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Rural Year-Round Growing to Ameliorate a Possible Negative Effect from Climate Change

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Abstract

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Of Climate Change

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MA, Walden University, 2009

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Dissertation Submitted in Partial Fulfillment

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Abstract

The Intergovernmental Panel on Climate Change (IPCC) suggested that, as the world population grows, food and water shortages will become even more serious issues (IPPC's 2014 predictions about the future effects of climate change (CC), Year-round growing (YRG) may provide a way for communities to extend growing seasons, expand local farm systems, and provide food year round. This case study included a detailed analysis of responses from representatives of all sectors of rural Mesa County, Colorado, regarding YRG and a local food and farm plan due to CC. The case was bounded by time (6 months of data collection) which provided an in-depth picture of responses from the community. The theoretical framework for the study was Kingdon's multiple streams theory; a local, conceptual framework was provided by Liu, Lindquist, Vedlitz, and Vincent, who identified the key factors for local agenda-setting, defined in the policy literature as an important step in policymaking. Research questions explored YRG as a way to mitigate CC and as a potential platform to create policy towards a local food and farm plan. Twenty-one citizens from all sectors of a small community in western Colorado were interviewed about their perspectives on CC, YRG, and an agenda for a local food and farm plan (LFFP). Data were coded to identify themes and patterns. Results revealed that most participants were not concerned about CC, although they would like to see YRG and a LFFP thrive as a free market enterprise. Policy makers' support of rural farming through YRG and LFFPs would reduce both the distance food travels and the use of fossil fuels; it would also help create a path to a more sustainable future.

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Chapter 1: Introduction to the Study

Background

Year-round farming could extend seasonal growing in rural communities and provide a way to ameliorate the effects of climate change on agriculture. Until recently, rural farm regions ranked among the most impoverished in the nation. Past farm policy has been blamed for the financial decline of rural America, as indicated by the collapse of local banks, merchants, feed and supply stores, equipment dealers, and even corner grocery and family-owned hardware stores (Hosansky, 2002). Agriculture is still prominent in most rural economies, even with the loss of family farmers over the past 50 years, yet "the current piecemeal approach to rural policy that we have today found within the U.S. Farm Bill is both chronically underfunded and, in the most recent negotiations, threatened with almost complete elimination" (Kleinschmit & Claussen, 2012, p. 1). The 2012 Farm Bill ignores new possibilities for rural farmers. Advances in technology, the use of greenhouses, and energy production via renewable resources offer new possibilities for rural farmers to grow food year-round locally. According to the Leopold Center for Sustainable Agriculture:

> There are many benefits that a robust local food and farm sector could bring to state economies and local communities: Greenhouse production also has the potential to play a role in expanding year- round fruit and vegetable production. Greenhouses, as well as plastic-covered high tunnel structures can extend the growing season, reduce seasonal fluctuations in farm income, and provide

> opportunities for increasing the circulation of local food dollars in the winter months when farm product sales typically stall (p. 14, 2011).

Agriculture is directly tied to climate change (CC), yet little has been accomplished in terms of climate policy. According to Girardet, "Because of the historical resistance from US recalcitrance, coupled with the escalating pace of CC, the Kyoto goals (but not the Kyoto process) are today irrelevant" (2007, p. 24). The author further claimed that a change of energy subsidy policy would be necessary to slow the effects of greenhouse gases, which have already caused deep oceans to warm, tundra to thaw, glaciers to melt, infectious diseases to migrate, and the timing of seasons to change. The United States currently spends more than $20 billion a year to subsidize fossil fuels.

Climate policy has not been addressed at the federal level of government, although the collective action of networks working together with municipal governments may challenge the character of national and global climate governance by increasing the actions and roles of sub-national governments. According to Gore (2010) "Research on climate change policy and politics has become increasingly focused on the actions and influence of sub-national governments" (p. 27). By engaging citizens in local policies and programs that work within national and international municipal networks, municipalities have the potential to support or demand policy at the national level of government (Gore, 2010; Linstroth & Bell, 2007). CC is representative of trans-subsystem dynamics, such as the way air quality is strategically linked with electricity generation, which places a focus on renewable energy subsystems with spillovers into weather and disaster management subsystems (Kingdon, 2003; Pump, 2011). Municipal or local action is becoming more

effective in spite of ineffective national action on policies related to climate change, even though the federal government has not acknowledged municipalities as central partners in greenhouse gas reduction strategies (Gore, 2010).

The severity and rate of CC have already affected both industrial and rural agriculture negatively (Beniston, 2010). “Tackling climate change requires attention [be paid] to agriculture” (Wollenberg, Marja-Lissa, Tapio-Bistrom, & Greig-Gran, 2012, p. 3). Farmers and scientists from around the world have witnessed a decline in the number of crop yields over the past few years (Lobel, Cassman, & Field, 2009). There is a large body of literature that has examined climate change relative to global agriculture specifically, while little research has been conducted at the local levels (Beniston, 2010; Kahn, 2009; Mendelsohn & Dinar, 2009; Rosegrant et al., 2009). The Lobel et al. study was conducted in 2009, and only 3 years later, as of July 13, 2012, 61% of land in the lower 48 states had experienced drought conditions, while the preceding12 months had been the warmest recorded since record-keeping began in 1895. In 2012 alone, corn had already risen in price by 45%, while soy prices had climbed to 22% (Basu, 2012). Raising crops and livestock contributes to an estimated 12% of greenhouse gas emissions globally, and emissions are expected to increase over the next 30 years as population, income, agricultural intensification, and preferences for meat and dairy increase. In order to feed a world of an estimated 9 billion people by 2050, a redesign of the entire food system may be necessary to achieve sustainability as well as mitigate the effects caused by climate change (Wollenberg et al., 2012).

Local food systems (LF) could provide the flexibility necessary to absorb unprecedented environmental upheavals and facilitate adaptation to climate change by altering current systems through the knowledge of local farmers (Brooks, Grist, & Brown, 2009). Municipalities are beginning to act on climate change for tangible reasons related to local quality of life issues through coalitions of municipalities, often just for an exchange of knowledge (Gore, 2010). In Iowa, the legislature established a local food and farm plan in 2011. The plan provided a blueprint that shows how to increase food production, distribution, and marketing in a local community (Leopold Center for Sustainable Agriculture, 2012, p. 1). Connelly, Markey, and Roseland (2011) explored the recent explosion of public interest in food system initiatives "ranging from interest in the 100-mile diet, peak oil and climate change, re-localization of economic activity, preservation of farm land and farm employment, organic food, health and equity" (p. 313). Hamilton (2011) contended that the public's desire for better food, more information, and choices, combined with action at the local level of government, can help to shape a more sustainable food future in a newly found food democracy. That being said, the elite theory of local politics suggests that community power is unequally distributed and is controlled by a small number of powerful individuals or groups who have a dominant interest in business (Liu, Lindquist, Vedlitz, & Vincent, 2010).

Problem Statement

According to Hulme, "Climate change is the defining challenge of our age. The science is clear; climate change is happening, the impact is real; the time to act is now" (2009, p. 331). The author further contended that human beings have created a political

log-jam of gigantic proportions based on the problem of CC as insoluble and beyond comprehension, yet the idea of CC could provide the impetus to stimulate new and innovative thinking that might thrive in conditions of pluralistic hope, rather than in conditions of universal fear. Cities can act as microcosms for potential national policies (Linstroth & Bell, 2007). According to Gore (2010), "Since the late 1980s, local governments in North America have emerged as leaders in climate change response and important actors in a multilevel system of climate governance" (p. 30).

This study focused on the contexts of rural farming and the use of greenhouse technology to address adaptation to climate change through local, year-round growing (YRG). As Americans consume more food grown in places outside of the United States, future prices of imported foods continue to rise due to a diminished capacity in production, which is related to climate change. The United States may become more reliant upon domestic production to satisfy food requirements (Hendrickson et al., 2008). This case study sought to explore and describe YRG in a small community in Colorado and how a food and farm plan might be developed in support of local farmers and associated small businesses. Consensus and coalition building is perceived as being the most important political factor in local policy processes and is essential for building a local food and farm plan (Liu, et al., 2010).The dynamics have been researched in Iowa's Local Food and Farm Plan (ILFFP). The study was conducted over the course of a year by the Leopold Center for Sustainable Agriculture (LCSA, 2012). This organization explored the elements required to build a local food system and made recommendations for legislative action.

Purpose Statement

The purpose of this study was to explore agenda setting at the local level of government for YRG due to the pressing issue of CC and its effects on agriculture. Once the obstacles have been identified and better understood, many counties may be able to achieve the placement of local farm plans on local agendas. The ILFFP recommendations provide strategies for local communities to move forward to establish local food and farm systems and suggestions to obtain agenda prominence at the national level of government. This research tested the key factors in local agenda setting, problem identification, and alternative policy selection (Liu et al., 2010). The ILFFP presented recommendations towards the legislation of local farm policy and the funding of necessary programs. The Iowa legislature passed an amendment in 2010 mandating the Leopold Center for Sustainable Agriculture (LCSA) to develop a local food and farm plan for the State of Iowa as an academic model. The LCSA is a research and education center that supports statewide programs to develop sustainable agricultural practices that are profitable, as well as to maintain the goal of conserving natural resources. The study was developed to corroborate or challenge the usefulness of the Leopold Center's recommendations for future social food and farm initiatives (LCSA, 2011). The goal of this research was to contribute to the body of knowledge relative to how local food system policy might evolve and to better understand factors affecting the successes and failures encountered when attempting to develop local sustainable food and farm systems.

Research Questions

In order to effectively analyze YRG and local food and farm systems in response to CC, the following specific research questions were proposed:

How might YRG impact agenda-setting for local rural farm policy and, ultimately, legislation for the expansion of local farm systems in an effort to mitigate CC?

1. Why is a local food and farm initiative that includes YRG not on the legislative agenda for rural farm policy at the national level of government?

Theoretical Framework

Kingdon (2003) posited that agenda-setting is a political process that is conflictive and competitive at the national level of government. It is a process in which certain public problems are identified, recognized, and defined, while solutions or alternatives are generated, considered, and then attached to these problems (Kingdon, 2003; Liu, Lindquist, Vedlitz, & Vincent, 2010; Robinson & Eller, 2010). Stakeholders such as interest groups, the government, the media and the public take action to align with or oppose the preferences of decision-makers. There are an unlimited number of policy problems, yet few make it onto the agenda due to policy dynamics. Agenda setting is contingent upon competing entries, the ability to influence groups to take action, the positions and views of key policymakers, and the preferences of interest groups and decision makers. Some solutions will be considered while others will not (Kingdon, 2003). Kingdon's theory of *multiple streams* describes the landscape surrounding the

process of agenda setting by using conceptual streams made up of problems, policy (alternatives or solutions), and politics.

The problem stream represents information and events that may unchain a series of events that either place an issue on or eliminate an issue from the agenda (Kingdon, 2003). Agenda-setting is enabled through the interaction of the problem stream, where problems come to the attention of decision makers through systematic indicators, focusing events, or feedback, which represents a series of conditions that require public attention (Liu et al., 2010; Robinson & Eller, 2010). Opponents can deny that there is a problem or provide evidence that a problem is not appropriate for government action (Pump, 2011).

Kingdon's (2003) *policy stream* refers to knowledge or advice that is derived from researchers, advisors, or analysts that offer alternatives or solutions which may or may not be considered or used by decision makers. The alternative selection framework articulated by Kingdon addresses what problems attract attention and how policy agendas are set as well as which alternative solutions are being seriously considered (Liu et al., 2010). Kingdon (2003) and Lui, et al. (2010) agreed that alternative solutions can be advanced by hidden specialists, such as academics and career bureaucrats who have the detailed knowledge and proximity to solutions, ideas, or re-combinations of previous ideas. The LCSA is one of the aforementioned research groups. The researchers were mandated to prepare a local food and farm plan by drawing on the expertise of more than 1,000 individuals across the state of Iowa and subsequently made recommendations to the Iowa legislature in 2011. The LCSA were composed of stakeholders who were hired

to test the technical feasibility, the value acceptability, and the political feasibility of a local food and farm plan. The center provided an assessment of the challenges as well as the opportunities involved in building a robust local food economy. They also suggested policy and regulatory changes with a plan that encouraged state investments to leverage federal, foundational, and private investments of grants and loans (LSCA, 2011).

The political stream captures the will of the political system and the strength of the actors in pursuit of placing an issue on the agenda (Kingdon, 2003). The political stream is the place in time where "elections, public mood swings, interest group demands, and personnel, or jurisdictional changes in an administrational contribute to an issue rising in prominence on the agenda" (Liu, et al., 2010). This stream represents the long-term evolution of ideologies in the political environment; however, it is at this point that a national election can trigger a political window to open (Robinson & Eller, 2010). The successful coupling of these stream avenues is facilitated by the presence of policy entrepreneurs, elected or appointed officials, or private sector leaders who champion a particular solution (Liu, 2010). Kingdon (2003) indicated that interest groups are among the most important participants outside of government.

Kingdon's framework addresses agenda setting at the national level of policy, yet according to Liu, et al. (2010), at the local level of agenda setting and alternative selection, there are many different policy participants. The authors considered that the most important groups in the policy process are governmental actors and interest groups. The second tier of importance in their study included the general public, experts from academia, researchers, analysts or consultants, and election-related actors who represent

political parties as well as campaigners. Ranking lower in importance were intergovernmental actors and the media. The most important factors in agenda setting at the local level included budgetary considerations, similar to Kingdon's framework, of focusing events, indicators, and feedback. However, according to Liu, et al. (2010) feedback, both internal and external to policymaking bodies, was the second most effective mechanisms. They found that policy compatibility was the most discussed attribute that contributed to the survival of an alternative or a selection in the local policy process. This would be in contrast to Kingdon's (2003) technical feasibility, value acceptability, and future constraints at the national level of policymaking. The most important finding at the local level was in the strength of consensus and coalition building, which is influenced by a shift in public moods and opinion or changes in electoral leadership; however, it should also be noted that:

> The balance of organized political forces, key personnel turnovers in government and competition of issue jurisdiction are also very important in local agenda-setting and alternative specification. Observers noted that well-organized political forces, with power and influence from money or from existing systems, can significantly impact local policy issues, and that the average citizen would have a difficult time competing against these influential, well-financed interests, e.g., home builders or land development corporations. (Liu, et al., 2010, p. 84).

The framework for this case study was based on the findings of the Liu, et al. (2010) study of local policymaking.

Gore (2010) specifically addressed municipalities that have joined the Federation of Canadian Municipalities to become partners for climate protection by producing local environmental initiatives. The federal government has never built policy based upon municipal action, yet municipal action could provide the right circumstances to welcome partners in greenhouse gas (GHG) reduction strategies, even though there has been little attention to the exploration of municipal climate change action in studies about Canadian local government, climate change policy, or politics. "The great thing about local governments is that they are nimble. They can morph into different characters depending on what's needed [or] they can come together as a coalition or work together to help inspire the transformation of markets" (Gore, 2010, p. 36). Partners in GHG reduction could include local farmers growing in greenhouses.

Research Design

The framework for this case study was based on the factors of agenda setting at the local level discovered by Liu, et al. (2010). The ILFFP recommendations support local food systems yet shifts in agricultural policy are slow to change, therefore these recommendations serve as a guide that could help to identify agenda setting obstacles in the development of local and regional food systems. In order to accomplish this goal, the qualitative case study methodology was selected, which is ideal when an in-depth study is warranted of a specific topic. A case study that is likely to be exemplary is the one in which the underlying issues are nationally important--either in theoretical, policy, or practical terms (Yin, 2009). This case study involved a review of diverse data, including

interviews with stakeholders, e-mail correspondence, and public records. The method by which each type of data was collected, analyzed and stored is discussed in Chapter 3.

The literature review in Chapter 2 presents the issues surrounding this case study;: CC, industrial agriculture compared to rural agriculture, issues surrounding the future of water, comparisons of countries that have already begun to grow year round, new technology to assist in year-round growing, renewable energy, the use of greenhouses, sustainability, and smart-growth planning. Recommendations from the ILFFP identified and included in the context of YRG and agenda-setting in public policy at the local level of government via Liu, Lindquist, Vedlitz, and Vincent (2010). Their findings provide the framework and are abbreviated LLVV (2010).

The purpose of the interviews was to identify the issues surrounding CC, rural farming, and YRG, which are discussed within Chapter 2. Interviews were conducted with public administrators, private and nonprofit organizations, and citizen stakeholders from MC to collect perspectives on a similar initiative for their community. The information collected depicted the current state of rural farm policy. Documentation, e-mail, and public record reviews were used primarily to provide narrative analysis of the factors that might be facilitating or debilitating rural farm policy. This information was used to corroborate data received through the interview process.

Definition of Terms

Clean energy farming (CEF): An emerging trend in agriculture that encourages farmers to improve energy efficiency by implementing more efficient farming practices,

saving energy, protecting natural resources, and producing, then using renewable energy (Chel and Kaushik, 2010).

Climate change(CC): Any change in global temperatures and precipitation over time due to natural variability or human actions.

Food miles (FM): Average miles food travels and the amount of fuel used before reaching plates.

Greenhouse: "A facility where plants are grown within structures, primarily of glass or plastic, in which temperature and humidity can be controlled for the cultivation or protection of plants" (ILFFP, 2011).

- *Solar greenhouse*: Has the capability to store energy in a medium other than the air during sunny days and can be cooled or heated as needed (Chel & Kaushik, 2010).
- *Mother Earth-sheltered greenhouse:* Can be built into the side of a mountain (Brigham Young University, 2002).
- *Pankar-Huvus:* Primarily used in Bolivia for year-round cultivation of vegetables (Brigham Young University, 2002).
- *Walipini:* A subterranean greenhouse (Brigham Young University, 2002).

Horticulture (HORT): The science and art of growing fruits, vegetables, flowers, or ornamental plants (Lans, Biemans, Verstegen, and Mulder, (2008).

Hydraulic fracturing (FRKG): The propagation of fractures in a rock layer as a result of the action of a pressurized fluid designed to release petroleum, natural gas (including shale gas, tight gas, and coal seam gas), or other substances for extraction.

Iowa Local Food & Farm Plan (ILFFP): Contains policy and funding recommendations for supporting and expanding local food systems (LCSA, 2011).

LLVV (2010): The framework for agenda setting at the local level of government was based on the findings of authors Liu, Lindquist, Vedlitz, and Vincent (2010). The original author Kingdon (2003) described his national agenda setting process in three conceptual streams that must come together to achieve a place on an agenda towards a change in policy; Liu, et al. (2010) treated the streams independently.

Leopold Center for Sustainable Agriculture (LCSA): A research and education center with statewide programs that develop sustainable agriculture practices which are profitable and conserve natural resources (n.d.).

Local Foods (LF): This term differentiates between food that is grown, processed, and sold within a relatively small area and contributes to the growth of that area. The word *local* is associated with trust, shared values, quality, stewardship, familiarity, simplicity, and community. Locally grown foods construct an alternative to the industrialized food system associated with breaches in consumer safety and animal cruelty (Hess, 2010).

Mesa County (MC): Ten small communities located on the Western Slope of the Rocky Mountains with a population of 146,723. For the purpose of this case study, the three towns of Fruita, Grand Junction, and Palisade were used to examine the risks and benefits of year-round growing. Collbran, DeBeque, Clifton, Fruitvale, Loma, Orchard Mesa, and Redlands are associated with the three towns mentioned above. The median household income was $52,067 between the years 2006- and 2010. The U.S. Census

reported that 12.4% of the residents lived below the poverty level between the years 2006-and 2010. MC leaders and residents envision the preservation of the agricultural character inherent to this area of Colorado while preserving quality of life and fostering a healthy economy (Census Report, 2010).

Multi-Jurisdictional Transfer of Development Rights (TDR/C): The City of Fruita and Mesa County entered into an agreement in 2005 to establish this program to accomplish the goals of preserving community character, preserving agricultural landscapes, and promoting an orderly development pattern within urban and rural areas that is synchronistic with the existing infrastructure (www.mesacounty.us, n.d.).

Open for Business Initiative (OBI): Aims to boost the local economy by encouraging development and business growth by lowering taxes and fees, streamlining the development process, expediting capital projects, adopting a developers' Bill of Rights, and supporting existing local businesses (www.mesacounty.us/openforbusiness/).

