for the most money that I could, so I would take them to the farmers market, rather than maybe Kroger because they would buy them at bottom dollar. -Coriander

> But then it's like, it's just like kind of a scalability, a numbers game, it seems like to me, and then you have this middle, it's like, there are these programs that will offer it to people, you know, who are on like benefits and stuff like that. But then there's a huge bunch of folks that I think aren't, don't qualify for those kind of benefits, but also, like, aren't really trying to spend the money that, you know, that they need to be able to pay what I think the people that are producing within those systems are justified in charging. But it's like how do you compete when you're competing against people that are doing it at this huge scale? With subsidies, and a totally different system of inputs and ability to carry debt and all kinds of stuff. I don't have any solutions, but I think affordability is huge. -Alfredo

For some, there is also a tension between economic stability in farming and sustainability of the environment:

> I work with producers that are extremely organic, and only-organic organic, and then I work with commercial producers. And then I also come from a farming family, myself, and we incorporate more sustainable techniques. But we're not completely off of the commercial route in some regards. But the main tie that comes together in all of these is everyone's trying to make a living. And I think that's one thing we're, we have to remember. That's not saying, let them do whatever the land, because we need to take care of our land and the natural resources, I care about it, I have an ecology background, I care about the soil, because as producers, you depend on that soil that is your livelihood, so you hopefully are going to take care of it. -Pomona

Participants commend the Supplemental Nutrition Assistance Program (SNAP) as well as the ability of the farmers market to accept SNAP as payment and offering a double bucks programs to extend purchasing power for low-income individuals:

> I think that, like the farmers market, the fact that they subsidized SNAP benefits, so it makes it more affordable for people who receive those benefits, to be able to access healthy whole foods. They do that and they do fundraising for that. And I think that if we're going to be a responsible community, we need to find a way to make that kind of support more possible. And I don't know whether it's the Town of Blacksburg funding it or supporting not for profits, like Live Work Eat Grow, or the work of other organizations. You know, last night at Town Council we had all the external agencies come and they sort of report what they've done because the town gives them money...But I think that the local government certainly has a role in supporting those kinds of organizations. -Julienne

The price of food for all individuals is proving to be an economic challenge, and participants would like to see these prices decreased in some way:

> The companies who sell the food need to not be so greedy and only concerned with profits and large profits. That would make everything so much more affordable for everyone. Inflation has ruined everybody's budget. I don't even, I'm not an economist. So, I don't even know what to say about that. But I know it's, I mean, even I mean, my husband and I, it's just the two of us. And we're both professional working people. And you know, we have a good income, but it's still putting a dent in our budget. I can't imagine it for others. There has been an increase in traffic at our church food bank, since inflation, a pretty sizable increase. But also with that the food that is purchased from Feeding America costs more too. So, they have increased their prices. I'd want to see decreased prices. And that's not completely feasible across the board, but a lot of it just has to do with greed. -Sherry

> I mean, just taking a step back, I think we are already in a situation where lots of people and an increasing number of people are already food insecure. Right. And I don't know exactly what those percentages are. But I do know that they've been trending upward for years as incomes have not kept pace with inflation. And other expenses have outpaced, you know, outpaced inflationary things that are nonnegotiable, right, like, so. I mean, as an aside, I always laugh when they're like, oh, the cost of TVs is a 10th of what it was back in 1980, I'm like, that doesn't matter. We need housing, medical care, education, and childcare, like these things that are nonnegotiable, have ballooned in expense. And food is now entering that realm of things as a runaway expense, right relative to incomes, another extremely nonnegotiable expense. So, our economic system is set up for, you know, food insecurity that's accelerating. -Ginger

This view of already overpaying for food stands in contrast to some farmers' perceptions that Americans are not paying enough of their budget for food as compared to countries with different economic structures than ours:

> And I remember going to a conference, a local sustainable food conference one time, where somebody a farmer got up, and was like, Americans don't pay enough for food. They're like, look at Europe, Europeans pay, you know, 10% or 12% of their annual income on food and Americans only pay 5% or whatever. And it's just like, that's not an argument that's going to work for anyone here. Like maybe that's true, but it's like, what are the social safety nets of those countries that you're looking at, like, do they have universal health care? What else is their budget like? The idea that people will need to pay more for someone to produce less efficient food that's more expensive is like a weird thing to me too. So, I don't know, I mean, I think affordability is like that's the big thing and scalability, like the ability to scale production, and for it to be affordable. I feel like these are the two main things. I feel like if you made it the same, or if you made it cost competitive, I think people would choose it. I think people of different cultures would be interested in it if it wasn't more expensive. -Alfredo

To address some of the disconnect and competing objectives between the economic sustainability for growers and buyers, one participant advocated for leveraging the love of our local farmers markets as a way to share the farmers' stories and needs with the community:

> So, my sense is here, trying to approach food systems from an economic development lens would probably, and although that's like a limited frame, it would be a good starting point. I think everybody loves the farmers markets, right?…How we understand and highlight the farmers' or food producers' stories and needs and concerns is maybe a way to resonate more around the climate change issue. Because at the end of the day, we want to go to the farmers market and we want those opportunities, but it depends on the farmers wanting to be there, right? And if climate change is impacting their business, then they may not be. -Rosemary

Another suggested that we focus on building a better business environment to support both the economic sustainability of the local food system and also local food access for consumers, naming that as a priority for sustainable development as our community continues to grow:

> Um, well, I think from my like corner of the world, it would look like a lot more prolific local options at a range of prices. And, like, I don't know, a better business environment sounds really narrow. But what I mean by that is like, I think there's a lot of room for our area to grow in terms of like, restaurants and retail outlets and local farms. Like I think we've, over the past 10 years seen, like a lot of growth in the farm sector. And what I would really love to see in terms of like, envisioning, like,

> something really amazing would be like the growth of that level of businesses and innovation like across the rest of the food system, besides just local farms. Like right now, there's not like a restaurant, you can reliably go to and get local food if you want it on any given day. And I'm not saying that that has to be the only option. I'm not saying everyone needs to just go eat local all the time. But like even having consistent options around that. And like farmers who can work with those people to like, increase options of like, there's gonna be a lot of people living here. And we should have, like, all of the food options that come with that level of development. And it feels like it's lagging behind everything else. -Harissa

One participant mentions that we have been reactionary due to the COVID-19 crisis rather than thinking about sustainability long-term, but that we need to get back to not only thinking about economic sustainability but also other aspects of sustainable development such as land use and zoning:

> I think that food security or things like that, or I think folks think about the farmers market from an economic development standpoint, I don't even think we're thinking from a land use standpoint and the decisions we're making about how to approach development or how to zone that that it's being talked about. I think that in order to make progress, it's hard to think about it because it feels like a long-term issue. And we've been, you know, over the last couple of years, everything's been COVID related and, you know, making sure the economy is functioning or dealing with the things that are right in front of us and how to deal with it as an issue that is right in front of us. -Rosemary

The accelerated rate of development in our area is one factor adversely impacting economic sustainability of the region, with the rate of development only projected to increase as climate impacts become more severe:

> The fact of the matter is we're exploding at the sacrifice of producing farmland. And sure, housing is a shortage. The more you fill that shortage and the more you fill them up, then there's that much more people, many more people that really need to rely or could rely on the locally grown locally grown product. And I'm not sure there's any farm or group in this area that would be large enough to sustain a certain community for a period of time. And prices, the economy, I mean, for the last several years has been terrible when you're paying over $4 for a gallon of gas, and you know, everything goes up, unfortunately, and I never thought I'd pay $9 for a dozen eggs before but now you know, it's beginning to come back. I understand that. But it created a lot of havoc, and I'm certain it squeezed the cents per dollar from agriculture even further over the last couple of years. -Rye

> And which areas do we support development in? I think there's at least from where I sit in my role. There's a huge need for housing. Yeah, and affordable housing. And how we provide that housing across our landscape is important. And I think our public wants both sustainability and they want their food, you know, their local food, but yet they don't want the density that would be required of housing to support maintaining agricultural land. And the American dream of like your one-acre lot or your half acre or a quarter acre lot. And so, there's like a discrepancy there that needs to be addressed in order to support the food system in terms of land use, and then how we encourage and support and market our local producers and food-based businesses, as compared to national producers and businesses. Yeah, it's a tension. -Rosemary

Stakeholders such as Alfredo also worry about the inequity in funding of the various localities within the New River Valley and how that will impact economic sustainability as climate change pressures increase: “There's so much inequity between localities too, like, you know, you have greater funding in some places than others.” Participants suggest ways to positively impact economic sustainability. One offers lobbying to change where and how much funding the Farm Bill invests for conservation efforts in order to better support local agriculture, and another encourages investing in and building infrastructure for a regional food economy that not only supports farmers economically but also increases consumer access to local foods:

> Talking about subsidies, the Farm Bill is up for discussion right now. Like, what besides like the spending for the next five, ten, I don't remember how many years it is, but like in terms of like low hanging fruit, if you look at a pie chart of where the money goes, there's like a sliver of it, like 2% of like billions of dollars goes to like conservation. Whereas where I think that that's where most of the like grants for, like sustainable practices are diverted, whatever you want to call them come from so like even. That seems like a low hanging fruit to change where the money's going, which is only one step but could make a big difference because all the subsidies and crop insurance are going to larger scale production which is intended to mitigate some of the financial like ups and downs, but then ends up incentivizing particular type of production, because it's relying on particular crops prediction of how much yield you're gonna get. -Olive

> I think we need to intervene in infrastructure for a regional food economy. There's a lot of I mean, you know, as we look at, like, I want an avocado or I want this, that's not possible in this region. But there are things in this region that are very possible.

> And one thing that I work on in Virginia Tech is like meat production. Like, there's no reason that the Greater Southwest Virginia region cannot supply all of its own meat. But it comes down to like coordinating producers, having infrastructure on like, you know, processing facilities, trucking, all of that. And I think that would lead to like, more of like, economic development, in especially the rural areas that have been dependent on land for their livelihood. I think, you know, seasonal vegetables, which, when they're in season in our region, we should not be transporting vegetables in. And, you know, maybe we, maybe we cannot fill the demand and maybe, you know, there's a contract that Kroger has that says, I have to buy this every month and stuff. But I mean, I think it's up to the consumer to be like, I know that when vegetables are in season, they're going to be better if I get them here and help my neighbor, support my economy. -Bran

Social Sustainability

Social sustainability refers to a set of principles that prioritize equity, empowerment, accessibility, participation, cultural identity, and institutional stability. It emphasizes the well-being of people to achieve meaningful lives through proper healthcare, education, gender equality, and peace. Achieving and measuring social sustainability can be challenging since the dynamics within the social system are complex and more intangible than economic or environmental sustainability. Social sustainability works to create conditions for individuals and communities to realize their needs and potential while upholding human rights and equity (Mensah, 2019).

Some participants in this study referred to the knowledge and tradition around growing food that has been lost. Rye shares fond childhood memories, stating, “I always remember growing up in the family garden, we fed our family out of it now. And then, of course, in that particular neighborhood there was a lot of sharing of produce once it came in. But we've just, that's gone away.” Others note how that will likely be disadvantageous in the event of catastrophe, as people cannot take care of themselves or their neighbors:

> Probably more than a decade ago, I read a book about when the Great Depression happened. There was a stat that more than 75% of like households were growing some of their own food at that time. So, they had this embodied knowledge. And now

> that number is like single digits. Right. And so, thinking about any sort of an economic or environmental catastrophe that would be widespread, like people don't have that muscle memory, or knowledge. So that to me is part of social sustainability. Think about all the families that sort of barely squeaked through the depression because they knew how to throw seeds in the ground, or like they knew someone that knew. But it was far more common for people to have that skill set. -Ginger

One stakeholder views the cultural context of food as being deeply important, and notes that part of the issue with local food in modern society is around cultural association, and that a lot of people do not identify with the idea "bougie" food, a slang term that denotes something is luxurious and high-class. This stands in contrast to former social norms mentioned above, in which local food was considered a social norm, but is now a cultural competency that has been lost:

> And, and then also, I mean, just because of, I'm especially interested in this, because of my background, and like the work that I do, but also kind of the cultural context of like, what food means to people, and you know, how it's shared. And the kind of, like, just the meaning attached to it for people also, I think is an important part that doesn't always get mentioned. I think that's huge. I mean, it's like, it's just, it's one of the deepest, like, expressions and like, ways that culture is, you know, carried and extended and continued. And, yeah, it's just deep. Food is very, like very, like, yeah, just an integral part of being a human. And it means a lot to people like what kind of food you eat, where you eat it, who you eat it with, why you eat this and not that. It's a huge part of people's identity, like the kind of food they choose to consume, or have the ability to consume…But I think at different times, I thought maybe there was a cultural problem there too. Because like, local food is "bougie". And like has like a, it's got like a cultural association that a lot of people don't identify with. -Alfredo

Regarding social equity, participants frequently mentioned SNAP benefits and the importance of healthy food access, as well as the limited capacity for our community to be able to supply everyone who would want local food in the New River Valley with it:

> They're trying to offer SNAP benefits, you know, you can buy local food with your SNAP benefits. And that's great. I mean, stuff like, that's great. But I think there's also a giant middle ground. And then also a question of scale of, like, let's say everybody in Blacksburg wanted to buy local food, could they do it? Like, do we have the capacity to supply all of Blacksburg with local food? I don't think so. -Alfredo

> And I would argue, maybe one more point, that that food is actually food. So, the system's working well, when it's not junk, and it's not creating unhealthy humans. I'm not saying I'm anti processed food, but less processed food, I'll just say less processing involved. I mean, I don't know what the exact definition of what I'm trying to say is, but I think, you know, just food that looks like vegetables and meat and bread and eggs and dairy. And that's not veggie straws, what is a veggie straw, it's a processed potato product with some coloring in it. So processed food. So, I'm, you know, like Michael Pollan's advice to go around the outside of the grocery store, not the aisles. So, I would say real food is on the edge at the grocery store. -Nori

> So, I think accessibility is a big part of it. The extent to which the population kind of in at all socioeconomic levels have access to sort of basic nutrition, right. So, things like how close are folks to a supermarket or, or some sort of place that would offer fresh food, not just not just processed foods. And we think about that, even in terms of the kind of restaurants that are available in areas that are largely fast food, as opposed to, you know, you know, again, less processed food system. So, think about a food system that is accessible. A system that has, I guess, some basic capacity to grow some of our own staples, so to speak. And I think if communities have a reliance on some of their own growers, that provides for a bit more kind of resilience within the food system. -Brie

Participants highlighted the challenge that individuals encounter when attempting to begin farming, particularly due to land access. This scarcity of local farmers, who often have smaller operations, impedes opportunities for local food production. This is both a social inclusion issue with potential farmers, as well as with local food access for consumers:

> So, like, to me, it's like, there's all these factors that, you know, it's like land, like, like, one of them is just land. So, around here, land is priced for development. And like, for the most part for development, and, you know, whatever the highest possible cost is, so it's like, right there, you have a huge barrier to it. Because if you're trying to farm on land that's productive and good, it's going to be really expensive to procure that land. And almost every farm local farmer, I know, has some way that they got their land like either for free or like, you know, they're living on their parents' land, or they've got a spouse that makes a bunch of money, or they have another job where they make a bunch of money. Their production systems are super small, and a lot of them are really efficient and good at growing food. -Alfredo

Not only did participants bring up local food access and availability as a consideration, but also human rights, quality of life and wellbeing, decent working conditions, fair pay, and social responsibility to the environment and people:

> A food system is working well, when there is adequate food in the food system to supply the demand so that we have enough food on the table. I feel like the food system is working well when the farmer is profitable, or has a business where they feel sustainable, and it's not, you know, the full meaning of sustainability, which is economic profitability, profitability included. So, the farmer wants to continue doing what they're doing, because it makes sense to them as a family and as a career and as a business and as an impact on their environment. So, when it is working well, the farmers are not burnt out. They're not poor, they're not worn out, and they're not degrading their land. So, all of those things need to be in place for that part of the food system to work well… And then when the food system is working well, I've already talked about having enough supply. But the food access, where everybody has enough to eat, I think that's where, you know, food, food systems are working well. -Nori

> Oh, I think a lot of collaboration and where many different folks are benefiting from the producer standpoint. Like the producers' side, where many producers are working together to provide a resource for the community and are successful, and it's helping their businesses thrive. As well as meeting the needs of the consumers in the area and getting that food out to all the people who are in need of it, whether that's through programs such as SNAP, or through nice restaurants or, you know, farmers markets. And just that, that ability to work together and make it a successful it's almost like a dance, I guess. -Pomona

> I mean, and this is just the food system as a whole. Well, I mean, we'll start with producers, since that's where we're getting our food. It would be a really great dream for producers to get paid what they should get paid. So livable wages, let's just throw that out in general. For everyone, I mean, and that's the thing is like the food system. If everyone had a livable wage, that would help a lot with just having a resilient food system for all, for producers, as well as consumers. I mean, having that access to fresh food anywhere and if we could do that without having to do like SNAP programs, and things like that, that are surrounded by the stigma. But also, you've got to be, you know, conscious of your resources. So doing as many sustainable practices as possible. And having like the means to even get to like, that's, I guess, that just has to do with access, but you know, travel as far as, hopefully not having to travel very far. That would be the ideal. -Pomona

Another consideration of social equity, Alfredo brought up topics of diversity and inclusion, with hopes that we will be welcoming of climate refugees who make their way to our community: “And I hope we do, and we'll welcome people from other countries that, you know, are trying to get away from rougher situations. And so that growth, like what is how we manage that growth? Yeah, I feel like it is a big question. That's the most interesting to me. More demand for community gardens, for sure." As climate change begins impacting our world and community, participants would like to see Blacksburg grow in a sustainable way that is accommodating to all:

> Like more people using Blacksburg Transit. Yeah, it's hard to connect in my head, but you can use Blacksburg Transit to go to the farmers market to get their food. And that's like one less trip traveled on a vehicle that's run on gas or diesel, that sort of thing. Blacksburg also does have a housing shortage. And if there are more folks that need to move to Blacksburg because it's a more optimal climate, I would want everyone to want to try to move to Blacksburg. But if Blacksburg is going to grow, it needs to grow in a sustainable way as well. -Colby

Participants also discussed issues around how sustainable development needs to be considered, such as the dichotomy between deciding what is important versus what is important to people most impacted by these issues in the community. An emphasis on letting people decide what is good for them, what works for them, and what they have the capacity for shines through in these excerpts:

> There are also a lot of cultural barriers there like I, I do think that some of our clientele in terms of like our meal program. I don't know, it's interesting. Like in rural areas, there's still a pretty big nostalgia and emphasis around local foods, and like growing up in agricultural communities, or agricultural families where you had access to that stuff. But I don't know that that is translated into a value of other local producers in our community in a way that it would be, like, worth their increase in prices to go shop there to support them. And that's like a cultural barrier, that's like, pretty hard to unpack. Because like, yeah, we can say that these people value local food, because they have it as a history to their community. But if they don't have the means to purchase it now. Or like the desire to spend more of their income on that. But I don't know that it's our role to remove that gap. I don't know. I think the problem with a lot of development thinking is like, deciding what is important or good. And then wondering why people aren't doing it versus questioning whether that's what's important and good to them. And I really struggle with that, like, binary because I don't know, I feel like very unentitled to assume what those people think is important or good or that my perception of it is more correct. -Harissa

> I do think that like the program that we're doing, and like SNAP and stuff is like a good stop gap to like, if there are people hanging in that limbo who really do want access to that stuff. That's a good option for them. But yeah, we probably should be investigating like, more deeply, like, why there's not more people in that category. And maybe through a program like ours, where we're kind of like, just incorporating

> that stuff, and not even like, necessarily talking about it all the time is like a good way to do that. And I know the Glean Team comes up against that a lot growing produce for donation and then bringing it places and people are like, well, what am I going to do with all this winter squash and so like, I do think there is a place for education around that stuff, but I don't know I'm also not going to tell like a single parent working a bunch of jobs to like go home and process squash. People can decide for themselves. -Harissa

Generational social responsibility also emerged in conversation, in the context of how dealing with the consequences of climate change is being unfairly pushed off to younger generations to deal with. Participants shared a desire for multiple generations to work together towards solutions and actions, and to take ownership of their part:

> But I don't think we're doing a bad job. I mean, but I still don't think it's enough, right. And even though we can compare ourselves to other people, and maybe they're not doing anything very much at all, it's still it's frustrating, especially, you know, if you're a young person to see all this work that needs to be done, and hopefully, you know, people that are my age and older won't just wash their hands up and say, well, we're gonna leave it to the young generation to figure it out. I mean, I think we know what the solutions are. -Kobe

Social sustainability also shows up as relationship building and the importance of having social buy-in for the success and continuation of community efforts that will become more and more necessary as the climate changes:

> And to make sure they're sustainable. Because, again, the Glean Team is amazing but it's a small group of volunteers who are passionate. So how do you create a succession plan for those folks so that that key work is still happening and it's not necessarily reliant on just a few folks who are passionate about the work? -Brie

> Um, I guess the only thing I'd say kind of broadly, is what we have learned through these different networks that we've been a part of whether it's food assistance, or early education is just how important investing in relationships building is. And I think increasingly, as we have like zoom and technologies and ways for folks to operate at all levels independently, that we lose the, you know, that interconnectedness, that, that we have found, particularly during COVID, anywhere where we had really invested in relationship building, then when COVID hit those networks, and those relationships could really be leveraged very quickly to respond to something the community needed. -Brie

There was also commentary around the othering, degradation, and exploitation of people for profit and comfort, and how that attitude has spread to other aspects of society, such as the exploitation of natural resources. Participants refer to the interconnection of all living things:

> My hope would be that, essentially, we get our shit together here. So, we could stop oppressing people over on the other side of the world. And then maybe we could even help them get resilient. This whole system where we're turning all these communities destitute, so that we can have all these commodities. So, part of becoming, you know, local, part of becoming resilient here, will actually maybe enable them, and maybe we don't even help them. Maybe we just leave them alone and they figure it out themselves. I don't know, but we also wouldn't have these tendrils out elsewhere. Whether it's, you know, even renewable energy with our lithium batteries, you know, that's going to end up impoverishing, you know, people somewhere else, right? -Basil

> I think there's so much stuff that is "away", we throw things "away." Right? But where is away? There is no way. We put people who are disabled or elderly "away", you know, and so all of these systems are of "awaying" and disappearing, things that are challenging or hard or that we don't want to recognize our role in we just away them and you know, and that has allowed food production to become really ecologically damaging and also just horrific for the workers who are working in both plant production, and particularly in like animal based stuff, like slaughterhouses and those kinds things that are horrible places to work. And so, we've “awayed” all of the unpleasantness about this, we can bring it back into our daily lives and our daily landscape and built environment and make it beautiful and lush and verdant. -Ginger

Environmental Sustainability

Environmental sustainability centers on maintaining the natural environment's productivity and resilience to support life on Earth. It involves using natural resources sustainably as inputs for economic activities while respecting the Earth's limits and boundaries. Concerns about environmental sustainability have grown due to the impacts of climate change. Our current and impending loss of biodiversity is an example that highlights the urgency to adjust human behavior so that we do not continue to exceed the planetary boundaries within which equilibrium is maintained. (Mensah, 2019). Environmental sustainability and preventing further environmental degradation were priorities for participants. Alfredo expressed, “I guess that would be the main thing for me, and that the food production systems are not also causing public health or environmental issues, too.” Avoiding waste and pollution, protecting soil health, and promoting biodiversity were identified as core concepts of a food system that works well and priorities of focus for mitigating the impacts of climate change:

> I would say, when that food system is working well, we're not like polluting the environment or creating more negative, like net negative waste in trucking, or displaying or cooling, or all of those things in the middle part before it actually gets to the consumer. So, if the food system is working well there's not like this net negative energy waste from producing to the table. So, from an environmental perspective, I would say it's working well when that stuff is, uh, is minimized or eliminated or somehow balanced. -Nori

> A food system that works well is one that recognizes the biological and ecological realities of the landscape that help produce it, or other ecological systems that produce it. So isn't one to borrow an agricultural idiom that doesn't like, you know, eat its own seed corn. Right? You're not degrading the soil, you're not overdrawing the aquifers for irrigation, like it works well, within the bioregion. It doesn't destroy biodiversity. -Ginger

> Because if your population is growing and all of your agricultural land is being developed, then where is your food coming from? Further away. So yeah, I mean, I think that's probably like the biggest one along with maybe like water. Like just thinking about, like downstream effects of all this stuff in Ohio and just like how those types of phenomenon are becoming more and more of a thing, we have the pipeline coming through. I'm just like, all of these crazy developments are happening and all of them play a role in I mean, just thinking about like the acreage of forest cut down for like the pipeline and all of this development is like that's a huge climate effect that's like, also not directly food system related but like pretty significant. -Harissa

> We still have to feed the people on this planet. And not everyone has the resources locally to be able to feed even just, you know, the surrounding cities. So, it's kind of that balance of how can we feed the world responsibly and be conscious of our inputs? And how we're affecting climate, the climate, as well. -Pomona

One participant shared environmentally sustainable initiatives that the Town of Blacksburg has implemented or would like to implement, and shared that while they are doing work in the sustainability field, there is a lot more work that could be done in this area:

> But I think we're slowly but surely making progress on a number of different fronts. One thing we've made a lot of progress on is, like I mentioned, the Blacksburg Transit. We're trying to secure more funding to convert it to be all electric. We're looking at things like we would love to have something like a municipal solar array. So, the town government operations can rely more on renewable energy sources. There are some barriers that make it difficult to do that, including funding it and working with the electric companies. When there's additional energy to go on the grid, they charge you, and there's different like regulatory barriers, things like that. We're also encouraging more folks to use our public transportation as well. We just went to fare free service at Blacksburg transit. Which is not just economically beneficial, you don't have to carry change with you to use the bus if you don't have a Virginia Tech ID or something like that. But it also encourages more folks to use the transit system, which is much better for everyone than everyone having their own individual vehicles for every trip. Yeah, I know all of those aren't really food system related. But I think we're doing a lot of work in the sustainability field, but there's definitely more that we could do now. -Colby

Juniper states, “And then of course, want it to, besides being healthy to people want it to be healthy to the land, which to me would mean elimination of confinement operations and monocultures.” This demonstrates how participants share a priority to protect prime agricultural land, and hope that there is a way to balance both the economic and environmental considerations around how to use the land that we have. Others share similar ideals:

> I see this region having, you know, a wealth of prime agricultural land, that I hope that we can have enough conversations with enough people to elevate the understanding that a monoculture crop or meat production wouldn't be sustainable long term. How to weigh that against return on investment or the bottom line feels like a difficult conversation. -Hazel

Participants would like to see environmentally sustainable transportation, renewable energy sources, and a reduction or elimination of reliance on disposable materials such as plastics. For example, Sherry stated in the focus group, “And I wrote that down, agrivoltaics. They will pair it up with certain crops that will grow very well.” They characterize the 21st century as a society that relies on single use or disposable resources, a mentality that needs to change:

> Well, I would like to see less reliance on automobiles and fossil fuels in general, I would like to see more renewables as our where we get our power from, and that we get more of our products locally, particularly food products, and where you know, we are reducing our carbon footprints, we are reducing our reliance on single use plastics, and just the general disposable society that has been the early 21st century. - Julienne

> And I think, kind of, these single use plastics and all that stuff, like just really kind of making it mainstream, that we're using reusable materials. And I know those things are becoming more and more available. But you know, it's so easy just to grab your bottle of water or your, your bottle of cleaner, you know, and until you think about how much plastic you're about to throw away or attempt to recycle or something. - Brie

More specifically, participants focused on waste and waste management, which play a pivotal role in achieving environmental sustainability by addressing the challenges posed by our consumption and production patterns. Efficient waste management systems help minimize the environmental impact of waste, reduce resource depletion, and mitigate pollution:

> Eliminating food waste is like a massive, massive way to sort of combat some of these issues. So again, like, with institutions like Tech, or Radford University, they cook so much food and that food goes to waste. And they you know, you've put so much water and energy into growing that food. I think like, I watched a documentary recently, it was like one third of the world, or the United States food that we produce is wasted. So, all of that energy, and all of that labor that's going to that is wasted. - Clementine

> I think we have to deal with our waste issue. And waste management sounds bad because it means that it remains, and you detain it. But how do we seek waste resiliency? Or how do we feed it back into the cycle? So, I've been encouraged by private entities, private citizens doing more waste conscious practices like composting, and going to zero waste, and in Floyd they've got the refill station. And I think those are efforts in the right direction, unfortunately, I think it falls on the backs of individuals frequently when there needs to be more systemic change at the production and manufacturing level. I think also understanding our own agency, which, of course, sometimes the choices are kind of out of our hands, in some regards. Yeah, just thinking about all the little bits of plastic I tore off of something

> yesterday, anyway. But I think dealing with that waste, we see it a lot in our work with DEQ and DWR, about the refuse off of animal farms. And so that's part of our waste system we have to really get a handle on. And there's regulatory measures that are in place. But again, I think it's more of an understanding of the broader picture. So why we're fencing off the streams and there's possibilities where we can also be in a system in which we didn't have to do that because the quality of feed that we're feeding our cattle is more closely in tune with their natural nutrition. -Hazel

> That we're less wasteful. I guess that's a part of the food system that I didn't touch on, but like how we deal with our waste and our consumption and changing that, because ultimately, that will help slow things, right. So, if we can protect lands that we know are important, because they have some ability to withstand climate change, and support our food systems. How do we slow climate change through our own actions and consumption? -Rosemary

Participants also discussed how increasing soil health can reduce pesticide use by promoting natural pest control. Ginger shares that, “Having to apply more pest management strategies would have a negative impact on sustainability” and in a similar vein Bran mentions, “The increase in manufactured pesticides leads to a decrease in sustainability objectives.” Healthy soil with beneficial microorganisms, diverse plant life, and balanced nutrient levels creates an environment that supports beneficial insects and predators, which help control pests naturally. Conversely, pesticide use can harm soil health by reducing biodiversity, disrupting microbial communities, and affecting nutrient cycling:

> When it comes to pest management, some of my understanding, the top comment is that when we focus on our soils, and our soils are feeding, everything that they are getting, everything that they need to be fed, then usually as a byproduct, we see our pest pressures increase. So, sustainability in the food system is focused on soil building. -Hazel

> But it's just like, if we could get some of these larger producers, where they feel okay, maybe I can, you know, test my soil more often and make sure I'm not over grazing or doing just like implementing a little bit of rotational grazing. Where that promotes good healthy soil or you know, is a little more conscientious about the environment. -Pomona

> So, this kind of comes back to this soil building, soil health, right? Because you're taking something that's actually greenhouse gas emitting, right, all the methane

> generation, food waste, into something that can build soil health and be better, more sustainable. -Ginger

In the same vein as promoting soil health and reduced pesticide use for environmental sustainability, some participants also shared how raising meat with rotational grazing methods is beneficial for the soil, the importance of carbon sequestration in the soil for mitigating climate change, and how sustainably produced meat is not bad for the environment in the ways that industrial agriculture meat production is:

> And we basically are in the business of raising meat but doing it in a way that actually is increasing the fertility of the soil. So, it's all through rotational grazing, it's all through multiple species. It's all based around our pasture, which is a perennial pasture that has hundreds of species, you know, it's essentially the solar panel that's taking all the sun's energy and converting it to biomass, and then we try to turn that into food that's very nutritional. So, at the end of the day, if we're not making our soils better, then we're not doing our job. But that, you know, to translate it into terms that most people that are not necessarily into soil or farms, it actually is like sequestering carbon, it's actually sequestering water. It's, you know, it's increasing the whole nutritional cycle, you know, it's just revving up those engines of cycling all this stuff. And so, it can be translated a little bit into the jargon of what municipalities might be interested and whatnot, but in the end it's just, you know, we're trying to actually improve the ecology of our footprint by providing meat. -Basil

> So, in order to keep that intact, you have to have animals, right. Grasslands, and pastures have evolved with animals, right? They are, what pumps they are, what cycles they are, what continues to get carbon and water into the soil and increase organic matter. Increase diversity and all. But most people are gonna go, oh, well, I'm going to not eat as much meat for the environment. -Basil

Participants discussed the importance of transportation as a factor in environmental sustainability, particularly as a contributor to climate change. Malina shares that, “We sell only locally. We don't do any shipping. So, we try to do that intentionally, too. We have a lot of requests to ship but we don't. So no, direct on the farm is our preference.”