Renewable energy (RE): Renewable energy technologies are ones that consume primary energy resources that are not subject to depletion and include solar energy, wind energy, geothermal energy, and biomass. Hydropower is also considered to be part of the mix of this type of energy. Solar energy is energy derived directly from the sun and is the most abundant source of energy on Earth. The fastest growing type of alternative energy is the photovoltaic cell, which converts sunlight directly into electricity. The sun delivers yearly more than 10,000 times the energy that humans currently use. This form of energy reduces environmental pollution and has the capability to replace fossil fuels. Small wind systems can provide power that can be used directly or can be stored in batteries. Wind

turbine electricity generation can be used to raise the living standard of rural farmers by improving agricultural productivity, especially where there is a shorter rainy season and a demand for pumped water. Wind energy is pollution-free, does not require fuel, does not produce toxic or radioactive waste, and does not create greenhouse gases; however, birds can be killed when they run into the turbines (Chel & Kaushik, 2010).

Smart growth (SG): Has been used to describe efforts by local governments to adopt and implement good practices of land-use regulation. Smart growth incorporates several elements, policies, and regulatory instruments that affect land use and is commonly grouped with principles related to planning practices intended to deal with urban sprawl. Smart growth regulations promote compact developments as well as regulations that attempt to address public issues such as traffic congestion, transportation, loss of farmland, urban disinvestment, the costs of public infrastructure, affordable housing, and economic and community development (Hawkins, 2010).

Smart growth planning (SGP): Smart growth policies focus on where development should occur and how best to protect natural resources while supporting a more equitable and affordably built environment, however State governments play an important role in providing support the development of standards and best practices by directing municipal governments to control local growth and manage development projects and by preparing comprehensive plans that are consistent with state planning requirements; there is a distinct trend of moving away from state-dominated, strict regulation-based policy to more cooperative, incentive-based systems (Hawkins, 2010).

Sustainable community development (SCD): Applies the concept of sustainable development to the local level. SCD is grounded in the understanding that mobilizing citizens and their governments through democratic processes serves to coordinate, balance, and catalyze the values, visions, and activities of various community actors to create change. SCD approaches recognize the finite nature of the Earth and the need to reduce demands placed upon it, and puts an emphasis on the efficiency of resource use as a means of environmental protection or conservation (Markey, Connelly, and Roseland, 2010).

Sustainable rural agriculture (SRA): An alternative for solving fundamental and applied issues related to food production in an ecological way. It employs design and management procedures that work with natural processes to conserve all resources while minimizing waste and environmental damage. The systems take advantage of existing soil nutrient and water cycles, energy flows, beneficial soil organisms, and natural pest controls. Sustainable agriculture is based on the use of renewable and recyclable resources, such as biological, geothermal, hydroelectric, solar, or wind energy. A sustainable agricultural system improves the quality of life of individuals and communities by creating a system that is profitable. This ethic strives to protect the health of the land community and its capacity for self renewal. Examples of sustainable agriculture are (a) precision agriculture, (b) integrated pest management, (c) rotational grazing, (d) soil conservation, (e) water quality/wetlands, (f) cover crops, (g) landscape diversity, (h) nutrient management, (i) agro-forestry, and (j) alternative marketing (Chel & Kaushik, 2010).

Year-round growing (YRG): Growing food for local communities through the use of greenhouses and bypassing the traditional growing season. (See Appendix B.).

Assumptions, Scope, and Limitations of the Study

Several assumptions existed within the study. The first assumption was that the stakeholders selected for interviews were knowledgeable in the area of rural agriculture and smart growth planning. This assumption was based on conversations, publications, and presentations or other evidence that suggested that an individual had the credibility to discuss rural agriculture. The second assumption was that all of the stakeholders were able to speak in an open and sincere manner. It was anticipated that this issue would not cause interviewees any discomfort in sharing their beliefs about year-round growing; however, it was possible that some interviewees wanted to protect their true beliefs about climate change. I assured interview candidates that confidential information would not be reported to other entities.

The scope of the study was limited to factors that affect local agenda setting and ILFFP recommendations for a local food and farm initiative. The recommendations did not include information related to YRG, yet the use of greenhouses might offer alternatives for growing for regions that were accustomed to traditional growing seasons before the onset of CC. ILFFP suggested hiring a local food and farm advisory board to help find funding for programs. Budgetary considerations are the most important factors shaping local priorities, according to LLVV (2010). Business development was included in this research due to the amount of financial assistance that would be required to create new systems necessary to accommodate a local food and farm plan. Policy compatibility

is the most frequently discussed attribute in local alternative selection. Liu, et al. (2010) noted the importance of a proposed solution being compatible with policies from higher levels of government in order to gain support and receive serious consideration. In this case study, this was especially true, due to water rights considerations.

A limitation that should be noted is that I am a stakeholder in rural farming by profession, which may have brought bias to the study. I had previous knowledge of the political landscape and stakeholder perspectives on the topic of climate change, --not in relation to YRG, but in relation to seasonal growing in general. I consciously limited this potential bias by using a reliable methodology in collecting and analyzing the data and by interviewing an adequate number of diverse stakeholders.

Significance of Research to Public Policy

Local food and farm plans have the capability to open new avenues for achieving community transformations through local food initiatives. The purpose of this research was to gain a greater understanding about how local food initiatives evolve. Government policy is typically slow to change, yet shifts in agricultural policy are being signaled across the country. It should be noted that YRG was not a part of the ILFFP, yet was a consideration for the future. Building a strong local food sector might expand agricultural opportunities by establishing new markets, encouraging more farmers, and keeping more of each food dollar spent in the state, and it could help to leverage federal programs to bring more federal dollars into the state's economy. This could help people to retain jobs in the food and farm sector, keep dollars circulating locally, provide business opportunities for young people, and offer opportunities for ancillary businesses to grow

(LCSA, 2011). In order for a policy alternative to survive, value acceptability, or values such as political ideology, equity and fairness, social justice, efficiency, and effectiveness, all affect the policy process, according to the LLVV framework (2010).

In this case study, I specifically looked to the recommendations of the ILFFP to better understand what is necessary to begin a local food and farm plan. There are many obstacles facing local and regional food system sectors, such as (a) a lack of knowledge for diversifying operations, (b) processing barriers for small producers, (c) a lack of facilities, (d) a lack of consistent supply, (e) a lack of funding for local food planning and the building of network systems, (f) a need for information on how to start and operate farm-based businesses, (g) and a lack of awareness of local food systems by local governments. This study examined ways for local governments to become educated in ways to put rural farming and YRG at the forefront of agendas, as has been accomplished by Local Governments for Sustainability (ICLEI), an international nonprofit association of governments that has been dedicated to addressing environmental problems through cumulative local actions since the 1990s via the United Nations (Linstroth & Bell, 2007).

This research directly relates to social change. Local initiatives are taking the lead on social and environmental issues that remain unresolved by state or federal lawmakers. A local food and farm plan allows consumers to push for social change because there is a growing public desire for access to local foods. The recommendations could be used as a blueprint from which to build a draft, an initiative, or ultimately, an amendment for local food and farm plans to make it onto agendas in other local communities.

Organization of the Study

Chapter 2 of the study begins with an introduction and review of the literature based on Kingdon's (2003) theory of problems, alternatives, and politics. The problem stream is defined through (a) CC, (b) industrial agriculture, (c) the negatives associated with fossil fuels, (d) the impending shortage of water due to CC, and (e) growth in the world's population. The alternative stream includes (a) rural agriculture, (b) sustainable agriculture, (c) renewable energy, (d) water conservation, (e) technology, and (f) greenhouses. The political stream includes smart growth planning, the recommendations of the ILFFP, and agenda setting at the local level of government.

Chapter 3 provides a description of the research methods employed in this study, including an explanation of the reason for selecting the methodology and data collection methods.

Chapter 4 provides an analysis of the findings based on the data that emerged from the interviews and documents.

The study closes with Chapter 5, which presents a brief summary of the findings and possible recommendations for actions surrounding CC, YRG, and local food and farm systems. Chapter 5 also presents opportunities for future research in rural farm policy.

Chapter 2: Literature Review

Introduction

This chapter provides an in-depth review of the literature on agenda-setting to initiate a local rural farm policy for year-round growing in response to CC. This chapter explores the difficulties associated with defining and recognizing the problem that CC poses for both industrial and rural agriculture. Decision-makers use indicators to assess the magnitude of a problem and to become aware of changes in a problem (Kingdon, 2003, p. 91). Weather crises, disasters, and focusing events will not carry the problems associated with farming to policy agenda prominence alone. As discussed in Chapter 1, the purpose of this case study was to evaluate a food and farm plan that allows citizens to place new legislation on a popular ballot, such as the national Farm Bill. Iowa's Food and Farm Plan (ILFFP) is a study that was conducted by the Leopold Institute in 2011 that favors a local food and farm plan for rural farmers.

The purpose of this literature review is to provide a comprehensive background on the topic under consideration, as well as to develop the theoretical understanding necessary to answer the following research questions, which were proposed in Chapter 1:

1. How might YRG impact agenda-setting for local rural farm policy and, ultimately, legislation for the expansion of local farm systems in an effort to mitigate CC?
2. Why is a local food and farm initiative that includes YRG not on the legislative agenda for rural farm policy at the national level of government?

The first section reviews the existing literature surrounding the key issues associated with CC, industrial agriculture, population, energy, and water. The first section details traditional agricultural systems or industrial agriculture, population concerns, energy, and the interrelated problems associated with water. This section also explores theoretical aspects of the complexities in Kingdon's (2003) problem definition in his multiple streams theory.

The second section explores rural farming as an alternative to industrial agriculture in Kingdon's (2003) policy stream. Sustainable rural agriculture (SRA) is addressed. New alternatives include the use of new tools such as greenhouses (G) and the technology to grow year-round, renewable energy (RE), and the recycling of water. This section also compares and contrasts regions that already grow year-round.

The third section investigates growing locally, smart growth planning (SGP), and a local food and farm plan. It reviews policy and funding recommendations in support of expanding local food systems as an assessment of ways to overcome obstacles to increased locally grown food production. This section portrays the framework for local agenda setting by LLVV (2010), which, along with a local food and farm plan, provides a tool to help determine the fundamental factors required to implement an initiative such as the ILFFP that would include year-round growing for other small communities (LCSA, 2011). The factors derived from the recommendations might provide the basis for constructing an initiative for YRG by using greenhouses in a rural community that otherwise might be limited to seasonal growing.

In developing the conceptual framework for this study, literature relevant to industrial agriculture and rural farming was used. Libraries of local universities, EBSCO (Academic Search Premier, Business Search Premier, and the Green File), Pro Quest Dissertations, and Theses--Full Text databases, and the Google search engine were used to research the literature on the subject. A subject-based approach was used for the search. Search terms included: *agriculture*, *sustainable agriculture*, *rural agriculture*, *water*, *land development*, and *climate change*.

The Problem of Climate Change: Associations With Industrial Agriculture

Climate Policy

There is no climate policy in global governance, as the Kyoto Treaty was never ratified. According to Cook (2010), *cap and trade* was an obscure public policy design deployed to reduce sulfur dioxide emissions from power plants to fight against acid rain; however, cap and trade has been absorbed into the larger politics of the moment. Hale (2010) indicated that this might be due to constraints placed upon the actions of national governments due to the growing power of transnational businesses, which can cut the lifelines of national politics, jobs, and taxes. Cook (2010) suggested that within cap and trade programs, decisions about how to allocate a budget for emissions can be bought and sold, banked, traded, or retired, yet it is a technically, legally, and administratively complex policy design. Hale (2010) argued that emissions trading is an important market instrument, yet will not drive investment decisions at the speed that is necessary. Additionally, lobbying has served to distort cap and trade, leading to the creation of institutional barriers by limiting or reversing the flow of new regulations. Cook (2010)

noted that the United States aggressively promoted emissions trading as a central design element of the Kyoto Protocol; however, the failure of the United States to ratify the Kyoto Treaty left the EU with the task of designing an emissions trading scheme, which turned out to be deliberately simple because it covered only carbon instead of direct emissions while omitting monitoring systems required in U.S. acid rain programs. Nationally, by the late fall of 2009, major legislation was passed by the House and is still circulating in the Senate. It has provided for most emission allowances to be allocated for free over the first decade of the cap and trade program.

Climate Change

Gosling (2011) reviewed the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) relative to the impacts of climate change and found that there is an increased risk to natural systems as well as to some components of human systems. Brooks et al. (2009) suggested that greenhouse gas (GHG) concentrations are rising at a rate greater than projected by the IPCC (2007) and that abrupt changes in the global climate system may occur during the 21st century. According to Connor (2009), the IPCC Report of 2007 highlighted a plethora of effects happening in every region of the world, including the enlargement of glacial lakes; ground instability in permafrost regions; increased warming of lakes and rivers; an upward shift in pole, plant, and animal species; and earlier timing of spring events and earlier migration of fish in rivers, which becomes a threat multiplier that exacerbates existing social, economic, political, and environmental trends. In their report, Jennings and Magrath (2009) gave examples of farmer perceptions of climate change supported by meteorological observations that

included shrinking seasons, an increase in temperatures in the winter, erratic rain at unexpected times, unusual and unseasonable events, violent storms punctuated by longer dry spells within traditionally rainy seasons, and winds that have increased in strength.

Vavrus et al. (2012) summarized the 21st century Arctic climate reported by the National Center for Atmospheric Research, using the Community Climate System Model, wherein Version 4 (CCSM4) was isolated from the previous Version 3. The authors noted that the model simulated a much warmer, wetter, cloudier, and stormier Arctic climate with considerably less sea ice, and found a high correlation among variables related to temperature, precipitation, cloudiness, sea level pressure, and ice concentration, which denotes a fingerprint of Arctic climate change; however, the authors also reported that arctic changes were 16% weaker in greenhouse forcing when compared to model CCSM3. Gosling (2011) noted that the IPCC A4 report suggested that with the rise in sea levels, an additional 63-102 million people might be flooded while an additional 5-20% of coastal wetlands are lost. Additionally, the absorption of CO2 by the ocean has already decreased ocean surface pH by 0.1 since 1750, which means that ecosystems and biodiversity will be impacted as approximately 20-30% of plant and animal species assessed are at an alarmingly high risk of extinction due to mean temperatures exceeding a warming of 2 to 3 ^{0C} above preindustrial levels. Beniston (2010) suggested that if climate change is accompanied by an intensity of natural hazards such as cyclones, floods, or drought, the effects on human health might be tremendous, not to mention the potential problems generated by large refugee or population movements to already densely populated areas. Kahn (2009) stated that between 1950 and 2030, the share of the

world's population living in cities is predicted to grow from 30% to 60%. Oleson (2012) referred to future cities as '*urban heat islands*' a phenomenon whereby urban areas promote more warmth than rural areas. Kahn (2009) contended that urban growth fuels income growth, yet has the unintended consequence of increasing greenhouse gas production as well. Oleson (2012) suggested that based on CCSM4 modeling, climate change will increase the number of warm nights in urban areas.

Average global temperatures are 0.7 ^{o}C warmer than before the Industrial Revolution, and atmospheric GHG concentrations are already more than one-third greater than preindustrial levels. Climate science has grown adept at reconstructing past climates and modeling future impacts of GHG concentration scenarios. Warmer temperatures could enhance the survival of pests and pathogens in winter, generating new and unexpected threats; additionally, temperatures could affect critical germination negatively, speeding growth cycles, resulting in less time for crops to fill out. Even though temperatures might become more suited to growing in higher latitudes, acidic soils may present a barrier that cannot be overridden by a chemical fix. Productivity would rest upon clearing some of the last great frontier forests in the world, allowing for the release of more carbon into the atmosphere and the loss of sequestration capacity (Weis, 2010).

McCright and Dunlop (2011) examined the current political polarization over climate change by analyzing data from 10 U.S. National Gallup Polls between 2001 and 2010 to find that liberals or Democrats supported the current scientific consensus and expressed concern about global warming, while conservative or Republican individuals

portrayed climate science as uncertain, provoking anger among conservative movement activists. Lockwood (2010) quoted Hughes as follows:

> From the industries whose activities cause it, and therefore might have to bear the cost of the efforts to counter it includes petroleum and coal companies, other fossil fuel industries, and automobile manufacturers. A third group active in opposing programs to mitigate global warming is political, composed of right-wing organizations that fight the role of governmental intervention on principle. These organizations fear that reduction of the emissions of greenhouse gases will require regulation on national and international levels, and they use questioning of global warming and the role of humankind in causing it as a way of resisting the extension of government control. (pp. 78-80).

Adger, et al. (2009) suggested that there is a recognized need to adapt to a changing climate, yet there is an emerging discourse about the limits of adaptation due to thresholds in biological, economic, or technical parameters. Connor (2009) argued that the discourse has emerged as a result of the rise of celebrity skeptics in journalism, politics, science, and religion and is supported by organizations with links to enterprises profiting from carbon-intensive industries and lifestyles. McCright and Dunlop (2012) noted that the rise of the Tea Party in the Republican Party created skepticism toward climate change, which became a litmus test for party candidates in the 2010 election. Connor (2009) implied that environmentalists struggle to find a coherent position to battle dominant groups that attempt to replace the myths of consumer capitalism with growth and a steady state economy. Adger, et al. (2009) argued that notwithstanding

physical and ecological limits affecting natural systems, climate change adaptation not only is limited by exogenous forces, but also is affected by the societal resistance associated with ethics, knowledge, or uncertainty about climate change, risk, and culture.

In a historical, cautionary tale, Brooks, et al. (2009) noted that at the end of the Holocene Climatic Optimum, the growth in population and intensification of resource use in Egypt and Mesopotamia showed that their population maximized the use of available resources and became dependent upon climatic stability. Their societies were unable to absorb subsequent climatic shocks, which led to the collapse of their central political authority as well as the fragmentation of their culture through famine and violence. Brooks, Grist, and Brown (2009) suggested that there is a need to move beyond current climate change discourse that emphasizes managerial and technocratic solutions, because development will need to be based upon approaches that can accommodate large changes in climatic conditions and an enhanced variability over a range of timescales in order to best be able to cope with the high degree of uncertainty about how climate will evolve. Weiss (2010) stated,

> "With the Earth's climate system being pushed beyond the range of climatic variability of the Holocene, the geological era in which agriculture began roughly 10,000 years ago, it has been suggested that we are now entering a new epoch in Earth history: the anthropocene, to mark the role of human economies in destabilizing physical processes" (p. 329).

Industrial Agriculture

The industrial perspective was conceived during the Industrial Revolution. Land use was considered to be good if it increased production and maximized profit, although to achieve economic goals, large-scale monocultures, machinery, genetic technology, and inorganic pest control were and remain a requirement. USDA statistics indicate that the number of U.S. farmers declined during the 20th century. In 1900, 40% of the U.S. labor force worked on farms, but by the end of the century, farm labor fell to minus 2%. Today, the United States imports most of its food supply more cheaply from poorer nations due to the high cost of land, labor, and environmental regulations in the United States (Hendrickson, James, & Heffernan, 2008). According to Woodhouse (2010), industrial agriculture did increase food production more quickly than the population grew in recent decades, yet the aggregate production achieved by modern agriculture may not be sustainable in the future due to an increase in the cost of fossil fuels. Ac (2011) suggested that *peak oil*, or the end of cheap oil, was reached in 1970. The essential concern of peak oil is that all of the easy-to-recover oilfields were not only discovered before 1980, but also are declining quickly; therefore, extracting the remaining reserves will be difficult, costly, and energy intensive (Weis, 2010).

Population. Lind (2010) voiced population concerns and the importance of agricultural sustainability because in the second half of the 20th century, the human population increased by roughly a billion people every 12 to 14 years, with predictions that the world's population would escalate to 7 billion people by 2013. Burdon (2011) suggested that there will be a steady increase in the consumption of food produced by

agriculture, but the price-tag might include the loss of healthy farm land. Today, 48% of the world's total grain production is directly consumed by human beings, while 35% is fed to livestock and 17% is used for bio fuel production. The competition for food supplies in the future will be driven by population growth, yet the prospect of transforming any more forests, wetlands, and grasslands into industrial monocultures seems illogical (Weis, 2010). In order "to feed the growing population, farmers will need to produce more food in the next 40 years than they have in the past 10,000 years combined" (Burdon, 2011, p. 723).

Between 1900 and 1960, the world's population doubled, and in the late 1960s, the U.S. population crossed the 200 million mark; during this time, environmentalism began to grow as a concept (Hoff, 2010). Purdy (2010) suggested that the language of environmentalism was born when Rachel Carson (1963) wrote *Silent Spring*, which that he believed reified a growing anxiety about the fate or outcome of technocratic mastery, a discussion that would became a part of the public environmental language in the 1960s and 1970s. The author further noted that Interior Secretary Stewart Udall supported Carson's warning that Americans had long disregarded the environment in favor of a myth of plenitude coupled with the civic religion of individualism. Hoff (2010) claimed that the doomsday population rhetoric emphasized pollution and the prospect of an environmental collapse where not only would the supply of natural resources and food be affected, but the developing world would be facing the most urgent food and population problems. Purdy (2010) agreed that the discovery of the environment as a unified phenomenon and the environmental crisis served as a narrative for modern life with

apocalyptic elaborations, including a congressional debate about an environmental crisis posing a threat to the survival of the human species and the planet. Hoff (2010) observed that natural scientists, birth-control advocates, foundation officials, and radical economists assumed that the most urgent population problems would be directed at developing nations. In 1968, the zero population growth movement was sparked, even though eventually President Nixon would come to reject zero population growth. The circumstances of that era included declining birthrates among U.S. women from 1960 to 1972; additionally the 1965 Immigration Act began to gather steam, and finally, the battle over abortion rights created an organized constituency of the new pro life movement. According to Lind (2010), there is a clear statistical link between the growth in global population and greenhouse gases, yet there are few discussions about slowing the growth of populations, just the knowledge that the world's poorest countries will gain 1billion additional people.

According to Byerlee, de Janvry, & Sadoulet (2009), the world in which agriculture operates has changed drastically as a result of globalization, which has spawned new technologies and institutions, new and more demanding markets, spurring rapid growth in the demand for agricultural exports and the importation of food from developing countries. King, Boehlie, Cook, & Sonka (2010) noted that the agricultural sector is increasingly becoming a source of raw materials for sectors outside of the traditional food system, blurring industry boundaries while creating new competitive challenges for agribusiness firms due to the production of bio-fuels, polymers, bio-based synthetic chemicals, pharmaceutical products, growth hormones, and organ transplants,

with profound implications for the structure of supply chains within the industry itself. According to Weis (2010) there has been a boom in biofuels which is produced from maize and sugar. The boom will be affected by a growth in population and competition for materials required to produce fossil fuel. Industrial production alone takes vast areas of land to fulfill many diverse goals.

Energy. Burdon (2011) identified growing criticisms of industrial agriculture as driving a series of negative environmental effects, including soil compaction as a result of the excessive use of machinery, contamination of groundwater and surface drainage water due to fertilizers, pesticide residues, causing a reduction in ecological biodiversity, ramping-up high rates of carbon emissions based on the high amounts of fuel and fertilizers utilized in production. Woodhouse (2010) commented on the capital investment necessary to purchase inputs of machinery and agrochemicals, which politically favors an increase in the scale of farming, resulting in control of land and landlessness in rural populations. Burdon (2011) observed that the transition from agrarian to industrial agriculture in America accented industrial interests which also promoted a new vision of private ownership. Fundamental to this shift was the idea that ownership of private property secured the right to use the land more intensely than by previous generations, therefore land was redefined as a commodity over the past one hundred years and subsequently exploited to satisfy production and profit.

According to Powers (2011) the development of domestic shale gas resources utilizes a procedure called hydraulic fracturing (HF) or 'fracking,' an intensive industrial activity which creates a significant environmental disturbance. Katel (2011) further

contended that HF is a process in which a mixture of water, sand and chemicals are directed under high pressure into rock formations to unlock oil or gas deposits, yet the concern is that the process uses too much water, threatening to contaminate drinking-water wells and surface water near discharges of HF liquids. Molden, et al. (2010) portrayed societies as having to confront a variety of water problems due to water scarcity. Powers (2011) described a potential 'tragedy of the commons' whereby individual actors are driven by short-term self-interest, yet they pollute commonly held resources even though each individual knows the group's collective actions will eventually destroy common resources. Katel (2011) stated that energy companies use HF in a number of Eastern and Western states, including Colorado, which raises the question of whether the cost in water is worth the output of oil. Powers (2011) claimed that any activity with an impact on the environment is subject to federal environmental laws and touched upon aspects of HF; however the oil and gas industry successfully lobbied for exemptions for HF, as occurred in the Energy Policy Act of 2005, where federal oversight of oil and gas development was exempted, prompting skeptics to call it the 'Halliburton loophole.' Katel (2011) believed that the size of the HF industry in Colorado may be limited by water availability, noting that estimates of water consumption range from between 1 and 12 barrels of water for every barrel of oil produced for the heating of the shale. Additionally, runoff from superheating operations could contain sediment, salts, or chemicals that could get into rivers or creeks, potentially harming fish and plants. Molden, et al. (2010) stated that the competition for water will be between agriculture and cities, hence as city water demands grow, irrigated areas will become targets of water

supplies, a challenge for governance in the twenty-first century. Hoff (2010) suggested that if population growth continues at the current rate, there may come a point when population size becomes unsustainable.

According to Jackson-Smith & Jensen (2009) estimates suggest that the agro food system contributes 17% of jobs and 13% of the gross domestic product in the United States by the wholesale, retail, and food-service industries. Weis (2010) acknowledged a celebrated efficiency related to industrial capitalist agriculture. The promises of more, cheaper, and better food, minus the drudgery of farm work is enticing, yet the trade-offs of this choice include chronic epidemiological problems of obesity, cardiovascular disease, as well as the rising cost of managing threats from avian flu, listerosis, E. coli, and mad cow disease. There are rising concerns about the impacts of fertilizers, chemicals, and other waste runoff from factory farms on human health.

Byerlee, et al. (2009) addressed the fundamental role that agriculture has played in development in past industrialization, often referred to as 'the handmaiden of industrialization' as it was seen as making contributions that helped to induce industrial growth as well as create a structural transformation of the economy; yet the authors argued that a new paradigm is needed to trigger new economic growth for the reduction of poverty, the narrowing of income disparities, the provision of food security, and the delivery of environmental services. Today, biotechnologies, bio fuels, and the provision of environmental services for the mitigation of climate change are all a part of emerging new markets for agriculture. The authors argued that industrial agriculture continues to be an effective engine for growth in late-developing countries. Weis (2010) suggested that

positive feedback for industrial capitalist agriculture has been reinforced as demand for industrial grains and oilseeds associated with the biofuel boom and the increase of meat in diets are trumping the cost pressures from peak oil, while climate change has, for the time-being, been trumped by productivity. In contrast, Delucchi (2010) implied that biofuels produced from crops using conventional agricultural practices will not mitigate the impacts of climate change and will exacerbate stresses on water supplies, water quality and land-use when compared to petroleum fuels. Chakrovorty, et al. (2009) noted that 1% of total worlds' cropland was used for biofuel production in 2004. Brazil had the highest share of acreage devoted to biofuel production which is derived from sugarcane and is the most efficient. The Food and Agriculture Organization (FAO, 2008) considered approximately 13.5 ha as the total land available left to grow on, whereby forests cover 4.2 billion ha while agriculture accounts for 5 billion ha with 2 billion ha remaining and suitable for agriculture. However, much of this land will be unavailable and zoned for protection.

According to Lobell, et al. (2009) the maximum possible crop yields achieved in farmers' fields might level off or decline in many regions over the next decades due to the uncertainty in growing season weather. Average yields in rain fed systems are 50% or less of yield potential. Mendelsohn & Dinar (2009) noted that crop simulation models are built from a deep understanding of agronomic science and are capable of defining hydrologic and soil conditions as well as having the ability to examine the effects of CO2 and fertilization. Five types of models have been developed to study the impact of climate change on agriculture for crop simulation, cross sectional analyses of yields, agro

economic simulations of farms, panel analyses of net revenues or land values, and general equilibrium. Crop simulation models use agronomic functions to gage the interaction between crop growth, soils, and management practices which are calibrated for selected locations to predict how yields might change at each location due to weather change. However, crop simulation models also have limitations relative to adaptation that is based on a purely agronomic relationship and therefore is unable to capture the behavior of the farmer. Only one crop can be monitored at a time and cannot predict crop-switching, an important component in understanding the relationship between crop growth and climate change. In one model entitled the Ricardian technique, efficient adaptations were incorporated by farmers reacting to climate change. Farmers modified their production practices in response to changes in the availability of water, rainfall patters, and temperatures. Ultimately, the authors of this study believed that the models were theoretically sound, yet might have been poorly calibrated, thus the underlying inaccuracies in each component of the model made the results unreliable.

Water. According to Rosegrant, Ringler, & Zhu (2009) irrigated agriculture is the main source of 70% of the world's freshwater withdrawals. Heathwaite (2010), noted that freshwater systems used for agriculture are subjected to multiple stressors, including changes in land use, demands that are put upon water resources, and changing nutrient cycles. Water scarcity is currently posing a challenge due to an increase in the costs of developing new water supplies, groundwater depletion, an increase in water pollution, and the degradation of water related ecosystems. Cook, Fisher, Anderson, Rubiano, & Giordano (2009) implied that the increase in food production is related to a burgeoning

human population, hence a greater consumption of water even though the volume of water available to agriculture is in decline. Molden, Lautze, Shah, Bin, Giordano, & Sanford (2010) stated that "agriculture, globally the largest user of water, is a major driver of water scarcity, and also the sector that has to bear the consequences of scarcity" (p. 249).

Miller & Piechota (2008) portrayed the upper Colorado River basin as serving Wyoming, Colorado, Utah, and New Mexico, while California, Arizona, and Nevada rely upon water resources delivered from the lower Colorado River basin. According to Katel (2011) population growth in the West was a twentieth century phenomenon, whereby massive dams, reservoirs and aqueducts made it possible for cities such as Phoenix to blossom as well as for agricultural producers in Los Angeles to spread north and east. Water shortages threaten to expand the number of conflicts between senior holders of water rights, which have priority over those with acquired junior rights. Miller & Piechota (2008) found that decreasing stream-flow trends were apparent throughout the Colorado River basin during traditional peak flow months however, they also discovered that the high variability of stream-flow rates have historically occurred in the river basin in the past. Katel (2011) looked to U.S. Census Bureau statistics and projections which stated that the population of California, Arizona, New Mexico, Colorado, Nevada, and Utah could reach 67 million people by 2030. The river currently provides water for 30 million people in those seven states and Mexico. Agriculture in the West accounts for 70 percent of water use, particularly in California, which also supplies a significant amount of food to the United States and other countries. The population in Las Vegas is 1.8

million people who depend upon Lake Mead for 90 percent of their water. Lake Mead has half the amount of water it did 10 years ago. Until 1993, the people of Albuquerque, New Mexico thought they had a vast underground water source that was continually being replenished by water from the Rio Grande which is where most of the city's water came from. Instead, the United States Geological Survey found out that the aquifer already receded by 160 feet, and it was not recharging quickly. New Mexico has been in a water crisis for some time. They started to respond in 1994 and escalated their response in 2002. Albuquerque reduced water consumption by 3.3 percent yet this knowledge did not stop the city from pursuing a policy of continued growth. Tucson, Arizona increases water prices as consumption rises (Roessler, 2008). Arizona is projected to become one of the nation's 10 most populous states, and worries about water supplies are escalating about whether a growth of that magnitude is possible, especially with drought hitting much of the Western United States. Norian (2011) noted that as populations increase, so too does the consumption of water, which occurred between 1950 and 2000 when the U.S. population increased by 90%, followed by a total water withdrawal of 127% while irrigated farmland rose by 147.6%.

The Law of the River. Pontius (1997) stated, "The Law of the River (LOR) is the legal and institutional framework for managing the river and defining the states' and individual entitlement holders' rights and obligations" (p. 21).

The Colorado River is one of the most legally complex river systems in the world, and is governed by multiple interstate and international compacts, legal decrees, prior appropriation allocations, and federally reserved water rights of Native American Indians

(Department of Interior, Bureau of Reclamation). Article 1 of The Colorado River Compact (1922) states:

> The major purposes of this compact are to provide for the equitable division and apportionment of the use of the waters of the Colorado River system; to establish the relative importance of different beneficial uses of water, to promote interstate comity; to remove causes of present and future controversies; and to secure the expeditious agricultural and industrial development of the Colorado River Basin, the storage of its waters, and the protection of life and property from floods. To these ends the Colorado River Basin in divided into two Basins, and an apportionment of the use of part of the water of the Colorado River System is made to each of them with the provision that further equitable apportionments will be made (www.usbr.gov).

Article II of the Colorado River Compact (1922) states:

> (c) The term "States of the Upper Division" means the States of Colorado, New Mexico, Utah, and Wyoming.
>
> (d) The term "States of the Lower Division" means the States of Arizona, California, and Nevada (www.usbr.gov).

According to Pontius (1997), "While there is broad acceptance of the LOR within the basin's water interest community, some aspects of the LOR are still unsettled and may create management problems for the future as competition for Colorado River water increases" (p. 21). Furthermore, a number of national parks and monuments have not been quantified. Additionally, Arizona and Nevada claim the right to tributary water

under the Compact, can divert water from tributaries but cannot divert it after it has flowed into the Colorado River.

In Article II of the (*State of Arizona v. California*, 1964): The United States, its officers, attorneys, agents, and employees be and they are hereby severally enjoined:

(A) From operating regulatory structures controlled by the United States and from releasing water controlled by the United States other than in accordance with the following order of priority:

(1) For river regulation, improvement of navigation, and flood control;

(2) For irrigation and domestic uses, including satisfaction of present perfected rights; and for power.

(B) From releasing water controlled by the United States for irrigation and domestic use in the States of Arizona, California and Nevada, except as follows:

(1) If insufficient mainstream water is available for release, as determined by the Secretary of the Interior, to satisfy annual consumptive use of 7,500,000 acre feet in the aforesaid three states, then the Secretary of the Interior, after providing for satisfaction of present perfected rights in the order of their priority dates without regard to state lines and after consultation with the parties to major delivery contracts of such representatives as the respective states may designate, may apportion the amount remaining available for consumptive use in such manner as is consistent with the Boulder Canyon Project Act as interpreted by the

> opinion of this Court herein, and with other applicable federal statutes, but in no event shall more than 4,400,000 acre feet be apportioned for use in California including all present perfected rights (www.usbr.gov)

Pontius noted, "While the states have authority over water management within their borders, Congress delegated considerable authority to the Secretary of the Interior over the use and management of Colorado River water in the Lower Basin"(p. 22). The Boulder Canyon Project Act vested authority with the Secretary to serve as water master for the Lower Basin, so that any user of main stem water in the Lower Basin is required to have an executed contract with the Secretary to use the water. The Secretary is required to consult with the seven basin states regarding the annual operating plan as well as consulting with tribes and other interests on a range of management issues on an *ad hoc* basis.

Miller & Piechota (2008) suggested that the Upper Colorado River Basin exists within a supply-driven environment whereby water resources and supplies are governed by seasonal snowpack and stream-flow events, while the lower Colorado River basin operates within a demand-driven framework. Releases within the Lower Basin are dictated by consumptive use and regulated by the Colorado River Compact, yet the river is also used for hydropower generation, flood control, recreation, and environmental health and recently, extreme drought has begun to strain resources within the basin. Pontius (1997) claimed that the rapid growth in the Lower Basin may lead to more dependence upon the unused Upper Basin apportionments. According to Katel (2011) concerns about water supplies are widespread throughout the West, especially in the

seven-state Colorado River Basin due to new scientific data on ancient drought patterns that have recently surfaced, causing scientists to worry about water shortages. Each state had concerns about the Law of the River before the acknowledgement of climate change.

Roessler (2008) implied that the Colorado River irrigates approximately 4 million acres of farmland. Katel (2011) predicted that conflicts among housing developers, farmers, and environmentalists will increase due to water shortages because in many states aquifers are losing billions of gallons of water annually because they aren't being recharged by rainfall. According to Noroian (2011) there are three predominant agricultural irrigation systems based on frequency of use including food irrigation, sprinkler irrigation and drip or micro-irrigation systems. Katel (2011) spotlighted agriculture as the largest user of water because growing accounts for 80% of Western water consumption, yet farmers believe that they are far more conservative than many suburban residents who use water for swimming pools and lawns. Noroian (2011) noted that flood irrigation is the main type of irrigation used throughout the United States and represents 47% of total irrigated acres. Flood irrigation is used especially where fields are flat, while sprinklers account for about 46% of irrigated agriculture. The author further suggested that drip and micro-irrigation systems supply water and fertilizer precisely to plants in optimal quantities and are the most efficient methods of irrigation, however just under 7% of irrigated acreage utilizes this form of irrigation.

Climate change, water, plus agriculture. Rosegrant, Ringler, & Zhu (2009) remarked that climate change affects the global hydrological cycle in many ways with serious implications for agricultural production. Mendelsohn & Dinar (2009) added that

higher temperatures are expected to speed up the hydrological cycle, while warmer temperatures will increase the amount of rain in winter, melting snows earlier which will cause greater flows in early spring and lower flows in summer. Heathwaite (2010) claimed that by 2025, 40% of the world's population could live in water scarce regions. According to Medelsohn & Dinar (2009) the geographic pattern of rainfall may change, causing some areas to get wetter, while other areas get dryer. Rosegrant, et al. (2009) discussed some of the water related climate changes could include changes in the volume, intensity, and variability of precipitation due to changes in the timing and distribution of rainfall, which is associated with more frequent, severe flooding and drought in many regions. Mendelsohn & Dinar (2009) stated that the inter temporal pattern of precipitation may also change, leading to more droughts and floods, while higher temperatures may lead to an increased demand for water. Rosegrant (2009) believed rising temperatures will increase the rate of snow cap and glacier melt, which will affect agricultural production in river basins fed by mountain ranges. Heathwaite (2010) implied that much attention has been place on climate and marine systems however there is growing evidence of changes to freshwater systems, while the pressures placed upon groundwater resources represent the most significant threat to sustainable use in the future. Noroian (2011) placed agriculture as the consumer of 65% of the freshwater in the United States. Heathwaite (2010) suggested that multiple stressors from urban, agricultural and industrial sectors compromise the quality of freshwater resources in the form of pollution and contamination from urban runoff, pesticides, and heavy metals.

Miller & Piechota (2008) declared that trends in climate variability, especially those associated with stream-flow have become particularly important in the western United States, specifically the Colorado River basin. Rosegrant, et al. (2009) stated that irrigation is the largest single user of water, yet growing scarcities of water and land are projected to progressively constrain food production growth. Heathwaite (2010) points to the notion that water withdrawals have increased six-fold since the 1900s, or twice the rate of population growth. Rosegrant, et al. (2009) further noted that the projected rapid growth in livestock production will be a significant factor in increasing water demand in addition to the demand for water to grow crops that are used as livestock feed, such as maize, grains, and soybeans. Molden, et al. (2010) reviewed challenges for governance in water, including managing transitions as river basins move from a state of water abundance to water scarcity, the regulation of water, and agricultural adaptation to changing objectives of society, such as the reallocation of water from agriculture to cities.

Rosegrant, et al. (2009) pointed to economic incentives such as pricing, taxes, subsidies, quotas, and the rights of owners as providing ways to manage water and affect the decision-making process to motivate water users to conserve and use water efficiently. The authors also noted that groundwater irrigation is more flexible than surface water irrigation and can be used in conjunction with surface water to improve water-use efficiency, because the scope for increasing water-use efficiency in agriculture has the most potential even though it is highly complex. Additionally, water use can be reduced as it is transported from the source to the farm along canals from farm gates to

fields in the system-wide efficient use of drainage water, recharge and extractions of groundwater which ultimately result in basin-wide efficiencies.

Chakravorty, Hubert, & Nostbakken (2009) suggested that in 2004, an estimated 14 million hectares (ha) worldwide were being used to produce biofuels or 1% of global cropland and that ultimately an increase in bio-fuel production may have a significant effect on food prices. Biofuels require more land and water than do petroleum transportation fuels due to the costs of supplying water, treatment, and adaptive responses, which act as stressors on and polluters of water supplies (Delucchi, 2010). According to Chakravorty, et al. (2009) biofuels are the only viable substitute for fossil fuel that is currently available in transportation. Delucchi (2010) noted that biofuel consumption would require 6% of current global pasture land, 16% of current global arable land, and 6% of global renewable freshwater. Today, 99% of energy services in the transportation sector are currently provided by petroleum, however second-generation biofuels and fuel cells, still hold promise but are still in the research and stage (Chakravorty, et. al., 2009). Second generation cellulosic biofuels would require 2% of current global permanent pasture land, 6% of current global arable land, 2% of global renewable freshwater, 44% of current global water used by agriculture and 31% of current total global water use (Delucchi, 2010).