Organizations are also thinking about transportation:

> One of the things that, that some of our food assistance organizations have talked about, again, is kind of a dream to do is that oftentimes, if they're getting, like a delivery of something huge, right, you know, that, that, that, you know, from Food

> Lion, or some somebody that's got excess food, so they're delivering with a truck, you know, is there some way that that truck is not only coming to deliver food to that spot, but then it's loaded with something else to bring back so you're not having empty trucks go back and forth? You know, kind of just ways to, you know, when you are traveling to different areas, that we can be thoughtful about the trips that we're taking, and what we're what we're transporting back and forth…Because transportation could be such a big barrier to accessing food, but then also a contributor to climate change. -Brie

Connected to transportation was the mention of fossil fuel consumption. Human behavior and our extensive use of fossil fuels has disrupted the slow carbon cycle by releasing unnatural amounts of carbon dioxide into the atmosphere. This excessive release of greenhouse gasses contributes to climate change by trapping heat and causing global warming. Minimizing fossil fuel use will promote environmental sustainability by mitigating climate change impacts and preserving natural resources. One participant notes that fossil fuels are throwing us into disequilibrium, and yet we blame climate change on cows and meat production:

> We need to mitigate our fossil fuel consumption. We of course, we need to get, we need to get our soils back to health, we need to get our ecology back to health, we need to get all this fast cycle back to health. But that is qualitatively different from the fossil fuel we're taking from the slow cycle, pumping it into the fast cycle. And the fast cycle doesn't know what to do with it. The oceans are taking up as much as they can. It's acidifying there, all this is happening, right? But that is a fossil fuel issue. And that is actually the primary driver of what's throwing things out of equilibrium. Despite all the problems we have with soil and desertification, everything. The thing that's really throwing a wrench into the thing is that we're taking from the slow cycle, putting carbon into the fast cycle at an unprecedented rate. Maybe when the meteor hit maybe we had that much carbon flying, right? So, all these things that we talk about local and everything, they have the side effect of minimizing the use of fossil fuels, which is throwing things out of equilibrium. So, a food system that gets the slow cycle back to health, we get our soils back to health. We get our ecology back to health. Our forests are healthy, our meadows are healthy, our wetlands are healthy, right? That has to import. And I think just by doing that we'll have the side effect that does help with this fossil fuel, but we also have to be mitigating. -Basil

> So, we have this fast carbon cycle, which is all part of us breathing, it's all part of the burps from cows, it's all part of trees. It's all part of trees dying. And that's definitely

> you know, something that we can impact with farming and whatnot, that fast carbon cycle. The whole other story of the slow carbon cycle where we have fossil fuels, right, where normally, it takes a million years for all this carbon to get into the ground and then explodes into a volcano, right? This like, geological time frame of millions of years. So now we're extracting out of that slow cycle. And we're putting all this carbon into you know, from all of our fossil fuels. And then we turn around and say, look what the cows are doing. Right? -Basil

Potential Leverage Points for Intervention

Many sustainability interventions focus on "highly tangible, but essentially weak, leverage points" (Abson et al., 2017, p. 30), thus they do not address key problems. Based on the framework of leverage points for sustainability interventions (Meadows, 1999; Abson et al., 2017) three realms of "deep leverage" can be used to effectively address sustainability transitions, such as those required to transition towards food systems focused on resource efficiency and eliminating waste. These include: "re-connect" people to nature to encourage sustainable behaviors, "re-structure" institutions and consider how institutional dynamics can create a supportive environment for sustainability, and "re-think" how knowledge is created and used, shared, and validated. Research that addresses relationships between the above areas can build an understanding of how to address sustainability issues within systems, such as the food system (Abson et al., 2017). This theme is broken down into the following codes: *re-connect, re-structure,* and *re-think.*

Re-Connect

The ways in which people perceive, value, and interact with the natural world shape various systems. Researchers have observed a disconnection from nature at individual and societal levels, which could negatively impact sustainability. Different types of connections with nature, including material, experiential, psychological, and philosophical all influence human values and behaviors. Strengthening these connections and understanding their transformative potential is crucial for promoting sustainable behavior and improving our relationship with the environment. Reconnecting people to ecology holds immense potential as a leverage point for addressing climate change by fostering a deeper understanding and appreciation for the natural world (Abson et al., 2017). Individuals may be more likely to adopt sustainable practices, advocate for environmental protection, and support policies that mitigate climate change if they feel connected to rather than separate from the natural world (Soga & Gaston, 2016). Some participants envision this re-connecting as redesigning our public spaces, where food production is integrated into daily life rather than segregated:

> I think ultimately, what looks like a resilient food system is a return to some elements of that. I don't think we're going to return to a medieval existence, per se. But there's so there's some wisdom to those strategies to having that sort of diversified and integrated food production. That's kind of just part of daily life, not just that person's a farmer, we have, you know, we have 2 farmers for every 500 people, it's more like everybody is in some way, you know, like landscapes look different, yards look different. Public spaces look different in that world, right? Where food production is integrated, not segregated. -Ginger

> We can remove barriers, which are like zoning regulations, and encourage more local food opportunities. Like, years ago, I saw a video about a community in England that had like, in all their public spaces, they had just planted fruits and vegetables, you know, blueberry bushes, you know, all these things. And so, people could just sort of glean as they would, and I don't think that it was feeding a whole lot of people, you know, but it would be really kind of cool if there were community gardens where people could just come and harvest. And I don't think the town necessarily has the role to provide that specifically. -Julienne

Participants highlight the consequences of our disconnection from nature and the overreliance on technology. Our modern society is largely centered around virtual and technological advancements that create systems which are detached from the ecological norms that used to guide society. This separation has led to a lack of understanding and respect for the natural world, which has led to unsustainable land use, undervaluing manual labor, and a disregard for ecological concerns. We need to reconcile with the limitations of this mindset, and reestablish our connection with nature in order to realize that the rules of ecological balance apply to humans as well:

> So, whether you're talking about land use, whether you're talking about a living wage, we talked about manual labor and not valuing it, the problem is we have built an entire virtual world based on technology, at scales that do not happen in nature, we've completely separated ourselves, we no longer know what's appropriate, ecologically. So, we build these systems that are basically at scale ridiculous that can only be dealt with and continued by things like technology. -Basil

> I think traditionally Western thinking and thought and philosophy has separated ourselves from nature. And we're now in, we've been reaping the rewards of that, so to speak. I think he's right, because we have separated ourselves from nature, the solutions, of thinking that somehow those rules don't apply to us. -Kobe

This reconnecting does not need to entail large scale efforts or everyone growing their own food but can look like redesigning systems in a way that connects people to their food and increase their understanding of the food system. It may encompass connection as small as caring for a single tomato plant:

> It's like creating systems, programs, and incentives that make people more connected to their food, it doesn't necessarily mean that they're growing it but ultimately, that would be great too. Even if it's just a single tomato plant, understanding of the food system. -Ginger

> But I do push back a little bit on that because I don't think that we'll ever get to the point where each family can produce, you know, enough for their own consumption. There's obviously some advantages and disadvantages and people have a different accessibility to that and everything. But I think the behavior change shift that is needed in order to push us into a future of more sustainable food systems is one where people are gonna have to start to relate to their food again. Most of the time that looks like a pot with a tomato and the kids get to see like those tomatoes coming to fruition like, and then I think there's more of that behavior change but it prepares us for like shifting our ability to see like, what do we mean by sustainable and who cares, you know, like doesn't, it doesn't matter because there's no connection to the food system. -Hazel

Many participants recommended reconnection to ecology and the natural world through formal education or programming, especially that focused on youth. Hazel highlights that, “I hope that also brings back into focus the importance of our early education time period and forming relationships with our land and with our beyond human species. I worked with children back in Raleigh in the gardens, and it's just so impactful." Some relate how connecting people to firsthand experiences with livestock and growing food provides them with valuable insight into the food system, and how these experiences foster a deeper connection to the source of their food. Hands-on engagement can inspire a sense of awe, instill an appreciation for the environment, and encourage a sense of responsibility that may encourage youth to support sustainable practices and advocate for a more resilient food system in the future:

> So, to begin to learn again, especially in terms of young people and young kids, is to let them experience and see and have that firsthand knowledge as a young, really young person. Let them dig in the soil. What is compost? You know, what do you want worms for? All, you know, it was a fascinating thing you can learn about, you know, moving dirt, putting seeds in the ground watching them grow. What's not to like about that? I mean, we should do everything we can to promote that. Almost like if we could maybe get Dean Crane at parks and rec, to support something, you know. That's one way to do it. He's got, you know, get the kids early. You know, there'll be some that will be very interested in that. And that'll spark a lifelong interest in gardening and soil cultivation, and fresh fruits and vegetables. -Kobe

> Now whether we're educating as I said that the students are, you know, able to grow and produce a small garden or large garden. I know my mother growing up, we always had a garden and always had, you know, food and canned foods and things. And I still do see, I still see a lot of small garden plots and things around. It's the educational portion of it and teaching the kids about livestock and, and how to care for them. And, you know, I'll use my granddaughter as an example. She took her agriculture class of FFA kids to a local beef farm, met with a group of veterinarians and they were doing pregnancy checks. So not only did they read the ultrasounds and saw how to do that, they learned how to inject large animals, but 15 of her girls, and none of her guys, actually gloved up and did the artificial insemination thing. And, she said you know, that's, you just don't see that much anymore. They got a lifelong experience just right there. -Rye

> I saw the biggest impact when I worked for the Center for Health Education. And we had a very robust garden and learning education kitchen in there and to see the link from growing the food to cooking it, it's something that we cannot miss, you know, that is something that we need to capture the attention of young people. I think it makes it relevant for them. I had kids not knowing that ketchup is made out of

> tomatoes. It's exciting when you can see the wheels turning behind their eyes. And it's really, it's quite amazing. Yeah, and they love it. -Hazel

Participants also shared that working the land and getting your hands in the soil offer invaluable opportunities to reconnect with nature and ecology. Engaging in gardening, farming, land stewardship, and other activities allows people to develop a direct and tangible connection to the earth, which fosters an understanding of the cycles of life and interdependence of ecosystems and all life. Humans also begin the recognize their role and connection to that web of life rather than feeling separate from it:

> You know, it's, it's, it's really a shame, I think, the most joy I've felt, in my work to this day is, is working in an agriculture setup, in an urban garden, every day, and I felt so much more connected, connected to the people, to the place, to my own body. We have disinvested in that. -Hazel

> But I feel for this... a vision where cities are not where most people are at. Cities are hotspots, they are disruptive to all the equilibrium of, of cycling, of water cycling, of heat cycling, right, that has to shrink, we have to get people get their bodies back into it, right so that it's actually not all technological machine work. But we get our bodies back into working with the land. And suddenly people are connected, not just mentally, but also physically, they have dirt under their fingernails, they have poop on their shoes, right? That's where it's going to happen. Because then out of that that's part of saturating everything. Get them off the concrete. Get their hands in the dirt, kiss the ground, you know, all that, right? It has to, otherwise it's not going to change. -Basil

> I would contrast that with sort of when I think about the big picture, it's very varied, because I know too much. I grew up in a failed state. But there are times when you're out, lambs are popping out and are jumping around the land. Those are some good moments that, you know, it's amazing to think that those moments of real enjoyment and pleasure are actually part of the answer. That can be, that's amazing that there is a part of nature that if we could tap into her abundance, it's a very enjoyable thing. And that the fact that that could also be the answer, a part of the answer to climate change, actually, that could be a very positive thing. -Basil

Re-Structure

Institutions play a crucial role in societal organization and can guide human action towards collective goals. Institutional change is vital for sustainability transformations, but it can be challenging due to the resistance of existing institutions. Understanding institutional dynamics is essential in effectively harnessing structural change for sustainability (Abson et al., 2017). Institutions can include governmental entities, non-profit organizations, educational institutions, corporations, social groups, and more. A social norm can function as an informal institution—as it becomes widely accepted and enforced through social interactions, it can influence individual behavior and shape collective expectations within a community. Institutions play a distinct role in shaping policies and practices (Hodgson, 2006). By aligning these policies, practices, norms, and decision-making processes with sustainability goals, institutions can create an environment that encourages and supports sustainable practices, consequently paving the way for climate action and food system resiliency (Abson et al., 2017).

One restructuring change that participants brought to light focuses on shifting institutions, whether entities or norms, to buying local food. This could be done through policy or programs at a municipal level:

> I think that the biggest impact that municipalities or, you know, like governments or anything can do is to encourage a healthy food system by purchasing local food. I think that is like an area of focus that would be very beneficial. And if there is demand, and farmers are making good money, then more people would want to be farmers. I guess in the market demand increases if more people are seeking out that product. So, I would say, you know, rather than training farmers, it's really about building the successful sales and marketing or outlets for local farmers to actually sell their product and make it easy and, you know, a booming business that people want to be a part of. -Nori

Buying local could also be promoted at the community level:

> You know, I'm part of two farmers markets. And I think both of them are growing, but anything that people can do to support and encourage that growth is helpful and support and encourage shopping at the farmers market, or shopping at local food stores that are carrying local products, or buying direct from farms, anything that people can do to encourage that, I think, would encourage more people to want to be farmers, if the demand is there, in some ways. -Nori

Stores and restaurants could focus on more local procurement, or redesigning their business models to focus on or even just incorporate more local food options:

> I just keep coming back to how can all businesses, grocery stores, restaurants, institutions, and stuff, prioritize more local buying. I just feel like it for some reason, I just feel like it has to be more localized and maybe I'm wrong, you know, maybe it will be more efficient to still truck it when we have clean energy to truck it. But in my little push for my local economy, I feel like a resilient food system is going to have to be more self-sustaining from a more regional, local level. -Nori

> But maybe starting even with some of this is really far-fetched, I would say. But it, it would be one of those where at least, you could potentially promote more local, somehow, with, you know, maybe grocery stores having a local section in their stores to where you're promoting local producers now that that's probably super far-fetched, because I'm not sure if that would ever happen. But even something like that, where you're intervening as far as what people are buying, and not by saying you can't buy this, but making it more available. Yeah. I think some companies would be more into that than others. We're gonna go that route, let's go big business instead of production. -Pomona

Shifting norms around individual or societal attitudes towards buying local among food consumers was also a consideration:

> You have this ecological disaster, you have this economical disaster, I mean, this is the price of globalism. But it's so hidden. It's so hidden that we think, oh, this is wonderful. And so, anytime we can do local, you may not even know what you're preventing. But every little bit of the system that you're involved in, is going to have repercussions, either good or bad. So, I also think that eating local is probably the most powerful thing you can do to affect climate change. -Basil

> Well, encouraging more folks to eat locally, or source, the food that they're getting locally would certainly help. Because then the food isn't, they're not using fossil fuels to transport the food not nearly as far. There's also kind of other environmental benefits to that too, there's less packaging if you purchase from a, if like, I went to pick up my CSA from glade road growing, I might use a reusable bag, that sort of thing. Whereas if you're picking up groceries from Kroger or Food Lion, there's like more packaging, and that has a not just environmental impact, but there's cost of transporting the packaging and things like that. But I would think the biggest would be encouraging more folks to purchase the food locally. -Colby

Participants also advocate for developing efficiencies around local food transportation and distribution, or purchasing food locally to offset fossil fuel consumption from transportation with concern for harmful environmental impacts and restructuring to offset them:

> And you know, as far as the food source comes, I just think we don't really have a clue exactly how that's going to affect us. For one, it's new, it's new to us. So, we can kind of predict and listen to folks that think they have a sense of what that is. But I think generally speaking, we're going to be kind of learning as we go along, on how to make those changes. I do think that it will affect our food, food systems and delivery systems. But again, it's sort of the catch 22. How do you deliver food? You know, you have to use trucks and different things like that, which again, goes back to the whole issue of different fossil fuel consumption. I think some of the answers are more local, local, keep everything small, keep everything close. So, the transportation is smaller. -Kobe

> And then like, if you wanted like a more specific response about like local food initiatives, I would say expanding like retail options for local purveyors or having like, we were talking about food hubs last week, but like, maybe reducing the individual transport of stuff from, you know, most of the local farms around here a little bit smaller, and they're all doing their own individual transport and distribution. And so there may be some intervention points of like, I don't know efficiencies that we could develop around that. -Harissa

Removing barriers was also mentioned as an essential area for restructuring. Participants emphasized the need to remove barriers and address challenges that hinder local food production. This includes addressing land access issues, providing support for farmers to overcome economic obstacles and access necessary resources and equipment, and removing restrictive regulations such as zoning restrictions on vegetable cultivation:

> I mean I feel like there has to be some kind of fundamental, like if we really wanted like strong local food production around here I feel like there would almost have to be some kind of like not land reform, but like some kind of thing where it's like we're like we need this amount of agricultural land in this region…it's got to be some kind of more organized thing than just being like we need more of these like little tiny farmers and little tiny farmers markets…if it was going to have a real impact it would have to be some kind of like, like crazy economic and political change…I don't know what you do other than like trying to find ways to continue to support to make it easier for people to farm you know, like economically I'm like I think like the economics are in a lot of ways the big hurdle, trying to make it like easier for people have access to land, trying to preserve more land for agriculture, and like connect

people that might want to farm but don't have like the ability, the capital to access that stuff. -Alfredo

But there's things we can do to support other people who want to do that, like, you know, like JP at Glade Road Growing has this idea. And he would need some compensation for it. Heritage Park, since it's across the street, is where he would kind of like to do it. His concept is and I don't know the details, but essentially, he wants to plant a field, fruits and vegetables, mostly annual vegetables. Because he says the single most expensive part of his process is the labor. So, he says he can grow anything. So let him grow it. And then people could just come and harvest. It could be a sliding scale. It could be, you know, pay what you will, but then people who don't have the means don't have to…I think that if we could remove the barriers, like say, we're gonna do this experiment on town property. And I don't know where the funding comes from because I'm just trying to be practical. But if I didn't have to be practical, then we could pay JP a reasonable wage to be the great farmer that he is, you know, and produce the food. On an aspirational side of things. From a practical side, I'm not sure how that would work, or if it would work. But you know, do you get grant funding? Do you get donors who would make that happen? There's possibilities there. I think that's a concept that 's intriguing to me, because if the expensive part of the food production for him is the labor to harvest, wash and bring to market, then cut that part out, let people come and just harvest their own. But then, of course, people who have disabilities aren't going to be able to do that. So how do you then, you'd have to have, you know, another way to get food to those people. But it's an interesting concept. So really support and remove barriers. I think that's really the only thing I can think of that we can really practically do. -Rye

I think we need to remove barriers to local food production. Some of that is zoning regulations. Some of that's code enforcement like, and we don't have a problem with this in Blacksburg, but some municipalities do like you know, you can't grow vegetables in your front yard kind of thing. You have to mow, you have to do this, you have to do that. That's not really a problem in Blacksburg. There's no zoning against that. But removing barriers particularly land use barriers. That's what we can do. You know, big national policy changes we don't have that much influence over, obviously. -Julienne

This could be accomplished through plans that assess and identify the barriers to entry or retention for food producers or plans for protecting agricultural land:

Identifying barriers to entry for food producers. Access to like, good land, and then once you get into it, it's like, well, everybody would keep talking about growing vegetables and stuff around here like livestock might make more sense, and then you need equipment and you need stuff that like as an individual, especially somebody getting started it's like, you can't make that kind of investment, so like how do we either like form relationships that help people spread those costs around or subsidize those costs or do something to make it easier to break through it. -Alfredo

> I would do an assessment of farmland that is important to maintain as agricultural land across the region. And develop a plan for protecting that and comparing how zoning interacts with that. And then, looking at what support we need to encourage sustainable and economically beneficial production of food in those places. So, like, what support is needed to make it vibrant? -Rosemary

In addition to assessments, participants think we need to support Extension and other programs that help with agricultural viability more than we are. They also believe there is a multi-level government role in preserving agricultural land that needs to be explored:

> And I think we can also support... I don't know if it's like Extension or other programs that foster greater climate smart agricultural practices with current food producers, support programs that actually, like help with agricultural viability. I mean, I think the whole issue is like farmers aging out, descendants not wanting to be in farming. You know, when we lose farmland, we lose it forever. And so, thinking about how to not just have a bank of municipal property, but ways to keep agricultural lands agricultural are all like some of the solutions at the federal and sort of multi state level. -Ginger

Participants discussed the importance of policy step downs in areas such as animal processing and compost facilities. By reorienting existing systems, such as transitioning from conventional to local beef, implementing tiered regulations for food producers based on scale, and addressing specific challenges like composting regulations, policymakers can create practical interventions that support sustainable food systems at the local and regional levels:

> Well, I mean, we talked about just this issue of food waste, and composting. And that might seem narrow, but it's a big, big part of the climate profile. And I mean, just within two minutes, we kind of identified this, this challenge of like, the just the DEQ, requirements for setting up a composting facility that are so outside the scale of what that operation is. And that seems like, look, getting anything passed to the General Assembly is really, really hard. I'm not saying that's an easy one. But that's such a concrete lift, rather than, you know, dismantle systems of oppression in food production. But that seems like a maybe short to medium term thing to work on and see if you can build, because if there are folks like in the Roanoke group, who were able to figure out a way forward. That's intriguing to me. -Ginger

> The thing that I've heard is that the DEQ regs on a composting facility are on par with a landfill, like there's not like a step down, where they're like, okay, this is what, you know, a municipal landfill, and then this is something else entirely. From a policy perspective that might be an intervention point actually is to lobby or do whatever legislative action is required to get that step down, because I think that's been a local complication here. -Ginger

In addition to the creation of local composting, participants advocated for the adaptation of existing conventional programs to local ones, such as scaling existing beef cattle setups or systems down to smaller, more local versions:

> But like one thing he was talking about a while ago, I don't know if he's still working on this or not. But this was an example of something that I thought was a cool idea. It's like, around here there's different farming people like there's like the small farm farmers market types. And then there's like the more traditional farmers in the area, a lot of whom like, mostly just like raising cows. And like a common system would be just like raising cows to sell to like to auction to go to feedlots and part of that system. So, it wouldn't be difficult to take that system and reorient it to local like pastured beef in some way. Like you'd have to have some kind of like economic structure like a buyer or an aggregator or something that's like organizing people and trying to find a way where they can scale it because that's the thing right now most of the local pastured beef, are like, I have three cows and I take one of them a year, or two or three a year to the local butcher or whatever. But if there was some way to like, network those people and adapt like an existing system and turn it into, like take an existing conventional system and turn it into a local one, that's something that would be easy, like relatively easy to do and not require, like, crazy foundational change in the area. So, stuff like that I think is helpful. And anything that broadens, like a lot the existing local food constituency. -Alfredo

Similar solutions were proposed around both hogs, and the effectiveness of policy step-downs around poultry were shared as an example of how beef and pork processing changes could also be a success:

> I do think we're talking about municipalities and government whatnot; regulations are the low hanging fruit for small, that's something you can change. So that if there are people, there are people I know, who want to be doing this stuff, and you are hampered. Right? And we can be wise, but we don't scale regulations. So, we have the same regulations for a food producer that produces 50,000 hogs, as you do for a producer that produces 6 hogs. And this is madness, right? Nothing in nature works, that the same processes at one scale at the tiny scale. And that's faulty thinking. And if we had, it seems like that's low hanging fruit to me, if you had some political will,

> and you have whatnot, that you would have different tiered regulations, it's simple. -Basil

> We do that actually with poultry. And it's worked really well. And so, for some reason, we have a different mindset with poultry. Because during the world wars, depression, everyone was encouraged to have their own flock and raise their own eggs and help out the economy that way, right? For some reason, other animals don't have that same mentality…there are all these custom processors, and everyone's just, we have to plan two to three years in advance on animals that have never been born and schedule our processing dates. And these people are very highly skilled. They have the facility, and we just can't get the political will to just encourage them, give them a grant, give him something so that they can expand a tiny bit and be able to do USDA, it's simple. But we can never seem to do that. I mean, if we start talking about COVID, because all the value supply chains were all crumbling, and there was bipartisan movement on it. But you know, we're at a gridlock. But it seems at the local level. Surely, surely, we could do something simple like that. -Basil

Participants shared ideas around how to restructure existing programs, spaces, and systems to improve their social impact or sustainability. Sherry states that, "One of the things that seems to be a win-win is aquaponics and hydroponics. That's like a win-win for, it seems like, everybody involved in it. It seems to increase yield per acre without doing it by altering the produce. It would be nice to see more of that." Others included expanding the farmers markets or creating a mobile farmers market for the New River Valley, utilizing schools after hours for food security and community building, and shifting to alternative growing methods:

> The farmer's market has grown, maybe we need to find additional space for the Blacksburg farmer's market. Or offer it on more days, or that sort of thing to help expand, creating more like education and like marketing of what food resources are available for folks, like not everyone in town probably knows that there's these different CSA programs or farm shares that they can participate in. I've heard of a program not here, but in the Newport News, Virginia Beach area, where it was like a mobile farmers market and would go to different low-income apartment communities in the Hampton Roads area. There's basically like a van that would be filled with fresh produce and sort of stuff, I think you'd have to have refrigeration and stuff. And it would go on certain days to different communities, and folks would be able to purchase fresh local foods that would come to them instead of them having to go to a farmers' market. They're also able to go to communities that don't have farmers markets, you know. -Colby

> In what ways are we using our school infrastructure in the evenings to provide meals to families that need it too? And community spaces as well because obviously food is not just about sustenance, but about connection so what how are we creating those? I'd love it if we had a system where our schools were also places where communities could come to kind of eat together and access food, particularly for those who are food insecure. -Brie

Virginia Tech is a major institution in Montgomery County, and stakeholders would like to see more involvement from Virginia Tech in advancing sustainable agriculture and local food systems. Rye asked, "Can you expand Virginia Tech's meat processing plant to take in the local stuff?" They would like the university to leverage its expertise and resources to better serve the community, such as expanding its meat processing facilities to the public and taking a leadership role in sustainability initiatives:

> Well, if I'm being honest with you, I think that Virginia Tech could play a higher role in this type of thing, then, certainly, Kobe or Julienne or Sage or myself could. Because whether you like it or not, you are an agricultural college. Back in the day, but, you know, with the powers that be with on your board of visitors and things, is there not something from the agriculture end that y'all could not reach out to some of these people and say, here's what we need to do. Now, it's great about expanding out and granting incentives for the local meat processors to get bigger. But it's, as Kobe says, and Sage will tell you, if we do that, then it's just like getting an unfunded mandate from the state, they tell us, you got to do this. But you got to pay for itself. So, it's got to be in it. It's got to be from the college side of it, along with the delegates and the state senators and Farm Bureau to move forward. That's, to me, if you're asking, if you're asking about one group, that certainly has a lot of impact, a lot of say, within the state it's Virginia Tech. -Rye

> And ultimately, for our area, I wish Virginia Tech would step it up a little bit. And being a model for the region, I mean, Virginia Tech employs so many people. And I know that there are so many other more progressive universities related to sustainability and their participation in town related work, because there's a lot of smart minds. And it could be a really great incubator for ideas. -Rosemary

> I think, you know, I think Virginia Tech's doing some interesting things down at Kentland farm. I wish they'd do more there. They have the resources. They need to be leaders in that I think and right now. I don't really see them doing as nearly as much as I can. And I work for Tech…supplying our cafeterias and dining halls here on campus. I think, you know, a lot of the restaurants I think, have had partnerships with the growers to the best of my knowledge, I think that's still happening. COVID

> may have thrown some of that into relief. I don't know. I'm sure there's a lot more we can be doing. But I think the answer has to be local communication, local support, support people. And, you know, if it means paying a little bit more then we should pay a little bit more, you know, I think if you know if we can solve some of our issues here locally, that will spread out. And that's the way to start. That's the only way to start. -Kobe

Participants want to see in increased reliance on renewable energy sources and reduction in fossil fuels, better infrastructure to support mainstream use of these cleaner energy sources, as well as regulations that hold businesses accountable to steep consequences for pollution:

> I think it would involve greater reliance on renewable energy sources, wind, solar, geothermal energy, all of those sorts of things, and significantly less reliance on fossil fuels. I think in order to do that you need, transportation is a huge thing. You need to do a combination of changing over, or electrifying vehicles, so folks are using electric vehicles. And then you also have to have the source of the electricity that is getting to the vehicles, needs to not be one that's putting carbon in the atmosphere. -Colby

> Yeah, my friends, they went to Arizona last week and got a taxi and it was an autonomous electric car. And I was like, I thought it would be expensive. They only went like four or five miles. They're like, "it was five bucks." It was electric. Kind of cool. It would be neat to have some more, I guess internal ways for... especially for transportation, if we had more infrastructure then maybe people would have more access to better food. But it's not the answer to the whole thing. -Coriander

> Less fossil fuel use and more regulations on polluting businesses and farms. And I don't care if the price goes up, I don't think that prices going up is an excuse to not do it, you know, or taxes going up. I think there's, there's a lot of wealth out there that can be tapped if we choose to tap it as a society, you know, if we make those choices. So, I think we have the resources to do it. And they just need maybe a little arm power, muscle power to get it done, however they want to get it done. If they don't want to call it regulations, maybe call it like extremely high taxes to run your CAFO (Concentrated Animal Feeding Operations) and whatever you have to do to really dissuade corporations from doing that. -Juniper

Policies to decrease poverty and increase equitable access to housing, local food, and other resources were suggested by stakeholders who believe it is becoming too expensive to live in Montgomery County, particularly Blacksburg. They emphasized the need for tax incentives to promote affordable housing and address the wealth gap in Blacksburg, ensuring that staff, faculty, and lower-income individuals can afford to live in the town where they work. By providing incentives for developers to include low-income housing in their projects and implementing progressive tax plans, more people can afford to support local farmers and contribute to the local economy:

> Overall, I think there should be more tax incentives for lower income housing in Blacksburg if you're going to build, or you're going to tear down low-income apartments to build extremely luxury housing, which is probably better for the environment, has integrated parking, and probably has way more energy efficient materials. So, it's overall better for climate change, yes. But it's those folks who are going to come and build in our area, because a lot of them are not from our area, these developers are not from our area. And then there needs to be incentives for them to provide portions of their housing to be low-income housing for students, nonstudents, anybody, because it should not be the case that staff and faculty who go and work at Tech cannot afford to live in the town that they work. -Miel

> Decrease poverty so more people can afford it…Medicare for All and like more progressive tax plans, if you close the wealth gap then you'll have more consumers who can afford to pay farmers what you know, they need to be paid and buying stuff. It has to be cheaper to live here. -Alfredo

Some municipal leaders believe it is possible to take firm actions to ban further use of businesses and practices that they deem to be harmful to the environment or climate change mitigation efforts:

> When you get into this climate change and warming and, you know, the fact that we're losing so many 100,000 acres of rainforest every year, and a lot more, a lot more forest areas are now being converted to housing developments and things. So, we got to be able to control, you know, the things that like the trees and how they absorb our carbon, these types of things that we need to be able to put a hand on it, we can probably do that here. It would take some pretty firm actions by the municipality to ban any further use of certain things over here. I wish I could ban car washes. We've got about nine car washes over here right now. I don't understand it. But that's you know, of course, the more car washes you have, the more usage of water. -Rye

Participants mentioned ways to restructure agricultural practices and systems to combat climate transformation, emphasizing the need, as Ginger states, to begin “Shifting those incentives away from monocultures to more climate resilient strategies." This includes promoting biodiversity within crop systems and examining local food production to identify gaps and vulnerabilities in the food system. Bran shares that, "I mean I think that we will have to be adaptive, it's not that we won't be able to grow crops, it's that we will have to change our crops." By diversifying crops and shifting incentives, we can reduce reliance on external food sources and increase community resiliency. Participants would like to scale production sustainably and find a nice middle ground, as Alfredo notes, "I would also say the flip side of that is like, finding ways to scale production like, I mean, I don't think the answer is like a million teeny tiny farmers growing little, like little truck gardens." They would like to establish a regional food system, leverage local resources, and shift incentives towards sustainability:

> I think, moving away from agricultural practices that prioritize monoculture are going to be needed, those systems are just too fragile in a changing climate, and so those that have to be we have to be operating with more. More, quite frankly, biodiversity within crop systems. -Ginger

> I do think it could be interesting to look at everything that is grown locally to understand where there are either gaps or vulnerabilities within the food system. You know, are there some things that just aren't going to grow here because they're not going to grow here? But are there ways that we can think about how to have some of the different kinds of products we need across the region, so that we might be less reliant on getting food from elsewhere. -Brie

> I mean, I don't know how they're gonna move forward. I look at all this and always come back to, what are we doing to like, establish a regional food system? What are we? How are we putting infrastructure in place? How are we capitalizing on what's produced here now? You know, we're always like, looking at something else. But we're not ever realizing like, Alright, these are our resources, how do we just leverage them around, move them a bit, and see if we can come up with a better system? And there's like, given all the cattle in this area, there's no reason that anybody should eat beef that is not from this area. I mean, that's just one of the things that gets me maybe I'm over generalizing that. And I really haven't crunched the numbers on exactly how many cattle per capita there are. -Bran

> I know we pulled one of the ones from sustainability over which maybe shifting incentives from monoculture to more sustainable methods, I think, sounds to me like it would be a most impactful intervention. However, I don't know if there's really many people advocating for a change like this that have any actual experience or like, I'm not sure who is representing that voice. You know, I'm curious about their background or understanding of what that would take and how that would look different across all of the United States, because we are in many different systems of production throughout but and we're producing different crops across the landscape. So, I don't know. But that one seems like a really powerful one for helping to create a less fragile system. -Hazel

Another potential intervention point focuses on policy and restructuring zoning to prevent farmland from being sold for development:

> Well, as I alluded to earlier, you know, it's a good growing climate that allows our farmers to produce whether it be the vegetables and fruits, or whether it be cattle industry, or the sheep or whatever. I mean, that, to me, is the ideal situation. And the ideal situation to me would be if for some reason, we could stop the demise of the family-owned generational farms that are being sold off now for development. -Rye

> I think from a policy perspective, while I see there is value to bolstering you know, sort of food security programs, that feels like a band aid solution, I'm not saying we shouldn't fund it. But from a policy perspective, I think we should but understand that if we're, if we're trending in the direction of increasing food insecurity, that's we're just going to have to do bigger a bigger and bigger band aids until a certain point, and I think that the town, the county, other localities, can look at quite frankly, land banking, and thinking about how to how to hold some land and some good arable land in reserve for food production, obviously, expand community gardens. But that's another way. It's not a purely band aid solution. -Ginger

Other potential intervention points focus on food security and food access. These include restructuring the ways that we direct food waste, channels of communication, ways of collecting data, and mapping systems for addressing food waste and ensuring efficient distribution of food to low-income neighborhoods. There is a need for transparent conversations about food waste and establishing networks to directly provide excess food from producers and restaurants to those in need. A comprehensive mapping system that includes information on farms, distributors, and food-insecure areas would facilitate better coordination and communication, allowing for more effective distribution of food resources to those that require them:

> So just again, having more public discussions about what you can do with food waste, instead of just being embarrassed and having organizations sort of keep it a secret, that they're throwing all of this stuff away. So, create more funnels directly from massive producers of food and restaurants, to low-income communities and neighborhoods where you can just give all of that food away. -Clementine

> Ideally, there would be sort of like a map of all of the different parties involved in the food system. So, like a list of all of the farms and a list of all of the distributors, and a list of the people that need the food, and then maybe some type of internal communication system where, you know, you can have people sign up and put out a message saying, hey, my family doesn't have food tonight. And so all of the local distributors, and all of the farmers and all of the restaurants would get that message. And then you have runners who would be willing to drive to a farm tonight, pick up the food and take it to them. So again, just like a much more connected system, with two or three main lines of communication so that they're all talking to each other. Because yeah, I think basically it starts with knowing who does what, like knowing who grows food would be helpful, you know then knowing where families are that need the food is also helpful. -Clementine