Rural Farming: A Stream of Alternatives

Woodhouse (2010) supported arguments which favor the sustainability of small-scale, less industrial agriculture due to the greater energy efficiency of systems that are less dependent upon fossil fuel. Woods (2012) suggested that CC parallels food security

and will have direct impacts on rural economies, therefore responses to adaptation will determine the future social and economic viability of that community. Molnar (2010) implied that farmers will have to respond to climate change and societal needs to mitigate the impacts from climate change due to unreliable rainy seasons which disrupt planting times, droughts, and tornadoes because they are direct threats to agriculture and subsequent food security. The author also noted that 'impact' scientists and rural sociologists tend to focus on local, rural communities to begin to investigate local food systems and regional development to foster community engagement in climate change risk reduction. According to Islam, Nath, & Wardell-Johnson (2011) the community food system or community-supported agriculture (CSA) emerged as a socioeconomic model of agriculture and food production first in Canada, then France, Japan, Portugal, Italy, Germany, and Norway due to concerns about food safety and the urbanization of agricultural land. The authors supported CSAs because the system is sustainable in terms of the way food is produced, processed, distributed, consumed, and the way waste is managed. Molnar (2010) implied that there is a clear need for integrating preparedness for climate change by learning to be resilient in order to buffer disturbances, to be able to self-organize, and then adapt. Islam (2011) noted that critics of local food systems warn that it can lead to local food patriotism, however local food systems operate with reduced food transportation costs and fewer carbon emissions which result in fewer processes that separate farmers, producers, and consumers from one another. Pilgeram (2011) underscored the importance of labor in sustaining local food systems and noted that the only thing that is not sustainable about farming is the farmer, because farming is

physically wearing on human bodies and is one reason young people do not see the value in farming.

Maxwell and Soule (2011) stated that the impacts from CC on populations affect current societal, psychological, economic and ecological conditions. The authors utilized drought as an example of a driver of change in populations of rural areas and discovered that when drought is severe, water demand increases, putting agriculture at risk which makes the production of energy more difficult and ultimately has acted as a catalyst for substantial human migration, wars, and famine in the past. Pant and Hambly-Odame (2010) suggested that an innovative systems framework in agriculture requires collaboration among the public, non-profit, private, for-profit sectors to produce technological, organizational and institutional innovations in order to create new products and new processes. According to Maxwell & Soule (2011) populations living in agricultural regions are vulnerable to CC, especially drought conditions, which are predicted to grow in both frequency and intensity.

Pilgeram (2011) implied that SRA means promoting the civil commons, not the profit margins of an elite group; additionally, consideration of race, landownership, and food security should raise the importance of racial diversity within farming, but oftentimes farming is affected by structures of gender inequality. Molnar (2010) believed that policies will shape technologies and land-use patterns in ways that can directly improve the possibilities for livelihoods in rural communities and argued for engaging rural women to commit to agriculture and to participate in strategies for climate change policy affecting agriculture. In one interview, Pilgeram (2011) stated that the more

income and wealth a farmer has, the more sustainable a farm becomes the better the survivability of the farm, yet while many farmers are independently wealthy, other farmers live extremely simply, and some farmers have well-paying, off-farm jobs that allowed them to purchase the land to farm initially.

According to Woodhouse (2010) "Since the 1970s, there have been calls to invest in small-scale agriculture as a means of improving the efficiency of resource use in farming" (p. 441). The 1996 Farm Bill was designed to get government out of agriculture, but instead of the bill leading to a reduction in subsidies for large farm commodity producers, agricultural subsidies rose since its passage (Gronski & Glenna, 2009). Rural economic development practitioners have observed a steady decline in the number of communities that are dependent upon farming for their livelihood, as farming does not provide direct or indirect sources of jobs, nor income in most rural communities (Jackson-Smith & Jensen, 2009). In their research, Jackson-Smith & Jensen argued "that measures of economic dependency imperfectly identify the places in the United States where farming is significant, yet it can paint an incomplete picture of the contemporary geographic distribution and structure of agriculture in the United States" (2009, p.37). Pilgeran (2011) analyzed the complex ways that class privileges and labor practices impact rural agriculture. Farmer privileges are segmented according to class, access to land and capital, which leads to power in decision-making within the local food and agricultural system. The author states, "considerations of race, landownership, and food security, moreover raises the importance of racial diversity within farming in general but also reveals a continuing failure to make farming more accessible (p. 377). Fukunaga &

Huffman (2009) suggested that landlords in the United States tend to be retired farmers or absentee landowners who are reluctant to be involved with farm management decisions, and do not want to shoulder the production or marketing risks, so they lease the land as a way to avert risk. Woods (2010) observed that rural geographical research is being conducted to identify spatial and social differentiation for the development and operation of local food systems and alternative food networks.

Briggeman, et al. (2007) discussed policy implications based on typologies for U.S. farm households after investigating three fundamental deficiencies of 2002 legislation. One deficiency was based on the fact that a majority of farms receive substantial income from non-farm sources, yet another deficiency was that the financial impacts of farm programs were broader than farm income, and the differential impacts of farm programs for unique farm households were underemphasized or overlooked by analysts. The strategic goal of their research was to enhance the competitiveness and sustainability of rural and farm economies for future policy. Pilgeram (2011) defined sustainable agriculture as the promotion of meaningful and equitable employment for farmers, laborers, and their families, yet having the ability to provide food to a wide demographic of consumers.

Sustainable Agriculture

Sustainable community development (SCD) provides a conceptual planning tool to help facilitate and guide integrated planning that is generally based on vision statements, yet there is little evidence to prove there has been success in accomplishing tangible projects or actionable implementation strategies. Perhaps this is due to a sense of

uncertainty in the application of sustainable rural planning or lack of a framework for integrated planning. Also, there is an enormous variation in the way environmental issues are defined by local government authorities. Themes of sustainability are based on the multi-dimensionality of objectives associated with resources. Therefore, the importance of governance in land-use decision-making must be underscored due to the disparity between local actors and institutions. Additionally, there are perceptual barriers to recognizing the relevance of sustainable development in a rural setting due to the traditional economic practice of attracting large resource intensive industries that rely upon those strategies despite research that suggests impotence in net gains for community economies. Hence, sustainability is targeted as a distinct threat to community viability or a rural way of life and generally shows a tendency to prioritize economic capital at the expense of other forms of capital. Ultimately, researchers have developed a variety of planning frameworks or tools to tackle issues of complexity by incorporating sustainability principles into community planning processes (Connelly, et al. 2011). Chel & Kaushik (2011) suggested that the concept of sustainable agriculture is predicated on a delicate balance of maximizing crop productivity, while maintaining economic stability and minimizing the utilization of natural resources.

According to Chel & Kaushik (2010) there has never been a time on earth when food has been produced on such a large scale with such an intensive use of land to satisfy the needs of a growing global population, yet worldwide agriculture contributes significantly to the use of chemicals in fertilizers and pesticides while using large amounts of non-renewable fossil fuels for farm production and the transportation of food

from the field to table. Islam et al. (2011) explored world-class agriculture through existing global and emerging agricultural food systems, pointing first to technological progress as the main driver of an increase in per capita food production over the past 50 years, yet the rules of trade, a change in climate, the depletion of natural resources, and rapid population growth will affect the security of the future food supply. Chel & Kaushik (2010) suggested that sustainable agriculture is an alternative for solving fundamental issues related to food production in an ecological way. Islam et al. (2011) noted that agricultural policy of Canadian food systems has had a significant impact on ensuring a sustainable food system even though only seven percent of Canada's land is used for farming, Canada remains one of the major food exporting countries in the world. The authors stated that Canadians show concern for food production and how associated factors affect the environment and local economies, as citizens want to know where their food comes from, who grew it, under what circumstances to ensure their choices have far-reaching health and nutritional impacts. According to Chel & Kaushik (2011) sustainable systems aim to produce food that is nutritious and uncontaminated, where the primary goals are to provide a more profitable farm income, promote environmental stewardship including, protecting or improving soil quality, reducing dependence on nonrenewable resources, such as fuel, fertilizers, and pesticides while minimizing adverse impacts on wildlife, water quality and other environmental resources towards the health of communities. Islam et al. (2011) implied that Canada has attempted to follow the principles of sustainable systems through small-scale farming and by attending to environmental issues related to food system quality through a product grading system,

which is enforced independently. Chel & Kaushik (2011) emphasized the importance of SRA in improving the lives of individuals and communities by offering diverse employment opportunities, health care, education, social services, and by instilling knowledge about farming into future generations to ensure proper use of the land. Islam et al. (2010) suggested that in order to be considered world class, a food system must start from local or regional contexts through consistency in regulations, economic development, community development, environmental sustainability, food quality and safety, and through providing food security.

Greenhouses: Ways to Grow Year-Round

One way to grow year-round in an unpredictable environment might include underground or pit greenhouses. The Aymara Indians in LaPaz, Bolivia designed and built what they called, the 'Walipini,' meaning a place of warmth, which is at a basic level, a subterranean greenhouse that is built half above and half below ground (Brigham Young University, 2002). The 'Walipini' could be created by citizens who are interested in utilizing nature's resources to provide a warm, stable, well-lit environment for year-round growing and vegetable production built by clearing a 6 feet by 8 feet area which captures as well as stores daytime solar radiation (Brigham Young University, 2002). According to Chel & Kaushik (2011) the use of solar agricultural greenhouses has increased over the last two decades because the primary objective of a greenhouse is to produce higher yields outside of the cultivation season, which is achieved by maintaining the optimum temperature at every stage of the crop.

Solar greenhouses are designed to utilize solar energy for heating, cooling, and lighting, yet can also be designed to store heat, factors that makes a difference in accruing higher yields. Photovoltaic technology converts light directly into electricity and can be used for fencing, lighting, water pumping, and small wind energy systems. There are many styles of greenhouses that exist today and discoveries to be made in greenhouse design that could catapult the building sector into a new way of building. Currently, there are Rigid-frames, Quonset, A-frame, Gothic, Post & Rafter, as well as subterranean greenhouses or underground pits designed for growing. Clean energy mechanisms can be applied to small-scale, greenhouse agricultural operations adding three dimensions to economic, social, and environmental sustainability that favor smart growth practices (Chel & Kaushik, 2011).

Technology. Chaudhary, Nayse, & Waghmare (2011) claimed that the evolution of wireless sensor technologies and miniaturized sensor devices make it possible to control the parameters of greenhouses in terms of temperature, humidity, and CO_2. Vanninen, Pinto, Nissinen, Johansen, and Shipp (2010) added that the effects of current and emerging lighting technologies allow greenhouses to manipulate artificial light for plant photosynthesis when artificial light is used as the principal or only light source and can modify factors by enriching CO_2 levels, putting forth high nutrient amounts, optimizing irrigation and temperatures in greenhouse production environments. Chel & Kaushik (2011) implied that photovoltaic systems are economical for providing electricity to remote locations on farms, ranches, and orchards and can be much cheaper than installing power lines or step-down transformers in applications such as electric

fencing or building lighting and water pumps for livestock or crop irrigation. Lopez, Valera and Molina-Aiz (2011) developed a methodology for studying natural ventilation in Mediterranean greenhouses by means of sonic anemometry, an experimental technique that predicts the direct determination of airflow through openings of a greenhouse and to predict air exchange rates as well as characterize all of those components.

In contrast, Meetoo (2011) looked to the science of nanotechnology (NT) to represent the new frontier of the twenty-first century and is being hailed as the next industrial revolution, or even the 'Holy Grail' for a sustainable future in agriculture. Chaudhary et al. (2011) suggested that the technological development in Wireless Sensor Networks is ideal for precision agriculture in greenhouses. The authors analyzed three types of sensors in their case study, in which Node A acted as a climate sensor to retrieve information about wind-flow, wind direction, ambient light, temperature, pressure, humidity and percentage of CO_2, while Node B monitored the climate inside as well as light, temperature, pressure, humidity and CO_2, and Node C acted as the senor for soil conditions relative to humidity, temperature, pH value, and electrical conductivity of the soil. Meetoo (2011) implied that the term nano food describes food that has been cultivated, produced, processed or packaged using techniques (NT) and manufactured nano materials added, therefore NT has the capability to transform the entire food industry based on changing the way nonfood is produced, processed, packaged, transported, and consumed. Chaudhary et al. (2011) viewed technological advances as being important to the quality of agricultural yields or for growing high quality crops. Meetoo (2011) claimed that nano capsules will be used for the delivery of pesticides,

fertilizers, and other agrochemicals, for tracking, to deliver vaccines, and for genetic engineering.

Lopez, et al. (2011) noted that currently natural ventilation is the most common system used for greenhouse cooling and monitoring, therefore control of the G environment plays a role in production processes, hence in order to optimize the design and operation of natural ventilation systems, growers must determine and understand ventilation mechanisms. Brigham Young University (2002) noted that venting systems in subterranean greenhouses can become a crucial factor in controlling overheating or too much humidity, while too much venting can also be a detriment. Lopez, et al. (2011) explained that the main driving forces of ventilation are created by having both roof and side openings to induce the static wind effect, which is achieved by arriving at the mean component of the wind velocity and the pressure differences between windward and leeward parts of the G, which creates buoyancy forces to generate a vertical distribution of pressures for the turbulent effect of the wind flowing along and across G openings.

Vanninen, et al. (2010) suggested that artificial light is necessary for plant photosynthesis and photomorphogenesis which is highest when artificial light is used as the only light source, therefore the quality of the light, light intensity, duration of the lighting per day, and the placement of lights enhance plant capabilities. Chel & Kaushik (2011) noted that commercial greenhouses typically rely upon the sun to supply their lighting needs, but are not designed to use the sun for heating instead they rely on gas or oil heaters to maintain the temperatures necessary to grow plants in colder months. Vanninen et al. (2010) related that high-pressure sodium lamps are the current artificial

light technology used in greenhouses at high latitudes, yet the extended photoperiods used during winter months result in differences in plant resistance. Chel & Kaushik (2011) claimed that solar greenhouses are designed to utilize solar energy for both heating and lighting and can collect and store solar heat energy by using insulation to retain the heat on cloudy days and at night. Vinninen et al. (2010) claimed that deepening the knowledge of the effects of light on the metabolism of plants could improve greenhouse artificial lighting to better harmonize crop yields and natural enemy populations.

Renewable energy. According to Chel & Kaushik (2011) renewable energy technologies are ones that consume primary energy resources that are not subject to depletion, including solar energy, wind energy, geothermal energy and biomass. Brigham Young University (2002) noted that underground greenhouses stay between 50 and 60 $^{o}f,$ so even if the temperature above ground is cold or 10 ^{o}f plus wind, the soil temperature at 4 feet deep in the earth will be at least 50 ^{0}f in most places, a thermal constant. Chel & Kauskik (2011) described solar energy as energy that is derived directly from the sun, and the photovoltaic cell has the capability to convert sunlight directly into electricity and whereby the sun can deliver 10,000 times the energy that humans currently use. Brigham Young University (2002) explained subterranean greenhouses as reliant upon the earth walls to absorb heat and charge much like batteries with electricity, which is also referred to as the flywheel effect because the flywheel is charged during the day, storing heat and energy, then spins down at night flowing out of the greenhouse. Chel & Kauskik (2011) noted that the need for solar and wind energy technologies in agriculture is critical

because currently kerosene, diesel or propane is used to power generators in agricultural operations. The drawbacks of fossil fuels include transporting fuel to a generator's location where the noise and fumes disturb livestock, while fuel spills contaminate the land and a significant amount of maintenance is necessary to keep them running. According to Brigham Young University (2002) underground greenhouses can use 55 gallon drums to hold water and should be painted flat black, then placed along the back walls to heat the water for pre-heated plant irrigation, which reduces plant shock and assists in growth. Chel & Kauskik (2011) implied that solar thermo-applications can produce heat for agricultural processes used for drying crops or grains and for heating water. Kaygusuz (2009) suggested utilizing wind power because it is a renewable resource, as well as a clean energy source that does not produce carbon dioxide, sulfur dioxide, mercury, particulates, or any other type of air pollution as do fossil fuel power sources.

Recycling water. Dividing water adds other challenges to local sustainability for cities, energy, agriculture and the environment. A physical water scarcity is already a reality in major breadbaskets around the world and will drive competition across sectors. Governance will be responsible for managing transitions as river basins move from a state of water abundance to water scarcity, therefore the promotion of management structures will become more critical in order to adapt to those changes. Conversely, agriculture will need to adapt to the multiple and changing objectives of societal water needs. Transitions will range from exploiting water resources, to managing the demand for water resources; from new allocations for water to re-allocating water; from

participant inclusion or exclusion to safeguarding rights to water; from developing groundwater to regulating groundwater; from dilution as a way to manage pollution to controlling pollution at the source; from single sector management to coordinated management across sectors; and from managing per design to dealing with uncertainty while managing for change (Molden, et al. 2010).

Thomas, Seymour, Pennist, and Stegelin (2005) investigated the advantages and disadvantages of recycling water for greenhouses. The authors implied that recycling water reduces wasting water and prevents offsite pollution; additionally when water is recycled, nutrients and other water additives are also recycled, so reduced amounts of fertilizers and other chemicals pose another advantage. They noted that the disadvantages are the costs of storage and additional pumping. According to Colorado State's University Extension through Adams State University (n.d.) the disadvantages of using recycled water can be overcome by monitoring salts, chemicals, nutrients and pH as well as by testing water three times a year or prepare to become proactive when dealing with waterborne pathogens, which can be achieved by treating the water for disease organisms through dilution, filtration, and UV light. Colorado State University (n.d.) implied that the costs associated with the installation of holding ponds, tanks, pumps, and possible treatment systems eventually pay for themselves.

The future augurs in a time of recycling wastewater, harvesting rainwater, and desalination. These are some of the current, yet evolving ideologies relative to water conservation that are achievable in greenhouse growing. According to the Environmental Protection Agency (EPA), water recycling is characterized as unplanned or planned. The

Colorado River would be considered unplanned because cities that receive wastewater discharges from the river has water that has already been re-used, treated, and piped into the water supply a number of times before the last downstream user withdraws the water. The EPA's Treatment and Uses Chart shows types of treatment processes and suggested uses show the level of treatment required, especially where there is a greater chance of human exposure, then more treatment is required. Agriculture is at the top of the list, because recycled water is most commonly used for non-potable purposes. Recycling water can reduce and prevent pollution, save energy, and create or enhance wetlands and riparian habitats. The EPA suggested that while water recycling has proven to be effective in creating reliable water supplies without compromising public health, the installation of distribution systems at centralized facilities can be initially expensive compared to alternatives such as imported water, ground water, or the use of gray water onsite from homes. A media campaign would help to educate the public about the misperceptions of recycling water because citizens should be informed about the process (Environmental Protection Agency, n.d.).

Australia has been recycling waste-water by employing water schemes for over 20 years and the same schemes may be considered for here in the United States. According to the Natural Heritage Trust in alignment with the National Program for Sustainable Irrigation, there are guiding principles which outline the basic requirements for planning and implementing recycling schemes for greenhouses. The first principle addressed the need for planning coupled with strong communication strategies because of the many groups that are involved; government departments, growers, suppliers,

wholesalers, packers, merchandisers, and farmer associations, quality assurance programs and auditors, retailers, mass media, special interest, community groups and the general public. The second principle relies on proof that the technologies are safe or manageable through hazard analysis and critical control points. A third principle was based on quality control or compliance, monitoring, and reporting to ensure that the quality of agricultural produce is not compromised. A fourth principle was to manage public health and environmental risks, such as bacteria, viruses, parasites, and risks to the environment, such as salts, sodium, nutrients and contaminants. Public management provides oversight through state regulations and by employing guidelines to be further overseen by the designated governmental department. Horticulturalists are continually informed of changes in technologies and practices, with requirements to implement changes annually as a way to modify systems and raise current standards or farming practices. Community acceptance and trust are achievable through the appropriate authorities, technologies, regulatory arrangements, and compliance measures that underpin this plan. Ultimately, the benefits to agricultural enterprises include; a greater certainty of water supply and water quality; a recycling of valuable nutrients to agriculture. These practices also minimize environmental impacts and provide security for investment in irrigation activities, thus meeting the required quality assurance of environmental management standards (Arris Pty Ltd, n.d.).

In Spain, a Water Framework Directive was adopted as a way to promote sustainable water use. Specifically, the Spanish passed legislation for their river management plan in 2009. A full implementation of documents had to be completed for

every river basin district which provided a general description of the characteristics of the districts, a summary of pressures and impacts of human activity on the status of water, and an economic analysis of water uses. Timetables and consultation measures had to be prepared, and public participation was mandatory during the planning process which required endorsements from the public to ensure participation. Three agricultural pressures were identified as causing the greatest impact on water resources. The first pressure was based upon large abstractions of fresh surface water to satisfy the demand for irrigated agriculture which caused reductions and changes in the natural flow of rivers; the second pressure was due to the excessive abstraction of water in aquifers, which caused significant damage related to terrestrial ecosystems; while a third pressure was a diffuse source of pollution, which is caused by surface runoffs and drainage of nutrients as well as the products used to control pests and diseases. The three main topics facing irrigated agriculture were; the satisfaction of water demand on sustainable usage, protecting against extreme climatic events, education and governance (Gomez-Limon & Riesgo, 2012).