> Like for our programs we run, they're USDA, it's a federal program. And their rule is that you can only put your feeding sites in school districts where 50% or more of the children are on free or reduced lunch. And so, we only have one school district that that works for, which is absurd, because we have trailer parks all over the place. But because the trailer parks are next to fancy neighborhoods, you know, we can't feed those children, we can't go to their neighborhood. So yeah, I think, again, knowing where the people are that need it is another big issue that we currently have, like we don't even have really good data on how many people in this area are hungry, I think we know at least 11,000 people in the NRV are food insecure. But I'm not even sure that that's very recent data. So, more data, more communication, one mapping system for the entire area. -Clementine

Participants are also thinking about ways to restructure regional support systems such as personnel or staff capacity by utilizing regional bodies to do work in communities that don’t have their own sustainability programs:

> So, when I think of food systems, I can't just think of the town of Blacksburg because we're not going to be able to support our own food supply. Like there's just no way within the town limits. So, we have to think regionally. I think it makes sense to support regionally as well, because there's a lot of people that enjoy that rural lifestyle. And so, it's how do we work as a region to support that? So, it's a lot of

> communications, for example, with how do we use our regional institutions like the Regional Commission, to maybe host sort of those conversations or a campaign like that in, in, you know, conjunction with supporting, because they provide a lot of additional staff capacity, especially to rural localities that don't have a lot of staff that are specialized. Like, I think it's unrealistic to expect Giles to have a sustainability manager, but using some of the regional bodies that support that work, you know, whether it's from an economic development side, the chamber or, or from a planning perspective, the Regional Commission to host conversations to get some sort of campaign like that started. -Rosemary

Charging for consumption and enacting policies that restructure institutional social norms around waste is another potential leverage point that stakeholders identified:

> I would love it if we had a town composting program. And then also thinking about waste. So, I was away in the Northeast last week. And like you, if you want a bag, you actually have to pay for it. And so, it's like changing how we approach those kinds of things. You know, our consumption, like charging for consumption. -Rosemary

> Waste management. I think waste is the intervention point that a lot of places have found success with like Denver, Colorado has the city-wide composting program. And like, yes, it does cost money upfront and continued maintenance of that, that service and that system. But that's taking so much waste, urban waste out of landfills and turning it into usable matter. -Hazel

Participants discussed a need for societal changes and redistribution of wealth to create community-centered agricultural neighborhoods and address socio-economic disparities. Hazel expressed this by advocating for “commons” and Colby proposed “agri-neighbordhoods,” which are, “these communities where they have like a community farm in the middle of the houses.” They suggest restructuring to a sharing economy where those who have more contribute more, enabling others to pay less and fostering a sense of shared resources. Additionally, the importance of considering infrastructure placement to ensure accessibility and reduce the environmental impact of transportation in food systems is emphasized:

> This isn't gonna happen without a massive transfer of wealth. Massive, like forceful, right? In some way. Like this has to involve us as a society saying, we need this

> money more than some other people who already have this money need this money. And this is really expensive and we as a society need to pay for that. That has to happen somehow to make this a reality. -Alfredo

> I think that comes down to like, you know, like socio-economic class or something, it's like, if you have more, you should pay more. And that allows somebody else to pay less, you know, so that we share, it's kind of like a sharing economy and like, that's something we don't really work with in America, there's no sliding scale. -Bran

Along these same lines of fairness and redistribution of resources, there is a desire for restructuring to more equitable community designs and placement of supermarkets and farmers markets:

> I think as well, kind of thinking about infrastructure broadly, kind of, like we were talking about with where we place, you know, places of accessibility matters, because, you know, even if folks do have a car to drive from more remote areas of the New River Valley to the supermarket, they're traveling in a car, which has climate change implications in itself. So are there ways to either think about our sort of food system infrastructure in terms of where we're placing supermarkets or farmers markets, or ways that we're supporting, you know, kind of more bulk transportation and out to some of these outlying areas. -Brie

> We need to be willing to pay for what we value, if this is what we value. And I'm not just talking about the consumer, I'm talking about, Sage put, government subsidies or incentives, we incentivize all kinds of behavior that is not necessarily good for our culture or our economy. I mean, you can look at how we, you know, subsidized certain producers...If this is what we value, we need to begin investing in it, not just as a consumer, not just trying to buy the cheapest pack of chicken legs, you know that you can find at Food Lion, but be willing to pay for the real cost to produce this food. And I think it's going to take, you know, not just the consumer, clearly, there are people who can't afford, you know, an extra couple of bucks a pound for ground beef. So, we have to find a way to incentivize local agriculture and more sustainable agriculture. -Julienne

Participants would also like to see sustainable agriculture groups such as VABF become politically influential and advocate for change in regulations and subsidies. They highlight the importance of addressing the dominance of big corporations in shaping agricultural policies and redirecting funding towards conservation and sustainable practices. The Farm Bill is identified as an opportunity to change the allocation of resources, moving away from subsidies that favor large-scale production towards supporting small-scale and sustainable agriculture:

> Start turning VABF or some sort of sustainable agriculture group into a politically, whatever, not viable, that's not the word I actually almost aggressive, you know, just to have some clout. In Pennsylvania, you have the PASA, the Pennsylvania Association of Sustainable Agriculture, they have senators that come to their conferences they have, you know, I mean, we need players in the game that can begin to come to the table and say, look, we need to change this if we want healthy, it's for your economy, it's for your health, it's for the global climate change. It's for all these things. It just seems like it's hard to understand from our perspective, why these things don't change, except that we have these big corporations that come in and they just constantly dominate every, every regulation. So that seems like something that could be changed. -Basil

> Talking about subsidies, the Farm Bill is up for discussion right now. Like, what besides like the spending for the next five, ten, I don't remember how many years it is, but like in terms of like low hanging fruit, if you look at a pie chart of where the money goes, there's like a sliver of it, like 2% of like billions of dollars goes to like conservation. Whereas where I think that that's where most of the like grants for, like sustainable practices are diverted, whatever you want to call them come from so like even. That seems like a low hanging fruit to change where the money's going, which is only one step but could make a big difference because all the subsidies and crop insurance are going to larger scale production which is intended to mitigate some of the financial like ups and downs, but then ends up incentivizing particular type of production, because it's relying on particular crops prediction of how much yield you're gonna get. -Olive

Re-Think

The way knowledge is created, shared, and used in society significantly influences transformation processes and has the potential to influence system parameters, feedbacks, design, and intent. Rethinking knowledge for sustainability transformations requires understanding how knowledge flows through systems of interest and how goals and expectations of sustainable transformations are identified (intent) or methods and means to achieve them are selected (design). Questioning existing perceptions of legitimate knowledge creates the potential to identify gaps and strengths in the knowledge base, limitations of knowledge production processes, and socially constructed assumptions that may hinder the desired sustainability transformations. This category of findings refers to reevaluating and transforming the way knowledge is created, used, shared, and validated. This entails challenging traditional systems and approaches to knowledge production, allows individuals and communities to critically examine existing knowledge systems, and explore alternative approaches that better align with the urgent need to mitigate climate change and build a more sustainable future (Abson et al., 2017).

Participants shared the crucial role of education in raising awareness and engaging youth in a deeper understanding of food systems and sustainable practices, and rethinking how we approach education. Initiatives such as garden camps and incorporating garden spaces in schools can provide hands-on experiences for young people to appreciate and connect with the origins of their food. By integrating concepts of nutrition, gardening, and sustainability into formal education, children can develop a stronger foundation of knowledge and appreciation for healthy eating and the interconnectedness of the environment. Engaging students at various stages of their education, from elementary to high school, can gradually cultivate awareness and empower them to make informed choices towards a more sustainable future:

> Like educational stuff. I mean, something and this is a little thing, but like what we did this summer with the garden camp, like things like that, like start helping young people kind of like appreciate it and know where their food comes from. And just in general, I mean, helping people know where their food comes from, and knowing that that's an option and things like that, I think could be helpful. Awareness raising. - Alfredo

> Well, I think maybe there's an education piece that I didn't talk about at all. And it's like we mentioned, you know, people who receive SNAP benefits often don't even know that they can access the farmers market and some of the local growers. So, in addition, that's part when I say support I also mean, you know, we have a megaphone, the town government does have a megaphone. But perhaps improving education on the importance of these resources, or teaching children why a diet of chicken nuggets and macaroni and cheese maybe isn't the best choice for them. So,

> there's other things like you know, education. I garden. And when my son was little, the thing that he most loved was like potatoes to him…And some I think schools do actually have, you know, gardens, at the schools, you know, but yeah, incorporating that into how we educate our children will be really important. -Julienne

> But, but I think that that is the key to getting the groups together is education, and letting these kids know, you know, that it is possible to sustain your family to an extent by a few common steps and, you know, teaching them the pollination process, to where you know, everything revolves around the climate and the pollination and how this takes this to grow. And the honeybees make everything else grow. And it's, it's a wild concept to me. -Rye

Participants believe that the school system can play a role in this education by weaving into their curriculum, whether that begins in elementary school or high school:

> So, like, all of that could start in elementary school, and, you know, teaching, you know, like how home economics and cooking classes and stuff like that just don't really exist anymore. And people just don't know how to cook. So, I'm just like giving that as one example of something they do bring together, create that, you know, close that circle. -Nori

> You know, I'd like to say that public schools are a good way…So maybe, maybe high school is a better age, because then kids start discovering their passions, discovering where they've been, where they want to be. But I mean, these kids have so much on their plates, now. And awareness can certainly start at an earlier age. And it could be gradual. -Sherry

One participant compares education among American children to that of children in other countries like Norway, and how education of youth can change their relationship to and behaviors around food choices:

> And so, my thought for the United States, at least would be, you know, I personally don't care if I have meat again. But the government's not telling me I shouldn't. I think there should be more not just education, because a lot of people know about this stuff. But it's too easy, and too, quote, unquote, inexpensive to go to the supermarket and get a ribeye, versus, you know, being told, like in Norway, kids grow up, being told, you know, how to eat simply and stuff like that. And, you know, that is very constraining. But, you know, if we're here to make the world last for many, many generations, it'd be nice for us to be actually working on it more than we are. -Sage

Participants also address the importance of rethinking education for adults, especially the importance of education and awareness in various aspects of the food system and consumer choices. Kobe advocates that, “The next step is making sure that everybody has that choice, that once it and then continuing to educate people about the, you know, healthy choices, healthy foods and vegetables, and promoting that lifestyle.” There is a need to educate the general population as well as leaders about agriculture and healthy food choices, as there is often a disconnect or lack of knowledge in these areas. Promoting education about nutritional labels, understanding the impact of food on our bodies and the planet, and empowering individuals to make informed choices aligning with their values are crucial steps for this potential intervention point:

> How can we go through our local and somehow get up the chain? And maybe it is educating our leaders. I mean, like our political leaders, because they don't, there's a big disconnect. A huge disconnect. We talk about educating our youth on ag. A lot of times within high school, we did Ag Day, the FFA put on Ag Day for fifth graders in Pulaski County. That was a student. Do you know how many of the teachers and the parents had no idea about the information we're teaching? It's not just our children. It's, it's our adults, and it's people who aren't in it, they don't work in it, they just, and it's not completely their fault. -Pomona

> I like the seasonal aspects, you know, of garden produce. So, I think part of our experiences, we don't think about things too much. Because here in the United States, we have so much and we have so many resources that we don't have to think about things…And so I mean, I just think some of us are becoming more conscious about how our food is delivered, and what's in that food. But I think in general, most people don't care about that, unfortunately. And we have a lot of room to grow in terms of both education, and letting people know that they have choices. -Kobe

Some participants believe that ease of access to information around multiple considerations for people making food choices would be beneficial, such as the environmental impact of the food, the carbon footprint, and the nutritional impacts on your body:

> One area I think we could do better is around better understanding the impact of food on our bodies and on the planet. You know, so for example, we do know, we do have access to information about how food affects our body if we understand the

> nutritional labels on the back of food. So, there's definitely, I think, a need to help people better understand what those labels mean. But you know, there's information there. In the last 15 years or so, we've been able to get more information on how food affects the soil in which it's grown, like, you know, whether or not it's organically grown and what that means, at least to a certain degree. You know, when I think about climate change, though, and this is getting maybe to the next step is, it would be great to know, like, I love coffee, but what is that carbon footprint? What does that carbon footprint look like when I go to purchase coffee? So being able to, I think, having consumers know better what the impact of their dollar spent is, is something that and I feel like that extends well beyond the food system to and not necessarily has to be directly related to climate either. -Basil

> I do think that there could be more to connect people to local products, and to make local products processing of local products more possible. So, um, I think that education is really big, like, letting people know how their decision affects the climate. And I also think that this extends beyond the local food system, but I think it should be, you know, going back to what I already said, like, raising awareness of, in the bigger box grocery stores of what purchasing one thing over another means for climate change. You know, really empowering individuals to use their dollar in ways that align with their values. So that if climate change is a big concern of yours, being able to be informed about how that dollar is being spent, and how it has an impact on the climate. -Amandine

Adult education could also look like teaching people how to grow their own food or helping people to understand the effort and inputs that go into growing food, especially regeneratively:

> So, you know, I also think that education around ways to grow, that's more regenerative. And helping people think about that is, would be very useful. And even on a very small scale, you know, so it's education across like what you can do on your own property, to feed your family, but also, for those that are trying to make a living, that regenerative agriculture, I think education in that space would be really helpful. -Amandine

> And it's an educational process because people, I will reference our farmers market, it's like, May 7 was the day we opened. And people were mad at me because we didn't have tomatoes. Homegrown tomatoes. Like, you got to think about this. And then they go, oh my god, this tomato is a dollar and a half a pound. And I can go to Kroger and get one for, you know, 75 cents less. You're paying for the freshness; you're paying for what you value. And I will always buy from the farmers market before I buy it from the big box stores. -Rye

Participants also communicate the importance of rethinking or shifting the narrative around climate change towards envisioning a better future and avoiding using overly catastrophic narratives. Hazel expressed an interest in, “The first thing that comes to mind to me is maybe how we tell stories or show a future in which it doesn't look like everything is destroyed.” Participants suggested that while reality is important, so is focusing on positive possibilities and telling stories that depict a future where not everything is destroyed. This can help engage people in fighting the climate crisis and mitigate paralyzing feelings of doom and gloom. Rethinking formal education to address the emotional impact of climate change and provide a more hopeful and empowering perspective for younger generations is another potential leverage point:

> And I wrote this on the climate change one because I think that sometimes we're most focused on thinking about the bleak future. I think, for me, I think a lot about how do we imagine something better? Because I think if we're not able to imagine something differently, then we won't work towards that. Like, not just thinking about what is not possible but what might be possible that we're not thinking about? And you know, it's always gonna be small things that get us to big changes too, but I don’t think we can be too idealistic, if that makes sense. Because we kind of have to have somewhere to go, something to strive for. -Olive

> I do think it would be helpful to move away from talking about it in a catastrophic way. Because, again, it's climate change. And I think there are places in the world that are either going to maintain a relatively stable place or are in some places going to become, you know, it might be a positive change in some places of the world. It's just a general destabilization change everywhere. So, I think anywhere where we can, I think that's a really helpful way to reach people that are on the fence, or are alienated by like, like, I don't buy the "day after tomorrow" kind of narrative about it. People are looking at it from a longer standpoint. -Alfredo

> Just like I wonder, I was just wondering about what the engagement looks like in their formal education that could be helped to mitigate some of the doom and gloom, the fanning of the flame that adults do when like, this date is much more inconceivable to you. -Hazel

Participants discussed rethinking communication and messaging when addressing climate change as a potential leverage point. As Colby shared, “That's also a way to explain this to people who might not believe in climate change, like, well, this is a good thing to do anyway." They recognize that simply focusing on specific growing methods or scientific facts may not resonate with everyone, and it is crucial to engage with producers and the wider community in a way that is relatable and understandable. Coriander points out that generational education and shifting mindsets is crucial, "I think in a complete system, you'd have to reevaluate and train the new next generation of farmers to do it completely differently. I think that's a different mindset." Education, particularly around the impact of food choices on both personal health and the environment, is seen as a key aspect of promoting change. The need to reach consensus and agreement on the urgency of climate change is also emphasized, as well as the potential of connecting climate change to food-related issues to make it more tangible and relevant to those who are in denial or don't see it as a pressing concern. The importance of approaching the conversation with empathy and a focus on shared goals is emphasized in order to cultivate engagement and overcome resistance:

> But I think it's important, our messaging, like I mentioned before, about how we can have kind of, a lot of times we have those people who are super passionate, and we need passionate people. But sometimes they only focus on their growing methods as being the only way to grow and provide food. And I think we're leaving out a whole branch of resources that we could be getting fresh food to, to those in need. So as far as growing organically and things like that, I know, you know, that's what would be ideal is we can all grow organically without having to use pesticides and herbicides and everything like that. But the reality is that we can't do all of that. And I think if we change our messaging to our producers, some of the ones that may be doing a little more commercial style, or they may not be doing the techniques that some folks think, are the only way to grow, like to their full extent. But they may do rotational grazing, while still using fertilizer or you know, something like that. Where we change our messaging to the producers, to where it's like, just make one small change, like these are some things you can do and implement that are in your realm and aren't a huge change. -Pomona

Participants expressed that finding a way to communicate across political barriers and value systems would be effective for making changing:

> I think that, you know, the Republicans like Trump, and stuff like that, that even doubt that there is global warming, I would, I would hope that there would be some definitive, even though is even though there is definitive data about it, that there was some more definitive data that was, you know, impossible to ignore. -Sage

> I guess my only hope is that like the players who control so much more than we do develop some type of ecological conscience which inspires them to value climate sustainable practices in the same way that they value revenue. -Harissa

Communicating the climate science in ways that generate more buy-in across differences is also a tactic that participants found value in:

> I think the biggest step, hopefully in the next 20 years, would be that everyone agrees that it's an issue. I think that step one is making, somehow promoting the science in a way that gets to the people that matter, so that we can all at least agree that something is going on, that's definitely step one. And then also convincing people that it's something they need to care about now. So, my other suggestion, yeah, getting people to understand that they need to do something about it now, like, why should I care? I can't do anything to change it, it's got to be on someone else. So, a more knowledgeable world, and a more willing to do something about it would be step one…so yeah, I don't know, we need to at least convince the majority of people that this is something they should work on now. -Clementine

One participant proposed a way to accomplish this, by connecting issues of climate change to how it impacts food, since everyone has to eat. Additionally, language that connects us around a common problem that everyone is already in agreement about, such as the awfulness of cancer, is another possible solution to addressing climate issues while working with climate deniers:

> I guess, I think maybe that is one of the best ways to communicate to people, the importance of this issue of climate change is like a concern is to draw obvious connections to how it affects food. Because food is the biggest motivator of all for humanity. So yeah, making it more that that's actually a good way that we should all work on talking about this is like drawing those connections and having local examples of like, well we used to be able to grow this, but we can't grow it anymore. Because of this, or, you know, stuff like that will just make it much more in your face, you know, and that's kind of what I think we'll have to do is just put it in

> people's faces. And again, people start to care about something when it affects their own lives. So maybe that's the best way to do it. -Clementine

> In addition to moving forward around climate resiliency and food system priority topics for people that think like "us", what will also be critical moving forward is to understand what truly motivates carbon deniers, or those that are not prioritizing climate change. Taking authentic steps to better understand where there is potential intersection and starting there. This will help us use language and approaches that connect rather than separate. This could be a great way to build trust for momentum, at a time when there seems to be a lot of distrust. A potentially great example of this is a few months ago I heard Biden say he was going to prioritize ending cancer for all. In my mind I thought that was genius - that goal would solve a scary and huge health problem that touches everyone and could also bring change around the use of plastics, emissions, pesticide and herbicide use, access to healthy foods and more. -Amandine

Another idea involves communicating change not from a place of climate action, but proposing some solutions to climate deniers or those who are disinvested as things that are morally or ethically good choices to make regardless of climate change:

> Or it's like it's an opportunity to imagine a better world where we are forced to do things that maybe we should do anyway. Like I bet a lot of solutions, I've been thinking about a lot of these problems. I'm like, you know, we should just do this, whether climate change is a thing or not in a lot of cases. So, there might be things that come out of it if you're actually able to mobilize to do them, they're good. -Alfredo

This aligns with other participants' views that if you try to force something on people or demonize what they believe in, they will likely be oppositional to your efforts, whereas finding a common ground or value would be more effective:

> And I'm glad that he brings more optimism to this because I'm like, phew, it's hard to get people to change. I'm not saying it's impossible, but to actually do something that results in the change. And I think a lot of that has to do with messaging and how we present what we're trying to do. Because if you demonize something, you completely cut off people's ears, they're not going to have, they're not going to listen to anything that comes out of your mouth. So, it's like, how do we all keep these conversations going to where people are actually engaged and listening? Instead of just like, that's not what I wanted to hear, or that was too intense. -Pomona

Participants identified rethinking priorities as an important point, with the recognition that Americans have historically valued abundance and consumption; this has hindered progress in adopting sustainable practices. Bran shares that we need to, “Value food as important, as one of the top priorities for our disposable incomes” and questions, “how do we value food as valuable as our entertainment expenses, or a doctor's visit?” Stakeholders suggested that we need to reframe the understanding of food as a vital life source and prioritize its importance for future health as a society. This involves creating a consumer base that values healthy food, which can drive policy changes and support local farmers. The idea of valuing food as highly as other expenses is a necessary shift in mindset. There is a shared desire to elevate the importance of food in society and reevaluate its role in our lives:

> But you know, by the same token, humans are very resilient. And we tend to figure things out when we have to. And the problem is that not enough of us realize that we have to that we're there, that we don't have another 5 or 10 years, I mean, this should have been done when I was your age, we had opportunities. You know, I remember when Carter was president. That was the year I graduated high school was when he left, and Reagan entered. I mean, he was growing things in the garden, he had put solar panels on the roof, he talked about thermostat, we talked about energy consumption. And then you know, Americans in general decided that they didn't want to do any of that. They just basically didn't want to hear about conservation or, you know, energy conservation. That we know we're an abundant people, we have the resources, it's a sign of prosperity and, and mastery, even if you will, sort of in the chain philosophy that says if you can, you will, so Americans have always embraced that. And that's a hard thing to go against. I think the secret is, is getting people to embrace the things we have to do, and still consider that to be, you know, Yankee ingenuity. -Kobe

> And, unfortunately, it's never been quite the priority. I think re-centering our understanding that food is life source, and that food is vitality. And it's what gets us to the future in a healthy way. Yeah, until that happens, that mind shift. I don’t, I don't know. Our options are to piecemeal it all together. Keep working on it. -Hazel

> As a parent, I'm really wishing that our school system could offer healthy, affordable food to our kids. Yeah, I feel like I've seen it in other places across the country, where they're working more cohesively with farmers to support food in schools,

> because I feel like creating the appetite, and the taste for healthy food is critical. It's critical, so that to me, if I started anywhere, that's probably where I would personally want to start because I feel like then you're creating the consumer based for something valuable, which then in, you know, changes policy and all those other things later. So, it's like the education of our citizenry around that. So, I have been working, I was on the board of an organization called Live, Work, Eat, Grow for many years, starting them up, and it's a commercial food and kitchen incubator. You might have heard about it. And trying to figure out what is the retail side of that, you know, how do we highlight new businesses and new products in our community? I don't know. Um, I would appreciate that. To put those kinds of businesses and people on the forefront of other's minds in the community where we like, own it as an identity, which in a way then helps, you know, everything comes back to protecting the agricultural land, right, and, and the livelihoods of farmers. And my mind goes to like, well, how do I make that a priority for our citizenry? And so that's why, you know, I bring that up. -Rosemary

Another participant shares that we need to rethink metrics to evaluate what is working or not working:

> And this is just a general thing. But I think one great thing is to have some sort of metric for measuring, figuring out if these things work or not, and looking at places like it's not just saying like, this might be a good idea. It's like chopping up your lawn and planting carrots. People are trying that. How does that turn out for people? I feel like sometimes we don't really look to see if something has been tried before. -Alfredo

Rethinking through action and trying no-waste strategies is another solution offered. One participant believes that a sustainable change in mindset will follow a change in behavior:

> Oh, I fully believe if you do humanure, it'll change the way you think, what you do with your body and how you participate, will completely change how you start thinking about things. And if you had a whole community thinking about that the structure would change. You couldn't build the way we build. -Basil

Participants express frustration with small-scale solutions being offered for addressing climate change and food system challenges, and that we need to societally rethink the scale of the problem and appropriate solutions. The scale of the problems is much larger than the solutions being offered, such as changing lightbulbs or building community gardens. Instead, there needs to be systemic change and dismantling of existing systems. Stakeholders note that the adoption of innovative solutions often follows a pattern, with slow initial adoption, a sudden increase, and then slower growth as the stragglers catch on, and that perhaps these small-scale solutions are creating behavioral momentum for larger scale solutions to come. Implementing solutions and leading by example proves to be effective in influencing others and promoting change even among those who are skeptical, moving the needle forward on the adoption curve:

> So, I think for me, the challenge I have around many climate resiliency strategies or just climate mitigation strategies is what over the years I've come to think of as the lightbulb solution. And you know, you're old enough to remember that like, the symbol of the like, CFL, the like twisty light bulb, was like "the symbol" for something being green, or like the recycle symbol, that's the symbol. And what frustrates me is the scale of the solutions being offered is like: Oh, just change out your light bulbs or use a reusable grocery bag or recycle. It's like, the problem is this big. And we're sold solutions that are this big. And I feel like the same thing is happening with food systems and climate and I'm like the problem, you guys, is this big. It requires us to completely dismantle systems that are massive. With all of the economic incentives aligned and the, and the socialization around this system. And, and we're like, oh, you know, chop up part of your lawn and plant some carrots or have some more community gardens, and like, those are lightbulb solutions. And so that is like, I get really, I feel like even within our climate vulnerability team, I'm bringing up these food systems. And I'm like, I don't see anybody talking about the scale of solution that's needed here. And maybe it's premature to do it because what has to happen is collapse first. Like people are just like, this is fine. -Ginger

> Right, that kind of follows the diffusion of innovation model, that like S curve of adoption, right, where you have like the early adopters, nothing, nothing, nothing, and then up and then it plateaus. And then kind of the last little bit, the laggards who just kind of never change. But, you know, I think that looking at that, that innovation adoption curve, if you've seen those, those charts, they're fascinating, they always follow the same shape, and but it's almost always like, there's this long tail of adoption until it gets to about 10%. And then it jumps quickly to like, 60%. Right, very quickly, overnight, and then kind of grows more slowly. And then that last 10%. -Ginger

> I've found that the only way to do that is to show them, you know, they learn by example. For instance, at Catawba sustainability center, we've been doing a lot of very intensive, intentional rotations. And people drive by that are farmers and they see that, they see our cows eating grass in February and how fat they are, and are like, what are they doing? How is that happening? They see our fields green up

> before everyone else's because of our manure distribution. Just by using the cattle. - Bran

Stroh's Creative Tension Gap

Stroh's four step systemic change process is built on the concept of the "creative tension" model. This model proposes that the energy for change is mobilized by establishing a discrepancy between what people want and where they are. If people hold to the vision they want and are simultaneously clear and candid about where they are, then the tension will tend to resolve in favor of what they want. This principle applies at both the individual level and at the collective level. The purpose of stage one is to build a foundation for change. One of the steps of stage one is to establish common ground by creating initial pictures of what people want to achieve and where they are now. It is useful at this point to develop an initial shared vision of the ideal outcomes and an overview of what is and is not working now. The final step in developing common ground is to highlight or contrast key aspects of current reality in relation to the vision (Stroh, 2015). This theme is broken down into the following codes: *what is working, what is not working, where they are now* to represent what they are experiencing in the present *and what they want* to represent ideal visions for the future.

What is Working

In the context of systems thinking for social change, *what is working* refers to the aspects or elements within a system that are functioning effectively or producing desirable outcomes. It involves identifying the positive aspects or successes within the current system that contribute to the intended goals or results. Understanding what is working is essential because it helps to identify and build upon the existing strengths and resources that can be leveraged to bring about positive change or to close the gap between the current reality and the desired future state (Stroh, 2015).

Participants in this study identified local efforts around food security and access as a strong point for the community, referring to successful initiatives such as the Glean Team's collaboration with local growers to distribute excess produce, farmers markets subsidizing SNAP benefits, non-judgmental food pantries providing groceries, and Virginia Tech redistributing surplus food through several avenues including the Campus Kitchen at Virginia Tech and the Market at Virginia Tech food pantry:

> So, I think there are some great examples that I would point to here that we could scale. I mean, I mentioned the Glean Team is a great example. So, you know, we have they're both growing some of their own food, but then also working with local growers to be able to glean excess or, you know, maybe kind of rejected, so to speak, not perfect items that can then be distributed to food assistance organization. So, I think that's a great example and an opportunity where they're demonstrating kind of value to the grower in terms of utilizing what's being produced, but obviously value to those who may be food insecure by redistributing. -Brie
>
> I think that, like the farmers market, the fact that they subsidized SNAP benefits, so it makes it more affordable for people who receive those benefits, to be able to access healthy whole foods. They do that and they do fundraising for that. -Julienne
>
> We have a food pantry that's open every Thursday at my church from 10 to three, okay. And they participate in grants. They're constantly getting grants; they buy a lot of food from the Feeding America warehouse. And they usually feed 150 families, unique families per week. Providing groceries. And it's all volunteer based. But they don't ask questions that don't require income information. Maybe they just need the assistance so they can make their car payment. And so, they don't judge, don't ask questions. -Sherry
>
> Right, and like Tech itself actually has made a massive difference in the last three years, they started this whole program. So, they firstly have a food pantry on campus, that students and professors and their families can use if they can't afford food, because there are quite a few students who can't afford food. And then the other part of it is redistributing extra food from the dining halls and giving it to all of the local nonprofits. So, we used to get a crazy amount of wraps and parfaits and fruit cups every week from the Tech dining halls that we could then give out to our families. -Clementine

They also mentioned the value of local communities taking collective action to create the environment they desire, as they may have more agency and capacity compared to larger-scale efforts. We have a lot of capacity in our community to make change in this way. The Thrive Food Access Network, Live Work Eat Grow, Sustainable Blacksburg, and other organizations and endeavors were mentioned as examples of this collective action working as an asset in our region:

> And then the second thing I think is important, I think if change is going to happen, it's going to happen locally. It's going to happen in local communities, figuring out what they can do, regardless of sort of the big picture world that's around them. And they're going to have to make those choices themselves. They're going to have to do the things individually that they need to do and then collectively what they need to do so that they can live in a sort of environment that they want to live in. And I think that's one of the good things about our area. I think we have the capabilities of doing those things. As opposed to maybe the bigger picture of getting all the right players on board, the ones that truly need to make change, agree what this situation is and then make the change to begin to move to address it. I'm never sure that we will have their attention. -Kobe

> Do you know about the Thrive Network? I think they are good. Is it the best that it can be? No, but it's really, actually pretty impressive. Are all the farms or food producers connected to it? No. You know, are all the hungry people knowledgeable about it? No. Is there lots of room for improvement? Sure. You know, I think that would be a really great place to start. And, you know, we have a lot of great leadership within that network, too. -Sage

> I think there's lots of, there's certainly a lot of different organizations that are dealing with sustainability minded types of work. There's like the Sustainable Blacksburg group in the town of Blacksburg. There's different local government entities that are working in that space, like Blacksburg has Carol Davis as their sustainability director, but sustainability is incorporated in like other departments within the town as well, like the transit system is trying to convert its bus fleet to be all electric, for example. The Public Works crews are looking at more sustainable practices for the work that they do. But for food systems specifically, I know that there's like several organizations that have come up that are working on that. There's Live, Work, Eat, Grow. Over the last few years, there have been a few. Yeah, there's also been different groups putting in community gardens. -Colby

> I think Blacksburg is taking some good steps. Virginia Tech is taking some good steps. I just joined the Climate Sustainability Committee at Tech. I think programs like Green RFP are investing a lot of funding and time. But also doing like more, send us your projects, tell us what you think will work, tell us what changes we should make, it's a great way to do that work. Public education programs are great. I love the sustainability interns. I love what Sustainable Blacksburg is doing. Everyone

> is working so collaboratively to do that. And I think small town Blacksburg is doing so much. I love Blacksburg. I think overall, we're doing so much good stuff. -Miel

Relationship building, trust, and effective collaboration are at the heart of the strength of many of these organizations:

> So, I think that's where we have seen the most progress happen, is when those relationships, and those are relationships of trust, they're very genuine. They're very personal. So, it's not just like, we always use the example in early childhood, that our goal is to create a situation where if I have to refer a family, for a need, I'm not just calling NRV Cares, I'm calling Andy at NRV Cares, like I know him personally, and the family I'm working with can leverage that relationship. And I think it's the same thing in food systems, the more that there's personal relationships, the more you're, you're wanting to go that extra mile to find a way to work together successfully or to address a need when it comes up. I mean, that's, the Glean Team's a great example of that, too. They're just really good at leveraging all their relationships to try to figure out how to get food where it's needed. And that that's always just a place that I think about and find the most rewarding. But I think it's the most powerful work that at least we do here. -Brie

> And I will say, like the New River Valley, I hear it from my colleagues at like, the foundation world, and I know other folks here at in their sectors that the New River Valley is kind of known for being very good at collaborating, you know, our localities do tend to work together. Like we've got a pretty robust system of collaboration, there's always more work to do. But I do think it's pretty cool when I go to talk to a huge Foundation, like, bazillion times bigger than we are. And they've heard about the New River Valley. That's pretty cool that you know about some of the stuff we're doing down here, because I think this kind of spirit of collaboration is something that we have to constantly foster, and should be, should be really proud of, is something that's part of the identity of the region. So, to me, it's just kind of continuing that sort of work, and expanding upon it. -Brie

The New River Valley region is rich in natural resources, such as ample water, a more protected or stable climate, regenerative grass growth, biodiversity, and the ecological abundance of the Appalachian region. Malina characterizes it by stating, “I think our region, Appalachia and Southwest Virginia is known to be pretty stable, I guess, and the climate is pretty good. The water resources are good.” These factors make the region a promising place for sustainable agriculture and resilience in the face of climate change:

> But yeah, by comparison, I feel like we have tons of water. We have I feel like the weather is kind of mitigated by the distance from the coasts where you don't get like hurricanes real badly, we get some flooding events, but like, and some of those might get more severe, but like, but yeah, compared to the rest of the state, it seems like we're, it's a much more pleasant place to be, which I think that's absolutely right. -Alfredo

> This region, the way it regenerates grass, as opposed to anywhere else in the country is amazing for that, you know, we can grow all kinds of different grasses that can't grow in any other, you know, the biodiversity of the Appalachian region is just insane. And, you know, we can harness that to kind of better prop up our food system. -Bran

> The amazing thing here is that there's water. Right? And we're also not flat. So, most people think of not flat being, you know, maybe a curse or whatever, but it's actually kept the vast you know, the multinational corporations and the whole agribusiness hasn't, is unable to come here. We have rolling hills, how are you going to, you know, how are you going to plant, you know, 5000 acres of something? You just can't, right. And so, it actually ends up being a blessing, that the ecology is still intact here. If you look out on our farm, right, we have pastures and we have forests, and you know, it's just, it's patchwork. And so, there's a lot of diversity. And being in the oldest mountains too, like, even tiny little ecosystems from you know, one valley to the next, you know, there's an amazing amount of, of life that's still intact here of the ecology. -Basil

In addition to natural resources, participants viewed built resources around food as a strength in Montgomery County. While there are numerous food deserts in the New River Valley region, they referred to a variety of grocery stores, farmers markets, and other food options in the Town of Blacksburg as a community strength:

> I think our local food system is working well, we have plenty of options. I don't think there would be any place in Blacksburg that you could really call a food desert, kind of in the traditional sense of the term kind of thing. Well and we have a lot of a lot of things going on. I mean, we obviously have like the Krogers and the Food Lions in Blacksburg. We also have a very active farmers market and the number of people that are coming to the farmers market is growing. There's different options to participate in community supported agriculture…There are some smaller, like, Asian food markets on the south end of town and stuff like that. But I guess we could have more diverse food options, but in general, I think our food system is working. -Colby

Municipal leaders in Montgomery County have tried to prioritize policies that benefit the community in terms of food access, land preservation, and not overly restricting food production. This has looked like decisions such as allowing chickens in town, creating new community gardens where they were asked for, offering tax leniencies for farmers, and trying to keep land in conservation as long as possible:

> We've got, even here in Christiansburg, about five or six years ago, we now allow chickens to be raised in town where we didn't before. It's only so many hens and you can't have a rooster and all this kind of stuff. But, I mean, there's certain guidelines, but I see a lot of a lot of people now even advertising on social media, that their hens have started laying again, and they're selling eggs. -Rye

> Well, that's the way ours is. You know, it's close to a couple of neighborhoods. But we ran a water line out there for them. So, we could do all this. But I think all in all, it was successful. I know, we've already tilled the spots for this year and are taking applications. -Rye

> There are conservation easements, permanent easements, I don't know how many there are in Montgomery County, but I know there's quite a few. You can look on our GIS maps and see many of them there are. But there are also permanent conservations. And of course, Montgomery County also has tax leniency for anybody who farms, there are reduced tax rates. -Sherry

> We have agricultural and forestal districts set up that not only, we have about 25,000 acres, which is about 10% of the county enrolled in these agricultural and forestal districts. Those districts limit the people who are enrolled on what kind of development they can do, and how much development they can do. It also serves as an extra buffer for them against development. So, like, say that somebody's enrolled in AFD. And somebody wants to put in a pretty high intensity, development or subdivision next to them. It will increase the buffer between the subdivision and their property line and things like that. -Sherry

In addition to support by municipal leaders, local food producers are also finding ways to adapt to some of the impacts of climate change on their own. Some are being flexible and creative with buffering their community supported agriculture (CSA) options in case of unpredictable weather:

> I mean, sometimes we offer that, and we've learned how to buffer that over the years. It's like well now we offer eggs, which can be an optional item in the CSA, or like a pack of meat. So, we do a little bit of like, well I know you signed up for a veggie share, but if you want to use, you want to get a meat product this week, you can. So, we play around with that. I mean, really, we're trying to be more, I guess adaptable and accommodating across the board. -Juniper

> Farmers have been adapting to what's going on since the beginning of agriculture, and then adding in new technologies and factors like changing seed varieties, adapting to changing climate, rainfall, drought. I don't worry about farmers' ability to adapt. I see benefits, you hit a fatalistic point where it's like this is happening, so how am I going to continue to do my operation with it? How am I going to get the best out of it? -Bran

Farmers also benefit from having strong selling spaces in our community. Montgomery County farmers markets are so robust that they draw vendors and customers from a variety of localities:

> I mean, I know we have folks from Hillsville. Floyd, of course, here locally Blacksburg and there's probably some in Giles, and Craig, counties. But that all makes sense to me. And I think we're good because that's where those folks want it. They want to come here and participate in this market. And the market event is a great event to be at. I mean, it's people, dogs, and music. It's one of my favorite things. It's a great place to talk to people. -Kobe

The farmers in our community who do not choose to participate at the farmers markets have found alternative business models that work for them as well:

> I mean, I like what JP and Sally do out at Glade Road farm. They just decided that they didn't actually need the market, that the market was going to come to them. I think it's working for them. I saw JP this weekend, actually on Saturday. delivering some mulch for our garden. So, I think the young people are willing to do the work, and the community is willing to support them. And if they're successful and thriving at it, then I think that's a pretty good sign that the food system is doing well. -Kobe

Many farms in the New River Valley are stable and growing each year and are able to increasingly provide for the community:

> Yeah, super interesting, the local food economy idea. Yeah, I mean, I think we're lucky here in Floyd, there is a lot of that that goes on. So, it's, I feel fortunate, like we get a lot of our produce we get from our neighbor in the summer or at the farmer’s market. There's a lot available. And I feel like there's more every year, some of the farms have gotten bigger and more established, and they feel more rooted. And it's a good thing. -Malina

While producers struggle with meat processing regulations for large animals, there are some exemptions such as the ability to slaughter poultry on farm that make things easier for farmers:

> Yeah. And that couples along with some of the regulations that there are, which state, federal, whatever, you know, they're not like local or anything. But like, for example, our poultry, we have an exemption to do our poultry, we can slaughter on farm up to 20,000, which is a federal minimum, and Virginia follows the federal minimum thing, and that's great because the inspector comes out once a year checks on our stuff, we talk to him, and he checks our label. And we have to renew our permit every year. And it's really easy. It doesn't cost us anything. And we're allowed to sell not across state lines. But I can sell directly to consumers. I can sell limited wholesale, but still, it's great. And it's doable. It's practical. But there's nothing like that for cattle or hogs. -Malina

Additionally, our local officials are connected to and feel heard by some state and federal officials around many of these issues, although it does require some follow up and energy to see progress:

> So, our two US senators are pretty open to be talked to. Often people will say, can you help me, Sage, make sure that the senators and so that's something that I can do, you know, but they have to have interest, too. I'm not saying that they wouldn't be interested in helping. But I find that it takes a lot of energy to make sure that they stay on task or actually make progress to help us. But I would think that it's worth a try. -Sage

In addition to policy, another strength is with the food producers themselves, in that younger generations are willing to try new ways of farming and are approaching the profession with a more sustainable-minded attitude. This contrasts with the older generations of farmers who are more set in their established ways:

> And I see that those older populations just not caring, it's always been this way. But I get excited when I meet like, some of the younger people coming on in those systems that are seeing that it's not working and are willing to try something different. I've met a lot of younger farmers that do come from the sixth-generation farms and stuff that are like, saying the way we've been doing it is not the right way. And it's more, I think they're looking at it more of like, affecting their bottom line. And they are looking at it like, you know, helping the environment. -Bran

What is Not Working

What is not working refers to the aspects within a system that are not functioning effectively or impeding the success of desired outcomes, contributing to the creative tension gap between the current reality and the envisioned future state. Identifying and understanding these weaknesses and challenges is essential as it allows stakeholders to address the root causes of issues and barriers. This enables them to find solutions and move closer to their desired objectives and ideal future (Stroh, 2015).

Stakeholders in this study identified that farmers face an incredibly difficult time, especially small farmers who are trying to stay afloat. Malina acknowledges the structural disadvantages stacked against farmers, especially BIPOC farmers: "I mean, yeah, it's the same thing in the US too. It is a loss of African American farmers. Yes, massive, wealthy, powerful people, and corporations especially. And the system is set up that way." Locally, some challenges and obstacles that farmers in the New River Valley face include difficulties in finding drop-off locations for CSA boxes, competition with cheap grocery store food, lack of water security and access to irrigation resources, high input costs, limited availability of local processing facilities, insufficient income and lack of social value for agricultural labor, low farm share in the food dollar, pest outbreak management issues, and the loss of livelihoods and rural landscapes, among other issues:

> I'm currently looking for partnerships for drop sites for my CSA, but I don't really know, I don't really have a solution for that, I just would like places to drop off my boxes. So, like, that means businesses and families or houses or something where I can drop off stuff. And people could come get it because, you know, consumers need ease of access to my product. But I don't, I don't have a really nice answer for that. So, if it's not driving to my farm to get my food, how else are they going to get my food? So, like, I'm just presenting a problem, I guess. -Nori

> So, I think grocery store food is cheap. And a lot of factors make it cheap. And that's hard to compete with if we're not doing those same factors, especially, because we

choose not to. And I think our nutritional value is higher. And I think it's worth more. But that's hard to explain to a consumer, especially a low-income consumer. And then we're one step removed from where they're getting the rest of their groceries, which is Kroger. So, people have to plan for it. And they don't always know what we have. And maybe they don't like what we have when they do come out here. Cooking takes time. And I know because I don't have much time. And a lot of my free time is spent, like in the kitchen cooking, because that health priority for my family, because I like to eat. But I know that a lot of people don't prioritize that or don't have the time to make it a priority. So, there's a lot of factors at play. -Juniper

I mean, I'm trying to get water security, you know, I don't know what other farms are trying to do for that, but like, if we don't have water, we're not going to grow. And a pond is really expensive. And I don't own this land, you know, so I either have to put out the 30, 40, 50 thousand dollars to put a pond on this land that I don't own, or I need to convince my landowner. And there used to be a lot more ponds built in the area and the, like, the NRCS would help you build ponds. But they don't do that anymore. They've, ponds are like too much of a liability now, or they don't, on paper give you that technical assistance. So, finding people with the knowledge about farm irrigation ponds in our area has been tricky, and then finding a contractor available to do it, just finding contractors are in short supply now. -Juniper

Local food producers are sharing challenges that their grower connections across the country are also facing, with a worry that we may soon face similar setbacks:

Yeah, all the growers I know... I was on vacation last week. And I met some grape growers from California. 500 acres. So, some of the longer season varietals, they're like, "We can't grow that anymore because we're getting more frost and it's getting colder." Just the climate is all mixed up. They're going back to varieties that are more like a hybrid, but you get less money for it. They're more tolerant, but you can't sell it at the price that you could for the other varieties. So, they're taking a loss to grow something that it's not as desirable, but it's something you can predict the outcome better. -Coriander

Participants share that lack of land ownership and the potential issues with leasing land for food production is another challenge for our small farms locally:

You know, you know, I think what we have here at our local farmers market is a pretty good solution. There are a lot of young people. I'm impressed with so many of the folks in the farms that are wanting to grow. And it's hard. A lot of them I know are leasing land from the landowners. I think Riverstone is that way, Glade Road Growing, of course, is doing that. And that's, I think, a boon to them. But it also shows a problem with on the one hand we have owners of property that aren't the actual growers, and what happens if a relationship there is spoiled, so they're not

> really that in control of their own future. From that standpoint, that worries me a little bit. -Kobe

Farmers also face a myriad of regulations, bureaucracy, and policy challenges to their operations, whether that's around meat processing or other supports:

> So, I think the funding is all there. The regulations, the bureaucracy of our funding system hog ties our farmers, you're already strapped for capacity. It doesn't incentivize local governments to build that capacity. And, unfortunately, it's never been quite the priority. -Hazel

> Oh yeah. A year and a half in advance. Yes. And we don't even know, animals aren't even born. You know, you're just stabbing in the dark, predicting, you know, what you're going to have. And also, I think it kind of snowballed. I think for a lot of people, it got worse during COVID. But, you know, I'm like, okay, I'm going to overestimate because I'm gonna make sure I have dates. And I think everyone did that. And then that made it all more booked up. Harder and harder. But yeah, just having a local processor closer would just make such a huge world of difference. And if there was more availability, you could schedule more like when your animals were ready instead of just, you know, it doesn't matter what size my pigs are, they have to go this day, because it's the only day I have for the next six months. Yeah, it's really, really hard. So that is like a number one huge thing. -Malina

> I mean, it feels like when you're a farmer, it feels like there's, clearly you can't do everything. So, you need help, you need other economic businesses to help you get your food out there and whatnot. But most of the time, you feel like you're being preyed upon, right? Oh, we'll help you. But you have to give us $100 a month, whether it's for the software, or whether it's like, you feel like you're being charged too much for the inputs, you're getting, right? The input, the agricultural business of inputs, has just exploded, they're making their billions the farmer, you know, there's a few that are making oodles of money. But in general, that number stays really low. Right, especially for small farms, while the input industry is just doing fantastic. How do you keep that in check where it's a proper relationship between the parabusinesses to the farmer? It means it's local, it means it's like the small things it means like our custom processor is now, 20 minutes away, versus three hours away, right. And then you want to talk about climate impact, you know, all the gas we have to use to drive there, right? I mean, it just all begins to add up and all these little sorts of interactions that we can make happen locally. We just would have a phenomenal impact and then it would reverberate out from there. We can't even get the simple stuff. -Basil

> Do you know how many times that's been asked? That was the first thing people did as soon as COVID hit. Can Virginia Tech help the local farmers with processing? Oh, no, we're too busy researching. That was the answer we got back. And so, it takes, well VSU was originally black and small farm right. It takes them all the way

> in Petersburg to try to help do meat down in Floyd and in Montgomery County where Virginia Tech is at! That speaks volumes. -Basil

Another weakness is that people are interested in farming as a profession, but economic and logistical barriers often keep new talent from entering the profession:

> We do have folks who are interested in farming, but what are the things that push people out, and that's like the lack of a living wage, lack of land access, it's not having kind of the systems like processing facilities, or all the local infrastructure necessary to kind of cultivate that. I think a lot of that, too, is not just like the money, like where's our money going from the government, public private, and you know, but also where and what do we value as a society? I think part of that has to do with the fact that manual labor doesn't, like agricultural labor doesn't pay well, because it's not socially valued, even though money is just one form of value, I think about value in a lot of different ways. -Olive

> But you can't make a living very easily without having another job, with just farming. And when you look at the food dollar, for the USDA they have a food dollar, there's a graphic and website you can go to I think it's seven cents out of a hundred, about seven, that actually goes to the producer out of that dollar. That's the farm share. That's out of a dollar. Seven cents! Without your producer, you don't have the rest of that chain. Right like, and it's different depending on if it's vegetables, vegetables, it's probably less, I think beef is usually a little more but about the average. That's just actually going to that producer. So, there's this imbalance as far as living wages. -Pomona

Not only are we seeing a decrease in farmers entering the profession, but we are also seeing existing farmers being pushed out of the profession due to a lack of necessary supports, not feeling heard, a decrease in economic viability, and agricultural land loss:

> But those are, that's the low hanging fruit. That's what needs to happen. And so seldom do those things happen, we've moved on to the next great thing that we need. So, we have people who are writing all the time, "oh, we have grant money, so we can help fix your website, so you can get on this online software to sell your stuff." You know, it's like everyone stood up and showed you what they wanted, they wanted these mobile processing units, everyone was like this would change our whole operation. This would totally enable us, like, this is what we want. And then it falls apart. It frustrates me because there was a clear, you know, this wasn't just Oh, or Yeah, it was a clear just like up swelling up, this is a need, this is a fantastic idea. Do it. And we haven't seen anything come out of it. And so that kind of thing is frustrating. So, like, there's a lot of low hanging fruit that we need to take care of. Let's take care of that before we move on to anything else. -Basil

> We're losing a lot of farmers nowadays because it is so hard, I mean, even if you look at the conventional side like, those guys, they're losing money just like everybody else. And they're aging out and now we're losing our rural landscape, we're losing our whole culture. And those are people that have provided our food for so many years. -Bran

Municipal leaders oftentimes face bureaucratic challenges and setbacks, inability to keep up with the development rate, as well as opposition from the other parties around making progress on sustainable policy. Ginger expresses frustration with the singular faceted rather than holistic approaches to addressing issues like food insecurity in our community, stating, “I don't think it makes sense for every locality to come to think that they're just going to throw some money at food pantries. And that's going to fix it. You know, that's, that's already not addressing the need that we do have.” Kobe also notes that more systemic focused solutions are necessary, but impeded by bureaucracy that slows or prevents meaningful solutions and change, “We just have a hard time implementing them politically, because there's so much inertia and roadblocks set up within the system to block that change.” Hazel isn’t sure how we can get past these bureaucratic roadblocks and challenges, citing the apathy of many policymakers, and how, “If we can't use children, and health and hunger, like metrics on children and say, like, hey, this is a pretty justifiable cause, like, we need action on this. And we can't do that right now. It's gonna have to get really bad really, really bad.” Other participants also echo the idea there is multi-level political disinvestment or lack of buy-in from many officials, and that many of the policies and programs designed to address climate change and food security are not designed in a systemic way:

> I have not seen from our representatives, federal representatives, our house representative, Morgan Griffith certainly seems profoundly insensitive to the impacts of climate change. So, we don't have a strong representative in the house. Tim Kaine is an advocate for policies that would address some of our climate change issues. I

can't speak about Mark Warner, as far as other localities. You know, if we're kind of a divided County, I mean, we are sort of half blue, half red. And I have not seen much in the way of policies from other local governments that are addressing climate change and food availability. I mean, they do address problems with hunger, but I'm not sure they're looking at it through the lens of systemic climate change. You know, let's bring Micah's Backpack to the trailer parks, which is great. I mean, it feeds the people in that immediate need, but it doesn't address the systemic problems. -Julienne

Every now and then there's Senators from both sides of the aisle who get together and say, hey, let's take these custom processing places and give them the ability to do USDA, let's change the regulations, let's soften them, you know, let's ease it up so that they can do it. And they can meet this need. Because the infrastructure is still hanging on there. It's barely there. But it's still there. Let's work with the infrastructure. Again, there was a push right after COVID. Again, to do that. No one has the political will to do it. It's low hanging fruit, it could have been taken care of, there's a way there are ways forward, whether it's the mobile, or whether it's you know, giving more help, or grant money or whatever it is to the custom units, right? I mean, all these communities still have to do their deer or to do your personal cows or whatever. Let's enhance that, let's give them help. That's local infrastructure, and that's the local economy we're talking about. And now we just regulate them right out of business. And it's so frustrating. So that would probably be my number one thing. -Basil

Some stakeholders also reference roadblocks and lack of action taken around increasing renewable energy source use in our community:

So, several years ago, like four years ago, we actually set aside $100,000, to start looking into doing solar within our county. And we have yet to spend that $100,000. And it's something that we could have done every year. -Sage

But the crazy thing is that here in Virginia, you're only allowed municipalities I think, are only allowed to provide solar on contiguous properties. So, we couldn't generate a lot of solar there and send it to our government center, the state has limited what we can do. -Sage

Challenges such as the pace of sustainable development and infrastructure issues were also shared. Some places of the New River Valley, such as the town of Blacksburg, are developing more rapidly than municipalities can keep up with:

There was a little, there was a period of time, it might still be going on, I don't really know. Where I think Blacksburg was growing a little bit too fast that the infrastructure in Blacksburg couldn't keep up, we've had several developments that we've approved in town, they can't move forward because we still have to put in

> water and sewer lines or expand water and sewer lines because we've grown in other areas and infrastructure has reached capacity. And it takes time to build out those things. -Colby

> Housing though is probably the biggest challenge we have. We've done a lot of work with student housing because Virginia Tech announced that it was growing its undergraduate student population to 30,000 plus undergraduate students. But now we need more housing for everyone else because it wasn't just undergraduate students who came to Blacksburg it was faculty, staff members of the university, folks working for like downtown restaurants. Folks that are working in the apartment communities and are like serving, the entire like service industry and service sector. Everyone needs housing in Blacksburg. -Colby

> One thing I'll throw in here, as more people move to the area, if we're talking about the local food system, just the ability to have access to land, like affordable and the economics of farming, the scalability and the economics of farming, and how is that impacted by things that are already happening anyway, that, you know, there's already land prices go up, and there's more development pressure and all that stuff, and difficult to like scale agriculture in this area for a variety of reasons. -Alfredo

Despite this growth, municipal leaders also cite a lack of public engagement and investment in showing up to community meetings around these issues as a problem:

> Montgomery County is getting ready to rewrite our comprehensive plan within the next year. And it addresses a lot of future land use stuff. And future land use considerations and where development should go where it should not go while balancing resources, natural resources, even. And we, as part of that process will have community meetings. And unfortunately, those aren't well attended, really matter how much you advertise them, no matter how much you put the information out, no matter what you do. We just recently did traffic, impact studies and traffic and transportation studies are getting ready to put together our transportation plans. And we were thrilled because one of our public outreach meetings, we filled out, not just one sign in page, but we started a second sign in page. Still, you would think with transportation issues people would want to give their input. I mean, we put out surveys online, just put them out on social media. And they still haven't come… So, there's a lack of public engagement, with a lot of the things that we do, unless it's in their backyard. And then suddenly, they're very invested and they'll show up. -Sherry

Local funding to bring stakeholders together for initiatives like moving sustainability and climate transformation planning efforts forward, as well as issues around differences in the political composition of local boards and their willingness to engage with these topics, were other weaknesses mentioned by participants:

> I've been thinking about this. Yeah, the Appalachian region, convening a bunch of stakeholders, and it's like, I always am searching for where the funding is to do stuff like that. And like, bureaucratic, just like hula hoops, we have to jump through and boxes that we have to check in order to like, to actually obtain substantial funding for this, it's, I wonder, I mean, it's out there for like multi state projects, you know, to kind of do some more innovative things. And I don't know where the buying has to be from, I can only pull it from our region, you know, I can, I can figure out how to get the buy in from our four counties. But I'm not really sure how to, like start to extend that to get enough buy in, that just takes more time, you know, and then the funding pool has to get bigger. And because you want to pay people for their time too, like, we're all committing two hours our day here and luckily, we're able to do that. And at no cost to the person bringing us together. And I'd love to be able to do that more. But like, there's going to be some people that we need to hear from that, that need to be compensated for, for their time and their travel and their energy. And so, I wonder where the funding is, I haven't found a funding partner that works that way. -Hazel

> Yeah, if there's funding to support it. Well, and quite frankly, if the Regional Commission can start getting real about saying climate change, because it's been a struggle, even in the hazard mitigation planning process, it's like they can't even say the word. -Ginger

> I was a Regional Commissioner for Blacksburg for four years or so. But it's structured. So, each locality sends like an elected official and like a citizen representative is appointed by the elected body, but because of the composition, the political composition of the different boards, you could probably get a lot of folks who might not want to use the phrase climate change. Not from Blacksburg, but from the other localities. -Colby

Participant discussed cost of living and other inequities. They also connected this to the need to focus on systemic factors such as industrial emissions and large-scale agricultural practices, rather than just blaming individuals for their carbon footprint, particularly those who are doing the least to contribute to it. The lack of affordable housing and income inequality leads to transportation issues and a cascading effect of inequality within our community:

> But I also think, one of the biggest, not traps, but like, one of the biggest things that I've seen people kind of fall into is blaming like, you should ride your bike and try not to drive your car. And I think that's a great way to have an individualized impact. But I also think, if you're not talking about industries, or like, general emissions, large factories and agriculture and those different things that are causing way more

emissions from that level, then, it just feels like shaming people for the situation that they're in. I really dislike when people are like, okay, but in lower income areas, people do this and this and this. But it's like okay, but that's because of the situation that they're in. And if you're gonna go after them, then it's really just that you're going after someone for being in poverty, and not actually going at the root cause of climate change. Because it's hard. Because there's so many things that affect the climate for people to like, really zero in on the ones that are the hardest to make change, and easier to say don't use a straw than to say, stop flying your private jet 50 times a week, and to focus on a scale that actually makes that impact. -Miel

It has to be cheaper to live here. And they have to let not every development that's coming in be like a giant like a bunch of 500-to-600-thousand-dollar houses. There has to be more affordable housing. There has to be you know, I don't know. There has to there's this I don't know. I feel like Blacksburg is getting so expensive. That I mean, we can certainly take in more people from Northern Virginia and more like professional people from other places. But in terms of climate refugees living here and stuff, it's like, I don't know how hardly anybody can afford to live like in Blacksburg proper. And in the New River Valley in general, even that, land is getting so everything's just getting super expensive. -Alfredo

And that I mean that all it's all just this interconnected complicated problem of, you know, income inequality that forces you know, people out of the community and that's just a cascading effect. You know, you don't live near where you work. So, you're driving your car and you have to pay for your, you know, your gas, and oh, if your car breaks down, then you can't get to work. If you can't get to work if you're a wage employee, you don't get paid. It's just a whole cascading effect of inequality. -Julienne

Participants took issue with the loss of agricultural land, both globally and in the New River Valley. Rye expresses concern with unintended consequences of farmland development in the New River Valley, stating, “I get concerned particularly in the rural areas when you take farmland and they're developing 25 and 30 and 40 homesites. And they're all on wells. So, at some point in time, I mean, does the 29th house tap the system out?” Internationally, there is a land grab taking place, and locally there is a growing trend of farmland being sold for development due to a variety of issues such as declining profitability, rising taxes, and the financial opportunity it presents to landowners. This development is a threat to the agricultural landscape and raises concerns about the sustainability of the land and water resources. While there are conservation programs in place to preserve farmland, the pressure to sell is only increasing, and it is difficult to prevent landowners from selling their land for development:

> Right now, we're basically using up our land. And so, there's a land grab going on. My friend references Africa, I grew up in Africa. So, you know, if it's the Chinese or the US or India, whatever, it's like they're looking at it as arable land. A nonrenewable resource that we can extract. -Basil

> Now we all support not for profits and food, and these types of things, but from a municipality standpoint, our key to it is, land use. And we all see people that have been willing, who've worked the family farm and their fathers and grandfathers have worked the family farm. And now they're into that age that you know what, it's not worth it, with the way prices have gone and production and taxes and everything else that they pay. So, they're willing to sell out and move on. And it's very hard for us to come to someone and say you can't sell your land.

> And the ideal situation to me would be if for some reason, we could stop the demise of the family-owned generational farms that are being sold off now for development. And that's, that's when you get on the municipal side of everything that's impossible to do. Because it is the landowner's right, and, you know, I have talked to people that are in the process of selling off the family farm and they'll say you know, I've been doing this for years and years and years and years and break even. And somebody offers me $3 million for the family farm. And I know I'm in this. I'm in my 60s. And I can retire. Yeah, I'm going to do it. But you can't prevent that, you cannot prevent that anyway, whatsoever. -Rye

> But we do have 25,000 acres that are owned by citizens who voluntarily enrolled in this program. That's been going on since 1981. And they're on eight-year renewal cycles. So, when they commit, they're committed for eight years, and to back out, they have to prove very specific things in order to be removed from that outside of their eight-year cycle. We have been seeing more and more removals though. Most of the time, it's because generational farming has kind of come to an end. -Sherry

> It's really hard for people to make a living off of these days. Yes, unfortunately, and it seems like they're releasing their land from that, so that future generations can choose to sell it to developers or something like that. It doesn't happen often, but it does happen, every year we have some removed for that purpose. -Sherry

Participants share barriers and challenges related to access to healthy and affordable food. Cost is a significant barrier, as there is a general perception that farmers markets are expensive compared to conventional grocery stores. The association of farmers markets with wealthier, predominantly white spaces further alienates marginalized communities from making use of them. Miel shares:

> I also think there's a big area of like, just cost, the cost to purchase things, understandably, is higher, as it should be. But it's such a barrier for people who can't afford, or who have a preconception of how much food costs at the farmers market, or other places like fruit stands and things like that. Because they think it's gonna be really expensive, even if it may not be, maybe if they are in season and things are super reasonably priced at the grocery store. When people think about a farmer's market, they typically think it is quite expensive. And they think things that I don't need, or that are going to be way more than they're worth. And they typically have been white spaces in the past. So that is a huge barrier for people who aren't white, who aren't wealthy, to want to enter those spaces and have those connections with people who are growing food that is local. But also getting people to want to eat locally, is also a barrier because it's like, well, if I can get it at the grocery store, it's always gonna be open from these hours on these days. Why would I not do that? - Miel

Transportation is another major issue since many individuals who are food insecure lack the ability to reach farmers markets or other local food sources due to limited transportation options or time conflicts with their other responsibilities:

> Oftentimes people who are food insecure don't have the transportation to get to these markets. And they're only open once a week in many cases. And so, there's really limited opportunities for, you know, it basically has to be the perfect storm for people to have the transportation to get there, for people to have the time when the markets are open to get there, to connect those producers to the consumers and those that are food insecure. -Amandine

> I think the biggest issue that all of the families that I see every day, the biggest issue that they always discuss is transportation. So, you know, having things like farmers markets, those are amazing, you get the food producers there, but you're never going to get the people that at the lowest income who would benefit the most from that food, they're never going to get to the farmers market, you know, because they might be working and someone's watching their children and all of these things. - Clementine

Distance and affordability of housing also influence the availability of fresh food in the area, or the ability to access food in general:

> And over the last year and a half with inflation and the increase in costs of fuel, it has absolutely affected the ability to go to the grocery store and get as many imported

> fruits and vegetables that we have in the past. And I don't think we have any of our places here in the area that are able to sustain a food chain. -Rye

> But I also know that if you have to take the bus an hour to get there and back, you're not gonna be able to carry enough groceries for a week. So even public transportation isn't the solution. And you know, in cities, there are food deserts, and they have public transportation, so I don't think that that's one solution. -Miel

> And I think it kind of underscores how much the food system is reliant on things like transport, transportation accessibility or, you know, like obviously the whole business environment, but like it's really integrated. And so, for those areas that are further out and more affordable. But they're not, you have to be able to access transportation to get to that fresh food. And for a lot of folks, particularly those who may have some of the greatest needs, that's just not an option. So, it's a, it's a major impediment for sure. -Brie

Consumers are often removed from the knowledge of how their food was produced and what the health implications of those choices might be. People with more privilege are more likely to access healthier food sources, whether it be the meals that school children are provided or the shopping venues that adults choose for themselves or their families:

> Where there is no waste, I guess. I think community awareness of where your product is from is huge. You know, we were talking to Dining. We had a meeting about an hour ago. And it's interesting, they, you know, so the United States produces chemicals that we can't use on our produce anymore, but they sell it to Mexico and then we buy those products, and we eat them. So, it's broken. But I think the local production system is way more sustainable than I think the huge national system is. It's kind of broken. If you bought avocados from Argentina. They could be sprayed with chemicals that are no longer allowed to be applied in the US but then we get these products from them, and they're in Kroger. -Coriander

> I think, again, like the people who pay the most attention to this stuff, are maybe the people with more resources and more time to think about it. So, like the people who are going to the farmers market and benefiting from all of this delicious produce are not the people who need it the most. -Clementine

> And whether that would be providing children with better school meals, school lunches, instead of being because at least I don't know if they've improved, but when my kids were there, it was a lot of pizza, a lot of corn dog nuggets, a lot of food like that, because it's easy to prepare for the masses. -Julienne

Even if consumers can access fresh food such as that at the local farmers market, some participants feel that there is a cultural barrier to cooking and eating fresh food due to modern societal structures that favor convenience and efficiency:

> I mean, I feel like there is a I don't know there's, there's a cultural barrier in cooking and eating good real food. I think a lot of people like to just eat processed food they like to eat out at restaurants. And they like ease and simplicity. You know, there's not a lot of time in modern life for cooking real food. -Nori

Participants shared issues of environmental degradation as weaknesses, such as unsustainable resource extraction. Basil characterizes this as, “It's a resource to extract and use so they are all fighting over who has the right, rather than trying to see how we cycle this water so that the ground actually holds more water.” Stakeholders view a lack of critical thinking about the utilization of built environments and existing infrastructure as something that is not working. They would like to see a change to maximize efficiency and minimize unnecessary waste of power and other resources:

> Thinking more critically about the way that we use the built environment and the infrastructure that we have, you know, like, my, my husband works at Radford University. And they've built all of these amazing buildings for 10,000 students, but right now, their enrollment is like, a little over 5000 students. So, they've got all these buildings that they're heating and cooling and so in what ways are we using some of those spaces? Same thing with public schools, or much more as community spaces. Or, you know, that are alive and being utilized 24/7 rather than only for a specific purpose, I just, like, sometimes rather than building a new building, are there ways that we could utilize some of these ones that we have? -Brie

> You know, at Gateway, outside of Fayetteville, West Virginia where the national park is, the development pressures are right outside the National Park now. You know, it's, it's not like you step over this like invisible boundary, like, you know, oh you're allowed to just bar up all of this, all of your pervious surface when it's raining into your park where you conserve and preserve land, it's like it doesn't work that way. And we know with increased traffic is increased pollution. It behooves us to consider holding the spaces more precious and really, they are literally a sponge for all of our human outlets. I don't know if you've ever tried to clean a dish with a dirty sponge, but it doesn't work. We've gotta be a little bit more mindful of what and how we're emitting into our environment. -Hazel

One participant drew connections during the focus group between sustainability and interventions, noting a weakness in how our food system and the environment are not balanced right now:

> It's almost like sustainability relies on intervention, you know? At this point in time, there's connections between, yeah, these are the things we see as how we achieve or maybe push towards sustainability. But they all hinge on interventions because we're in a system that's not balanced right now. So those connections. -Hazel