Comparing and Contrasting Year-Round Growing

One case study in favor of greenhouse growing was conducted in Almeria, Spain, where year-round farming was successfully achieved utilizing plastic greenhouses for over 40 years. Intensive agriculture would not be the goal of this study, however it provided a model to help in understanding the processes involved with transitioning from traditional farming to greenhouse growing. The citizens of Almeria, Spain implemented the concept of YRG through the use of greenhouses which were located on 26,750

hectares (ha). The land is called 'El Poniente,' and is known to have the largest concentrated area of intensive agriculture in the world. Almeria is the top vegetable-growing province in Spain and is the largest Spanish exporter of fresh vegetable produce. The farmland was divided among 13,500 small scale farmers who in turn, provide direct employment to more than 40,000 workers annually. Almeria was once a province that was underdeveloped and in decline, until the 1970s when a boom occurred in intensive horticulture (H), spawning Spain's second highest population growth in the last three decades. The growth in GDP nearly quadrupled relative to the regional and national averages. The factors that influenced the boom in Almeria's intensive H included natural conditions of the region which were ideal for growing off-season crops under plastic due to the high number of hours of sunlight. Low, erratic rainfall was compensated by the abundance of underground water resources, but it was the influence of the National Colonization Institute, who created institutional actions to access underground aquifers and promoted the use of the technology necessary for extracting water. They also provided the infrastructure for electricity, encouraged new people to settle in the area and offered technical and financial advice. The allocation of small-scale plots of land of 3.5 hectares (ha) were offered to families in crisis, who assumed the risk of farming un-irrigated soil by way of new technological innovations, which the farmers put into practice. The first G farmers used sandy soil because it suited H, but later constructed the first plastic, hydroponic greenhouses to provide protection against winds and low winter temperatures. Almeria was then able to provide off-season produce which perpetuated demand for more products and in-turn created incentives for yield increases and

continued investment for farm development (Aznar-Sanchez, Galdeano-Gomez & Perez-Mesa, 2011).

The authors admitted that even though the 'Almeria Miracle' and greenhouse growing was proven to be an immense success, there were negative effects that occurred over the decades due to a lack of planning. Some lessons that were learned included the overexploitation and contamination of aquifers, the over-extraction of sand and vegetable soils for agricultural use, uncontrolled dumping of waste, landscape degradation, deficiencies in the road network, and competition for natural resources which affected other economic activities such as tourism (Aznar-Sanchez, et al., 2011).

Woodhouse (2010) provided Cuba as a successful prototype for reorganizing agricultural production as an alternative to industrial agriculture, which was developed out of necessity when a shortage of imported animal feed, industrial fertilizers and pesticides occurred. The author portrayed Cuba's ability to generate alternative organic input supply chains to provide seeds, compost, pest-control methods; additionally, they also trained thousands of oxen to replace tractors, while stimulating innovative ways to recycle agricultural waste. According to the author, the success Cuba experienced required a shift in the social organization of production and the operation of local markets, combined with new technological innovations relative to organic fertilizers and pesticides to make farming possible for small scale, labor intensive production and to provide a significant proportion of the fresh vegetables necessary to satisfy local demand.

The Political Stream Is Made of Water

The political stream in this case study is water. The Colorado River is shared between seven states in the west; all have unique perspectives about how to use water, minus CC. Agenda setting is a political process that is conflictive and competitive. Systemic or macro agendas include the widest range of potential issues that might be considered for action by the government and that might be placed on the public agenda. Consequently water stakeholders will use their power and resources so that their issue makes it onto the agenda (Kingdon, 2003). Figure 1 depicts the competition for water:

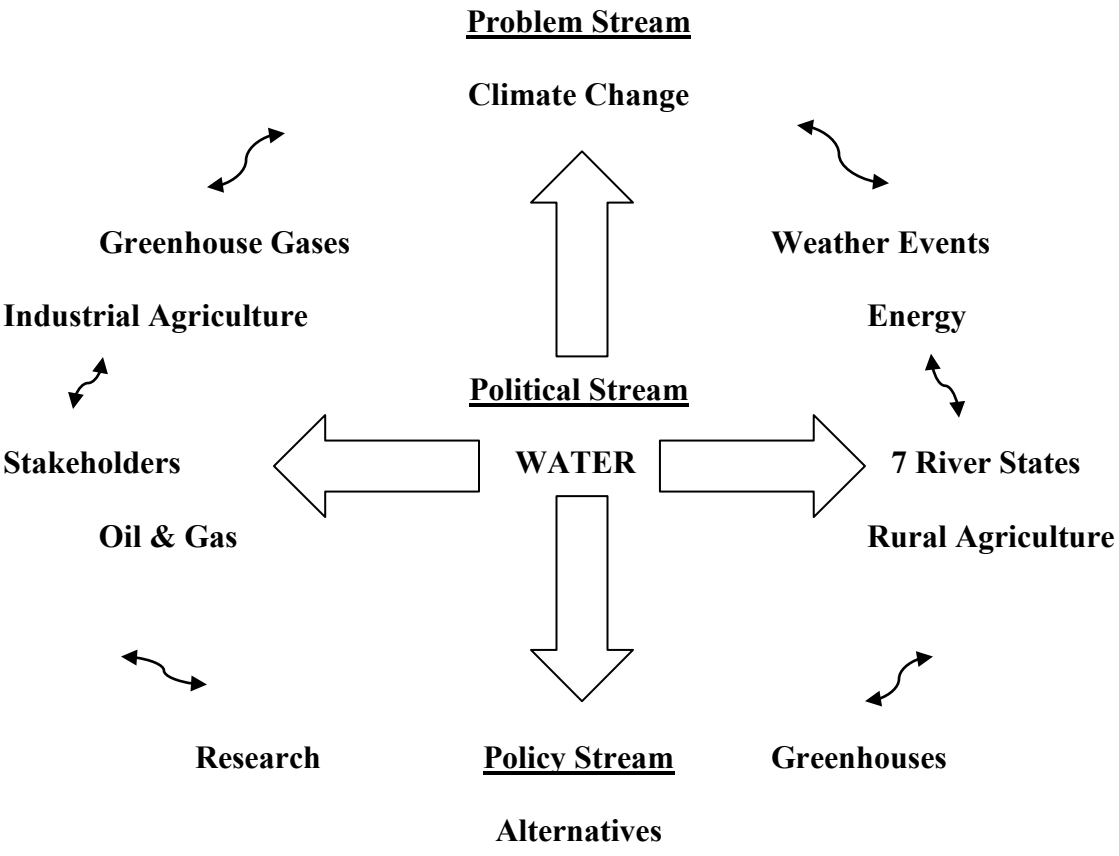

Figure 1. The Competition for water.

Stakeholder Groups		
Industrial Agriculture/Policy Entrepreneurs	M	Rural Agriculture/Grassroots
Organizations Fossil Fuels/Lobbyists	E	Renewable Energy/Incentives
Develop Land & Water/Investments	D	Efficient use of Land & Water/Research
Global Market/to Local Economies	I	Local Economies/to Global Market
Recreationists	A	Environmentalists

Figure 2. Stakeholder groups.

Today, irrigated agriculture is the main source of 70% of the world's freshwater withdrawals. There are challenges related to scarcity as a result of groundwater depletion, an increase in water pollution, population growth, and the degradation of water-related eco-systems (Rosegrant, et al., 2009: Cook, et al., 2009). An increase in water productivity is not expected.

The Benefits and Politics of Growing Locally

Henneberry, Whitacre, and Agustini (2009) suggested that consumer interest in locally grown food and Community Supported Agriculture (CSA) has been increasing dramatically in the United States. Hess (2010) implied that there are ten reasons why people like to buy local; some people felt that they received better customer service or more choices; others pointed to the creation of new jobs and economic development; while others liked the notion of supporting locally-owned, independent businesses as an integral part of the region's distinctive character; yet another reason claimed that buying locally reduced the environmental impact on their region; but the multiplier effect of money might be the most important because the multiplier effect recirculates throughout the community which enhances consumer-based motivation. Henneberry, et al. (2009) stated that farmers markets can have a notable impact on local and regional economies

due to the induced retention of local dollars. Hess (2010) stated that two movements have been beginning to blend, a buy local movement and an anti-chain store movement as a result of powerful transnational corporations with 'big box' names like Wal-Mart, Target, and Home Depot, who have dislocated communities in the wake of trade liberalization, de-industrialization, and the consolidation of retail stores. Henneberry, et al. (2009) reported that consumers at farmers markets generated over $1 million annually in direct and indirect effects to vendors, downtown businesses and rural communities in addition to generating jobs in picking, packing, labeling, cleaning produce, vendors, and assistant vendors.

Blake, Mellor, & Crane (2010) suggested that consumer choice must be assessed at the local level, because consumers frame convenience differently, whereby some shoppers think of convenience as one big weekly shopping excursion with easy parking and relatively close to home, or perhaps a store might be further away, more of a 'top up' shop that is closer to home at a smaller, more expensive outlet. Born and Bassok (2009) observed that typography also plays a role and noticed there are 30% fewer stores in low-income areas. Zenk, et al. (2009) suggested that racial and socioeconomic disparities in obesity are related to systematic inequalities in the retail food environment based upon neighborhood economic and racial characteristics. Michimi and Wimberly (2010) implied that limited access to supermarkets may reduce consumption of healthy foods, resulting in poor nutrition as the prevalence of obesity is a growing health concern for children, adolescents, and adults in the United States. Cummings, et al. (2010) noted that access to healthy food at affordable prices has been recognized by policymakers as a major barrier

to healthy eating in disadvantaged communities and contended that in rural areas, most consumers frequent their closet major supermarket to undertake major shopping trips on a weekly or monthly basis while utilizing local convenience stores as their secondary source of top-up shopping. Michini & Wimberly (2010) claimed that rural neighborhoods have fewer chain supermarkets than urban areas and have poor geographic access to supermarkets, transportation, and healthy foods. Tomlinson (2011) reported that diets high in saturated fat, sugar and salt and low in unrefined carbohydrates are largely associated with rapid urbanization and are often accompanied by a corresponding increase in diet-related, chronic, non communicable diseases such as cardiovascular disease, some cancers, and Type 2 diabetes, suggesting that diet-related heart disease and stroke are the two leading causes of death in low and middle-income countries. Michini & Wimberly (2010) suggested that over the past 30 years, the restructuring of food retail industries has occurred that shows local grocery stores that once serve small rural communities have been closed and replaced by national or regional chain grocers or supercenters. Blake, Mellor and Crane (2010) found that it was easier for large firms with strong supplier networks to access food farmed locally for consumers than it is for small independent retailers because local food is likely to travel away from the local area to be packaged and processed before returning to a local store. Year-round growing would create competition by implementing small local, corner markets, packager and processor businesses to compete with large firms and convenience stores.

The Politics of Smart-Growth Planning

Hawkins (2011) noted the importance of smart growth policies at the municipal level of government, yet in many cases a local government's policies may not be environmentally or economically sustainable. Ramirez de la Cruz (2009) defined factors that explain the boom in the adoption of land use regulations which included population, the identification of growth as the cause of traffic, congestion, and a decline in the quality of life, as well as patterns of growth moving toward the edges of cities. Hess (2010) suggested that local movements in the United States are situated in the broader context of current anti globalization movements, new political coalitions, and neo liberalism. Perhaps smart policies are becoming more important due to deficits in the Food, Conservation and Energy Act of 2008, which in effect turned out to be a continuation of the 2002 Farm Bill which endorsed a long history of agricultural subsidies. However, the bill may have started a conversation about renewable energy, conservation, nutrition, and rural development programs (Gronski & Glenna, 2009).

Small businesses make important contributions to economic growth in providing job growth, tax revenues, and a sense of community. However, it cannot be understated that, "in November 2009, private sector employment decreased by 169,000 and small businesses alone accounted for 68,000 of those jobs" (Botwinick, Effron and Huang, 2012, p. 608). Zoning regulations are the most common tool used to protect small and local businesses and the most common form of land use regulation that differentiates between land used for agriculture (less intense), residential, commercial, and industrial uses (most intense). Conceptually, smart growth zoning cities remove the traditional

focus from specific land uses in an area to the intensity with which the land is used. This type of zoning allows for more flexibility that utilizes more detailed mechanisms, such as; mixed use zoning, incentive zoning, historic district zoning, open space zoning, performance zoning, form based zoning, and cluster development zoning, although city boundaries may serve the same purpose. Smart growth regulations involve redistributing the benefits and costs associated with land development (Ramirez de la Cruz, 2009).

Local movements also represent an avenue for building communities that lessens the dependence on large corporations while creating possibilities for a political reconfiguration that decades of privatization, deregulation, and devolution have engendered (Hess, 2010). However, learning by entrepreneurial venturing would be novel to networking businesses, which suggests there might be high levels of risk and uncertainty associated with the creation of new businesses (Lans, Biemans, Verstegen, & Mulder (2008). That being said, consumers are looking for healthier food that improves America's diet and nutrition, therefore policies that expand direct marketing of fresh produce and improve food access may also have a positive, indirect impact on diet-related illnesses and obesity (Hamilton, 2011).

Strategies to develop a multi-stakeholder and shared decision-making processes require guidance and the assessment of baseline conditions to determine the current state of environmental, economic, and social conditions as key indicators. Equally important is the development of a vision coupled with the objective to establish goals of where the community wants to be in terms of long term targets. The creation of action plans help to put an emphasis on priorities to achieve intermediate targets, but should be monitored to

track progress and to hold participants accountable (Connelly, Markey & Roseland, 2010). That being said, smart growth regulations involve redistributing the benefits and costs associated with land development and the effects for various interest groups are likely to be harmed by any regulation that limits available land for new projects or increases the cost of building (Ramirez de la Cruz, 2009).

Hawkins (2011) discussed the notion of smart growth for local governance, implying that there are at least six key dimensions necessary to achieve this including; natural resource preservation, community development, housing, economic development, transportation choices, and planning for land use as policy objectives. One successful example of smart growth planning was presented in a study that was conducted in the State of Vermont, which implemented smart growth planning through the mechanism of cluster development zoning. Citizens of Vermont realized that agriculture was changing in 2003. Vermont's Sustainable Agriculture Council presented a recommendation for the state to assist farmers in conducting an economic analysis of the alternatives. Instead of relying upon expansion, citizens selected the creation of agricultural enterprises that encompassed farm-based activities without industry classifications. The results showed that direct sales to consumers by farmers' markets and CSAs, local contracts with restaurants, stores and institutions saw sales rise from: $3.8 million in 1982; growing to $9.6 million in 2002; topping off at $22.9 million in 2007. Vermont's sustainable food system cluster employed 30,499 workers in more than 9266 establishments in 2008. The state ranks above other states in their concentration of local farms, CSAs, and farmers' market to promote their economy through agriculture. Vermont's agriculture sells mainly

to local markets and concessions of farmers at five times the national average. Vermont's success comes from their rural farming cluster, which relies upon assistance from a vast array of public and private organizations for the infrastructure of sustainable food systems and institutions. The Vermont Agency of Agriculture listed 48 organizations that are networked through farming. The State provides access to technical and business assistance as a way to identify market trends and new farming methods.

The Colorado Department of Agriculture (CDA) noted that the way wealth is distributed is critical within rural communities. Policies to promote biofuel production can lead to creating wealth in communities with agricultural farmland. Yet without the common ground necessary to preserve a water supply that is adequate, transportation, infrastructure, and an entrepreneurial class of farmers willing to work with private investors, efforts to promote biofuel may be unsound and actually deplete local wealth (2012). The CDA claims that agriculture generates $20 billion annually and supports more than 100,000 jobs. Colorado is also home to the nation's leading processed food companies. Financial Executives International states that the CDA's mission is to strengthen and advance Colorado's agricultural industry by ensuring a safe, high quality and sustainable food supply with goals of protecting consumers, the environment, and natural resources. According to the CDA, exports amounting to $1.8 billion of agricultural products were sold to more than 100 countries in 2008, with exports of beef increasing by 58%. The CDA is predicting that future Colorado consumers may prefer to grow and buy locally or purchase food from local farmers. The ILFFP reveals the potential process, and impacts as shown by the LCSA (2011) in Figure 3.

Iowa Local Food and Farm Plan: Process and Impacts

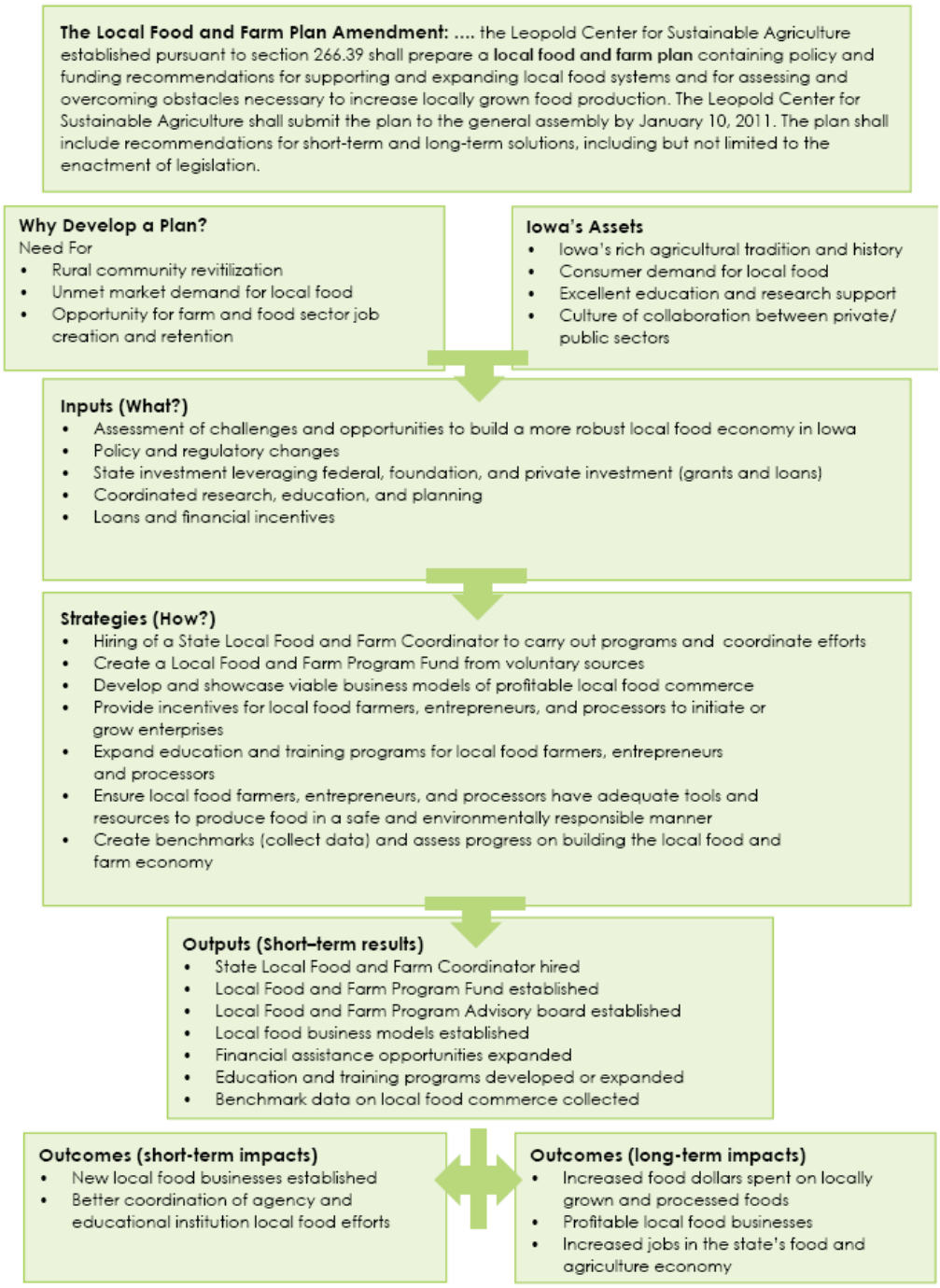

Figure 3. **"Iowa Local Food and Farm Plan: Report to the Iowa Legislature from the Leopold Center for Sustainable Agriculture." (2011, p. 7). LCSA, Iowa State University. Found at: www.leopold.iastate.edu/iowa-loca-food-and-farm-plan. Reprinted with permission.**

The Methodology Used For ILFFP

The methodology used for the ILFFP relied upon public input through a workshop which was attended by 162 stakeholders who represented more than 60 public sector and non-profit groups and more than 30 businesses (LCSA, 2011). The stakeholders (farmers, producer groups, universities, ISU extension, state and federal agencies, retailers and food service, food processors, food distributors, community and economic development groups, resource conservation and development agencies, lenders, and other groups) identified assets, obstacles, and strategies for developing a robust local/regional food business sector in Iowa. This was followed by listening sessions involving 161 participants from 37 of 99 counties to see which assets, obstacles, and strategies were identified. The stakeholders were then invited to complete an electronic survey. Additionally, a public survey was conducted to reach a broader audience interested in food and agricultural policy at the Leopold Center site. The participants included 100 % of the survey respondents and 70% of the listening session participants. Ninety-seven percent were Caucasian and half were women between the ages of 45-64 years old, while 15% were between the ages of 18 and 34 years old. One in three was a farmer or employed in the farm sector as shown in Figure 4.