Another stakeholder also mentions a rural-urban divide that splits rather than unifies farmers around environmental sustainability and causes people to think that others are part of the problem rather than looking at their own contributions:

> But yeah, like younger people that are involved, they do it out of passion. And yeah, I find that the younger farmers, even on the conventional side that I meet are like, aware of climate change, seeing how it's affecting their, their products. And you know that we need to do something about it, like, at least on our farms. Yeah, I think it's like, you can talk to a farmer, at least from my perspective, it's like, I'm preserving how many ever acres of rural land, I'm keeping my cattle out of the stream. Like I'm rotating them around. I'm doing XY and Z, so I'm not really the problem. I think a lot of rural folks see that like, the urban rural divide, that the urban folks are more of a problem that's creating these things than the rural people are. And now you've got the urban folks like, who don't want to live in urban areas who still want to have access to urban areas. So, they're taking and encroaching on our farmland because they have more money. And that's kind of I think, that's creating a bigger divide, rather than anything else. -Bran

They also discuss the lack of local composting facilities that could significantly reduce waste in our region:

> Because we don't have a commercial composting facility. So, we have to truck everything to Lynchburg, and they don't have the capacity locally. And because we've got two-thirds renters we can't compel. The state won't allow us to compel composting, family housing, which is the bulk of our rentals, so there's not enough density of people who do it to make it economically viable and support a commercial composting facility here. -Ginger

> I think for us, the greatest opportunity is Virginia Tech has a huge amount of animal waste. And they really want to, they have a real nutrient management problem. And so, they need to come up with a local solution. I think the town can jump in and partner with them. But we're kind of waiting for them to do that. I mean, right now

> it's most of that dining hall food waste, that they are trucking to Lynchburg. And they know that it doesn't pencil out carbon wise, like there actually is a net negative because they drive it that far. Yeah, they're just sort of doing it because it's the expectation of the students. -Ginger

Participants noted a sense of disengagement as an issue. Ginger shared that, “There's so much evidence about how paralyzing that is, like with doom and gloom messaging, people just disengage.” Overly negative messaging about climate change can paralyze people and cause disengagement. Additionally, it may require significant shocks or events for localities and government leaders to recognize the need for different strategies to address climate change. Ginger also notes, “I think it's going to take a handful of shocks to the system for localities to realize, and or, or government, governmental leaders at all scales of government to realize that we might need different strategies that more firmly address climate.” Moreover, during the peak of the pandemic, there was a large influx of financial resources and attention towards food access, but this level of focus and support seems to have diminished:

> And I know we saw unprecedented financial and resources being pumped into food access during the heights of the pandemic, like I was in Raleigh at the time, also operating an urban agriculture system and education program, and just the amount of people that were like, give me more information about how I do this, like, more information about how to access food, where it's being aggregated, like all of that. And so, I think that yeah, there was so much resource and attention and intention and focus put on it. And I don't see that as much anymore. I don't know if you're experiencing a difference, then. I know Virginia Tech might be a little different. -Hazel

Several stakeholders are critical of a community garden in a new apartment complex that was poorly executed and is hardly being used. They express concern about initiatives like that likely give people a false sense of contributing to sustainability while ignoring other important choices. The lack of quality community gardens may discourage people from pursuing genuine efforts in the future. Alfredo shares concern that it may, “Make it harder for people to try to do the real thing later, when they're like, hey, man, I've seen community gardens and they suck, when what they've seen isn't even really a community garden. There's a lot of bad ones." Participants question the motivation behind implementing initiatives like this one and whether they truly serve the needs of the community or not, and critique the "quick fix" mentality of some sustainability initiatives that do more harm than good:

> Did you come with us and look at that apartment complex's community garden when we were looking at it? That's like an example. It's like, let's pay the developer to make a community garden that no one will use in their development. And that would be a thing. We could say, hey, now we have this amount of more square footage of growing space, they can feel good, they'll probably get a tax break or some kind of thing that they don't need and, and, you know, I went back the other day and looked at them. There were two being used, the rest of them are like filling up with invasive species and things and it's like, you know, it's like, that's the thing I worry about. That is like the opposite side of it is, where you get to like, you know, think that you're doing something if you're not and sometimes I think that happens with that kind of stuff. It's a well-intentioned thing but poorly executed. -Alfredo

> Yes! Yeah, it's actually I mean it for me, it's like my whole beef with recycling is that people are like, you ask them you ask any average citizen what they do to live a more sustainable lifestyle. About 100% of them will say, oh, I recycle. And that's just we're not recycling our way out of plastic pollution or any, we're just not, you know. But it gives people a permission structure to not interrogate any of their other choices. Right. So, it's just this little escape valve that we've been sold but it's not really a thing. Right, you know? And so yeah, I worry about things like that, like absolute bullshit, that community garden in that development, that you can't even walk between the rows in. -Ginger

> Because it's probably like the metric. And again, I feel like this goes back to like, having good metrics was probably like, how many growing spaces do we have per resident, like, there was probably some metric where they're like, we have this space, we need to squeeze in as many spots as we can. -Alfredo

> Well, they might not even want like, I don't even know if they want like, do they want it? Like do the people who live there want that? I don't know, like, is there a need there? Or like, when would it be okay, if somebody from outside of that community came in and started using them, and it's like, I don't know, maybe, and then maybe it could be a good thing if like, you know, it was available to people outside of that community, but then that's gonna come up against. -Alfredo

Where They are Now

This category of findings refers to the current state or condition of the system under consideration. It involves understanding the existing dynamics and outcomes of the system in its present state. Identifying *where they are now* provides a baseline to assess the system's strengths, neutral areas, and areas for improvement. By gaining insights into the current reality, stakeholders can make informed decisions to guide transformative efforts and work towards realizing their intended goals. While *what is working* and *what is not working* focus on specific components and their performance within the system, *where they are now* takes a more holistic approach by considering the overall state of the entire system. This includes its assets, weaknesses, interactions, and outcomes and encompasses a broader perspective that looks at the overall current state of the entire system. It goes beyond evaluating individual elements and considers the system as a whole. (Stroh, 2015).

As one aspect of their present experiences, participants in this study express an awareness of where their food comes from and a desire to shop locally, but also contend with the reality of local food having limited hours and accessibility:

> Well, I think about where we get our food from, I think about the Kroger because that's where I do you know, I do live next door to Glade Road Growing so I do get a lot of my food from them. But there's a lot of food that I buy at Kroger. I try to buy no meat from Kroger because that's a particular issue for me personally. Humane. I mean, I do eat meat. But feedlots and factory farming just seems unnecessarily cruel. So, I try not to buy any meat from Kroger but my food system. When I think of the Kroger and you know, I buy maybe 10% to 20% of my food from Glade Road, because it's convenient for me to go to Kroger and get everything I need. But Glade Road Growing is only open on Tuesdays and Saturdays. And if you know, what am I going to cook for dinner tonight? And they're not open, or I don't have time to place the order yada, yada. And I do go to the farmer’s market. But I think of just where we get all of our food, whether it's dairy products, whether it's produce, canned pantry items. And, you know, with the realization that this stuff gets shipped all over the world, I try to not buy food shipped from China and other countries to the extent that I am aware of where the food is coming from, but I do eat food out of season. - Julienne

In contrast to the consumer perspective, a food producer notes a desire for people to shop locally more often and to buy less of their food prepared:

> And so, I think people who, you know, one, one little anecdote that I kind of get a pet peeve on at the farmers market is somebody coming to the farmers market, and they have a recipe in hand, and they're buying ingredients for their Saturday night meal. And that's all they're buying. They're just buying enough food for a Saturday night recipe, and I go, what are you going to eat the other six days of the week before? So, I mean, I'm just laughing at that, I'm giving it as an example, because they might only cook once a week. So, you know, and all the other times they're eating something a little bit more quick and fast and easy. So, there's a cultural paradigm shift of like, what is real food? And how do we eat it? And how do we enjoy cooking simple, easy, healthy meals? -Nori

While climate change is not significantly impacting food producers in our community yet, they are aware of both agricultural impacts on climate change and the impending impacts of climate change on agriculture:

> In terms of, you know, on the farm, you know, there's a lot of things that can be improved in the climate friendly future. We burn a lot of diesel fuel, we drive a lot of tractors, we use a lot of plastic. We put a lot of produce in bags. We are very resource intensive. You know, I'm all of those things. I feel like we'll have to lift or change or adapt. And it's scary to think about, you know, I'm not really doing much about it. But things like fertilizer costs are extremely high, and what are we going to do if it's not available anymore? So, you know, we're plowing forward with what we've got. But what are we going to do when the fertilizer is too expensive, and we can't buy it anymore? Or there is no more diesel fuel? So, there's that, also. So, from a farmer perspective, you know, working on a climate friendly future involves a lot of innovations on the agricultural front. -Nori

> Well, as a farmer and a grower, we tend to learn how to grow things in certain climates, or certain growing zones. And I think those growing zones are going to constantly be changing. So, we have to keep learning, you know how to grow in a different climate zone, even though we're not actually moving physically. -Nori

Consumers are also thinking about how their food choices will impact climate change, and balancing the tension between feeding the world and choosing responsible inputs:

> Well, I mean, as far as looking at food systems looking at food miles, inputs into the systems, just how our inputs to the food systems and what parts of the food systems that we are supporting as far as if it's local versus national versus global. And how

> our decisions and how we utilize the food systems and the localities can have a really big impact on climate change as far as emissions and resource use. Yeah, well, and part of it is like I did an urban horticulture class and we talked about food miles and locality and your food sources and looking into research on you know, do food miles matter more what, you know, what is the big contributor? I mean, and sometimes I think it's easier to focus on things like food miles because it's easier to wrap your head around and think like I am helping by only buying locally. But I think one thing too, that's important to realize and this is one of those things that might not be the most I don't know, popular opinion is that like, we still have to feed the people on this planet. And not everyone has the resources locally to be able to feed even just, you know, the surrounding cities. So, it's kind of that balance of how can we feed the world responsibly and be conscious of our inputs? And how we're affecting the climate, as well. -Pomona

Some participants are concerned with oppositional opinions on climate change, with some people in our community denying its existence while others solely focusing on it. Extreme perspectives can be problematic as they may overlook other impacts and inhibit collaboration:

> I think that there's some polar opposite opinions on that. I think we have some folks in the area that are potentially even just denying the fact that climate change exists, and that we need to worry about it. And then there are those folks that may solely focus on that. And I'm not saying that that can be bad. But at times, that can be bad because the messaging that they can send on being kind of purist or almost elitist in how they grow, and their effects on climate change. I think we have that as well, that they solely focus on that to where they might forget about the other impacts that are outside the science, or things like that, that's and then there's a lot of people in between, I believe there's a lot of folks that understand climate change changes is important to consider. And they want to support local for many different reasons, that being part of it. But they've got this kind of in between where they're like, let there's pros and cons to both sides as far as production methods and techniques. -Pomona

Some view climate change as a global regulation problem beyond the local municipality's scope. They believe in the need for individual buy-in and voter engagement to address climate change effectively, and that collective effort is crucial:

> This is a bigger problem. Like this is a big, like global regulation problem. Like, I don't know how Blacksburg's municipality is going to alleviate that here. This is a big stakeholder problem, which is why I don't think about it, because I don't see how I can really help. I think you do need individuals to be on board and to buy into the idea that climate change is happening and it can be harmful or present more

> variability. And you know, everything happens at the voter level, a lot of ways so you kind of do need to convince these people…Yeah, it's gonna take like, everybody. -Juniper

Other participants are focused on the importance of SNAP and the importance of creating clarity around food access programs for both producers and consumers alike:

> I know that one thing that I want to do is have some meetings or do something where I can promote SNAP. And those kinds of programs that are out there to show like, this is an area of revenue that you're not tapping into, it's beneficial to you as a producer as well to our communities. Because I think there's a lot of miscommunications on what that means. I think a lot of folks think that's just automatically donating their produce, or their meat or whatever they raise. And a lot of folks can't afford to just give away all of what they are growing. But finding ways to, to help facilitate that. And to get that messaging across. -Pomona

SNAP and food access could be further included in the plans that the locality is actively working towards at this time. Participants feel that Blacksburg is already making steady progress on the goals that they do have written into their current sustainability plans:

> We have in writing a lot of different documents and studies that the town of Blacksburg has done that has more information about food systems and sustainability. So, one resource is Blacksburg has a very detailed comprehensive plan, which is kind of our vision of what we want Blacksburg to look like in several decades. And that has a very thorough chapter on sustainability that Carol Davis was involved with helping we just updated it about a year and a half, two years ago, the entire comprehensive plan. There's also been different studies and the plans produced about how the town of Blacksburg can become more sustainable. And we're slowly but surely, it's not a not something we can solve overnight. But I think we're slowly but surely making progress on a number of different fronts. -Colby

Included in those sustainability plans are new ARPA funds to support a variety of efforts and engagements. Participants uplift ongoing community efforts to expand food access such as the YMCA Meals on Main, the Christmas Store, the Market food pantry at Virginia Tech, Interfaith Food Pantry, and efforts on small farms such as Glade Road Growing accepting SNAP payments:

> I know like in the case of Glade Road Growing, they started off at the farmers market, and then were able to build up a customer base that way before they moved

> to have more people getting their food through the CSA and through their farm stand that they have at the farm on certain days. And that's how they're able to grow their base of folks. But they have also been involved with, like a SNAP benefits program where folks who are, the program is not called like food stamps anymore, but food access programs for low-income individuals, are able to use it at Glade Road Growing, I think the Blacksburg Farmers Market has a similar program. So, expanding those types of programs, I think would help with food security. The town of Blacksburg also received through the American Rescue Plan Act or ARPA funding about $13 million dollars that we could invest in different areas. And one of the things that we did invest in was food security types of programs. So, there's a lot of these programs that are happening, you know, like the YMCA has their meals on main program. The Christmas store, for example, over the holidays has food security programs for folks, in addition to their, like presents for kids and things like that. They also can pick up food. So, we've invested some like town funds into supporting some of those efforts as well. I know that on Virginia Tech's campus, I was surprised by this. I've read a few articles about how there are college students who are food insecure. And I know that there's been some efforts to deal with that. I forget the name of it. But on University City Boulevard near the mall, there's a space where students can go to pick up food. The Market pantry. Yeah. So, there's things like that there's the Interfaith Food Pantry as well. Which I think is on Harding next to the Methodist church there. Um, so yeah, I think there's just kind of different programs and things that are trying to address it, I think with investing the ARPA funds, I think will involve some of them like trying to work together on some of this as well. -Colby

Municipal leaders are currently investing in sustainability initiatives that are community identified needs:

> And that's, again, we're seeing, we're seeing more demand for that kind of activity in that kind of space. And one of the things the council has been able to say is, we should support that, we should, we should have as many community gardens as we think we can support. So, we use some of our ARPA funds that we got, we had $13.1 million come in for the ARPA funds, American rescue plan act. And we gave some money to the gardeners to start new community gardens. And then part of that is getting the equipment and the fencing for deer fencing and stuff like that. And then advertising the fact that these gardens are available for people to have a little plot if they want. -Kobe

In addition to Blacksburg, other towns in Montgomery County have been working on increasing sustainability through investing in and implementing their own community identified programs such as farmers markets:

> Well, and this past year was the first year that we have made a serious run at community gardens. And we had, I think, on the land that we had available. I think we had 15 or 16 plots. And I would go by, they're close to where I live. So, I would drive a little bit further and go by and look and even if I saw someone working I'd stop by and introduce myself. Some of them are growing, you know, vegetables, and then others, you know, flower gardens, sunflowers, and this type of stuff. But the fact that the people were willing and wanted to do this shows that there is a change in the thought of just running down to the local store and buying all your vegetables. -Rye

> It's a great space. In my mind, it's better than the original space, which was in downtown Christiansburg, which was what we wanted. But the visibility and the advertising and people would tell me, so you know, we've had a farmers' market for five years and they'd say, I didn't know about it. But now, that's probably one of the most visible spots in town. I think over the last couple of years that we've been, we've been over there for two years. I think that our average weekly attendance has increased somewhere between 150 and 200 people a week. Which shows it's working. That's a very heavily populated area back there. People would say, well, I'm coming home from work, I'm not going downtown. So, we put it in, we brought it to them, and we saw a big change in it. -Rye

However, not all community identified needs are being met. Farmers are driving multiple hours to get to meat processing facilities due to a lack of what they need in our own community:

I mean, you probably know that, like, all the small processors have gone out of business in the last 50 years. While we drive, because there's different levels of inspection that you're required to meet. So, if I wanted to sell you a whole or half hog, I can take that to my local processor here, that's custom exempt. And we have one in Floyd, we have one in Stuart, they're both fairly close, but to sell at the market to sell by the cut it has to be USDA stamped, and we drive three hours up to Harrisonburg each way to get that so that we can sell it. -Malina

Other participants are thinking about our current food retail spaces, and how grocery stores are not efficient or conducive to food security for many of their own employees, as well as customers. They voice concern with corporate agri-business and large-scale grocery chains. Additionally, they are also thinking about current motivators for where and why people buy their food from various spaces in our community, and how climate change factors into those considerations:

My son worked for a grocery store for three and a half years. And they don't. I mean, they pay a decent wage, but not great. Somebody's making the money somewhere. And you know, I mean, not that this is a bad thing, but a couple of the local grocery stores do donate their going out of date stuff to our food pantry and stuff. And so, it eventually does end up being given to people in need. But that just goes to show that in some cases, there's a supply issue somewhere. Like, if they have so much of it, that they have to get rid of it. It's just not efficient. -Sherry

Yeah, I think the last remaining like segment I would think about would be like retailers and like, I think that there are retailers in our community who are like prioritizing local things or prioritizing, like, ethical types of foods in response to customer demand, but like, once again, I don't know that climate-friendly food availability is like the forefront of their decision making, even if it's the sort of thing that they're like, yeah, there's demand for local foods or for these, you know, fair trade or ethically raised things that are all kind of related to climate change, but that is more just like demand driven I would imagine. A lot of that is just my own like assumption and purview. And like, I bet there are people who are way more climate savvy and likeminded than I am. Not that I don't think it's important. I just, it's a reality and it feels hard to interact with in a lot of ways. -Harissa

But like, from my anecdotal, like evidence as to like, why someone would buy local, I don't feel like that's the first reason I feel like it's like, I don't know if it's the right term or like ancillary benefit, like, oh, yeah, I'm supporting, like a local business. And like, this is right down the street, and like, the quality of the produce is good. And like, if it helps with climate change, that's great. Yeah, but I don't know that it's like the number one reason. And I think in terms of like farmers thinking about it, they're probably thinking more about kind of the same idea where like, what practices can I use that are cost effective, that are, you know, improving the quality of my soil and like, providing maximum yields without degrading and like, if there is like a climate mitigation relationship from those farming practices that like, that's also a benefit, but maybe not the primary reason like I don't think there's farmers who are going to like put their like economic drivers aside in order to like, use climate resilient practices or something, I think that it has to be like, held simultaneously to all those other things. And I certainly know that there are local farmers who I know, who are thinking about those interactions, but it's never like in isolation, I guess. -Harissa

Stakeholders are exploring solutions and aspects of scalability, collaboration, potential for adoption, and attitudes around them from different social groups. They are currently hopeful that the up-and-coming generations will be able to make a greater impact on climate change than future generations are able to:

> And we have no idea what it would look like in 20 years if that happens. So, I am optimistic. I think Gen Z is probably gonna just kick ass and stop the whole issue. Because they, you know, they came out of the womb thinking like, oh, this is real, we need to do something about this. So, I am hopeful that they will do the things that we could not. -Clementine

In addition to generational differences around climate change, they are noticing cultural differences across organizations right now:

> But I just say all that to say, you know, locally, we don't get involved in the culture stuff. But what I'm seeing is a some of that is rearing its head and affecting the ability for different organizations of different groups to get along on what should be a common and shared purpose, which is to try to, you know, figure out what's happening through climate change and what it is we're going to do, especially with regards to the delivery and the production of food. -Kobe

Participants are currently investing in small scale solutions with hopes that they provide the scaffolding for more systemic and large-scale changes in the future:

> I was talking about one of my frustrations with sustainability as like a profession or framework is like does everybody remember like the CFL light bulb was like the symbol for everything sustainability? And that absolutely grinds my gears in the worst possible way. Because it was like here are these like massive environmental problems, and just switch all your lightbulbs so these solutions, which I was calling these lightbulb solutions are so insufficient to the scale of what we're up against. But like kind of through our conversation I came up with that also, these sorts of small-scale solutions provide a little bit of a way in. And so, if we're, you know, tearing up a piece of lawn and growing our tomatoes or our carrots or we're doing demonstration projects at Catawba, or we have community gardens or emergency feeding programs that the town supports that these are all kind of small and not to the scale. But we're building at least some minimal scaffolding that can be expanded upon. And so, I think I see that as like I don't know like yeah, we built building some thin and fragile scaffolding, that hopefully we can scale because I think we are we're headed for, we're in the long emergency, right like, and so in the same way that we all got, like, really aware of toilet paper. -Ginger

At this time, participants would like to convene a roundtable to further solutions-oriented climate change planning conversations with diverse stakeholders:

> I hope so. I mean, I think we could definitely convene a four-county roundtable for sure. I would love to, like have all of y'all's input and assistance and guidance and all of the networks that we all each hold, but all we can do is like, basically provide the table, you know, it's, and hopefully others come in with the ability to make it happen,

> like our staff isn't obviously going to be able to fix these systemic problems. But yes, I do. We host the watershed roundtable right now, which brings in a bunch of diverse stakeholders from all over the New River watershed. And that's, you know, a three county or a three-state partnership. And, and so I think that this is feasible. -Hazel

Currently, participants are facing an issue that food security conversations in the community are less future focused around issues like climate impacts on the food system, and more reactive to immediate issues:

> I think that they do, I think that the stakeholders I've been involved with definitely understand climate change on a broad level, but I think from week to week, month to month, when we meet when we talk about food and food justice, in the New River Valley, and far Southwestern Virginia, the conversation, I think we all think about and talk about climate change often, or are thinking about climate change topics, but we don't talk about it a lot. And I think it's because like when we're talking it's generally like okay, an avocado truck wrecked. Let's try to figure out where we can get all these avocados to. To make that like happen, and it's all very reactive to trying to make sure that people are being served right now. -Miel

In addition to a culture of immediacy, farmers are now facing an influx of people into our region who don't always respect the premise and value of farmland:

> There's a lot of people from metropolitan areas who are starting to realize that climate change is more and more of a threat who wants to move to a better space, and they research where and a lot of them are moving here to the Floyd area. What they find, they buy farmland. And then a lot of them maybe want to do a little homesteading. But for example, we have a neighbor down the road when he moved in here and built his nice house with all his money. He specifically wanted to write into the contract of all the neighborhood that you wouldn't have all these unsightly things like no cars that were not in use, you know, or no hogs or things like that, which is kind of scary for me. Like, this is farmland, this is prime farmland. This is our life; this is what we do. And we need more people to do this, not fewer. So, I feel like that's kind of a bit of a threat, having a lot of people moving into the area, because they're concerned about climate change. But they don't understand, like he said, how the systems work. Yeah, they're not intentionally being, you know, anti-farm, maybe, but they just don't understand the reality of how it works and how the systems work. -Basil

Currently, agricultural land in our area under other threats as well, and is also being converted to development land:

> That's one of the issues that we deal with quite a bit. Maybe not so much Blacksburg although you do have some with the County and the Town of Christiansburg, it seems to me like every, every month or so we have someone who wants to convert agriculture to R1 or partial or business. It's draining the land that has produced so well. -Rye

From the conversations held in the focus groups, participants felt invigorated by idea that we need to make systemic and social changes and want find ways to move those efforts forward. Ginger highlights this sentiment by stating, “I love that we're coming up with: we just need to fundamentally change our relationships with land and food. And then the question is, what does it take for us to move in that direction?” Where they are right now is a space of acknowledging both the community’s strengths and weaknesses, and a desire for something better. Many of the participants share a desire to bring about systemic changes but aren’t sure yet what is needed to accomplish that.

What They Want

This category of findings represents the desired future state that stakeholders aim to achieve through systemic change. Identifying what they want requires collaboration among stakeholders to articulate a shared vision and set a clear direction for transformative efforts. Understanding the stakeholders’ ideal future requires active engagement and collaboration among the participants to clarify their aspirations and involves recognizing diverse perspectives and interests within the system and finding common ground among them. This collective dream helps create and sense of unity and vision to drive actions towards achieving the desired future (Stroh, 2015).

Participants in this study dream of a future that puts renewable energy at the forefront, with a greater reliance on solar, wind, and hydropower, as well as reduced dependence on fossil fuels. Coriander envisions that, “We'd have renewable energy as far as transportation and tractors and everything.” This renewable energy could look like:

> I think that solar could be implemented. You know, fission should be, I'm guessing, nuclear could be, I'm still not sure about the safety, but more hydropower, more processing of saltwater to non-saltwater. You know, a lot can change, more manufacturing of all of those things, funding from the different governments. I would, I would think that we could stop global warming in 20 years, if you really put as much, you know, resources, as many resources as you really need in order to do that. -Sage

One participant draws connections between reducing our reliance on non-renewable resources and a regional food economy:

> I mean, in 20 years, I mean, we should probably, you know, stop relying on non-renewable resources to feed our energy needs, which goes into our food production, and our you know, food economy. I would like to see a more regionalized food economy. I really believe that it is very important to counteract climate change, especially if we look at food systems. I always think about you know I talk a lot about it at work is this drawdown study that was done a couple of years ago, like the top 100 things that we could do now to slow climate change. And I think something like the top out of the top 10 I think four or five of them had to do with our food system, like better, you know, a better infrastructure for moving food you know. Can we move away from trucks and go to trains? You know, we've proven that trains are a more climate friendly way of transportation. Better storage facilities, more efficient storage of food, we're storing food way longer than we should like, because its nutrient value is dropping, the longer we store it, but we're, we're worried about selling it. So how can you know more efficient food storage systems and then incorporating, you know, kind of more environmentally friendly practices into our agricultural production, you know, limiting our fertilizer and chemical use and going to more of a biological use. -Bran

An ideal future involves a political system that makes renewable energy technologies a priority in order to make them mainstream:

> I think access to some of the, you know, renewable energy technologies. You know, I think, I think a political system that prioritizes those would be nice, you know, like, looking at ways to make renewable sources of energy much more accessible, and just kind of mainstream for everybody would be, would be amazing. And I guess, you know, sort of more knowledge about where our food comes from, would be nice so that folks can make more informed choices about buying locally, buying fresh foods. Gosh, I mean, you know, here in the NRV, public transportation that can cut down on vehicular transportation. Absolutely, yeah, is a big area. And I know, you know,

> to some extent with more broadband access, folks are able to, you know, work from home, and so that can hopefully be helpful as well. But still, I think, again, that, you know, the folks that are able to do that are generally of a higher socioeconomic class, then folks who really rely on that public transportation, I would love to see public transportation be free. You know, kind of like the bus system in Blacksburg, you know, it's just, it's accessible, it's just expected, it is something that is available to you. -Brie

They would like to see a transition away from fossil fuels that can be done peacefully, without too much conflict or violence:

> Yeah, less reliance on fossil fuels, obviously, but a lot more awareness of our connection to the natural world. And that goes hand in hand with farming. I hope we can get there without too much drama... or other terrible things. That's my biggest fear. -Malina

Their vision includes transitioning to electric vehicles and ensuring the electricity used is generated without carbon emissions:

> Hmm, I think it would involve greater reliance on renewable energy sources, wind, solar, geothermal energy, all of those sorts of things, and significantly less reliance on fossil fuels. I think in order to do that you need transportation is a huge thing. You need to do a combination of changing over, or electrifying vehicles, so folks are using electric vehicles. And then you also have to have the source of the electricity that is getting to the vehicles, needs to not be one that's putting carbon in the atmosphere. So those are probably the biggest things. -Colby

Participants also acknowledged the interconnectedness of many of our modern issues, such as our reliance on fossil fuels and disposable materials and social and economic inequities such as food security and housing. All of these interconnected issues need to be addressed in an ideal future:

> Well, I would like to see less reliance on automobiles and fossil fuels in general, I would like to see more renewables as our where we get our power from, and that we get more of our products locally, particularly food products, and where you know, we are reducing our carbon footprints, we are reducing our reliance on single use plastics, and just the general disposable society that has been the early 21st century…And if I can be aspirational, I would like to see you know, us address, hunger and food availability and scarcity. Housing inequality. Those are pretty big. And I feel like they're all interconnected. -Julienne

Additionally, they imagine a future with not only a reduced reliance on non-renewable resources, but also ways to reverse some of the damage caused by overreliance on non-renewable resources. This could look like carbon capture and storage:

> And I believe people have the power to innovate in ways that create a much better community and planet. And an additional vision for the future. I envision a future where everyone has the transportation they need to access food and that the transportation they use is not just carbon neutral but somehow captures carbon in the air and stores it or uses it in advantageous ways. -Amandine

> Yeah, it's one where we, not only have we stopped, abolished, completely stopped using any fossil fuels. But we are working toward reversing those damages. We've got a certain amount of greenhouse gas emissions that are there and are going to, if every molecule of greenhouse gas emission depending on type, whether it's carbon dioxide, or, you know, methane, persist in the atmosphere for years or decades. And so, we've got, we've got a minimum of 50 years of stuff up there that we need to be drawing out, right. And the good news is, living systems can help us. I mean, that's the carbon cycle, right? Plants and animals grow containing tons of carbon, and then they die, and then it returns to the system. And so, we have ways of drawing it back down. But we need to rededicate so much more of our landscape to living things that exist within natural cycles, not unnatural cycles to get all of that, that ancient carbon that we started dredging up. We need to find ways to put it back into the ground forever, and then we'll leave it there. -Ginger

Participants dream of a future that has not shortage of food access, equity, and inclusion. Colby paints this vision of access as being able to access your entire diet locally, “That if you wanted to, you could get all of your food grown within like 100 miles.” Hazel takes it a step further by envisioning that, “Money would never be involved. I mean, I think that that is, that's the biggest dream where we go back to timebank, barter, gather, share, in our community, around food” and advocates for “recentering prosperity over profit.” Not just the consumers of food, but also the producers of food and their wellbeing are taken into consideration. Ginger would, “Like to see the people who are part of growing our food have lives of dignity and that are livable.” Sherry would like to keep growers on the land if that’s what they want or enable them to leave if that’s not what they want. The future vision is all about having choices and dignity: “It'd be nice to see agricultural growers remain generational. If that's what they want. If they don't want it, then I understand that it's a lot of hard work. They either feel pushed out of it or trapped into it.”

The ideal vision is to eliminate food deserts and ensure access to nutritious and affordable food for all. They desire a food system that prioritizes health, provides a variety of culturally appropriate choices, and supports local growers with fair compensation. Collaboration, community connections, and education play a crucial role in achieving these goals. Miel would like our future selves to look back and, “Feel proud of the choices that we made. That in 20 years we look back at where we were now, and we say, I'm so glad we started making those big changes then, when we did, or who knows where we would be as a society.” Being proactive and making the changes now for a better tomorrow is a sentiment shared amongst many of the stakeholders. Additionally, their vision includes addressing climate change sustainably, promoting regenerative agriculture, and ensuring equitable access to resources and technology for communities already impacted by climate change. Hazel notes the importance of making mental and social shifts, such as, “Treating food as medicine. If we think about it as like preventative care, that's something that goes into our intentions of how we consume and produce food.” The ideal food system treats food as medicine, fosters dignity and connection, and emphasizes community well-being over profit.