Iowa Local Food and Farm Plan: Overview of Public Input Methods

Table 3. Overview of public input methods and number of participants/respondents.

Method of Public Input	Number of participants/respondents
Initial workshop – June 24, 2010	162
Listening sessions (15)	161
Invitation survey	256
Public survey	330
Regional Food Systems Working Group policy recommendation session	57
Target group policy recommendation session	57
Total	*1024**

**This total does not represent the total number of different individuals. We estimate that 2 percent of the total number of participants/respondents participated in multiple methods of public input (for example, by completing the survey and participating in one of the work sessions or listening session). Hence, it is likely that an estimated 1,002 different individuals offered public input to the Plan.*

Figure 4: **"Iowa Local Food and Farm Plan: Report to the Iowa Legislature from the Leopold Center for Sustainable Agriculture" (2011, p. 39). Leopold Center for Sustainable Agriculture, Iowa State University, found at: www.leopold.iastate.edu/iowa-local-food-and-farm-plan. Reprinted with permission.**

Survey respondents were asked to select up to 2 of 10 sectors from which they had the most expertise or experience and then choose the top two obstacles. The 586 responses showed that more respondents were knowledgeable about consumer issues, crop production, and marketing. The sectors that needed the most attention were marketing and market venues, consumers, financial assistance, aggregation, and distribution. After the survey and listening session, participants identified the top obstacles for each sector in which they had expertise. They were then asked to describe strategies to address obstacles they thought were significant as shown in Figure 5.

Iowa Local Food and Farm Plan: Expertise of Respondents

Table 5. Expertise of respondents and top needs and obstacles facing local/regional food system sectors

Sector	Percent of survey respondents with expertise in each sector	Rank of sector needing most attention (listening sessions)	Percent of regions identifying each sector as needing the most attention (listening sessions)	Top obstacle facing the sector, by percent of respondents*
Crop Production	26%	5	50%	Lack of knowledge to diversify operations (56%)
Livestock Production	15%	10	0%	Processing barriers for small producers (76%)
Processing	5%	6	25%	Lack of facilities (58%)
Aggregation and Distribution	4%	3	87.5%	Lack of coherent business structure for distribution (41%)
Marketing and Market Venues	23%	1	52.5%	Lack of consistent supply (41%)
Food Safety, Regulations, and Policies	10%	9	12.5%	One-size-fits-all standards difficult for small producers and processors to achieve (66%)
Financial Assistance	10%	3	50%	Lack of funding for local food planning and network building systems (45%)
Beginning and Underserved Farmers	9%	7	37.5%	Need for step-by-step information on how to start and operate a farm-based business (50%)
Planning: Roads, Buildings, and Farmland Preservation	8%	7	25%	Lack of awareness of local food systems by local governments (67%)
Consumers	30%	2	62.5%	Lack of access to local foods (61%)

**Only survey respondents stating expertise in that sector were permitted to identify the top obstacles facing that sector; respondents could choose up to two.*

Figure 5: **"Iowa Local Food and Farm Plan: Report to the Iowa Legislature from the Leopold Center for Sustainable Agriculture" (2011, p. 42). Leopold Center for Sustainable Agriculture, Iowa State University, found at: www.leopold.iastate.edu/iowa-local-food-and-farm-plan. Reprinted with permission.**

Iowa Local Food and Farm Plan: The 12 Emerging Issues Developed

Table 6. The 12 Emerging Issues Developed

1. Farmers, processors, and food entrepreneurs need access to affordable loans to start and grow businesses.
2. Farmers, processors, and food entrepreneurs need incentives (such as tax credits, tax rebates, grants, and equipment cost-share programs) to supply markets.
3. Existing and beginning farmers need access to land and water to initiate or expand operations.
4. Farmers, processors, and food entrepreneurs need affordable and comprehensive insurance products to minimize risks in crop production, liability, and health.
5. Existing and beginning farmers, processors, and food entrepreneurs need education and technical assistance to develop profitable enterprises.
6. Small and mid-sized farmers need customized environmental and food safety regulations to be profitable, protect natural resources, and ensure food safety.
7. Farmers and processors need access to a skilled, affordable, and reliable workforce.
8. Iowa needs investment in aggregation, distribution, storage, and processing facilities (such as cold storage, packinghouses, and distribution warehouses) to reach existing and new markets with high-quality local food products.
9. Iowa needs marketing networks for local food processors, food entrepreneurs, and farmers.
10. Consumers need better access to local foods and more information about local foods.
11. More coordination and data collection on the state of local foods is needed within and across organizations and agencies supplying technical assistance, financial assistance, and regulatory oversight to local food producers, processors, and entrepreneurs.
12. Iowa needs innovative and creative ways beyond tax instruments and funding reallocation to pay for programs and assistance to build a strong local food business sector.

Figure 6: **"Iowa Local Food and Farm Plan: Report to the Iowa Legislature from the Leopold Center for Sustainable Agriculture." (2011, p. 43). LCSA, Iowa State University, found at: www.leopold.iastate.edu/iowa-local-food-and-farm-plan. Reprinted with permission.**

Iowa Local Food and Farm Plan: Recommendations at a Glance

			Short-term	Long-term
Needs state appropriation	1.1	Hire Local Food & Farm state coordinator*	✓	
	1.2	Provide 2-year support for Iowa Farm-to-School Program*	✓	
State-level local food program fund and advisory board	2.1	Appoint Local Food & Farm Program advisory board*		✓
	2.2	Set up voluntary funding mechanism for Local Food & Farm Program (to fund coordinator after year 1)*		✓
	2.3	Annual local food and farm report*		✓
Business development and financial assistance	3.1	Implement 4-6 local food business projects across the state	✓	
	3.2	Extend Iowa Small Business Loan Program Fund*	✓	
	3.3	Recruit women & minorities for local food small business program	✓	
	3.4	Offer local food business development program for bankers	✓	
Processing	3.5	Offer local food processing educational program for farmers, entrepreneurs		✓
	3.6	Pilot small meat processing facility investment credit program*	✓	
	3.7	Reclassify small meat plants as industrial property*		✓
	3.8	Pilot meat-cutting education and mentoring program for small businesses	✓	
	3.9	Expand education and training for small meat processors		✓
Food safety	3.10	Set up task force to review state laws and regulations on local foods*	✓	
	3.11	Offer recurring Good Agricultural Practice (GAP) educational training		✓
	3.12	Pilot food safety audit cost-share program for farms selling wholesale to larger volume buyers	✓	
	3.13	Increase outreach about Iowa food regulations		✓
	3.14	Add local food producer to Iowa Food Safety Task Force		✓
	3.15	Train educators working with local food producers about food safety	✓	
Beginning, minority, transitioning farmers	3.16	Develop programs for beginning farmers and food entrepreneurs with outreach to minority populations	✓	
	3.17	Business training program for food brokers and supply aggregators	✓	
	3.18	Business training program for recruiting, managing and optimizing labor for small food operations	✓	
	3.19	Create sample contracts/production agreements for local food sales	✓	
Assessing progress	3.20	Set up subcommittee to oversee data collection and track growth of local food businesses*		✓
	3.21	Track state agency purchases of Iowa grown foods*		✓
	3.22	Survey producers of edible horticultural food crops	✓	
	3.23	Survey producers about labor skills needed for fruit/vegetable production, processing	✓	
	3.24	Survey capacity of food production and aggregation centers for distribution, storage and processing	✓	
	3.25	List sources of technical assistance for local food businesses		✓
	3.26	Increase outreach for local food producer liability insurance options	✓	
Local food incentives	3.27	One-year pilot program to reimburse five K-12 school districts that serve Iowa produce	✓	
	3.28	One-year pilot program to reimburse five health care facilities that serve Iowa produce	✓	
	3.29	Add local foods component to Iowa Great Places program		✓

* These recommendations require legislative action; others could be implemented in whole or in part without legislative action.

Figure 7: **"Iowa Local Food and Farm Plan: Report to the Iowa Legislature from the Leopold Center for Sustainable Agriculture." (2011, p. 6). LCSA, Iowa State University. Found at: www.leopold.iastate.edu/iowa-loca-food-and-farm-plan. Reprinted with permission.**

The authors of the ILFFP focused on a plan that is actionable, or is well researched so that legislators could take action when the legislative session opened on January of 2011. The ILFFP revealed a very advanced plan in the context of this case study and therefore will serve as a knowledge guide. Liu, et al. (2010) provided the framework for this case study of CC, YRG, through local agenda setting, based on Kingdon's (2003) multiple streams theory.

Local Agenda Setting

In this case study, it is important to distinguish the fine line that exists between agenda setting at National and local levels of government. Kingdon (2003) suggested that agenda setting is enabled through interactions in the problem stream, as a result of systematic indicators, focusing events, or feedback to get the attention of decision-makers. In the policy stream the specification of alternative solutions is advanced by hidden specialists, such as academics or career bureaucrats, who are privy to solutions, ideas, and re-combinations of previous ideas. The author further noted that the political stream is affected by elections, public mood swings, interest group demands, and jurisdictional changes in administrations. When the successful coupling of these elements are facilitated by the presence of policy entrepreneurs, such as elected, or appointed officials, and private sector leaders, they champion the issue or a particular solution (Liu, et al. 2010). According to LLVV (2010) the agenda-setting framework at the local level included the following elements: governmental actors and interest groups were the most important agenda setters in local policy processes; the general public, experts, and election-related actors were perceived as secondary in importance, while the media had

little power. Budgetary considerations were the most frequently mentioned factor in shaping local priorities, while feedback was the second most effective mechanism to attract attention to an issue; policy compatibility (not mentioned by Kingdon, instead technical feasibility, value acceptability, and anticipation of future constraints were discussed) was the most discussed attribute which contributes to an alternative's survival and selection in the local policy process; and that the local process is most influenced by consensus and coalition building, unlike the national policy process, compared to Kingdon's (2003) shift in public moods and opinion or changes in electoral leadership (Liu, et al. (2010). The findings of the LLVV report provided the framework for this case study (2010).

Summary

This section has reviewed the considerable literature about issues surrounding climate change. The problems associated with industrial agriculture, water, and energy, were compared and contrasted with alternatives that included rural, sustainable agriculture, water recycling, and renewable energy. As the literature indicated, the macro agenda associated with local smart growth planning should include the widest range of potential issues considered to be actionable by the government to ultimately, place YRG on the public agenda. Chapter 2 offered a prototype for YRG based upon ILFFP that was completed by the LCSA in 2011. Their research offered many alternatives that would support legislative action for growing locally. The purpose of this study is to conduct a case study to evaluate YRG through ILFFP and LLVV framework of key factors that were identified as impacting the likelihood of success or failure in achieving local policy.

Chapter 3: Research Method

Introduction

Chapter 1 investigated why YRG may be a way to ameliorate the effects of climate change on agriculture. Kingdon (2003) provided the conceptual basis for understanding agenda-setting in three visible streams of problems, policy alternatives, and politics. Chapter 2 investigated the issues surrounding traditional agriculture, water, energy, and population, which were defined in the problem stream. Rural farming, recycling water, renewable energy, technology, and smart growth planning were placed in the alternative stream. The political stream was designated to water, the benefits and politics of growing locally, ILFFP, and smart growth planning, indicating both the promise of and a resistance to change. The goal of this research was to explore YRG as a way to mitigate and placate the effects of growing due to CC. Information was gathered from the community of MC to better understand what would be required in MC to build a local food and farm system for YRG. Kingdon (2003) suggests that after ideas bump into each other in a policy primeval soup, combinations and reformulations of ideas, similar to biological natural selection. The criteria for selection include "technical feasibility, congruence with the values of community members, and the anticipation of future constraints, including budget constraints, public acceptability and politicians' receptivity" (p. 200).

This chapter addresses the research design and why the qualitative case study methodology was chosen to examine YRG, CC, and local food and farm systems. As stated earlier in this study, ILFFP does not specifically study YRG; however, the plan

provided information about the process required to expand local food systems. The plan contained policy and funding recommendations to support local food systems and for assessing and overcoming obstacles to increase local food production. An understanding of the factors that impact local food and farm systems is necessary in order to develop a formal plan that details specific actions, responsibilities, and performance criteria necessary to build a coordinated effort in which actions and policies support one another. The rural farm sector is currently impacted by a lack of policy to support local farmers and subsequent systems.

Chapter 2 established an understanding of the many issues related to CC, agriculture, and YRG. Policy for climate change is nonexistent, and many believe that it has been abated by corporate interests, including industrial agriculture, while fossil fuel energy continues to add to greenhouse gases, and policy remains stagnant. The identification of alternatives for change focus on the backyards of local communities and the sustainability rural agriculture might accomplish while ameliorating CC. Through the use of greenhouses for YRG, and the use of technology, water recycling, and renewable energy, rural farming might provide solutions to national problems at the local level. The political backdrop for this paper was defined in terms of the LLVV (2010) framework at the local level of government to initiate social change in farm policy at the municipal level of government and, ultimately, at the national level.

YRG policies in rural communities will be affected by the many diverse stakeholders vying for how land will be used for burgeoning populations with diverse interests. Smart growth planning might provide potential solutions or policy alternatives

for small communities that desire a local food and farm plan. This form of planning presents the capability to incorporate policy and regulatory instruments that affect land use. Greenhouse growing could offer citizens the capability to change food systems as a result of YRG and inspire new financial opportunities at the same time. Investing locally into an entrepreneurial network of stores, trucking companies or, storage facilities may eventually help resolve economic problems such as job growth (Kim, 2011).

Mesa County, Colorado

A candidate for smart growth planning might be Colorado's Mesa County, which has recently subscribed to an "Open for Business" (OB) initiative to boost the local economy or to encourage development and business growth by lowering taxes, streamlining development procedures, expediting capital projects, adopting a developer's bill of rights and supporting existing local businesses (Mesa County, n.d.). Currently, MC has the land and 265 days of sunshine for YRG with the help of greenhouses. Mesa County has a total population of 146,723 people living within 10 communities (2010, Census). For the purpose of this study, the three towns of Fruita, Grand Junction, and Palisade (MC) were explored in the context of innovations that are suited for year-round growing in greenhouses to bypass traditional, seasonal farming.

Land-use is an issue that is at the forefront in MC due to large recreational and ecological populations, as well as farming (wine and tourism) and energy interests. When the City of Fruita became concerned with a sprawling development on the outskirts of town, it implemented the Mesa County Land Use Plan in 1996. The plan recommended a transfer of development rights program to guide growth patterns in a manner that would

preserve agricultural lands within the county. Fruita entered into an intergovernmental agreement in August 2005 to establish a multi-jurisdictional transfer of development rights program (TDR/C) to accomplish those goals. The program mapped out sending and receiving areas, whereby receiving areas must become parcels within the city limits, plus six unincorporated areas. Sending areas must meet certain criteria for agricultural land or environmentally sensitive lands and must be a minimum of 20 acres (MC, n.d.).

A vision for the Town of Palisade is to "preserve and enhance the agricultural village atmosphere of Palisade while fostering tourism, economic growth and prosperity to create an attractive and vibrant community for residents and visitors" (Palisade Comprehensive Plan, 2007, p. 3). Palisade had a population of 2,802 in 2004 and is known for its peach orchards and wineries. Growing year-round would be unique to MC based on weather alone, whereby the lowest temperature recorded was -23 ^{o}f in 1963, and the highest recorded temperature was 106 ^{o}f in 2005 (The Weather Channel, n.d.).

It should also be noted that the local beef industry in Mesa County is investigating the process associated with local beef production. Additionally, Mesa County grows hay for the region. Hay can now be grown inside, hydroponically. This chapter details the research design, with discussions of the selection of the case study method, data, collection, data analysis, verifiability, and reliability. The following sections provide the protocol for this study.

Qualitative Research Design

Selection of the Case Study Method

The method best suited for this research was a qualitative case study because it was necessary to obtain a wide array of information about the case to provide an in-depth picture of it. Creswell (2009) defined qualitative research as "a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (p. 4). In this case study, expanding or supporting local food systems is required for YRG as well as assessing and overcoming obstacles to increase food production at the local level. The preliminary research involved in this study made it clear that much of the data to be collected would need to be qualitative in nature. The ILFFP model was constructed through the use of quantitative research, and the research was a state effort that included all farm systems specific to Iowa. Even though ILFFP recommendations helped to guide this study, the framework for local agenda setting was based on the LLVV (2010) study.

A public survey might have been used if the research had called for reaching a broader audience interested in local food and farm policy, including specific factors related to YRG. Quantitative research would have defined negative or positive responses about YRG from the citizens of MC. Instead, a qualitative approach was chosen to explore the features involved with YRG through the use of G and a local food and farm plan. Potential local stakeholders involved with agenda setting and policy for a local food and farm plan in MC were defined. There were many components of local agenda-setting to explore that would contribute to a body of knowledge that could encourage communities' to invest in rural agriculture. A qualitative approach is inductive, and the

research is about idea generation. The design is open and emergent rather than rigid or fixed to permit exploration, discovery, and description (Bloomberg & Volpe, 2008). This design is distinguished from an explanatory, quantitative method of inquiry, which attempts to establish a causal relationship between variables to explain the occurrence of a phenomenon (O'Sullivan, Rassel, & Berner, 2000). A qualitative study could be conducted by exploratory means, as it could make it possible to find out what actions, if any, a local community might take to enhance local food and farm systems via rural farming and YRG. These are the reasons that the quantitative tradition was ruled out.

Other Methods Considered

In the design phase of the research study, several qualitative strategies or traditions of inquiry were explored to determine the appropriate methods to use for this study. All qualitative research holds a number of characteristics and assumptions in common, yet there are variations in the primary traditions of ethnography, phenomenology, grounded theory, and narrative inquiry. The selection of the case study methodology was predicated on the design and intent of the study.

Ethnographic research describes and interprets a culture-sharing group in a natural setting and involves the examination of customs or ways of life via patterns of behavior, values, and practices (Creswell, 2007). This study did not address the behavior of a specific group; therefore, the use of observations and interviews as the major sources of data would have limited the study. Understanding the shared cultural patterns of a group requires the analysis of cultural themes and did not satisfy the intent of the study.

Phenomenology involves investigating the meaning of the lived experience of people who identify the core essence of a human experience (Bloomberg & Volpe, 2008). This form of inquiry is ideal for studying a small number of subjects with a primary focus on meanings to describe a phenomenon. The study would been limited in terms of content and context if it had been grounded in phenomenological inquiry because it would have examined only one aspect of climate change, possibly in arrears, such as the themes in the meaning of natural disasters, rather than developing the issues surrounding climate change.

Grounded theory is a good design to use when a theory is not available to explain a process, or when the theories that are available are incomplete. The extraction of an emergent theory is established through the findings (Creswell, 2007). The aim of this study was to seek details related to farming challenges during climate change, not to generate a theory. However, grounded research would have helped to gather enough information to develop a model for the social implications of rural farming and increasing populations. The difficulty with this form of inquiry would have been in finding current theoretical ideas that are relevant to CC and YRG that might provide a substantive theory or a theory where specific components could emerge.

Narrative research would not have supported the purpose of the study, but would have lent weight in understanding how individuals are enabled or constrained by current farm policy. This could have been accomplished through a biographical, life-history study about a rural farmer's life or a gathering of personal reflections of weather events from a farmer over decades. This form of inquiry would have limited the scope of the

study, but would have been a way to describe observations or turning points in climate over the life of a rural farmer (Creswell, 2007).

A survey questionnaire was considered as a possible method for data collection for this study but was found to be unsuitable because a survey questionnaire seeks to test or verify a theory. Theories on climate change or in their infancy; this fact, combined with a lack of literature about rural farming, renders hypothesis testing impossible. Using a questionnaire would not have yielded the in-depth account necessary to provide an understanding of the effects of climate change on and the possible importance of rural farming in the future. Quantitative research seeks to generalize results from the research sample to the larger population, which was not the ambition of this study.