Participants dream of a future where everyone not only has access to food, but that food is inexpensive and not highly processed:

> I guess I would say an absence of food deserts, or massive areas where there are no foods available. And I guess, specifically nutritious foods, I think that's one of the biggest problems is that we do have food availability for a lot of people. But the types of foods that are being offered to them, and the pricing of that food has a massive effect on what they're eating and their overall health. So yeah, not only reasonable access to food, but also reasonable access to food that is inexpensive and

> not filled with chemicals and nonsense. I guess that's what I would picture as a food system working well. And then obviously, like a lot of good communication between all of the parties involved. So, you're not having massive amounts of food waste. -Clementine

> That it provides a variety of healthy choices adequate to feed the people in my community. And at a price that they can afford. Fresh fruits and vegetables, obviously… So, to be able to have a variety of healthy whole food choices year-round, at a price that is affordable and convenient to get to and access. -Julienne

> I think the ideal thing would be that the standard for food would be like locally and sustainably produced food. So, it wouldn't be like a value-added product, it would just be like, more normalized, somehow. Like where you just go in, and that's just the food that you buy, you know, it's not like this weird, like fetishized thing. -Alfredo

One participant proposes that all food would be healthy food, and that there would be no other alternatives:

> I mean, of course, I want everyone to have healthy food, not just access to healthy food and then they choose to get it, I want everyone to actually eat healthy food. You know, like, the only food out there is healthy food, and it's not like a choice. And yeah, you know, I want it to be and if that's the only choice, then that's what everyone is getting, and like the income part has been resolved or figured out. And then of course, want it to, besides being healthy to people want it to be healthy to the land, which to me would mean elimination of confinement operations and monocultures. And those kinds of things. -Juniper

Food is viewed as a right and an investment in the wellbeing and health of the community rather than a commodity, and we have built food access into our school systems and communities:

> Um, I mean, so I think it's, I think it's a system where everyone has access to kind of the basic food that they need. So, for me, it's you know, every child in school gets breakfast and lunch, right? Like there's, I just find it horrifying that we don't just continue what happened during COVID and feed everybody. That seems like a no brainer to me. And, and I think kind of beyond that, in what ways are we using our school infrastructure in the evenings to provide meals to families that need it too and community spaces as well so places because obviously food is not just about sustenance, but about connection so what how are we creating those. I'd love it if we had a system where our schools were also places where communities could come to kind of eat together and access food, particularly for those who are food insecure. Um, you know, we have talked a lot here about what we call a food distribution center. But a place where that is accessible by public transportation where growers

can bring excess food, they can either sell that food or they can donate that food that can then be processed and distributed out to the community, particularly those that are food insecure and thinking about how that space also addresses things like workforce development and health. -Brie

Well, certainly, it would be where people could find enough to eat without having to make compromises on quality or healthy, healthy choices. And that should be accessible…So I'd like to see a lot of healthier choices for kids in our education system. Like when you see pictures of what children in France get served versus what they get here. It can be done, they have millions of people, they do it. It'd be really great if we could do that. You know, again, if it's aspirational, it would really be great if all kids were fed breakfast and lunch, if they chose, at school, and it was a good healthy choice, that would be really awesome. And then their parents at home have access to plenty of healthy food, and again, whole choices, and not just convenience foods that are, you know, cheap to produce. -Julienne

In addition to making sure no one is going hungry, participants dream about a future where this is balanced with economic stability and lives of dignity for food producers and workers as well:

Everyone has access to culturally appropriate, healthy foods, so that their families are healthy and satisfied, I think that it's people are able to grow and have local businesses and be and not have to, and have a, you know, a not I don't even want to say a living wage, like be able to live at the level that, you know, they're able to prosper, and, and support and like, set the next generation up for success as well. Because I think it's being able to look not just like what's going to be a living wage for us right now. But how can we actually think about having careers that are supporting or going to position the future generations well, in addition to the current workforce? I think it's also having access, you know, one of my greatest joys is to be able to eat foods that I'm not familiar with and cook foods that I'm not necessarily familiar with. And oftentimes, these foods aren't necessarily grown in this area. I mean, it would be nice to have a more robust local food system, but I also very much value foods that I'm able to get that aren't local. And to be able to do that, in a way that kind of limits the impact on climate and the planet. To be informed about that. I think, like being able to be better informed, I think it would be huge. You know, obviously, where no one's going hungry would be the first step forward. -Amandine

Farmers would be trained and compensated for their work the same way that we treat any other respected profession that is absolutely essential to our lives:

I mean, yeah, I mean, things we've already kind of hit on and had hopes for like nutrient dense food availability, affordable to everyone while, you know, farmers are making a living wage doing it. Not even a living wage, but a life. Just like anybody

> else. I think, you know, you go to school to be a doctor or a lawyer or whatever. If you want to be a farmer, you should be able to be a farmer and go to school to be a farmer and make a decent living doing it. Because it is such an integral part of our lives. It's something no matter your race, class, sexual orientation, we all eat food. And it's the one thing that we as human beings, no matter where you are on the earth have in common, and it's the most important thing to all of us to stay alive. And it should be good for you and affordable to you at the same time. Yeah. Paying a livelihood for the people producing it. -Bran

Everyone’s needs are met, with consumers having food security and access to fresh foods, while food producers are getting paid top dollar for that food, rather than those two goals being at odds with one another:

> I would say that people have access to the foods they want and need at an affordable price. And the stakeholders who are working in that system are being compensated and treated fairly with regard to provisioning those foods. I mean, obviously, if it's an ideal system, it's a win-win scenario that it's like everything is affordable, and everyone's getting paid also. And like in reality, we know those things are often in a sort of tug of war…I mean, ultimately, everyone needs to eat. And it would be nice if they could eat what they wanted. And it would be nice if they could get that in a place that's close to them. We know that all those things don't always happen. But that's the ideal. -Harissa

> The system that works well is economically just for the people who work within the system at all levels from, you know, producing the food to otherwise, whatever is the middle part, packaging, transporting, and processing, to the people who are able to get the, the both their caloric and nutritional needs met in a way that's, you know, affordable to them, and accessible to them. -Ginger

> But yeah, so where somehow, everybody is able to easily, like where that's the norm, where it's affordable, but where paradoxically, and simultaneously that people who are producing it are also, you know, being paid enough to live a good life off of farming also. And where people can also have the ability to choose what kind of food that they get and have the degree of choice to pick things that are culturally and personally desirable to them. And where, you know, it's resulting in healthy outcomes, you know, and better public health outcomes too, because people are eating healthier, because they want to. -Alfredo

Participants not only want to see equity for the consumers and producers, but also for the environment regarding food production:

> And so, I think that, for me, the fundamental thing is that everyone's getting enough of it. And it's healthy, the way it's produced is healthy, you know, produced equitably

> and in a way that's healthy for the environment and the people living around it. That's like my, I feel like prime objective number one, and then also that the people and that includes like the people producing it also sounds like people producing it are getting treated and, you know, paid what they're worth and the people consuming it are able to do so and have access to it. -Alfredo

Participants imagine the infrastructure required to bring these visions to reality, such as a food hub or distribution center, or food assistance centers located next to health centers or other resources for community wellbeing:

> So there's some kind of big dreaming going on about, you know, a food sort of distribution center, and where some of the, you know, for where growers can come provide that food, and for some folks can get it fresh, or others, it might be made into meals that are then accessible to folks who don't have that ability to cook for themselves. -Brie

> You know, there's some amazing models of health centers next to like food assistance centers in a way that that may that are, make those things accessible for folks, but also help folks to understand the link between the food that we eat and our and our physical and mental health. So, I would love to see some community spaces and a food distribution center that really looks at how we, you know, how do we create sort of some central places where folks can bring food, but then also it's distributed outward, and then look at and access other services as well. -Brie

The dream scenario also includes infrastructure to support local meat production and distribution to keep our beef local:

> We are producing calves that we're shipping out west, and then putting in feedlots and we don't know what kind of meat is coming back. You know, if we can streamline that, we definitely produce enough calves and enough steers in this region that like beef, at least, should be completely local. And I see no reason why it couldn't be. It's just putting in the infrastructure and the organizational development to do it...I think more buy in from our local food distributors to have a preference on the local meat. And so like picking it up at the packing and taking and making sure that that's what's in, in your, on your shelves other than, you know, whatever came from Oklahoma or Kansas or, you know, wherever they're getting shipped from, and closing that gap and not transporting something across country, of course, is going to lower your costs, lower your emissions, and be sort of better for everybody, I feel like. We control it, we, you know, we have better grass finishing capabilities now. -Bran

Some participants see value in local solutions, but imagine a future of strong local economies that are all connected to one another rather than operating in silos:

> One where we're not worrying about climate change. Yeah, that we have clean water. People are fed and have access to the foods that they need to live healthy lives. That we've got these sort of robust local economies. I actually don't necessarily think that we need to have these microcosms of local economies that don't connect with other localities and regions and the globe. But I think we need to do it in a smarter way. I think there's a lot of value and benefit in local. And I think there's a lot of value and benefit in global and, and I don't want to beget one for the other. I just think that we need to do it in ways that are smarter. And I would hope in 20 years, we've solved some of that. -Amandine

The desired future entails staying connected to the land rather than an over-reliance on technology. Participants imagine food as part of the natural landscape, and an ecological abundance that we are connected to:

> When we talk about scaling regenerative agriculture, if we scale just the way we've scaled, conventional agriculture, we're just gonna fall into the same. We have to scale in a way where our bodies are still part of the answer that we still are in it, we're not just trading the abundance of living this way to a machine to do it. Right. So, part of it's just gonna have to be a change of people wanting less of this and more of that. That's my vision. -Basil

> And you know, I imagine a world where you can take a 10-minute walk during your lunch break and eat your fill of berries and fruit and sugar snap peas, you know, you don't have to pack a lunch because it's just there. Right? And the bees are everywhere. The birds are everywhere. And there's enough for them too. -Ginger

In this future, there is also a spirit of dignity and inclusion. People take time to not only connect with nature, but one another, fostering relationships and interacting:

> Spend more time than just delivering the food but kind of interacting. I also think, you know, a lot of our food organizations are trying to do this, but it provides the dignity that we would hope our food assistance organizations have for those who are in need, you know, and creating opportunities for connection beyond just coming to get a bag of food, but like shopping for your food and having some, you know, the all those things are such key aspects of just, you know, kind of treating people humanely and regardless of their need. -Brie

There is space for everyone to participate and contribute in these interactions, regardless of their ability. Everyone can play a role in the community in their own unique way:

> You know, I was talking to a guy the other day about how he does a CSA for people who can't afford it. And he offers like, you know, five hours of work on the farm to get your share. And if you're elderly or disabled, and you can't really, you know, work on the farm, then they will, he likes to have a shared meal for everybody that comes for the Volunteer Day. So then maybe you're chopping vegetables, or cooking or something and finding a place for people to fit in. I mean, it is more like a grassroots community model. And if you think about trying to make that for everyone that's eating, it's kind of hard to do. But it's more of those things. -Bran

In the spirit of inclusivity, the future also entails acceptance and support of climate refugees from diverse backgrounds. Participants imagine increasing the services they need to adequately support them, as well as cross cultural exchange rather than an expectation of assimilation:

> I think there are some local groups that are trying to work to help people, you know, there's like Blacksburg refugee partnership and groups like that they're trying to, like, you know, consciously make the area like welcoming to people from other places. I feel like that's a big part of what we do with the community garden, for sure. We try to have an open community where everybody's welcome, no matter who you are, and where you're from. So, I think anything like that, and increasing like, different kinds of whatever the services that people need, that are coming from those places, you know, if they need support, economically, or, you know, navigating being in a new home. -Alfredo

> Really that can be another thing too, that we could do like, as a community is like, try to, you know, like, encourage, you know, both like, cross cultural exchange, but also like letting people feel comfortable to continue what they've done in other places here, like they don't have to assimilate, but we can all hang out. -Alfredo

People who are impacted by climate change but who do not want to or are not able to move to other communities would be offered the support, technology, and resources to recover from the harmful impacts of climate change while remaining in place:

> I guess the only other like dream I would have would be that maybe the populations of people living in landscapes most directly affected by, like the climate change that's already happening, like, even if we sustain in 20 years from now, right, like they're already affected by it, that they would have access to the technology or resources to,

> like improve their livelihoods in a way that's not going to like, it's easy to say like, oh, coastal communities, they can just move and it's like, not if they don't have the means to. Or like, if we have enough technology to help mitigate the effects or to increase sustainability, then my dream would be that there would be equitable access to those things. And I have no idea how that would happen. But I think in terms of a dream scenario, like that would be necessary because yeah, I mean, it's human rights. -Harissa

In addition to inclusion, participants would like to see more collaboration and cooperation, particularly in the sharing of resources, so that we can focus on the prosperity of the collective rather than the individual:

> I mean, really, I wish for a climate sustainable world. Well, I would hope for more collaboration, honestly, I think that's the only way we can really do it. And I think that also is like addressing the whole extreme, like if we could actually collaborate, I think we could get to a more sustainable world...Well, and even just like talking with local producers, it's like, okay, if you're looking towards going away from making hay, then why not, like, borrow equipment, or, you know, like, each of you take someone go and help do hay over here, because there's not enough labor for these folks. And so, it's like, help one another. Because we can all benefit from that. Well, and then we're not if we could just do a lot better if we weren't all so focused on being individually successful. -Pomona

Participants dream of an ideal food system that involves healthy food businesses and a patchwork of smaller farms. There would be increased local food options and businesses, not just limited to local farms. The ideal scenario involves the proliferation of smaller and mid-sized farms, strategically distributed throughout the region, supported by essential infrastructure such as local slaughterhouses and markets. This would minimize the need for long-distance transportation and create a more interconnected and efficient local food system than the current reality:

> Um, well, I think from my like corner of the world, it would look like a lot more prolific local options at a range of prices. And, like, I don't know, a better business environment sounds really narrow. But what I mean by that is like, I think there's a lot of room for our area to grow in terms of like, restaurants and retail outlets and local farms. Like I think we've, over the past 10 years seen, like a lot of growth in the farm sector. And what I would really love to see in terms of like, envisioning, like,

> something really amazing would be like the growth of that level of businesses and innovation like across the rest of the food system, besides just local farms. -Harissa

> Certainly, a reduction in like, our level of food insecurity would be amazing. But there's a lot of like, yeah, there's a lot of opportunities for growth. And even with the level of development we're seeing, there's still a lot of untapped potential here. I don't want it to just all be Dollar General in Southwest Virginia, you know, like, thinking about how we're situated within Greater Appalachia, just kind of like I don't know, envisioning, like a more abundant food system is like a really lovely thing to imagine. -Harissa

> There would be a lot more farms, smaller farms, or mid-sized farms, you know, patchworked around in between instead of concentrated in very specific areas, like where it's flat out in the Midwest, or California or Florida, or what have you. Like, there's lots of good agricultural land around here. And just having that more patchworked in between. Yeah, all the residential areas, what have you, would make the web easier to, you know, for the local food system to function. And then having infrastructure that would support it, like, local slaughterhouses. More markets. Less cross-country transportation. -Malina

Participants dream of no waste and environmental sustainability in their ideal food system. Coriander imagines, “There's no waste. Everything is recycled. I mean that would be ideal. I mean, you'd have community knowledge and involvement, just more like a food community family.” The participants’ vision entails a reduction in food waste at both household and producer levels, with widespread community knowledge on both growing food and minimizing waste:

> Less consumption, less waste, and less emissions. To me, that means cleaner energy, cleaner sources of energy. And again, more localized. more dependent on your region, rather than the whole world. So yeah. I don't know, I just keep thinking about consumption of resources, too. So, you know, like living a life that is more simple, that doesn't consume as much resources. So, I also envision that. -Nori

> I would say it looks like there's way less food waste on a household but also producer scale. So, we work hard to reduce food waste. So, if there were no food waste, that would be the dream. If folks knew how to grow their own foods, and knew how to do it well, and knew how to avoid food waste in that process. So, everybody who wanted to could grow their own food, that would be an amazing food system. You don't need to wonder who's growing your food. You don't need to wonder if the food system is going to be reliable. You don't need to wonder if you're going to be able to get to a store because you're growing your own food. Or only what you can grow

> around here. I would say, for there not to be a need for my work. I think that would be great. Like if, and I hate to say it like that. But if there weren't students at Virginia Tech, who were food insecure. If they could know that they were going to have accessible, safe, nutritious, affordable food, always. Overall, I think, in general, everybody would have access to those things, the affordable, safe, nutritious, culturally appropriate food that they like to eat…There was no longer a stigma surrounding folks who didn't have access to that. -Miel

There would also be proper infrastructure to support no-waste or circular waste models such as local composting options, as Bran shares, "The compost idea is like why do we have recycling, we have trash pickup, why not have compost?" Hazel shares the dream of conserving land, sharing, "If I could dream big, I would start putting land in conservation starting now and never stopping, and the more places that become less and less populated, to start to preserve those spaces and to reduce the development pressures on a lot of our lands." This no-waste future includes efforts to curb waste and conserve land and natural resources, and also focuses on soil management for climate sustainability:

> But certainly, there's a ton of natural resource conservation that would also be a part of that dream scenario. And, man, we can just talk about soil for like, ever. Soil is gonna be a big part of it. For the human and nonhuman. Yeah, if we're gonna be climate sustainable, we're gonna have to get our soil management under wraps. -Harissa

Conclusion

In summary, participants from both the food system and municipal leader stakeholder groups are primarily defining climate change as urgent, caused by human activity, and something that currently is and will impact our community increasingly in the future. They are making connections between climate change and its impacts on the food system, including the harm to crops and livestock caused by a variety of unpredictable and extreme weather events, increasing issues of social inequity, and future considerations to plan for in our more climate optimal region, such as a potential influx of climate refugees. Stakeholders are thinking about various aspects of sustainable development and climate change, such as the tension between the economic livelihoods of food producers and the affordability and accessibility of fresh, nutritious food for consumers of all backgrounds. Participants have ideas about potential areas of intervention that could be useful, such as policy step downs, the redesign of local infrastructure, and investment in regional food economies. They acknowledge strengths of their current reality such as investment in expanding programs like farmers markets and community gardens and removing policy barriers to local agriculture to allow chickens in town. They simultaneously share critiques of what is not working, such as the inability to process livestock on farm or even locally, and the lack of a composting facility within a several hour radius. Stakeholders are dreaming about an alternative future and sharing their visions for transforming the food system in our community. They are dreaming of a better tomorrow with commons, inclusivity, a greater connection to ecology and community, climate neutral energy sources, shorter supply chains, abundant food for all, quality life for those who are producing our food, and overall, a society driven by values rather than profit.

Chapter 5: Discussion and Conclusion

Introduction

In my findings chapter I examined how food systems stakeholders and municipal leaders are understanding climate change impacts on the sustainability of the food system, their ideas about areas of potential intervention to leverage systemic change, and the tension between their perceptions of the current reality versus where the ideal future they dream of creating. This emerged through the lenses of *climate change defined, climate impacts on the food system, sustainable development and climate change, potential leverage points for intervention,* and *Stroh's creative tension gap*. These domains reveal how Montgomery County food system and municipality stakeholders are understanding and responding to the intersection of climate change and food systems as part of the larger picture examining how municipalities are thinking about and planning for climate change transformation.

In this chapter, I will re-center my three research questions in context to the broader literature and concepts such as the *metabolic rift* and *slow violence* to elaborate on how stakeholders are thinking about climate transformation impacts on the local food system and what interventions they would like to see come to fruition. Following the discussion of my questions, I will revisit the need for investing in creating and supporting alternative food spaces instead of only resisting the current neoliberal corporate food regime as necessary to reach the ideal future they dream of. I will then close this chapter by suggesting recommendations for future research and practice, discussing study limitations, and concluding with final remarks.

Research Questions One and Two

The first question asks, how do local municipality stakeholders understand climate change and its impacts on the food system? My second question asks, how do New River Valley food system stakeholders understand climate change and its impacts on the sustainability of the local food system in our region? I found the answers to these questions to be so similar that I opted to discuss them in tandem instead, pointing out differences between perceptions of each stakeholder group as they present themselves.

Revisiting the concept of metabolic rift from Chapter 1, which is defined as "the change in the nature of the metabolism between a particular animal—humans—and the rest of the ecosystem (including other species) that is at the heart of the ecological problems we face" (Foster, 2013). This connected to participants' understandings of climate change. Some attributed climate change impacts only to natural variability, but the overwhelming consensus among both food system and municipal leader stakeholders was that climate change is attributed to human activity, such as the burning of fossil fuels and changes in human behavior since industrialization. Additionally, participants from both groups emphasized the interconnectedness between climate change caused by anthropogenic factors and various aspects of our resources, well-being, and ecosystems. They understood the need to address climate change holistically, drawing systemic connections between its wide-reaching effects on the environment, food system, soil health, and the health and sustainability of communities as well as the connection between these elements.

Despite the challenges and potentially irreversible impacts of climate change as we are on a current trajectory to rise above the 1.5-degree Celsius limit recommended by the Intergovernmental Panel on Climate Change, participants from both food system and municipal leader stakeholder groups expressed a belief that it is not too late to change course. While realistic in their view of the scope of the climate crisis, they also challenged fatalistic narratives for our future and highlighted the importance of "hope", "collaboration", and "collective action" in reaching a brighter future. The growing recognition of the current climate crisis by the general public and a collective understanding give them “courage” and “optimism” that meaningful change is still possible as part of their understanding of this issue. Revisiting the concept of slow violence from Chapter 1, which is defined as a type of violence that, “occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all” (Nixon, 2013, p.2). Nixon proposed that part of addressing slow violence involves bringing the issue forward to light and working on it collaboratively, in line with participant views around a growing societal recognition of the climate crisis as part of the solution.

Both stakeholder groups understand this as an issue that needs cooperative innovation and learning from other communities to solve the complex challenges associated with climate change but emphasized that change is still possible if we choose to act determinedly and swiftly. While acknowledging the tension between these difficult truths and their aspirations, participants from both stakeholder groups remained steadfast in their belief that we can still reach a plateau in global surface air temperature rise and translate the ideas and changes generated in our discussions into reality.

Both groups of stakeholders predominantly understand climate change as an urgent issue and discussed the generational differences they have experienced in attitudes about climate change. Younger generations were characterized as distressed and obsessed with addressing climate change that will disproportionately impact their future, while older generations were characterized as being ambivalent or in denial of climate change science. Participants of all ages feel frustration around the inequity of these generational differences and understood the importance of taking proactive action soon to avoid severe consequences. This connects back to slow violence, and how the consequences of the violent actions may be experienced by future generations or marginalized communities, far removed from the original cause. Both stakeholder groups brought up impending deadlines, such as the target of limiting global warming to 1.5 degrees Celsius by 2030. Emotions such as “stress” and “pressure” were associated with the time sensitivity of addressing the climate crisis and compounded by political challenges and the need to dismantle existing systems. They understand climate impacts on the food system to be dire, and the potential solutions to dealing with these impacts complex.

A few participants, mostly from the food system stakeholder group, did not consider climate change an urgent priority. Instead, they expressed feeling overwhelmed by the scale of the issue. These participants choose to focus on immediate concerns and day-to-day operations, as part of their understanding includes a belief that climate change requires bigger problem solvers than themselves. Some attributed this to having a reactive rather than proactive approach to challenges in life, while others expressed that food system organizations lack the resources or willingness to invest in long-term measures when they are struggling to address more pressing needs in the present. Their understanding of climate impacts on the sustainability of the food systems included an acknowledgement of science, but a lack of individual responsibility or capacity for addressing it in the present. Another aspect of their understanding involves the tension between balancing the sense of urgency around climate action and the time it takes to engage in participatory and collaborative trust-building. Building relationships necessary for sustainable collaboration takes time, all while critical issues are already impacting people's lives. This tension is embedded in their understanding of these issues. These points relate back to Chapter 1 and Chapter 2, where I mentioned participatory and collaborative methods as being most effective for planning for climate change at a local level, as well as the tension between urgency and trust building.

Participants from both stakeholder groups agreed that climate change poses significant threats to the food system and food security. While food system stakeholders were keen to share more detailed and firsthand experiences of climate impacts on the local food system that inform their understanding, even municipal leaders shared an awareness of and worry regarding the unpredictability of weather patterns, severe weather events, and how droughts, floods, fires, and other elements of climate change are already impacting food production across the world. Both stakeholder groups understand the existing issue of food insecurity, particularly among lower-income populations and those who are most vulnerable, but that could also eventually impact everyone, will worsen if the systemic impacts of climate change are not addressed. These points relate to the social consequences of the metabolic rift, wherein the environmental degradation and resource depletion exacerbates social inequalities. Additionally, as mentioned in Chapter 1, slow violence disproportionately affects vulnerable communities, especially those who are low-income and marginalized populations.

Food system stakeholders in particular understand that farmers, who are at the forefront of experiencing changing weather patterns, struggle to plan and predict outcomes, which makes their profession even more challenging. Embedded in their understanding of these issues, both stakeholder groups shared a critique of global food chains, noting that our dependence on them further heightens vulnerability to climate change impacts. Food system and municipal stakeholders both feel that decision makers such as federal and state officials or local officials with opposing views are not taking the threat of climate change seriously enough. They worry that it may take catastrophic events affecting the majority of the population to spur large scale or meaningful systemic action and understand that not everyone is thinking about these issues from the same level of awareness as they are.

Stakeholders from both groups shared that they believe uplifting the voices and needs of farmers and community members, as well as collaboratively identifying and adopting various adaptive measures, are the best approaches to enhance food security amidst current and impending climate change challenges. This participant belief aligns with my argument from Chapters 1 and 2 that participatory and collaborative methods are best used to address advancing climate change transformation planning at a local level. Participants from both stakeholder groups also understand the New River Valley's potential resilience as a more climate-optimal region that will be less impacted by climate change than many regions of the United States. They noted that this will come with unique advantages and challenges, such as an increased growing season and a change in crop varieties and growing conditions.

Their understanding of climate impacts includes an acknowledgement that our region's relative resilience will likely attract climate refugees and contribute to development of the community in the face of a growing population. Stakeholders from both groups viewed the influx of climate refugees either neutrally or as a positive, but worried about the capacity of our community to adequately support a larger population. Others worried about outside powers seeking the New River Valley’s resources as it remains more optimal than other changing regions, which could lead to exploitation or violence. Part of their understanding of climate impacts on the sustainability of the food system is that it will impact our community in one way or another, and that we need to be thinking ahead.

Both stakeholder groups also understood pest outbreaks to be part of the issue with climate change on the food system, with participants noting changing pest issues and the difficulties faced in controlling them using sustainable practices. Food system stakeholders shared firsthand experiences in dealing with invasive or increased pests impacting both their livestock and crops, while municipal stakeholders shared their awareness of the issue or anecdotes they have heard from those growing food or working in Extension. Participants from both groups expressed worries about the use of harmful pesticides to combat increasing pest pressures, relating these practices to their understanding of how climate change consequences and resulting human choices or attempts to adapt can undermine the sustainability of the food system if choices are not considered carefully and systemically.

Participants from both groups discussed the need to make connections between climate impacts and food availability, drawing comparisons to disruptions in supply chains during the COVID-19 pandemic. Inequity was an element of both stakeholder groups' understanding of climate impacts—concerns were raised about the potential exacerbation of inequities because of climate change, such as increased poverty, shortage of affordable housing, and decreased access to farmland for new farmers essential to growing food. Within both groups, but especially among food system stakeholders, crop damage or loss due to climate change was identified as a significant challenge for farmers, with an emphasis on the vulnerability of large-scale monocultures and the importance of diversification. Participants from both stakeholder groups proposed a need for collective action, with some emphasizing the disproportionate impacts on marginalized communities and the importance of equitable solutions that do not perpetuate further inequities as part of their understanding of climate change impacts on the food system. This relates to the spatial dimension of the concept of metabolic rift, as it highlights the spatial separation between production and consumption, which creates a geographic disconnection from the consequences of production on the ecology and other living beings.

Both stakeholder groups understood various aspects of sustainable development as connected to the impacts of climate change on the food system. Economic sustainability was highlighted as a crucial factor in the local food system, with concerns raised about the economic viability of farmers and the affordability and availability of food for all members of the community. Participants recognized the tension between making a living as a farmer and providing affordable, high-quality food to consumers. They also understand the role of government support such as SNAP benefits and double bucks or incentive programs in enhancing food access and affordability. The need for a better food business environment, increased local options, and decreased food prices were identified as priorities in the sustainability of the local food system. Participants in both stakeholder groups uplifted the importance of sustainable land use and zoning decisions, investing in infrastructure to support local agriculture, and building a robust regional food economy. This is in line with the Blacksburg Climate Vulnerability Assessment Report's recommendations about investing in becoming more self-sufficient as a community mentioned in Chapter 1.

Both stakeholder groups understand that the loss of knowledge and tradition around growing food is a disadvantage in times of crisis such as climate change, as people lack the skills to take care of themselves and their communities. They also understand that letting people decide what works for them and their communities is essential for adaptation and mitigation planning for climate change and sustainable development, which is in line with participatory approaches mentioned in Chapter 1. Both stakeholder groups criticize the exploitation of people and natural resources for profit and comfort and share the idea of eliminating the concept of "away." These notions align with both the critique of capitalism in Chapter 1 as well as the concept of metabolic rift in addressing the concept of "away".

Participants emphasized the need to avoid waste and pollution, protect soil health, and promote biodiversity, which aligns with the waste accumulation and ecological rift aspects of metabolic rift in Chapter 1. They understand that a food system that is functioning well minimizes negative environmental impacts and ensures balanced energy use from farm to table. Participants understand that environmentally sustainable practices in transportation and agriculture, renewable energy sources, and reduced reliance on disposable materials like plastics are important considerations when thinking about climate impacts on sustainability and the food system. Both stakeholder groups stress the need to shift away from a disposable society mindset that contributes to climate change, drawing connections to the resource depletion aspect of the metabolic rift from Chapter 1. Participants from both stakeholder groups understand transportation as a main contributor to climate change; fossil fuel consumption was identified as a significant factor in disrupting the carbon cycle. Minimizing fossil fuel use is seen as crucial for mitigating climate change impacts and promoting environmental sustainability for the wellbeing of local and global food systems, again relating back to elements of the metabolic rift concept.

Research Question Three

My third question asks, what are the potential leverage points, or most critical places to intervene, in our current local food system to address climate change transformation in the New River Valley? These intervention points are situated around reconnecting people to nature or ecology to encourage sustainable behaviors, restructuring formal and socially constructed institutions and considering how institutional dynamics can create an enabling environment for sustainability, rethinking how knowledge is created, used, shared, and validated.

Reconnecting people to ecology was seen as a powerful tool in addressing climate change, and a way to address the ecological rift component of the metabolic rift. Participants shared the need to integrate food production into public spaces, creating a system where everyone is connected to the source of their food—intervention ideas included removing barriers like zoning regulations around food production and promoting local food opportunities. One stakeholder shared an example about a community in England that planted fruits and vegetables in public spaces, allowing people to harvest and glean as they pleased as a model we could follow.

The discussion among stakeholders highlighted the consequences of our disconnection from nature and our overreliance on technology, such as a detachment from natural world norms and cycles, which has resulted in unsustainable land use and a general disregard for environmental consequences. Potential leverage points included consciousness raising around the concept that the rules of ecological balance apply to humans as well. Participants shared that it doesn't necessarily require large-scale efforts or everyone growing their own food. Instead, it could look like redesigning our systems to connect people to their food and increase their understanding of the food system, even at a small scale. Education and hands-on learning emerged as one way to accomplish this, particularly for young people. Participants emphasized the importance of firsthand experiences with livestock and food production, such as gardening experiences. Increasing opportunities for hands-on engagement, such as digging in the soil and witnessing the natural growth cycle of plants, were all viewed as areas for intervention.

Working the land and engaging in activities like gardening and farming were also highlighted as transformative ways to reconnect with nature, not only among youth, but also adults. Participants shared personal experiences of feeling more connected to people and the land through this sort of work, and their ideas included expanding opportunities for adults to also engage with the land physically. Stakeholders stressed the importance of getting your hands in the dirt and being intimately involved in the cycles of nature. These experiences not only bring joy to those experiencing them, but also provide a tangible connection to the earth, which reinforces the interdependence of ecosystems and the role of humans within them.

Restructuring institutions and considering their dynamics was also a powerful leverage point participants discussed for addressing the impacts of climate change on the food system. Participants often suggested restructuring as a greater shift towards buying local food. They emphasize that municipalities and governments can have a substantial impact by encouraging a healthy food system through local food procurement. This tactic would not only boost the demand for local produce but also ensure that farmers can earn a fair income, which could draw more people to engage in farming. Conversation included creating alternative and successful sales and marketing outlets for local farmers aside from existing farmers markets, which would make it easier for them to sell their products and contribute to the growth of a thriving local food economy.

Supporting and bolstering local food initiatives, such as existing and new farmers markets and local food stores, were areas of possible intervention. Participants expressed the need for developing efficiencies in local food transportation and distribution, as well as purchasing more food locally to offset the fossil fuel consumption involved in transportation. Participants would also like to see the challenges that hinder local food production addressed, such as land access issues and economic obstacles faced by farmers. They advocate for providing support to farmers in overcoming these barriers, including better access to resources, equipment, and funding.

Policy step downs were a major point of discussion in the focus groups, which stakeholders see as significant in promoting sustainable food systems at the local and regional levels. This would involve implementing tiered regulations for food producers based on scale. For example, transitioning from conventional to local beef production by adapting large scale systems to smaller scale systems and having less restrictions around meat processing on farms or at local processors. It would also entail addressing specific challenges like composting regulations so that the New River Valley could create their own composting facility. These step-down policy changes would reorient existing systems and don’t require creating something entirely new and would provide practical interventions to support sustainable food practices.

Areas of potential intervention also included greater involvement of existing institutions around planning for climate transformation in our region. Stakeholders would like to see Virginia Tech, as a major institution in Montgomery County, take a more active role in advancing sustainable agriculture and local food systems, as well as climate change adaptation and mitigation planning efforts. They believe that the university can leverage its expertise and resources to benefit the community in many ways. Suggestions include expanding Virginia Tech’s meat processing facilities to the public, taking a greater leadership role in community sustainability initiatives, and utilizing the university's agricultural background and expertise to reach out to stakeholders and government officials to advocate for positive changes.

Transitioning towards renewable energy sources and reducing reliance on fossil fuels were additional prospective leverage points. Participants expressed the need for better infrastructure to support clean energy options. They would like to see new regulations that hold businesses accountable for their environmental impact, such as extreme consequences for pollution that are steep enough not to be ignored. Areas for change around socioeconomic inequalities and ensuring equitable access to housing, local food, and other resources were shared. Participants want to see tax incentives to promote affordable housing, especially in areas like Blacksburg where the cost of living is becoming increasingly expensive. By implementing progressive tax plans and incentivizing developers to include low-income housing in their new housing plans, more people will be able to afford to live in the communities where they work, which in turn allows them to support local farmers and contribute to the local economy while reducing fossil fuel use attributed to commuting.

Moving away from monoculture crops and promoting biodiversity within crop systems to have more climate-resilient agricultural practices was suggested as a way to make impactful food systems change. Participants also suggest establishing a regional food system and leveraging local resources to reduce reliance on external food sources, thus increasing community resiliency, again aligning with the Blacksburg Climate Vulnerability Assessment Reports recommendations to invest in becoming more self-sufficient. Participants proposed potential leverage points to address food insecurity such as restructuring waste management systems to prevent food waste, establishing networks to provide excess food to those in need, and implementing comprehensive mapping systems to facilitate better coordination and communication within the community. They would also like to see the restructuring of regional support systems such as utilizing regional bodies to support communities without their own sustainability programs to further sustainability initiatives across the New River Valley.

Stakeholders mentioned intervention areas around policy advocacy, such as the need for sustainable agriculture groups like the Virginia Association for Biological Farming to become politically influential and advocate for change in regulations and subsidies across multiple levels of government. They highlighted the Farm Bill as an opportunity to redirect funding towards conservation and sustainable practices, shifting from subsidies that favor large-scale production and towards supporting small-scale and regenerative agriculture. They cited other states who have adopted similar measures, such as PASA in Pennsylvania.

Rethinking various aspects of our society to address climate change and promote sustainability in the food system were suggested. Participants shared the need to challenge modern knowledge systems and explore alternative approaches. Education emerged as a leverage point, with a focus on engaging youth through initiatives like garden camps or school gardens and integrating food systems topics and sustainability into formal education such as public-school curriculum.