The Researcher's Role

My role as the researcher was to improve the understanding of the possibilities of the resurgence in rural farming toward diminishing the effects of climate change on agriculture. The responsibility for collecting all documentation data; identifying appropriate interview candidates; and scheduling, conducting, recording, and transcribing the interviews fell directly onto my shoulders. Additionally, I was responsible for ensuring that all aspects of the study met ethical and academic expectations. The importance of personally recruiting participants and seeking the necessary consent and permission to conduct interviews and collect documents was emphasized. I used emails, telephone calls and letters to personally contact participants to introduce the topic and eventually conducted interviews with participants, performed observations, and gathered documents. In the course of the interviews, memos or notes were taken and later used to

aid in the analysis to assist in writing the narrative report. I the instrument used for data collection (Creswell, 2007).

In this study, I planned to analyze documents and interview stakeholders from MC who were involved in rural farming and current systems related to farming, small business, county growth, and weather in an attempt to identify patterns in the current farm system. I also looked for new factors that might assist in building an initiative for rural farming and YRG to be placed on a legislative agenda.

Researcher Bias

It is natural for a researcher to bring bias from his or her life experiences to any study being conducted. The role of the researcher as the main instrument for data collection, as well as his or her background, puts him or her in close contact with the data.

> A researcher's personal beliefs and values are reflected not only in the choice of methodology and interpretation of findings, but also in the choice of a research topic. In other words, what we believe in determines what we want to study. (Mehra, 2002, p. 2)

I undertook the tasks assigned to this study based upon my own experiences in farming and in growing hay for 10 years.

Throughout the process, I was aware of my bias when entering into the data collection and analysis portion of the study and as a result, took possible measures to monitor my bias and subjectivity. Reflective field notes were recorded in a subjectivity journal, which helped me to deal with feelings when coming face-to-face with opposing

worldviews. It was important that I clarify my bias, which was the belief that climate change is occurring and is making farming more difficult than it has historically been. Member checks were used by sending transcribed interviews of conclusions to participants for review. A colleague was asked to examine the field notes to question assumptions or consider alternative ways of looking at the data. Detailed and thorough explanations of how the data were collected and analyzed provided an audit trail. The process of category development was documented to make the process of data analysis open and to enhance the trustworthiness of the findings (Bloomberg & Volpe, 2008). I withheld any personal perspectives or opinions during the actual interviews, during data analysis, and while drawing conclusions. The final report provides detail to allow readers to determine whether the assessments of the interview results were well-justified and supported by the stakeholders themselves. These measures were taken to minimize the incidence of my subjectivity.

Institutional Review Board Approval: Number 08-12-13-0056926

As a researcher, I was morally and ethically bound to conduct my research in a manner that minimized potential harm to those involved in the study. Therefore, prior to initiating this research, I presented the study to the Institutional Review Board (IRB) through Walden University to ensure the ethical protection of all subjects. The IRB process requires assessing the potential for risk, such as physical, psychological, social, economic or legal harm (Creswell, 2009). The IRB considers whether or not protected groups might be harmed or negatively impacted by the study. In this case study, no

protected groups were be questioned; however, I developed an informed consent form for participants to sign before they engaged in the research (see Appendix B).

Approach to Data Collection

The case study methodology was selected due to the significant depth of inquiry warranted to evaluate YRG as a possible alternative to growing seasonally due to CC. Further, a local food and farm system would require local policy to achieve YRG in MC. The methods chosen were consistent with collecting data that was rich in ideas to compete for a place on a local agenda. The opportunity to conduct several in-person interviews with key members of the MC policy community was the approach that was used and was the basis of the design for this study. E-mail was utilized for interviews when in-person interviews were not possible. One advantage of using email as a research method was the capability to access hard-to-reach participants. The constraints of money, time, travel, a disability or differences in communicating could also be overcome through the use of email. The compression of space and time online allowed for geographically dispersed participants be interviewed and allowed the researcher an opportunity to overcome a number of practical constraints that are often found in face-to-face interviews; such as the ability to study body language, facial expressions, or general observations of the setting (James, 2007). In this report, I sent individual emails to approximately 8 to 15 individuals as prospective participants. I described the purpose of the study coupled with an invitation and a request for a convenient date and time for an email interview. It was anticipated that some follow-up documentation or questions

would arise from the interviews which did occur via email, and were included in the study results.

Yin (2003) described six sources of evidence that are most commonly used to conduct case studies: documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts. In this study, documents, archival records, observational field notes, and interviews contributed to the goals of the research. Collecting data through a variety of sources is fitting for a case study, including the use of films, photographs, and videotapes. I remained flexible about the aforementioned sources. The next sections addressed the process used for collecting documents and archival information, as well as an interview guide that included descriptions of the types of stakeholders that were approached for an interview in this study.

Documentation & Archival Records

The researcher made use of primary and secondary sources covering the political, socioeconomic dynamics of the community. Yin (2009) suggested that agendas, minutes of meetings, public documents and written reports of events relative to agriculture and climate change might be helpful to this type of report. An attempt to glean administrative documents such as proposals, progress reports, archival sources and other internal records was sought to help understand existing agricultural events related to current farmer's markets, community gardens, as well as weather anomalies affecting agriculture as recorded by the National Weather Service. Community newspaper clippings or other articles appearing in the mass media were used. Internet documents were used carefully and not accepted as literal recordings of events that have taken place. As Yin (2009)

pointed out, “even transcripts of official U.S. Congress hearings have been deliberately edited-by the congressional staff and others who may have testified-before being printed in final form” (p. 103). The documents were collated, analyzed and reviewed to ascertain the rationale for year-round growing, the areas of tensions related to climate change, and the impacts of growing year-round on Mesa County.

Documentation was stable, but was difficult to find. It offers an unobtrusive way to collect data although I had to be aware of bias selectivity and try to ensure that the collection was complete. It contained exact names, references, and details of an event; however, I had to be aware of my reporting bias. The broad coverage gave a long span of time of many events in many settings, yet access occassionally was deliberately withheld. These are the strengths and weaknesses involved with this type of collection, according to Yin (2009).

Observational Field Notes

In addition to the interviews and documentary sources, I kept a journal to record daily summaries of field observations during the period of the study. These notes formed part of the analyses and findings. Many agricultural sites were observed to discover where greenhouses might be placed (according to size, what might be grown, water sources, and light). Required permissions from gatekeepers were obtained for the researcher to gain access to sites. My role was one of a participant observer. An observational protocol was designed as a method for recording notes in the field, both descriptive and reflective notes. Aspects of the physical setting, the informant, events, activities, and reactions were recorded (Creswell, 2007). Yin (2009) points to the fact the

direct observations can be time-consuming and the reality that broad coverage is difficult to achieve without a team of observers, which was not be problematic in this study. The pluses were that the events were covered in real time and they covered the context of the case.

Interviews

Yin (2009) stated that "one of the most important sources of case study information is the interview" (p. 106). The interview was selected as the primary method of data collection for this research because of the potential to elicit rich, thick descriptions (Bloomberg & Volpe, 2008). The in-depth interview provided the capability to ask key respondents about facts related to growing in Mesa County as well as their opinions about climate change (Yin, 2009). Interviews took place over an extended period of time, not just in a single setting, although the typical qualitative interview was a one-shot occurrence lasting about one hour (Polkinghorne, 2005; Yin, 2009).

This study placed a focus on the individual in-depth interview because of the benefits of collecting data that captured a person's perspective or experience relative to farming or climate change. The perspective of others was meaningful, knowable, and was made explicit (Creswell, 2007; Patton, 2009; Yin, 2009). I attempted to adhere to a consistent line of inquiry, yet the actual stream of questions in a case study interview is allowed to be less rigid (Yin, 2009). Intensive interviewing allowed the researcher to solicit an in-depth and detailed amount of information about the phenomenon being studied while controlling the interview process. This elicited the opportunity to clarify statements and probe for additional information (Bloomberg & Volpe, 2008). It should be

noted that YRG and the phenomenon of climate change is new, consequently the research required accurate information to make the results useful. One disadvantage of the individual interview was that it was costly and time-consuming.

In this case study, the community was small and individuals were available for interviewing (Creswell, 2007). It has been noted that not all people are equally cooperative, articulate, or perceptive and interviews are not neutral tools for data gathering. Instead, I was aware that often times they were the result of a satisfactory or unsatisfactory interaction between the interviewer and interviewee (Bloomberg & Volpe, 2008). Other negatives related to interviews are bias due to poorly articulated questions, response bias, inaccuracies due to poor recall, or interviewees give a response the interviewer wants to hear (Yin 2009).

Semi-structured interviews were conducted with prepared questions that focus on the objectives of the research, which was YRG. Ample space was allotted for writing responses to the interviewee's comments (Creswell, 2007). The utilization of interviews was to draw out the reflections of participants relative to YRG and the many issues surrounding local food and farm systems. In the course of the interview, adapting questions was allowed where necessary, while the open-ended questions allowed for the reformulation of the questions according to participant response. Interviews were recorded with a tape recorder to keep the information safe (Creswell, 2007).

Interview Selection Criteria

Sampling Procedures

In qualitative research participants or sites are purposefully selected to help the researcher understand the problem (Creswell, 2009). "The logic of purposeful sampling lies in selecting information-rich cases, with the objective of yielding insight and understanding of the phenomenon under investigation" (Bloomberg & Volpe, 2008, p. 69). In contrast, quantitative research is characterized by random sampling, which controls for selection bias, except it also enables generalization from the sample to a larger population, whereas qualitative researchers do not seek to generalize. The sample was based on Marshall and Rossman's (2006) conceptualization of the "four aspects of events, settings, actors, and artifacts" (In Creswell, 2007, p. 126).

The number of participants and actual sample size could not be determined at the onset of this study. Creswell (2007) suggested that, "One general guideline in qualitative research is not only to study a few sites or individuals but also to collect extensive details about each site or individual studied" (p. 126). A sample of potential participants was proposed to guide this study. The potential selection was based on a pool of actors which represented all sectors of a rural community of the Western Slope of Colorado. As discussed earlier, one way to select unusual cases in collective case studies is to employ maximum variation as a strategy or technique to extrapolate diverse cases (Creswell, 2007). Many participants were observed first through local media or websites and an attempt was made to contact them through e-mail or the telephone. The goal for this case study sample was to diversify the data sources rather than to rely upon the number of

participants (Bloomberg & Volpe, 2008). Marshall & Rossman (2006) "note that sampling can change during a study and researchers need to be flexible" (p.126 in Creswell, 2007).

In this case study, the researcher used purposive sampling to select potential participants' who were willing to contribute their knowledge about YRG or a local food and farm plan to the study. "In a case study, I prefer to select unusual cases in collective case studies and employ maximum variation as a sampling strategy to represent diverse cases" (Creswell, 2007, p. 129). The maximum variation strategy assisted the researcher in the search for and discovery of common patterns or themes among diverse groups within a small community (Bloomberg & Volpe, 2008). The rationale for the maximum variation strategy was to acquire diverse views about YRG and a local food and farm plan. Maximum variation was a good strategy for gathering descriptive views on year-round growing and a detailed account of a local food and farm plan. This was very critical to the study as diverse perspectives are the hallmark of a case study (Creswell, 1997). Extreme or deviant cases were used and would only be helpful if the phenomenon of interest was relative to the phenomenon of CC and the many unusual weather events over this past decade. Snowball sampling may be employed as a strategy to seek out referred individuals.

The population for the stakeholder interview component was intentionally selected based on their involvement with farming in the community. Within the context of this study, key interviews for the study will include public officials, private companies, and non-profit entities of the community. This population was targeted because they

represent all of the sectors of the community that were perceived to possess knowledge about year-round growing, farm systems, greenhouse growing, climate change, and smart growth practices. The interview process required identifying important stakeholders, collecting contact information, developing interview questions, and testing the interview protocol.

The researcher created a list of potential participants for the interview. Mesa County officials were targeted because of their knowledge of county issues related to rural farming, zoning laws, tax laws, smart growth practices, and job services. The Chamber of Commerce, the Incubator Program, and the Open for Business Initiative represented the business sector. The U.S. Department of Agriculture contributed a substantial amount of information about policy, as well as the potential rules and regulations associated with YRG and a local food and farm plan. The National Oceanic Atmospheric Administration office was able to provide information about the past, present, and future weather experienced in Mesa County. The Ute Water Conservancy provided information about local water and irrigation practices. Potential private sector informants included wine, peach, corn, and hay farmer experiences. Colorado Mesa University had the potential to offer agricultural education plus technology to help train generations of new farmers. Interviewing individuals from various renewable energy sources, such as solar and wind energy, as well as oil and gas or 'fracking' companies was an attempt to identify alternative interests to YRG. An individual who manages the farmer's market made a good candidate, because this individual would be able to discuss the successes and limitations of rural farming currently. Non-profit interviews

approached included ‘Community Gardens,’ and ‘Protect the Flow.’ An attempt to interview or collect data from Governor John Hickenlooper’s office was approached.

Figure 8 shows the total number of potential policy participants with a breakdown in the description of each category. In all, there were 22 potential participants from the public, private, nonprofit, and citizen sectors of Mesa County, Colorado. The largest group was the private sector category followed by the public sector and nonprofit entities as the smallest group. Possible key stakeholders affiliated with rural farming in MC contacted for this study were as follows:

Potential Participant Interviews:

8 Public Officials	12 Private Businesses	2 Nonprofit Organizations	Alternate Candidates
State Official	Talbot Farms	CSA	Media
Mesa County Official	Fisher Farms	Protect the Flow	Recreationists
Senator Mark Udall	Gobbo Farms		Environment
US Department of Agriculture	Grande River Vineyards		
National Oceanographic & Atmospheric Administration	Renewable Energy: Wind		
Ute Water Conservancy	Solar		
County Commissioners	Water Recycling		
Incubator Program	Greenhouse Enterprises		
	Farmers' Market		
	Chamber of Commerce		
	Colorado Mesa University		
	Encana Energy		

Figure 8. Potential participants.

The Pilot Interview

Trying out the questions in pilot form was included as a part of the proposal to test the protocol. A research-question-based set of questions was worked out in advance. The purpose of the questions was not to get a simple ‘yes’ or ‘no’ answer, but rather a

description of an episode, a linkage, or an explanation. The main questions were to be kept in mind and probes carefully created. Testing the protocol allowed the researcher to identify flaws in the design of the questions as well as the order of the questions. A research-question-based set of questions was worked out in advance and tested on an individual not associated with the study (Stake, 1995).

The Interview Protocol

Gaining Access to Participants

Developing rapport and gaining access to participants is very crucial to the research process. In order to create rapport with prospective participants, I built trust by informing participants about the goal of the study by personally communicating with prospective participants through telephone calls, emails and letters. Additionally, I designed a consent form specifically for the participant to review that was validated by their signature. The consent form was a reconfirmation and reassurance for the participants that specific elements would be met in order to proceed with the qualitative study. It was important to state in writing that the rights of participants to voluntarily withdraw from the study would be honored during any point of the research.

It was critical that the participant know the purpose of the study and the procedures that would be utilized to lend transparency to the project. Participants need protection to disclose comments, hence protecting the confidentiality of the respondents was a top priority. A statement about the known risks associated with the study and participants was made clear so that the respondents knew what they were committing to. In terms of benefits, I explained to the participants that their knowledge and experience

about the research topic was critical to the study, and that their opinions or views would contribute to the understanding of year-round growing and local food and farm plan. I signed the consent forms with participants (Creswell, 2007). These were the approaches I used to gain direct personal contact and to secure the commitment of participants. Their consent was obtained before the interviews were conducted as a measure to secure the trust between myself and the participant.

Developing the Interview Questions

Interviews are essential sources of case study information and a process where the researcher can ask key respondents about the facts of a matter as well as their opinions about events (Yin, 2009). In this case study, issue questions were the primary questions and as Stake (1995) suggested, "issues are not simple and clean, but intricately wired to political, social, historical, and especially personal contexts" (p. 17). The questions evolved through a process of working backwards from the research questions while considering Liu, et al. (2010) in their local policy agenda-setting approach. LLVV (2010) used four sets of specific variables. The first set of variables were based on important policy participants; participants inside of government and participants outside of government, such as interest groups, academics, the media, etc., who have already been named. The second set of variables focused on problem indicators, focusing events, feedback, and budgetary considerations (Kingdon, 2003). The third set of variables included the attributes of key alternatives based on technical feasibility, value acceptability, anticipation of future constraints, value acceptability, and policy compatibility (Kingdon, 2003; Liu, et al. 2010). The fourth set of variables included local

policy dynamics, such as political mood, organized political forces, personnel changes in government, jurisdiction changes, consensus and coalition building (Kingdon, 2003; Liu, et al. 2010).

The research questions posed were separate and distinct from the interview questions, although the interview questions advanced a mechanism for collecting answers to the study's research questions. In this study, the research questions sought to identify how YRG might impact agenda-setting for local, rural farm policy. Further, the research questions strove to identify why local food and farm initiatives that include YRG are not already on the legislative agenda at the national level of government.

In order to translate the research questions into viable interview questions, it was important to focus on interactivity with participants to elicit in-depth, context-rich personal accounts, perceptions, and perspectives about YRG, CC and the logistics associated with supporting a local food and farm system. The interviews were semi-structured so that the respondents could explain and describe complex community interactions and processes as a way to facilitate the discovery of local nuances in MC. Verbatim transcriptions were used to document the interviews (Bloomberg & Volpe, 2008).

The goal of the interview in this case study was to achieve guided conversations rather than structured queries, so that the actual stream of questions was fluid, rather than rigid. Another goal was to ask conversational questions in an unbiased manner while still addressing the needs of the inquiry. Yin (2009) pointed to the difference between posing a 'why' question to a key informant, which creates defensiveness, and a 'how' question,

which offered a non-threatening way to approach a respondent in an actual conversation. Before the final questions emerged, it was important to see how they worked in practice. The questions were tested in a trial run and recorded to bring them into focus. This test also helped to identify instances of bias or leading questions. Revisions were made at this point to ensure that the goals of the interview were met before proceeding.

Interview Questions

Research Question 1:

How might YRG impact agenda-setting for local, rural farm policy and ultimately legislation for the expansion of local farm systems in an effort to mitigate CC?

LLVV Agenda Factors	Correlating Factors of LFFP	Interview Questions
Problem Indicators	Unemployment rates, no economic growth	Q1: What factors contribute to low/high economic growth and low/high unemployment rates in MC?
Focusing Events	Drought, Wind Industrial Accidents	Q2: How has climate change affected agriculture in MC? Q3: What measures might be taken to ensure the quality of water for farmers worried about 'fracking?'
Internal Feedback	Government Officials	Q4: What are the various forms of governmental feedback that attract policy attention to MC issues, such as YRG & LFFP?
External Feedback	Public Opinion Polls	Q5: When a new project comes up, are there public meetings in an attempt to get citizens involved?
Budgetary Considerations	Costs, Funding Assessment of challenges and opportunities. Policy and regulatory changes. Coordinated research, education & planning. Loans & financial incentives	Q6: What tools would be required to build a LFFP? For YRG in greenhouses?
Technical Feasibility	Practical mechanisms/ implementation LFFP fund, advisory board, business models, financial	Q7: In your opinion, what mechanisms would need to be put into place before YRG would be taken seriously?

	assistance, education & training programs established?	
Value Acceptability	Equity & efficiency Redress inequities, imbalance New incentives for local farmers	Q8: What would be the proper size and role of the government to implement a LFFP?
Anticipation of Future Constraints	Tolerable costs	Q9: In your opinion, would the costs of a LFFP offset the benefits of YRG?

Research Question 2:

Why isn't a local food and farm initiative that includes YRG on the legislative agenda for rural farm policy at the national level of government?

LLVV Agenda Factors	Correlating Factors of LFFP	Interview Questions
Political Mood	Social Climate	Q10: What factors would best describe the social climate of MC?
Organized Political Forces	Mobilize to Promote or Organized to Block?	Q11: What are the prominent issues of MC? Is agriculture an issue that frequents policy agendas?
Changes in Government	New County Commissioners	Q12: In your opinion, would a change in the regime of county commissioners help to promote or discourage a LFFP?
Changes in Jurisdiction	Struggle over issue turf Struggle over policy objectives	Q13: In your opinion, can a new issue such as YRG gain so much attention that it actually drives the competition toward preservation of other ideas?
Consensus or Coalition Building	Processes of persuasion and diffusion	Q14: How can potential coalition supporters become enticed to support a LFFP?

It should be noted that the original framework for the questions was taken from Kingdon's (2003) agenda setting process at the national level of government and then converted to the local level of government through the LLVV (2010) framework.