Educating adults, especially leaders, about agriculture, healthy food choices, and the impact of food on health and the environment was also seen as a potential leverage point due to participant perception of a knowledge gap that prevents the average person from making informed choices around these topics. Another idea involved reframing the narrative around climate change to uplift positive possibilities and envisioning a better future that empowers people to act, rather than solely focusing on catastrophic scenarios that may create fear paralysis or a sense of helplessness and disengagement from addressing climate change.

Some participants recognized the importance of rethinking communication and messaging, making them relatable to a broader audience. They suggested connecting climate change to food-related issues to make it more relevant. Empathy and shared goals were noted as ways to engage people across the climate views spectrum and overcome resistance. Intervention around shifting social priorities was another point of discussion, so that valuing food as a vital life source and prioritizing it alongside other major expenses in society might become the norm. Lastly, stakeholders considered the idea of reevaluating metrics to measure the effectiveness of different approaches and experimenting with no-waste strategies. Participants shared their frustration with small-scale solutions for large-scale problems but believed that these smaller initiatives could create momentum and social buy-in for larger-scale changes to follow, which could lead to systemic changes in time following the standard adoption curve.

Visions for an Alternative Future

Stroh's four-step systemic change process centers around the concept of "creative tension." This model suggests that change can be initiated by creating a discrepancy between people's desired outcomes and their current situation. By acknowledging with honesty and clarity where they currently are in the present and what their visions for an alternative future are, communities can generate the energy necessary to resolve the tension and move towards their desired outcomes collaboratively. This study utilized the first stage of the process, which aims to establish a solid foundation and common ground.

To achieve this common ground, participants articulated various aspects of the local community that are working well, particularly in the realm of food security and access. Examples included initiatives such as the Glean Team's collaboration with local growers to distribute surplus produce, farmers markets that accept or double SNAP benefits, the no red-tape or non-judgmental nature of many food access programs, and the redistribution of surplus food that would otherwise go to waste by organizations like Virginia Tech. These efforts were seen as successful and scalable.

The region itself was seen as an asset, with the New River Valley having ample natural resources, such as water availability, a stable climate comparative to many other regions, regenerative grass growth, and ecological diversity. Participants recognized the significance of these resources in supporting local food production and creating a more robust regional food system in the face of impending climate change, as well as desire to protect these assets.

Municipal leaders praised local efforts to prioritize policies that promote food access, land preservation, and supportive regulations. Examples included allowing chickens in town, expanding community gardens, offering tax leniencies for small farmers, and implementing conservation easements. Stakeholders from both groups agreed that while these efforts are helpful, they are not enough to address the scale of issues that climate change presents and that we need to be doing more.

Food system stakeholders applauded the adaptability of local farmers in the face of challenges posed by climate change and regulatory frameworks as a community asset. Farmers were recognized for their ability to adjust their practices, adopt new technologies, and explore innovative business models in a very challenging profession. The concern about climate change by the younger generations, as well as the willingness of younger generations entering farming to embrace more sustainable practices were seen as assets and hope for a brighter future. Stakeholders emphasized the need for continuous progress rather than stagnation, greater engagement with elected officials, and a commitment to explore new approaches as ways to protect these assets.

Participants were also realistic and honest about what is not working for them right now. Small farmers are facing numerous challenges and obstacles that make it difficult for them to thrive. Some of the challenges expressed by food system stakeholders are logistical with connecting their produce or meat to consumers, competition with cheap grocery store food, lack of water security or access to irrigation resources, high input costs, limited availability of local processing facilities, insufficient income and social value for agricultural labor, low farm share in the food dollar, pest outbreak management issues, and the loss of livelihoods and rural landscapes. Municipal leaders express frustration with bureaucratic or funding challenges to making the policy changes they would like to see, or that make addressing the food system stakeholder challenges more difficult.

Farmers express struggling with everything from finding a drop off location for their CSA boxes to competing with cheap grocery store food as challenges. They find it difficult to convince consumers, especially lower-income consumers, that the higher nutritional value of farm produce makes it worth buying. The distance between farms and consumers also poses difficulties, as people must plan ahead and may not always find what they need or like when they visit the farm, as compared to grocery stores maintaining foods that are out of season.

Water security is an issue for some local farmers, but the cost of installing ponds for irrigation is high, and obtaining assistance from organizations like the NRCS has become more challenging in recent years. Finding contractors for these sorts of projects has also become difficult. Managing pests organically is difficult since control measures are limited compared to inorganic methods. Funding and regulations present additional hurdles for farmers. Municipal leaders express that bureaucracy often disincentivizes or prevents local governments from investing in policy changes to positively impact small agriculture. The income disparity is evident in the low farm share in the national food dollar, where only a small portion goes to the producers, while input costs continue to rise.

The lack of local processing facilities and the need for custom processors in closer proximity pose significant challenges for farmers. Farmers struggle with scheduling and transportation issues when there are limited options available. The relationship between agricultural businesses and farmers is imbalanced, with farmers often feeling taken advantage of by higher input costs and fees. The need for affordable local infrastructure, like custom processors and local food transportation and procurement, is evident.

Food system stakeholders lamented the significant loss of farmers and agricultural land, as well as concerns about increased development. Farmland is being sold for development, threatening the agricultural landscape and exacerbating concerns about land and water resource sustainability. While conservation programs are in place to help preserve farmland, the pressure to sell increases each year. Food access organizations worry about the impact of development on the population and the rates of food insecurity in the community and express that current efforts to feed everyone in the New River Valley are already challenging and falling short.

Municipal leaders often face bureaucratic challenges, opposition from other officials, and inadequate resources when trying to implement sustainable policies. There is a general lack of political will to address climate change and food availability comprehensively. They expressed that inadequate public engagement also hampers progress in addressing systemic problems, aligning with the notion in slow violence that there is often disengagement from or even denial of violence that is not immediate or sensational in nature. Municipal leaders mentioned problems with the voluntary land enrollment program for conservation, which has been ongoing since 1981. They noted that there has been an increase in removals from the program, mostly due to the cessation of generational farming, and they feel relatively powerless to prevent the loss of this prime agricultural land.

After acknowledging where they are now and what they view as assets and challenges, participants dreamed of visions for an alternative future. One element of these dreams revolves around a transformative vision of a society that prioritizes renewable energy and reduces dependence on fossil fuels. They want to see a shift towards sustainable energy sources such as solar, wind, and hydropower as the norm. This future also includes transitioning to electric vehicles and ensuring that the electricity used is generated low to no carbon emissions. They believe that by investing adequate resources and government funding into these initiatives it is possible to plateau climate change global surface air temperature rise in 20 years.

To achieve their ideal future, participants dream of more localized food production, reducing reliance on non-renewable resources, and improving transportation systems. They envision a food system that prioritizes access to nutritious and affordable food for all, eliminating the existence of food deserts and ensuring equity and inclusion. People would be involved in food production to the degree that they are able to, and there would be opportunities to connect with nature built into society and our infrastructure.

Participants dream of a future that utilizes regenerative agriculture practices, carbon capture and storage, and efficient food storage and transportation infrastructure. They envision an alternative future where carbon emissions are minimized and living systems are utilized to draw down and store carbon from the atmosphere, which includes dedicating more land to natural cycles and finding ways to put carbon back into the ground permanently. In their dream future, education and awareness play an important role. They envision a future where individuals have greater knowledge about where their food comes from, enabling them to make informed choices. People would also have greater food access due to free public transportation systems.

Ideally, society would treat food as medicine. They envision a future where everyone has access to healthy and culturally appropriate food options at affordable prices. They hope to see thriving local food economies that provide fair compensation to farmers and ensure a prosperous livelihood for all involved in food production. There would be opportunities for cross-cultural exchange and connections between growers, consumers, and the wider community. They envision a significant reduction in food waste at both household and producer levels, and composting is a standard practice. Participants emphasized the importance of collective action at the local level in creating and maintaining these aspirations.

They recognized the capacity within their own community to drive change towards this ideal future, and several organizations and endeavors were mentioned as examples of successful collaborative initiatives. These included the Thrive Food Access Network, Live Work Eat Grow, Sustainable Blacksburg, and others. The participants acknowledged the need for continuous improvement and expansion of such efforts to reach their ideal future but expressed pride in the existing spirit of collaboration in our region. Participants' dreams for an ideal future encompass a holistic and interconnected vision of a society that prioritizes renewable energy, social inclusion, connection to natural cycles, equitable access to nutritious food, sustainable agriculture practices, collaboration, and environmental conservation. They believe that realization of these aspirations would lead to a more resilient, inclusive, and sustainable future for all.

Why all of this dreaming—what does it matter? The act of dreaming allows us to be hopeful and expansive. The ability to imagine possibilities that seem impossible in the present is an act entrenched in a historical legacy of contesting prevailing authorities. In essence, dreaming represents an act of dissent, signifying refusal, protest, and resistance against established norms and constraints. As Octavia Butler once wrote, “What we don’t see, we assume can’t be. What a destructive assumption” (Butler, 2017). Dreaming is the only way we can realize, and then chase, the change we need.

Transitioning from the prevailing neoliberal corporate food regime to alternative food spaces is both crucial and transformative in achieving this truly sustainable aspirational future. Referring back to Chapter 1, capitalist systems contribute to the metabolic rift. When examining what is not working well for participants in this study, the myriad of challenges they would like to be rid in order to reach their ideal future of relate back the consequences of profit-driven and unchecked growth. The exploitation and depletion of natural resources, waste generation, loss of biodiversity, and social inequities caused by unconstrained pursuit of economic growth without consideration for the environment and in direct opposition to the vibrant and equitable future of food that participants imagine. The urgency to create and support alternative food spaces lies in their ability to foster resilient food systems, tackle food insecurity, empower local communities, and promote ethical consumption practices that stakeholders want.

This project highlights many tensions—tensions between local and global, between conventional and regenerative agriculture, between a participatory, community-based research design that takes time and the urgency of the climate crisis that we are facing, among others. In each of these cases, the underlying metabolic rift represents the disconnection between human activities, economic systems, and the ecological processes that nourish life on our planet. This disconnection often results from the prioritization of short-term economic interests and immediate needs, while neglecting the long-term well-being of ecosystems and communities. I see these tensions as creating divisiveness between people, approaches, and plans to create sustainable solutions to complex issues such as climate change, ultimately stifling our ability to make progress that would benefit everyone. To me, a rift is a break, or even a break-down in something. There is a physical, social, and emotional divide or conflict in the metabolism of the relationship between people and the natural world. The system is broken. I believe we need to address these tensions by recognizing the systemic nature of the metabolic rift and working to bridge the division between economic activities, ecological well-being, and social justice. You cannot address a system but separating its parts; each of these elements needs to be addressed with the others in mind. I see the potential areas of intervention that many of the participants in this study have shared or dreamed of for a better future, and believe that these are great starting points for shifting to more holistic approaches that prioritize the health of ecosystems and communities over economic profits, which would contribute to healing the metabolic rift. I think we could re-connect, re-structure, and re-think our way towards a healthier metabolic relationship between humans and nature. And what if we didn't stop here, in our own community, but each community could work on their own unique ways healing the metabolic rift? I imagine a future where every community and municipality is working to reconnect their social and ecological systems, transition to more sustainable ways of production and life such as circular and no-waste economies, redefine their wealth and progress, focus on climate justice and just transitions that protect and empower marginalized communities, drive policy change that aligns with environmental and social justice through political mobilization and collective action, and shifting the culture towards social attitudes that value nature, collaboration, and interdependence over individualism, profit, and growth. This is the type of future that I imagine will heal the metabolic rift.

While some argue that change at the local or community level is too small to make a difference, I believe otherwise. Part of moving towards an alternative food future involves the concept of fractal organization, wherein the small reflects the large, and the health of the whole system requires the flourishing of each part. Adrienne Maree Brown stated that, "How we are at the small scale is how we are at the large scale. The patterns of the universe repeat at scale. There is a structural echo that suggests two things: one, that there are shapes and patterns fundamental to our universe, and two, that what we practice at a small scale can reverberate to the largest scale" (Brown, 2017, p.54). Large-scale action is not the only way to bring about meaningful change. Fractals demonstrate that the small elements within a system are significant and have an impact on the larger whole. Brown emphasizes the importance of focusing on small acts, conversations, and relationships that collectively create transformative effects (Brown, 2017).

Montgomery County can make changes around climate transformation planning that serve as an example to other communities, who in turn could make their own changes that fit the needs of their community, which would ripple outward to other communities, who then have an effect reaching to other interconnected communities. We can build this change by starting small, with each community focusing on their own stakeholders, then weaving in multi-level stakeholders along the way to link the knowledge of local stakeholders to technical expertise, enabling collaborative knowledge creation and empowering effective policy action that could make systemic change.

I think there is a lot of power in fractal organization and what we focus on at the small level, but that doesn't mean we have to be disconnected from the larger fractal spaces or the whole, operating independently of them. What we are doing at the small scale sets up patterns for the whole system, but the patterns emerge at the local, regional, state, and global level. Each fractal and level of organization or pattern is connected to the others. While the work in this project focuses on local or municipal level policy and planning for the impacts of climate change on the sustainability of the food system, this work should not stop at just focusing on the Town of Blacksburg or even the New River Valley.

Not only should we be working to develop climate adaptation and mitigation plans in this one area, but other areas on the New River Valley could also take up their own risk assessments, planning, and responding to the risks. Then each county or city in the New River Valley could work on focusing on their own level of fractal organization, but also work together through the linkages and interconnections to learn from one another, collaborate, and operate as part of a larger unit of organization. If local municipalities and communities across the United States and across the globe were all working on planning for their unique needs, I imagine we'd have a very expansive network of small connections making up a bigger system. We need each other to make change, but we have to start with what's right in front of us in our own communities.

I think to accomplish this, we should have more people in roles like Carol Davis's across other counties and cities in the New River Valley, across the state, and across the country. Currently, we do not have any other Sustainability Manager positions in other areas of the New River Valley. If government at any level took it upon themselves to fund these important positions, all municipalities would have a Carol doing this type of work. We need to put our money where our values and best interests are and take up the funding of local level climate planning and policy work. I believe we need global solidarity to address the metabolic rift as this is a shared planet in which we are all connected, but that starts with the smallest levels of fractal organization, and then connects out. We can redefine our global systems from the patterns we create in our own communities.

Implications for Future Planning

This research is significant in that it addresses the gap in the literature around how municipalities are planning for climate resiliency in the food system and provides insight into the use of interviews and focus groups to bridge the creative tension gap in collaborative problem-solving through a systems thinking approach. This study's findings have the potential to inform community-engaged efforts to plan for climate change while envisioning a more resilient and fair food system.

Specific to the New River Valley, the findings of this study will help further the ongoing climate transformation planning process through the Sustainability Department with the Town of Blacksburg. The Blacksburg Climate Vulnerability Report suggested the convening of expert and equity centered policy development teams to address current and future climate resilience issues in our region. This study has helped establish common ground among key food system and municipality stakeholders for Montgomery County who may be interested in working together on a future climate food resiliency team. Even if they are not interested in being part of that team, the information gained from this study will help inform the development of a resiliency plan for the region with community perspectives, visions for the future, and potential leverage points to focus on for community-identified change.

The Blacksburg Climate Vulnerability Assessment Report shared that some of the top recommendations for climate resiliency for the New River Valley entailed prioritizing climate resilient food systems and emergent feeding programs, investing in becoming self-sufficient, planning for eventual crop shortages, and exploring how to incentivize regenerative practices as ways to mitigate or adapt to climate transformation. The findings of this study show that both food system and municipal leader stakeholders have identified these same areas of intervention and are already thinking about leverage points and ways to bring these recommendations into fruition, or the challenges that may prove prohibitive to them. This is valuable information that should be taken into consideration for future planning.

This project accomplished step one of Stroh's four-step systemic change process. Step one entails building a foundation for change and affirming a readiness for change. Step two involves stakeholders clarifying the current reality and accepting their respective responsibilities for creating it. Step three involves stakeholders making a deliberate choice in favor of the aspirations they support. The final step is when stakeholders begin to bridge the creative tension gap by focusing on high-leverage interventions, engaging additional stakeholders in the process, and learning from experience. While conducting the additional steps of the process would have exceeded the scope of this project, these additional steps can be taken in the future by the Sustainability Department of the Town of Blacksburg to continue Stroh's process.

At the request of my community partner, the findings of this study will also be compiled into a public-friendly report that will be used to engage the broader community in the ongoing climate transformation planning process. This report will be shared in a variety of ways, including at a public forum to discuss the report that will be open to anyone in the community, creating a space where individuals can share their ideas around next steps in the ongoing local climate change adaptation planning process to keep the planning efforts as participatory and collaborative as possible.

Recommendations for Future Research and Practice

Revisiting Chapter 1, there is no clear consensus on how to plan for climate change at a local level. While there is an identified desire to put people and equity first in the planning process, there is no plan for how to actually do that. The literature in Chapter 2 demonstrates that local governments are uniquely positioned to deal with extractive systems at the root of climate change rather than just the symptoms. From the process and findings of this project, I recommend that local governments and communities leverage this unique position through participatory and collaborative methods for planning for climate change. If every community or municipality undertook the planning process laid out in this study, they would have a solid foundation for change, as well as identified potential leverage points unique to their own community. Communities could share this information and their practices to cooperate and collaborate with one another, both helping to heal the metabolic rift and protecting vulnerable people and ecology. In addition, facilitating systems thinking and taking a systems approach to engaging stakeholders in this process was highly successful. Individual interviews paired with focus groups allowed me to effectively capture the views of participants both on their own and in collaboration with others.

The gallery walk and focus group allowed for a cross pollination of ideas amongst participants, who were able to glean information from one another, share information and experiences, and draw connections in ways that they were not able to do on their own. Participants left the focus groups expressing a sense of connection with the other stakeholders and verbalized a sense of hope that something may come out of this. Stakeholders expressed great interest in continuing to have face to face conversations around these issues with others who are equally invested in and interested in planning for climate impacts on the food system and the community in general. From these considerations, I would recommend that the next iterations of climate action should be a collective, participatory effort centralized around systems change, community, and plenty of face-to-face time.

As the researcher, I found that establishing strong relationships with participants was essential to garnering open, honest, vulnerable dialogue with participants in this study. I took the time to get to know the participants before beginning the interviews, making small talk, and really doing my homework to look into their operations or involvements through public facing information online, attending farmers markets that they are vendors at, etc. I recommend practitioners present as genuinely and transparently as possible with study participants, spend time getting to know them as people and letting them get to know you as a person rather than just a researcher, being open to their questions or concerns, and conveying a sense of openness about the process so that the participants are at ease during the conversations. Several times during interviews a participant would pause and note that they had said something they didn't want included or on the record. I would reassure them that this information would be removed or kept anonymous to be sure that they felt safe to speak freely and to collect the best data and solutions possible.

During the interviews, I found it helpful to provide participants with a variety of choices for meeting locations so they did not have to leave their site unless they were able and desired to, which allowed more participants to say yes to the interview invitation. Since the interviews were semi-structured, I began with the first interview question on the script but allowed the participants to move through conversation topics organically, shifting the questions around as needed to accommodate the natural flow of dialogue. I recommend that practitioners be similarly flexible with the questions, as well as allowing participants to speak to additional information or stories that may come up for them throughout the interview. There is a balance to be struck between helping participants elaborate on their relevant ideas and make connections and guiding them back to the main conversation topics when they stray too far from the ideas you are trying to collect.

During the gallery walk activity at the beginning of the focus group, I recommend setting up the gallery walk with an intentional flow of ideas throughout the room. I moved through the major themes in the same order that the arose in the individual interviews and from where participants are now to where they want to go. They started with quotes about how participants were understanding climate change, then moved to quotes about climate impacts on the food system, to sustainable development, to potential leverage points, and lastly quotes about visions for the future. This order moved the participants through a dire and urgent current reality around the climate crisis, through potential points of action and solutions, ultimately to a place of hope and visioning. I would recommend that practitioners really focus on the order of the ideas or themes and how they want participants to move through them. I would also suggest that practitioners encourage participants to engage in dialogue with one another after reading the quotes at each gallery walk station rather than only writing their own ideas on the flipcharts posted with the quotes. I found that walking around the room with the participants and reiterating the theme of each set of quotes and how the theme was defined helped them feel more comfortable, and they naturally engaged in conversation with one another. In one of the focus groups, participants took it upon themselves to have a different person be the notetaker for each theme so the rest of the group could just focus on talking, whereas in the other focus group participants wrote down their own ideas while engaging in a shared dialogue. I also walked around the room with them to keep time and let them know when it was time to move to the next set of quotes so they could focus on being in the moment rather than worrying about the logistics of timing out moving to each station.

During the focus groups, I recommend seating participants in a circle or rectangle facing one another so that there is a sense of collaboration, equitable power dynamics, and to give the focus group questions or conversation a clear direction to flow around in. While at times the conversations were not structured to flow around the circle for everyone to answer, I found it very helpful to move around the circle at various times so that everyone felt they had a chance to share their answers. Some participants were much more willing to speak up and share during the focus groups, and I wanted to be intentional in creating space for those who had ideas to share but were less confident to speak up in a group setting or interject themselves. While some participants would choose to pass on their turn to share answers to one of the discussion questions, for several being asked to share was the only time they would contribute to the conversation. I would recommend that practitioners remain aware of maintaining this balance so that no voices are left out of the conversation due to a lack of space for them. I also think that facilitating connections among ideas and themes was really important. While I explicitly asked participants to draw connections between ideas or themes from the gallery walk as part of my focus group script, I also asked organic questions to draw more information from the participants when it seemed like they were naturally beginning to understand or make systems thinking connections. Sometimes just engaging with the participants to understand their perspectives and experiences within the system revealed hidden dynamics and complexities that I was able to hone in on and draw attention to.

I recommend that the following limitations be considered. While *too late to change* and *will not impact our community* were codes initially involved in the *climate change defined* section of my codebook, there were no instances of these codes identified from either the individual interviews or the focus group discussions. While a wide variety of food system and municipal leader stakeholders were invited to participate in this study, participation was purely voluntary, and no compensation was offered for participation. I speculate that the stakeholders who self-selected to participate are intrinsically motivated by an interest in climate transformation planning and attempting to reach a better future, and that stakeholders who do not believe this to be an important topic or who already feel a sense of overwhelming defeat did not opt to participate. This likely contributed to bias in the lack of findings of *too late to change*. As for *will not impact our community,* it became apparent that all stakeholders in this group realize that climate change impacts are real and are either already impacting our community or will be in the future. As a positive, having participants who self-selected to participate created a strong group of invested, motivated, and hopeful stakeholders who felt unified in their collective vision to make positive changes, and did indeed establish a common ground for that change to potentially happen.

An additional limitation lies in the lack of financial resources to compensate participants in this study. One stakeholder who is a food producer participated in the interview phase of the project, but expressed being unable to participate in the focus group due to the time away from work and the gas it would take to get there. This participant likely would have been able to attend the focus group if I had been able to offer some financial compensation. Many of the municipal leader stakeholders were on the clock and being paid from a salaried position even while attending the focus groups, whereas roles like food growers are not, which is a limitation of this study.

Final Remarks

Through this study, I attempted to contend with some of the ambiguity around how communities can plan for climate transformation at a local government level by moving efforts forward in the community I've been lucky enough to call home for the past 13 years. Ultimately, this study has documented the experience of a small region located in southwestern Virginia along the Appalachian and Blue Ridge Mountains that demonstrates both the complexity of community development and how qualitative, participatory, collaborative, and systems-focused approaches may be understood and carried out in practice for local level climate change planning. My wish is that the experiences the participants shared with me and one another, which shaped this work, may not only move our community towards a more sustainable food system future through policy changes, but also help to inform other communities who wish to advance climate transformation planning. In the face of the current climate crisis and our narrowing window of time to act, it can be easy for some to feel discouraged or hopeless about the impact of making adaptation and mitigation changes at the community level. While federal and state level changes play a role in addressing climate change, so do local and regional changes.

I hope that the experiences here that have generated hope and a spur to collaboration among food system and municipal leader stakeholders in the New River Valley will embolden other communities to also dream, and to use that dreaming as fuel for action. May they realize significant impacts can happen through small change repeated at scale. It takes bringing people to the table together to bridge the gap between where they are and where they want to go. Climate impacts on the food system is an issue that is going to take all of us to address. So, let's keep bringing folks to the table to imagine a better world where we can halt climate change, improve human wellbeing, restore our ecology, deal with ongoing issues of equity and justice, and leave a world we can be proud of for future generations. Then let's get to work on making these dreams a reality.

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Appendices

Appendix A: Participant Recruitment Email

Recruitment Letter

DATE:

Re: Town of Blacksburg Municipal Level Food Systems Planning for the Impacts of Climate Change

Hello (INSERT NAME),

My name is Kasey Owen and I am a Masters student in the Agricultural, Leadership, and Community Education Department at Virginia Tech. As part of my thesis, I am seeking food systems and municipality stakeholders in the New River Valley region of Virginia to participate in a research interview and a focus group. This project is in partnership with Carol Davis, the Sustainability Manager for the Town of Blacksburg. The overall purpose of the interviews and focus groups is to bring together diverse stakeholders to establish common ground around the issue of climate change and its impacts on the local food system.

Through systems thinking and appreciative inquiry facilitation, stakeholders will generate and co-create dialogue that addresses which potential leverage points they believe are most critical to address, and identify next steps for community climate change mitigation planning. We hope to better understand the perspectives on what a resilient food system looks like, as well as the impacts of climate change on the sustainability of the local food system in our region from the lens of food systems and municipality stakeholders. We believe we will see an increase in climate change mitigation planning in the region through bringing together stakeholders. We are also interested in producing one or more papers or reports for publication and possible presentations at professional conferences or meetings.

To accomplish this aim, our team is seeking your participation in a 60-minute semi-structured interview to be completed Fall (October-November) 2022 and a follow up 90-minute focus group to be completed Winter (December-January) 2022. The individual interview can be held in-person at a location of your choice, or through a secure online communication platform such as Zoom. The focus groups will be held in-person at an easily accessible public location in Blacksburg.

This study has no financial benefits to participants. Participants in the study will receive the benefit of having their ideas shared with the community as part of a public-friendly outreach report that will help guide next steps for climate change mitigation planning in the regional food system. Thus, you will have access to the finalized report once it is edited and made available to the public.

The interview will consist of several open-ended questions. The focus group will be based on the themes that emerge from the individual interviews. We hope to accurately capture your responses via audio recording of the interviews and via notetaking in the focus groups, which will all be synthesized into the final report. Please note that your participation in this interview and focus group is in no way required or compulsory. You have the right to remain anonymous in any publication. You also have the right to keep your identity known in any subsequent publications, including outreach materials and booklets for public dissemination.

If you are interested in learning more, I ask that you please reply to this email. I will be pleased to follow up to discuss the research and confirm a date and time that will be convenient to you if interested. If you have any questions, you are welcome to contact Kasey Owen at kasey14@vt.edu or by calling 540-922-6439. You may also contact my advisor, Kim Niewolny, at niewolny@vt.edu or by calling (540) 231-5784.

Thank you very much in advance for your interest in this research, collaboration, and outreach opportunity!

Sincerely,

Kasey Owen

Appendix B: Consent Form

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Consent to Take Part in a Research Study

Title of research study: Town of Blacksburg Municipal Level Food Systems Planning for the Impacts of Climate Change

Principal Investigator: Dr. Kim Niewolny

Other study contact(s): Kasey Owen

Key Information: If you decide to participate in this study, you will complete a 60-minute semi-structured interview, followed by a 90-minute focus group to explore your thoughts and experiences as a food systems stakeholder who is actively participating in or leading food system programming in the New River Valley region. As part of the study, the interview will take place in person at a location of your choice, or virtually using a secure online format such as Zoom. All interviews will occur between October 2022 and January 2022. This interview will be audio recorded to ensure that we accurately capture your story. The focus groups will be captured through a notetaker.

Once your interview has been conducted, the research team will transcribe it verbatim and identify key themes and ideas that will guide conversations in the focus groups. Once the focus groups take place, the research team will compile findings and key ideas from the focus groups into a report. The study should take approximately 150 minutes of your time (60 minutes for the interview and 90 minutes for the gallery walk and focus group).

The risks associated with participating in this study are minimal. There is possible emotional discomfort during the interview, though steps will be taken to mitigate these potential risks. You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at Kim Niewolny, niewolny@vt.edu.

This research has been reviewed and approved by the Virginia Tech Institutional Review Board (IRB). You may communicate with them at 540-231-3732 or irb@vt.edu if:

- You have questions about your rights as a research subject
- Your questions, concerns, or complaints are not being answered by the research team
- You cannot reach the research team

- You want to talk to someone besides the research team to provide feedback about this research

How many people will be studied?

We plan to include about 20 to 30 people in this research study.

What happens if I say yes, I want to be in this research?

If you decide to participate in this study, you will complete a 60-minute semi-structured interview, followed by a 90-minute focus group to explore your thoughts and experiences as a food systems stakeholder who is actively participating in or leading food system programming in the New River Valley region. As part of the study, the interview will take place in person at a location of your choice, or virtually using a secure online format such as Zoom. All interviews will occur between October 2022 and January 2022. This interview will be audio recorded to ensure that we accurately capture your story. The focus groups will be captured through a notetaker.

Once your interview has been conducted, the research team will transcribe it verbatim and identify key themes and ideas that will guide conversations in the focus groups. Once the focus groups take place, the research team will compile findings and key ideas from the focus groups into a report. The study should take approximately 150 minutes of your time (60 minutes for the interview and 90 minutes for the gallery walk and focus group).

What happens if I say yes, but I change my mind later?

You can leave the research at any time, for any reason, and it will not be held against you.

If you decide to leave the research, contact the investigator so that the investigator can remove you from the scheduled interview or focus group and discuss whether you would like your answers to be included in the final report.

Is there any way being in this study could be bad for me? (Detailed Risks)

There are no known risks to participating in this study.

What happens to the information collected for the research?

We will make every effort to limit the use and disclosure of your personal information only to people who have a need to review this information. We cannot promise complete confidentiality. Organizations that may inspect and copy your information include the IRB, Human Research Protection Program, and other authorized representatives of Virginia Tech.

If identifiers are removed from your private information or samples that are collected during this research, that information or those samples could be used for future research studies or distributed to another investigator for future research studies without your additional informed consent.
The results of this research study may be presented in summary form at conferences, in presentations, reports to the sponsor, academic papers, and as part of a thesis.
We will do our best to protect the confidentiality of the information we gather from you, but we cannot guarantee 100% confidentiality.
Any data collected during this research study will be kept confidential by the researchers. Your interview will be audio-recorded using a digital recorder and then transcribed. The researchers will code the transcripts using a pseudonym (false name). The recordings will be uploaded to a secure password-protected computer in the researcher's office. The researchers will maintain a list that includes a key to the code. The master key and the recordings will be stored for 3 years after the study has been completed and then destroyed. These pseudonyms will also be used in preparing all written reports of the research. The ideas shared during the gallery walk and focus groups will be included in notetaking and the final report, though participants will not be identified by name or pseudonym in these notes or the report.
You have the right to remain anonymous for this interview. Your identity, and that of any individuals whom you mention, will be kept confidential at all times and will be known only to the research team. No sensitive personal information will be solicited in the interview.

Can I be removed from the research without my OK?

The person in charge of the research study or the sponsor can remove you from the research study without your approval.

Your signature documents your permission to take part in this research. We will provide you with a signed copy of this form for your records.

____ ____________

Signature of subject Date

____

Printed name of subject

____ ____________

Signature of person obtaining consent Date

____

Printed name of person obtaining consent

Appendix C: Interview Script

Stage 1. Pre-interview Script

Spend some time introducing yourself to the interviewee and ask them to do the same.

Proceed to some version of the following script:
We're glad you've agreed to be interviewed. I want to explain how this will work. We'll do about a 60minute interview that will be recorded and transcribed. You do not have to answer any questions that you don't want to answer.

Stage 2. Interview Questions

The following description of the process and questions is presented as a guide. The questions within each section do not need to be asked in the order listed. Rather, they should follow the flow of the conversation as naturally as possible.

The answers obtained from this interview will be used to identify key ideas and themes, which will guide the focus group conversations.

Interview Questions:

1. What is your understanding of climate change?

2. How do you, as a local municipality stakeholder, understand climate change and its impacts on the food system?

3. How do you think other New River Valley food system stakeholders understand climate change and its impacts on the sustainability of the local food system in our region?

4. How do you understand the food system?

5. What is your concept of a food system and what does it look like when it works well?

6. How do you think we can bring local food producers and consumers together in a way that addresses barriers to food security in our region (related to the impacts of climate change)?

7. What do you currently believe are the most critical places to intervene in our current local food system to address climate change transformation in the New River Valley?

8. What does a resilient, fair, or functional food system look like to you? *(This takes on an appreciative inquiry approach, so the interviewer encourages the participant to dream and to be in a space of abundance when responding to questions 8 and 9.)*

9. In 20 years from now, what would be your hope for a climate sustainable world?

Wrap up: Thank you for talking with me today. We appreciate your time and answers to these questions. A member of the team will follow up with you regarding the gallery walk and focus groups. If you have any questions, you may contact me at kasey14@vt.edu or 540-922-6439 or Kim Niewolny at 540-231-5784 or niewolny@vt.edu.

Appendix D: Gallery Walk Layout and Focus Group Script

Stage 1.
Open with the following script:
We're glad you've agreed to participate in today's focus group. I want to explain how this will work. We'll conduct a 90-minute focus group, which will entail introductions, a 45-minute gallery walk activity, and 30 minutes of discussion. You do not have to answer any questions that you don't want to answer.

Frame why I'm bringing diverse stakeholders together to set the tone:
I am excited to bring you all together here today to engage in a rich, important discussion that will help move climate change transformation planning forward in our community, especially as it relates to the food system. This is a very complex problem, but I feel encouraged sharing in this space with each of you today. You all bring something valuable to the table, and I look forward to you sharing your insights with one another.

Stage 2.
Please take 1 or 2 minutes to give a brief introduction of yourself including your name and your role. Check in question: why are you excited to be here today?

Stage 3.
Provide a gallery walk overview to the participants before beginning the activity:
The Gallery Walk is a collaborative discussion strategy that allows participants to work together or separately.

*Explain theme headings as part of the activity to make sure we have a common ground to work from.

Topics arranged in this order for the gallery walk:
● Climate change
● Climate impacts on the food system
● Sustainability
● Intervention points
● Where we are now and visions for the future

The facilitator has posted prompts on chart paper located at various stations around the room. These prompts have been developed using themes and key ideas from the individual interviews.

Everyone is given a specified span of time to read, discuss, and respond to the prompt before the facilitator signals for them to rotate to the next prompt. You may write your ideas directly on the chart paper. People continue to rotate around the room until they have responded to all the prompts and the facilitator calls time. After everyone has completed the rotation, everyone has a couple of minutes to debrief and share some of their ideas.

Stage 4.

Begin gallery walk activity.

Utilizing common themes and key ideas from the individual interviews, prompts are organized by theme with sub-questions during the gallery walk:

● **Climate change**
○ There will be several quotes pulled from the interviews representing the theme next to the flipchart. These quotes are:

- Every time you get a movie that's in the future, the world is destroyed and… there are no good depictions of the future of humanity. And I don't think that we're necessarily there yet. I think some things are irreversible, some things we cannot change, it's too late. But a lot of things are still fixable.
- That said, keeping it at a 1.5-degree Celsius change is almost going to be impossible if we don't really make some major changes between now and 2030... We're not moving fast enough.
- It's a little bit concerning, I guess, the realities and how quickly those changes are happening. And like the volatility it's bringing to a lot of landscapes.

○ *What ideas or opportunities come to mind for understanding climate change?*

● **Climate change impacts on the food system**
○ There will be several quotes pulled from the interviews representing the theme next to the flipchart. These quotes are:

- Our food system is entirely reliant on predictable weather patterns and growing seasons… and climate change means… things are thrown into potentially chaos.
- Last year we had a storm come in and it brought a pickle worm, which has never been seen here before. They're from the tropical areas, like south of Florida. The storm brought them in and they just started eating on the cantaloupe and everything.
- Also just massive groups of people being pushed out of their homes into other areas, so you get a lot of refugees of climate change.

○ *What ideas or opportunities come to mind for understanding climate change impacts on the food system?*

● **Sustainability**
○ There will be several quotes pulled from the interviews representing the theme next to the flipchart. These quotes are:

- If there are more folks that need to move to Blacksburg because it's a more optimal climate, I would want everyone to want to try to move to Blacksburg. But if Blacksburg is going to grow, it needs to grow in a sustainable way as well.
- There's a ton of natural resource conservation that would also be a part of that dream scenario… If we're gonna be climate sustainable, we're gonna have to get our soil management under wraps.
- I feel like the food system is working well when the farmer is profitable, or has a business where they feel sustainable… So the farmer wants to continue doing what they're doing because it makes sense to them as a family, a career, a business, and an impact on their environment.

○ *What ideas or opportunities come to mind for understanding*

sustainability?
● **Intervention points**
○ There will be several quotes pulled from the interviews representing the theme next to the flipchart. These quotes are:

- But we get our bodies back into working with the land and suddenly people are connected, not just mentally, but also physically. They have dirt under their fingernails… that's where it's going to happen… otherwise it's not going to change.
- My only hope is that the players who control so much more than we do develop some type of ecological conscience which inspires them to value climate sustainable practices in the same way that they value revenue.
- I just keep coming back to: how can all businesses, grocery stores, restaurants, institutions, and places prioritize more local buying?
- The problem requires us to completely dismantle systems that are massive… and we're like… chop up part of your lawn and plant some carrots… I don't see anybody talking about the scale of solution that's needed here.

○ *What ideas or opportunities come to mind for potential intervention points?*
● **Where we are now and visions for the future**
○ There will be several quotes pulled from the interviews representing the theme next to the flipchart. These quotes are:

- I was talking to a guy about how he does a CSA for people who can't afford it. And he offers five hours of work on the farm to get your share. And if you're elderly or disabled… maybe you're chopping vegetables or cooking or… finding a place for people to fit in… But it's more of those things. And more thinking outside the box.
- I envision a future where everyone has the transportation they need to access food and that the transportation they use is not just carbon neutral but somehow captures carbon in the air and stores it or uses it in advantageous ways.
- I imagine a world where you can take a 10-minute walk during your lunch break and eat your fill of berries and fruit and sugar snap peas, and you don't have to pack a lunch because it's just there. And the bees are everywhere. The birds are everywhere. And there's enough for them too.

○ *What ideas or opportunities come to mind for understanding the gap between where we are now and visions for the future?*

After each group has made their way around the charts, have everyone share a brief summary of what they wrote.

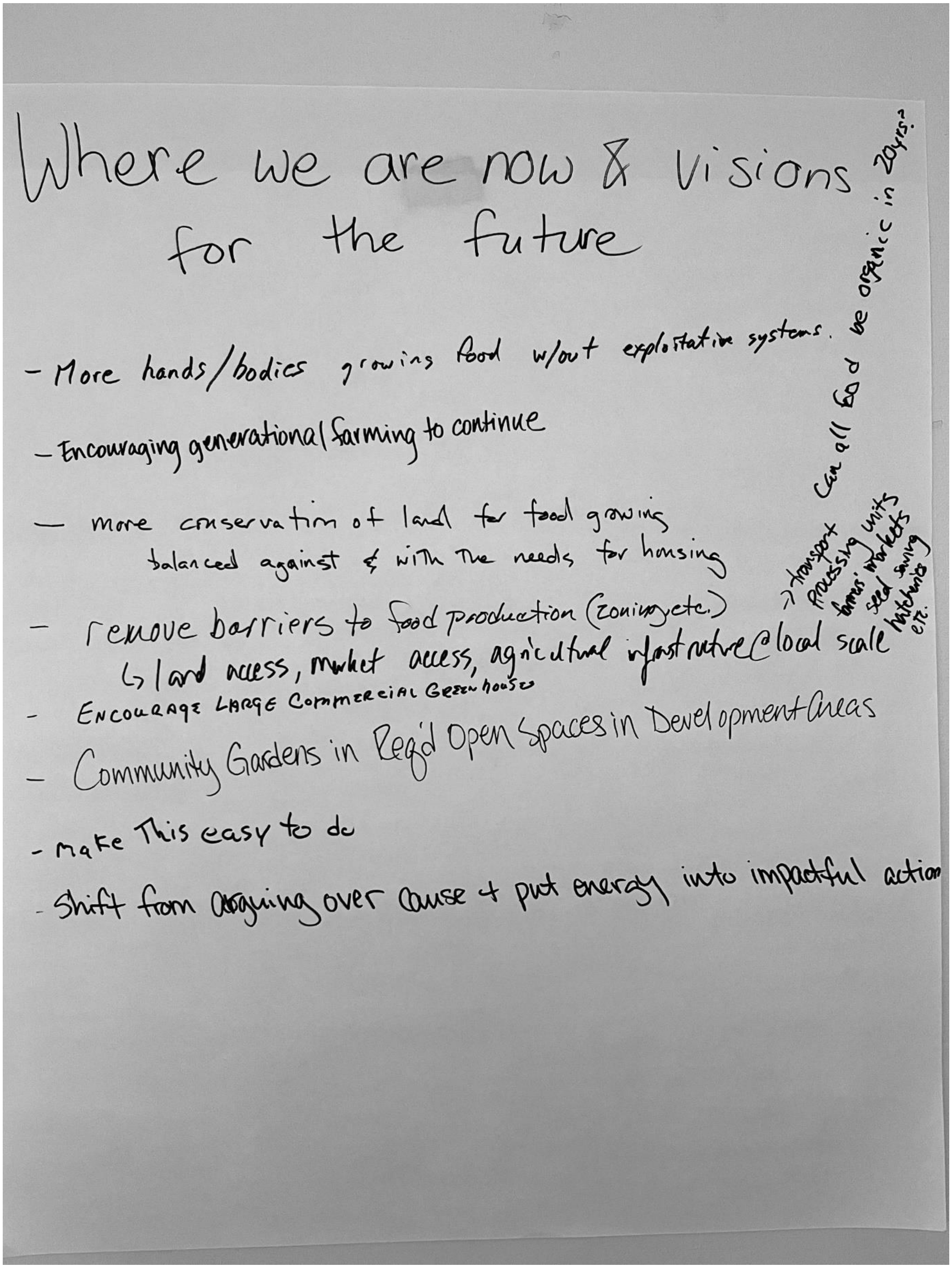
Stage 5.
Post-gallery walk discussion begins. Each participant is given an equal and designated amount of time to share their response in a talking circle format. Each question is asked, and the participant can choose to share their thoughts or pass to the next participant seated in the circle. Participants are encouraged to listen to the other group members' ideas and save their responses to others for when it is their own turn to share.

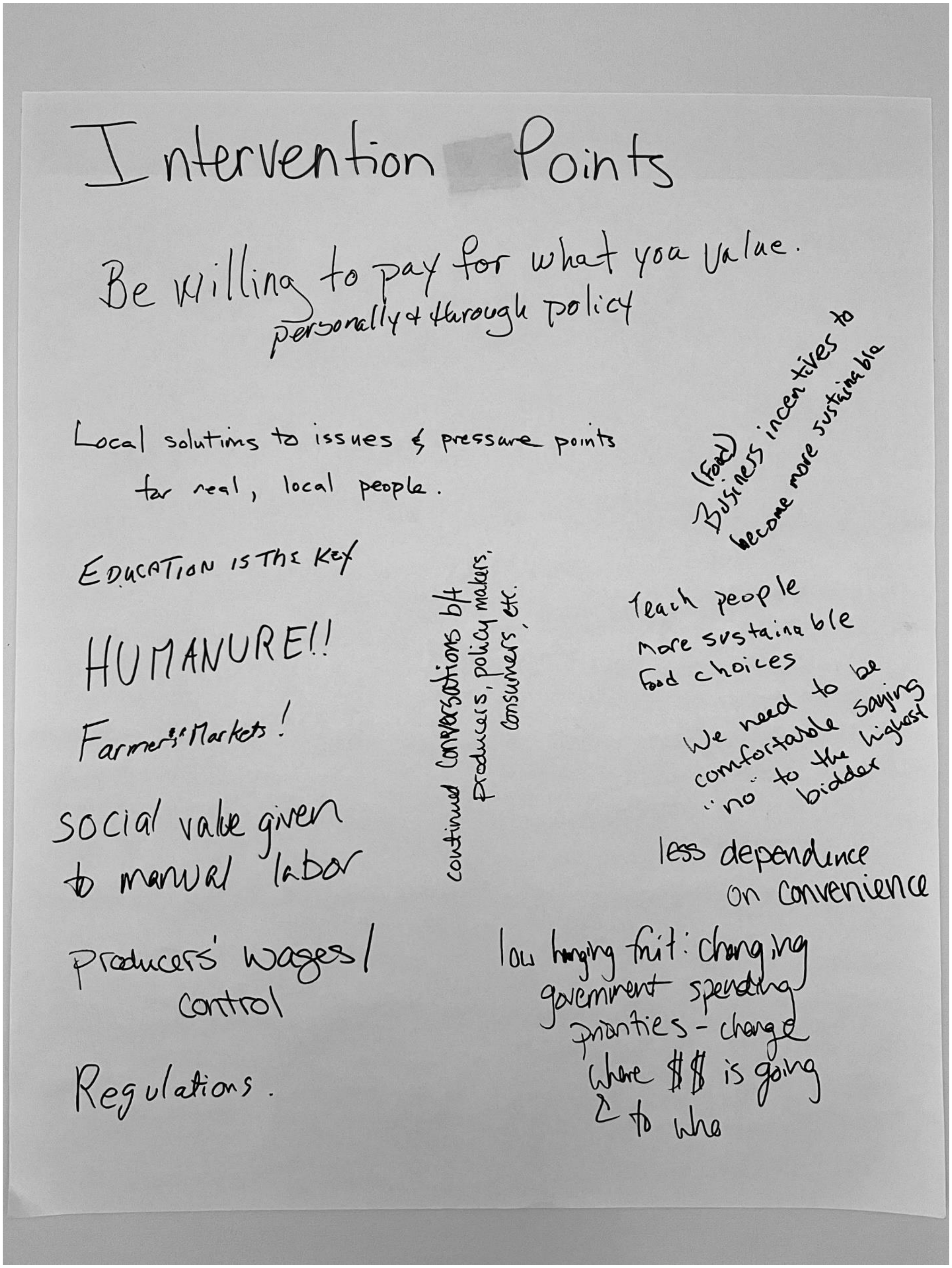
Questions:
1. What stood out the most to you as you read the charts or listened to the summaries?

2. What patterns and interconnections did you notice?
3. Which intervention points do you think are most pertinent to addressing the systemic causes of food insecurity in our region?
4. How, if at all, has your perspective or understanding of climate change and its impacts on the sustainability of the local food system in our region shifted?
5. How would you like to see these ideas move forward?
6. What are some questions you still have?

Wrap up: Thank you for talking with us today. We appreciate your time and participation in this discussion. Please reach out to me if you have any questions or concerns.

Appendix E: Gallery Walk Flipchart Photo





Intervention Points

Be willing to pay for what you value.
personally & through policy

(Food) Business incentives to become more sustainable

Local solutions to issues & pressure points for real, local people.

EDUCATION IS THE KEY

continued conversations b/t producers, policy makers, consumers, etc.

Teach people more sustainable food choices

HUMANURE!!

We need to be comfortable saying "no" to the highest bidder

Farmers' Markets!

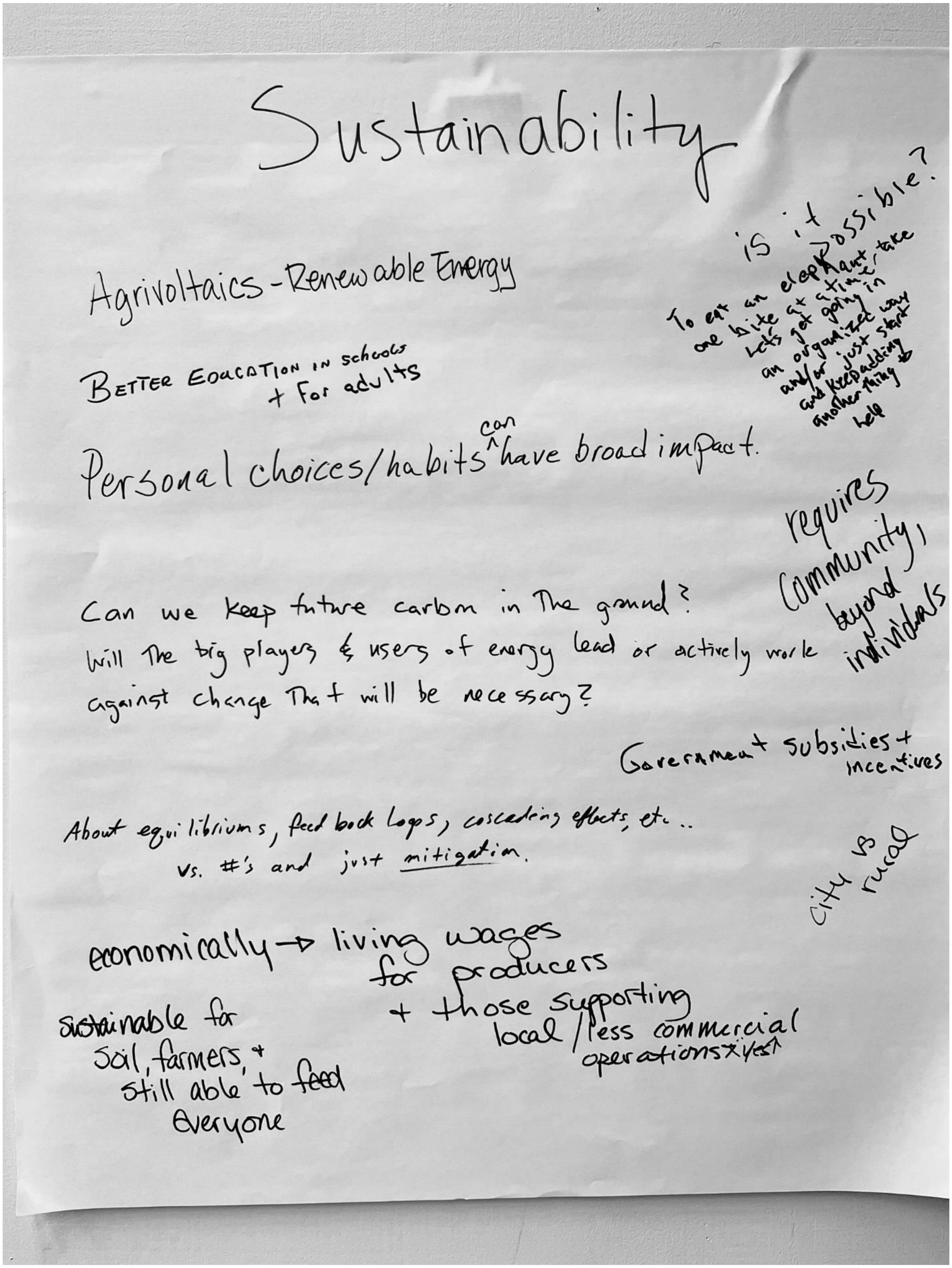
social value given to manual labor

less dependence on convenience

producers' wages / control

low hanging fruit: changing government spending priorities - change where $$ is going & to who

Regulations.


Sustainability
is it possible?
To eat an elephant, take one bite at a time. Let's get going in an organized way and/or just start and keep adding another thing to help
Agrivoltaics - Renewable Energy
BETTER EDUCATION IN schools + For adults
Personal choices/habits can have broad impact.
requires community, beyond individuals
Can we keep future carbon in the ground?
Will the big players & users of energy lead or actively work against change that will be necessary?
Government subsidies + incentives
About equilibriums, feed back loops, cascading effects, etc..
vs. #'s and just mitigation.
city vs rural
economically → living wages for producers + those supporting local / less commercial operations * yes
sustainable for soil, farmers, + still able to feed Everyone

Climate Impacts on the food system

Food systems Helps Drive climate change.

DECREASED PRODUCTION + QUALITY

Balancing housing needs of Climate refugees + preservation of Agricultural Resources.

How to build adaptive capacity in food systems to adapt to increased variability in etc.

Transportation costs & effects of moving large amounts of food long distances: maybe This has to change to more local production & distribution.

- H_2O !!

↑ pests, ↑ diseases

effect on management ↑

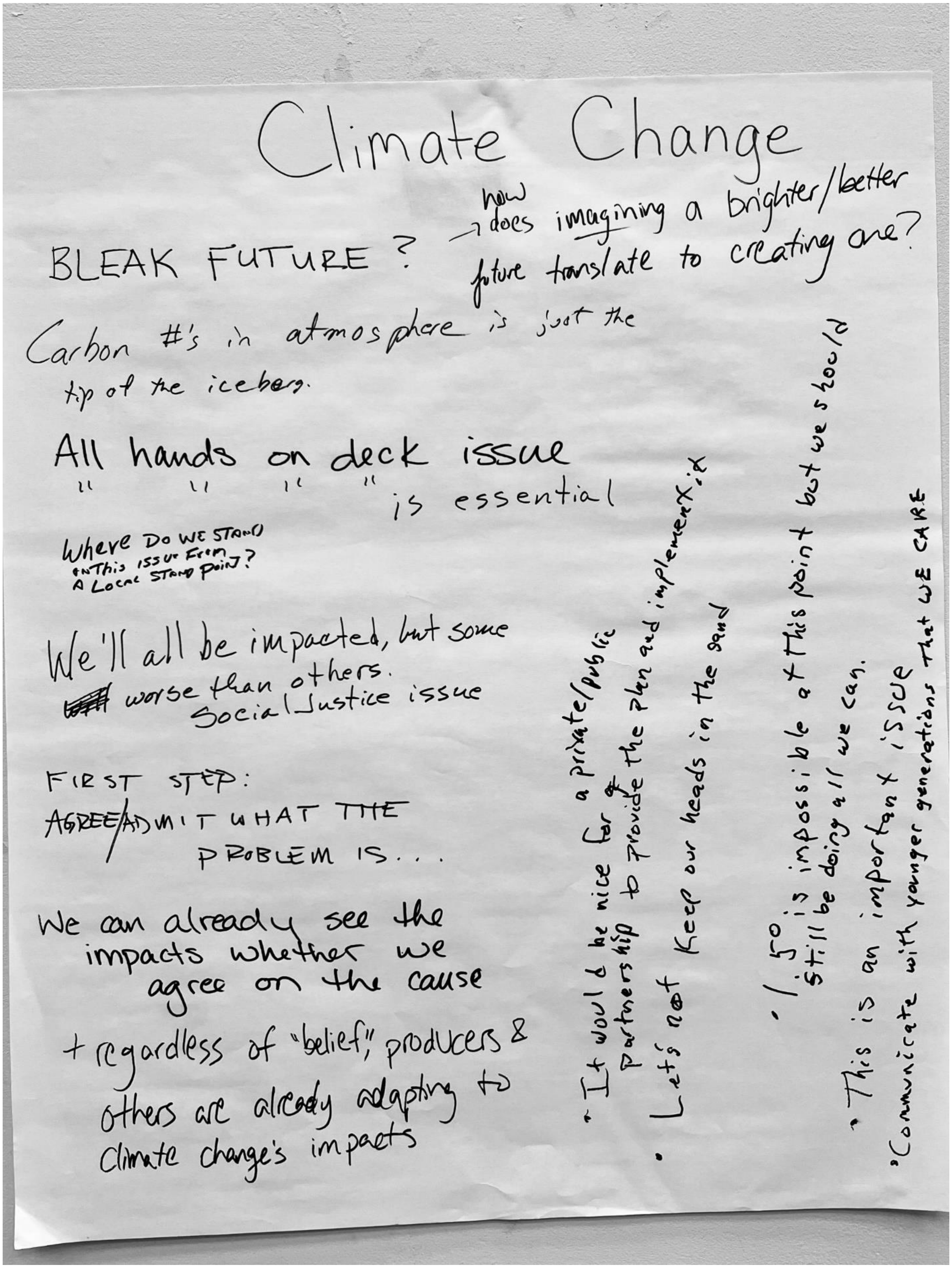
↓ fertile land → ↑ costs + use of fertilizer

New opportunities to grow in more northern areas

- maybe good unsuspected findings

· Solar to produce energy for different parts of system

- Scared of drought
- Driving new/old farming techniques


Climate Change
BLEAK FUTURE? → how does imagining a brighter/better future translate to creating one?
Carbon #'s in atmosphere is just the tip of the iceberg.
All hands on deck issue
" " " " is essential
Where DO WE STAND ON This ISSUE From A LOCAL STAND POINT?
We'll all be impacted, but some worse than others.
Social Justice issue
FIRST STEP:
~~AGREE~~/ADMIT WHAT THE PROBLEM IS...
We can already see the impacts whether we agree on the cause
+ regardless of "belief," producers & others are already adapting to climate change's impacts
• It would be nice for a private/public partnership to provide the plan and implement it
• Let's not keep our heads in the sand
• 1.5° is impossible at this point but we should still be doing all we can.
• This is an important issue
• Communicate with younger generations that WE CARE

blow up ⇒ land use policies that make growing food hard / impossible

Where we are now & visions for the future

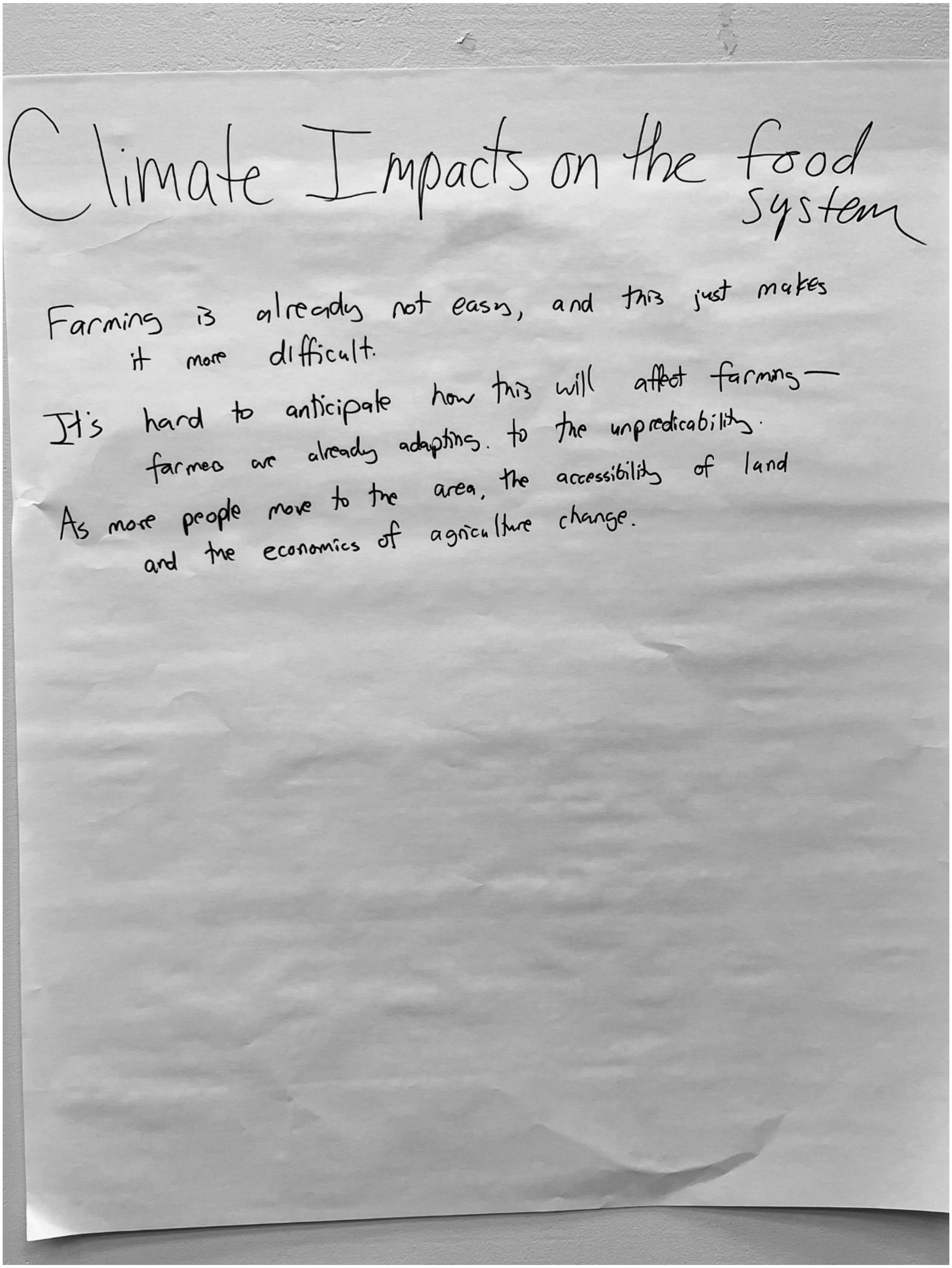
- ~~#A~~ a future where the people who produce our food have a livable wage and dignity – thriving
- no bougie local food (except arugula)
  pastimes (golf & horses)
- food is valued as a top priority in our disposible income
- food is recognized as the medicine it is
- breaking down the barriers to sustainable food production – incentives, subsidies, cooperatives

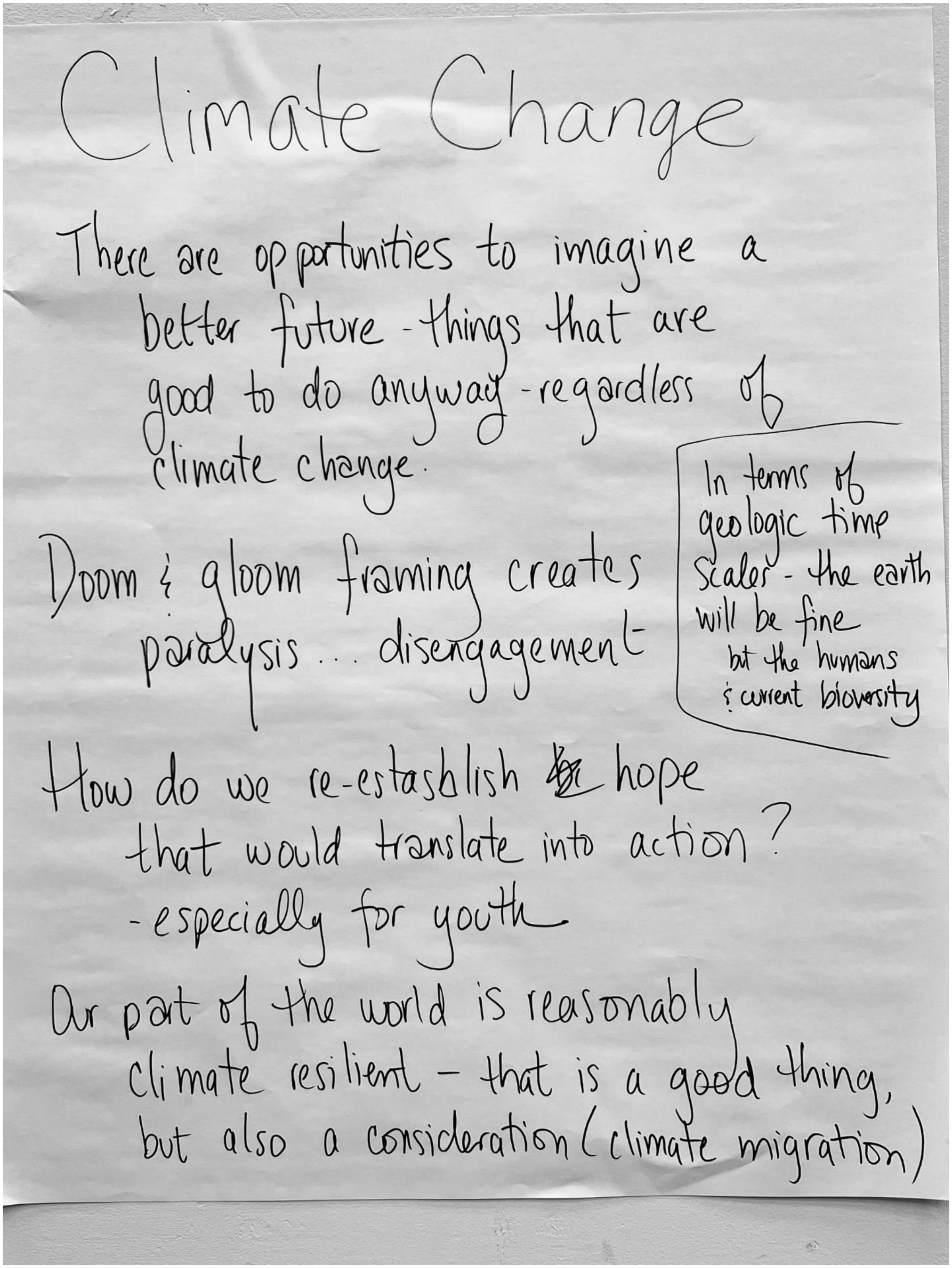
Intervention Points

- Food waste management/composting facility
- metrics for measuring possible solutions
- Lobby policy changes/step downs around composting/managing organic matter
- Creating programs + incentives to bring people back to the land
- Agri neighborhood

Sustainability

- PEST PRESSURE TO ~~DECREASE~~ ↑ in manufactured pesticides. FOCUSING ON SOIL HEALTH + SOILBUILDING.
- Agroecology ~~cycles~~ cycles + systems
- Appropriate crops/management practices
  - ↳ education/access
- Fragility of large scale monoculture
  - ↳ shifting incentives from monoculture to more sustainable methods
- social sustainability around connection to food production. Important for future resiliency.


Climate Impacts on the food system
Farming is already not easy, and this just makes it more difficult.
It's hard to anticipate how this will affect farming— farmers are already adapting. to the unpredicability.
As more people move to the area, the accessibility of land and the economics of agriculture change.


Climate Change
There are opportunities to imagine a better future - things that are good to do anyway - regardless of climate change.
Doom & gloom framing creates paralysis ... disengagement
In terms of geologic time scales - the earth will be fine but the humans & current bioversity
How do we re-establish hope that would translate into action? - especially for youth
Our part of the world is reasonably climate resilient - that is a good thing, but also a consideration (climate migration)

Appendix F: Codebook

Constructs	Family Codes	Sub-Codes	Research Questions
Systems thinking	Potential leverage points for intervention	Re-connect (reconnecting people to nature/ecology), Re-structure (restructuring institutions), Re-think (rethinking how knowledge is created and used--referring to both communities of practice co-creation of knowledge, and how knowledge is shared and validated)	What are the potential leverage points, or most critical places to intervene, in our current local food system to address climate change transformation in the New River Valley?
Stroh's Systemic Change Process	Stroh's creative tension gap	What they want, Where they are now, What is working, What is not working	How do local municipality stakeholders understand climate change and its impacts on the food system? ; How do NRV food system stakeholders understand climate change and its impacts on the sustainability of the local food system in our region?
Climate Change	Climate change defined	Attributed to human activity, Attributed to natural climate variability, Urgent, Not urgent, Will impact our community, Will not impact our community, Too late to change, Not too late to change	How do local municipality stakeholders understand climate change and its impacts on the food system?
Sustainability	Sustainable development for climate change	Economic Sustainability, Social Sustainability, Environmental Sustainability	How do NRV food system stakeholders understand climate change and its impacts on the sustainability of the local food system in our region?
Systems Thinking	Climate change impacts on the food system	Unpredictable weather patterns, Extreme weather patterns, Crop damage or loss, Pest outbreaks, Increasing inequity, Food insecurity, Food prices, Food access, Nutrition, Climate refugees	How do NRV food system stakeholders understand climate change and its impacts on the sustainability of the local food system in our region? ; How do local municipality stakeholders understand climate change and its impacts on the food system?