Additional Open Ended Questions:

1. What competitive advantages does MC have for building a robust local food

economy?

2. What disadvantages does MC have for building a robust local food economy?
3. How would local food systems need to move from the current emphasis on small-

   scale, direct markets to include larger, mid-scale operations that can supply larger-volume buyers?
4. Would a public awareness campaign for YRG and a LFFP benefit more from traditional media to inform the public? Would social media be more productive?
5. What participants should be included to gather public input for YRG and a LFFP?
6. How might existing or beginning farmers access land and water to initiate YRG

   or expand existing operations?
7. In your opinion, could education of greenhouse growing and technology be advanced through Colorado Mesa University?
8. In your opinion, could a local food system efforts be coordinated across organizations and agencies?
9. What is your perception of how consumers will respond to a LFFP and YRG?
10. Can you think of anyone else who is particularly knowledgeable about the evolution of LFFP or YRG?

The interview questions and procedures were refined through pilot testing to refine data collection plans that helped to develop relevant lines of questioning. Interviews were recorded through the use of a microphone which was adequate and sensitive to the acoustics of the room. An interview form of about five pages in length with ample space between the questions was constructed in order to write responses to the interviewee's comments. During the interview, the researcher attempted to stay to the questions and complete the interview within the time specified, if possible. The information was recorded. However, in the event that the audio-recording did not work, bringing a second recorder was a necessary consideration (Creswell, 2007). During an interview, if I felt that a new factor was emerging, I focused on developing spontaneous, probing questions to further find a new factor which may be relevant, or was not considered. This provided an opportunity to collect the interviewee's perspective on that issue. If new questions emerged during the interviews, questions related to that factor were then added to the remaining interviews to explore the factor further. The goal of each interview was to listen more, and talk less.

Storage of Study Data

All documents related to this study have been carefully stored by the researcher. Copies of the interviews have been burned to a CD and stored for safekeeping. The hard copy files, interview recording files, and transcripts of the interviews are being held in my home office throughout the duration of the study, defense, and for a minimum of five years after completion of the dissertation.

Data Analysis Methods

This Section discusses the methods used by the researcher to analyze the data. The analysis of this case study largely involved comparing the existing factors identified from framework of LLVV (2010) that emerged from studies of agenda setting at the local level of governance relative to the rural farming sector. Much of the data collected was distilled into a format that is easily comparable with the findings of the framework as well as the proposed research questions for YRG and a local food and farm plan. It was important to remain open to the possibility of rival explanations in an attempt to strengthen current academic frameworks that are relative to local food and farm systems.

The primary tool used for analysis of raw data was coding. Coding is a system for classifying or noting what is of interest or significant. Different segments of the data were based on factors of both LLVV (2010) in tandem with the ILFFP (2011). In effect, the conceptual framework was turned into a coding scheme through the assignment of codes to each category or subcategory. The codes were designed by my own unique shorthand with identifiers for segments of data relevant to agenda-setting for CC, YRG, and local food and farm systems. The segments included single words, phrases, sentences, or whole paragraphs. Codes were written into margins or texts. Participant identification was included with each unit of information. If the data did not fit a category, emergent descriptors were created, while some categories were eliminated entirely. At the point that it was necessary to re-read and re-examine the data, a colleague reviewed the work to see whether the codes were appropriate and relevant to the research questions. Inter-rater

reliability was also a way to assess the views and interpretations of the data in different ways that also included researcher bias (Bloomberg & Volpe, 2008).

Approximately 10 initial categories were formed to look for multiple forms of evidence to support multiple perspectives in each category. Each category was described, classified, and interpreted for code formation relevant to agenda setting factors. Each code was analyzed one by one. The documentation and interview transcripts were reviewed for concepts, insights or references related to each code (Creswell, 2007). The relevant portions of the data were pasted into a separate document with a code, which allowed interview responses to be consolidated so they could be evaluated together. Naturalistic generalizations were developed when analyzing the data.

Stake believed that "we can look for patterns immediately while we are reviewing documents, observing, or interviewing - or we can code the records, aggregate frequencies, and find the patterns that way, or both" (p. 78). An actual separate flip chart was used for each category of agenda setting and YRG as categories of the conceptual framework, which enabled the researcher to have an opportunity to visualize the data. The case study is explanatory in nature, so the patterns were related to the dependent and (or) the independent variables of the study, which is the circumstance in this study (Yin, 2009). The analysis was designed to seek information about agenda setting at the local level of governance in an attempt to understand what is required to achieve YRG and a local food and farm system in light of CC. The following sections reveal the specific steps of data analysis for each type of data to be collected.

Document Data Analysis

The analysis of public documents, such as official memos, minutes to county commissioner meetings, records, and archival records, were an important part of this study. It was important to provide an understanding of the characteristics of MC, so the reader has a concept of the parameters involved with agenda setting and rural farming at the local level of government. Archival data, such as public use files, offered statistical data about the federal, state, and local governments that affect YRG and possibilities for a local food and farm plan. Organizational records, such as budgets, revealed which policy issues have received attention in the past. Maps and charts of the geographical characteristics of MC were relative to the types of farming that are traditional to MC. NOAA's statistics produced the history of weather in the region in support of/ or opposition to CC. The media contributed to the study through articles about farmers and how farming has changed in MC. The collection must be complete to avoid bias selectivity (Yin, 2009). The documentary portion of the analysis was concluded before the interviews were conducted, so the researcher would have a strong knowledge base of the three streams of problems, policy alternatives, and the politics of MC.

Presentations were given by people who build greenhouses and for the new technology which supports YRG, the core information required for this study. This information was pertinent in order to be able to change systems for growing year round. Additional information about renewable resources in MC was collected; largely about recycling water, as it is one of the biggest challenges associated with YRG in greenhouses in MC. This was a big help towards advancing knowledge about the many

ways to save water. All of this information provided a preliminary understanding about facilitating or debilitating YRG and placing a local food and farm plan on a local agenda.

Interview Data Analysis

Analysis of the interviews began with transcription from the recorded files as soon as possible following the interviews. The next step was to read each transcript and listen to the interview recordings, which was critical for reorganizing the notes taken during the interviews. Any additional codes and correlations were identified during this process. The next step was in the creation of individual code documents that would serve as an organized repository for each agenda setting factor. Each table contains one factor from the agenda-setting framework and the correlating factor for ILFFP.

From this information, each question response was coded and grouped with other responses relevant to that code. Once all of the responses were collected for a particular code, they were evaluated to determine if there were any themes that could be correlated with the predicted factors.

A data summary table was created for each question in order to compare each response by each stakeholder. The descriptors were listed exactly as they appear under each category of the conceptual agenda-setting framework. How each participant responded to each of the descriptors on the horizontal axis and tallies are noted at the bottom of each column (Bloomberg & Volpe, 2008). A sample is described in Figure 9.

	Descriptor 1 Problem Indicators	Descriptor 2 Focusing Events	Descriptor 3 Internal Feedback	Descriptor 4 External Feedback
	Economy	CC	Policy Attention	Citizen Response
Interviewee 1				
Interviewee 2				
Interviewee 3				
Interviewee 4				
N = X				

Figure 9. Data summary table.

Data summary tables are working tools that create a record of who said what and how many times a response occurs. A compilation table was created to analyze the values for each of the response questions. This helped to draw conclusions about whether or not the response corroborated or dispelled the agenda setting process at the local level of government when adding the new issue of YRG. A narrative discussion will follow, comparing the outcome for local agenda setting of the LLVV with the ILFFP.

The Structure of the Narrative Report

The findings in this study were presented through the holistic tradition as recommended by Creswell, (2007). By utilizing this approach, it provided "a description of the problem, a thorough description of the context or setting, a description of the transactions or processes observed in that context, salience's at the site, and outcomes of the inquiry" (Creswell,1997, p. 196). Charts were referenced to assist in the narrative discussion and to present the positions of various respondents. I wrote with several audiences in mind, such as academic colleagues, non-specialists, research committees and research specialists, as this part of the case study report is a significant communication device (Yin, 2009). Stake (1995) suggested that "the important thing is to write for the understanding that ought-to-be, not to write down so as to minimize misinterpretation but to write up so as to maximize reader encounter with the complexity

of the case" (p. 126). An overall analysis of whether or not responses trend towards the LLVV (2010) framework on local agenda setting was evaluated as a conclusion to each discussion.

In terms of structure, I intended to draw the reader into the case with clear, logical, relevant, and credible interpretations; therefore, it was important to evaluate each response thoughtfully for accuracy, rather than for consensus (Bloomberg & Volpe, 2008). Several issues were probed further to either confirm or disconfirm the evidence for or against YRG and a local food and farm plan, where assertions were then presented about the case (Creswell, 2007). It was anticipated that the open ended interview response would be opinion based and possibly anecdotal in nature. There was not always a way for responses to be compared between the respondents. Consequently, this information was analyzed separately for relevance and inclusion in narrative form. The research was guided by the objective of the study in an attempt to provide a deeper understanding of the process of agenda setting for year-round growing through the use of greenhouses due to climate change. The strength of the research was in the in-depth and detailed analysis of the phenomenon.

Issues of Quality and Ethics

Traditional empirical research is mindful of the importance of reliability, internal validity and external validity of measures and procedures, although there are qualitative equivalents that parallel traditional quantitative approaches (Rudestam & Newton, 2007). The case study methodology has often been criticized for not being a robust methodology; therefore, the research has been carefully designed to be able to execute the

study in a manner that ensures academic integrity (Yin, 2009). Strategies to enhance issues of trustworthiness in this study included Guba and Lincoln's (1985) recommendation to utilize the alternative constructs of credibility, transferability, dependability, and confirmability for qualitative research. The criterion of credibility (validity) asks whether the participants' perceptions match the researcher's portrayal of them. One aspect of credibility involves checking on whether the researcher's interpretation of the processes and interactions in the setting is valid; therefore, triangulation made use of multiple and different sources, methods, investigators, and theories to provide corroborating evidence that shed light on perspectives (Creswell, 2007). Presenting negative findings as well as positive findings proves that I am searching for diversity in the understanding of the phenomenon that might have confirmed or challenged my expectations (Bloomberg & Volpe, 2008). Additionally, to ensure that the my own biases did not influence participants' perspectives, member checks were utilized. Member checks entailed sending the transcribed summaries to participants to review the credibility of the findings and interpretations (Creswell, 2007). A colleague examined my field notes and asked questions to help examine assumptions.

Dependability parallels reliability, yet this was not measured through statistical procedures. Rather, it provided detailed explanations of how the data was collected and analyzed, which provided an audit trail. Reliability also refers to the stability of the responses and multiple coders of data sets to determine the exact coding relative to themes, code names, the coded passages, or that the same passages are coded the same

way (Creswell, 2007). Transferability was achieved through the richness of the descriptions and the amount of detailed information (Bloomberg & Volpe, 2008).

Threats to Reliability

One threat to the reliability in this study was the fact that I am a farmer who lives in MC. It was important to assure the selected interviewees that the nature of the study is more theoretical and academic, which is why the opinions of the many stakeholders were being sought. Respondents were also informed that this study will not be publishing confidential information of any individual organization or interview.

Another threat to reliability was based on the possibility that interviewees might respond with information they thought I wanted to hear, in a reactive manner. To minimize this threat, well-crafted questions were careful not to present bias or to dig into confidential topics. Reactivity is bias due to the researcher's own thoughts, values, and emotions surrounding an issue, which requires the researcher not to disclose a personal stance on the any of the given issues. The respondents did not have knowledge of my personal views. Additionally, the stakeholders who were not directly involved in rural farming may not have been able to answer all of the questions regarding the systems associated with a local food and farm plan. To mitigate this potential problem, responses from these individuals were scrutinized for value and weighted according to the discussion.

For the purposes of this study, the data sought was reliant upon all sectors of MC. My experience within the farming sector did not have any bearing on the outcome of any one of the LLVV (2010) factors for YRG and placement on an agenda. Rather, it should

have shown that this may be something to be explored. It was the intention of the research to avoid using leading questions in interviews. The questions were developed to be straightforward, so as not to lead the interviewee to a particular response by the researcher.

I am morally bound to conduct the research in a manner that minimizes potential harm to those involved the study. Ethical issues can arise in all phases of the research process, whether it is data collection, data analysis or interpretation, and dissemination of the findings. The protection of human subjects was an important issue because it is social science research; therefore, in order to ensure that this principle of retaining autonomy was adhered to, informed consent was secured from all participants as a way for them to judge for themselves if the risks were worth taking for the purpose of furthering scientific knowledge (Bloomberg & Volpe, 2008). The five C's of research ethics principles of confidentiality, coercion, consent, care, and communication were observed during this study (Rudestam & Newton, 2007). A sample consent form appears in Appendix D.

Participants' Protection

Participant protection was critical to the success of this study. The purpose of the study and how the interview would be used was explained to each individual. Participants were recruited upon voluntary consent with an explanation that each participant had the right to withdraw from the study at any time with or without a reason. Participants were informed that they could stop the interview at any time without any consequences if necessary. Climate change is a sensitive issue currently; therefore, voluntary participation was made to be clear and explicit, especially for a person who appeared apprehensive

about social standing, job security, or friendships; reassurance was offered to those that could possibly be affected by participating, or declining to participate, and that if they withdrew, this too would also remain confidential. I identified myself to let the participant know who was conducting the study. In addition, those who were selected were informed as to why they were chosen to participate and the timeline involved. Participants were asked to sign a copy of the informed consent form and to sign another copy for the researcher. Confidentiality was guaranteed; this referred to the treatment of information that a participant disclosed. Information will never be divulged to others without permission as a way to preserve the participant's identity (Rudestam & Newton, 2007). I protected the anonymity of the informants by assigning numbers to individuals participating, so that the study represented a composite picture rather than an individual picture of the results (Creswell, 2007).

Summary

Chapter 3 examined the theoretical method of inquiry and design for the study. This study sought to examine year-round growing as a way to ameliorate the effects of climate change on farming. The concept of rural farming is beginning to change after remaining the same for decades. This case study explored and described how rural communities might be able to become self-sustaining by growing year-round through the use of greenhouses and the creation of a proper infrastructure that supports local farmers. Chapter 4 consists of data analysis and findings of the research performed in addressing the research questions.

Chapter 4: Results

Introduction

As discussed in the previous chapters, the purpose of this study was to evaluate how YRG might impact agenda-setting for local rural farm policy. The framework for this study was founded on four fundamental aspects of the agenda setting process derived by LLVV. The LLVV based four factors of agenda-setting at the local level of government on Kingdon's (2003) 13 key elements of agenda-setting at the national level of government. The study sought to evaluate each of the LLVV aspects that might enable or weaken agenda-setting at the local level of government as it pertains to YRG in greenhouses and the local policy process. The research questions posed in this study were as follows:

1. How might YRG impact agenda-setting for local rural farm policy and, ultimately, legislation for the expansion of local farm systems in an effort to mitigate CC?
2. Why is a local food and farm initiative that includes YRG not on the legislative agenda for rural farm policy at the national level of government?

This chapter presents the results of the data collection including document review and interview analysis. The discussion begins with the results and findings from the pilot study, followed by a discussion of how the interviews unfolded. A breakdown of the analysis of the interviews and study documents follows. The results are portrayed based on the data analysis methods described in Chapter 3. The first part of the discussion focuses on responses to the portion of the first research question regarding climate

change, which presented challenges related to problem identification in the agenda setting process. Agenda setting or legislation for YRG and the expansion of local farm systems are addressed separately following climate change. The last section address the second research question by presenting new criteria that emerged as a result of the study.

Preparing for the Study

The first step in preparing for the study was to conduct a pilot interview and test the interview questions. The pilot interview was planned with an individual who had spent many years working with coalitions at the local level of government. The questions were modified and restructured slightly for those individuals who were unfamiliar with public policy and to address familiar components that are inherent to the community. As soon as clearance was granted to proceed with the study from the IRB, a telephone interview was scheduled.

The pilot study revealed that some of the questions required some rewording or further explanation in order for the respondent to properly understand them. This was determined by hesitations or pauses of the respondent, or by a request for clarification about the question. In several cases, once the question was explained, the respondent understood the meaning, which indicated that the question needed to be modified. The pilot interviewee was asked specifically for feedback about the question. Some of the feedback was divulged immediately after the question was asked; however, other comments and suggestions occurred at the end of the interview. It was at this point in the process that many questions were modified for clarity. The revised questions are those reflected in Appendix A(1). The pilot interview provided an opportunity to practice

interviewing and arrive at a point of satisfaction with the questions themselves. It was important to become confident in the quality of the questions in order to conduct the rest of the interviews successfully, or on an even and consistent basis. The optional questions were used as warm-up questions for the subject matter.

Once the pilot was completed, the interview candidates were contacted via telephone or email; this contact was accompanied by a letter inviting them to participate in the study. For the most part, a positive response to the invitations was received. Twenty-one interviews were successfully scheduled, as well as two greenhouse observations, and one archival tutorial was acquired to represent all key stakeholder groups.

Conducting the Study

Twenty-one interviews were conducted over a period of 3 months. Each interview was recorded electronically using a digital voice recorder, while some interviews were answered via email. During each interview, the interview script was used as a guide to ensure that all questions were answered. It was found that in most cases, the flow of conversation rarely followed the anticipated order. If the interviewee's response focused on a specific issue that was covered more deeply in a later question, I would skip to that question in order to draw out further details about that particular interest. The interview guide helped to ensure that all questions were covered when applicable, which allowed for the most depth and performance in interviewee responses.

All of the interviewees were either stakeholders in agriculture or involved with local community interests, including respondents from all sectors of Mesa County public

officials, private businesses, and nonprofit organizations. There was some variability in the roles and positions of respondents. Several interviewees were directly affiliated with local food and farm practices as they exist currently. A number of candidates were from community and city organizations that promote the growth of small businesses on the Western Slope of Colorado. Others were associated with water, education, and greenhouses, as well as technology in support of greenhouse growing. With such a varied panel came varied responses, although in certain cases, the interviewee was only familiar with some aspects of growing or other factors and may not have had the information necessary to answer each of the key elements relative to year-round-growing through the use of greenhouses.

It is important to note that it was not always possible to ask every question of every respondent, especially if the respondent was unaware of public policy or agenda-setting. In several cases, the interviewee responded that he or she were not knowledgeable about a certain aspect of the topic. As certain questions built upon the questions of others, I refrained from asking other questions related to the question a respondent had already responded to if he or she were not knowledgeable.

Despite these minor deviations, the bulk of the information generated was rich in depth and breadth. It was important to glean a significant number of interviewees from various perspectives across the sectors to obtain a well-rounded landscape for analysis against the backdrop of the LLVV framework. In the next sections, the findings for each of the LLVV factors are presented as well as additional relevant factors discovered during the interview and document review process.

Results From LLVV Factors

The agenda-setting framework at the local level of government includes some factors that are not pertinent to the national policy process. “The elite theory of local politics stresses that community power is disproportionately distributed, and local policy formation is controlled by a relatively small number of very powerful individuals or groups whose dominant interest is business” (LLVV, 2010, p. 70). This study did not seek stated positions related to agenda-setting, CC, agriculture, or greenhouse growing year-round through the use of greenhouses, but instead gleaned responses from the context of an agenda-setting approach, or the importance of key elements and the forces at play in pre-decision local, policy-making. This section presents the research results for questions extracted from each of the 13 categories described by Kingdon (2003) at the national level of government, which were then shaped into the 4 categories created by the LLVV’s study of policy participants, attention attractors, alternate attributes, and political factors, at the local level of government. Local policy participants are explained in the next paragraph.

Local Policy Participants

Policy participants included actors from the federal government, state government, and local government. Interest groups were included as well as academics, researchers, and one nongovernmental actor. Election related actors also participated in this study. The general public was not a part of the original design, although private businesses were included. In the LLVV study, local, state, and federal government actors, as well interest groups (oil and gas companies per Mesa County), were among the first-

tier of the most influential actors in the local policy-making process. Experts (academics, researchers, and consultants), the general public, an election-related actors were identified as the next most important set of players. The media were depicted as the least important players by the LLVV, although conceptually they were included for the purpose of this study. Mesa County exhibited a similar picture of the actors' influence at the local level of government according to the LLVV framework.

Attracting attention is a key concept in agenda-setting literature, including previously overlooked information, which is based on changing social conditions and problem indicators. Focusing events were used to place an emphasis on the occurrence of natural or man-made disasters. Internal and external feedback is depicted as messages that are looped back to policy-makers, including budgetary considerations. The first portion of responses are based on these tenets, starting with attention attractors and focusing events. A summary of interviewee responses is provided for each question, along with analysis of whether or not the LLVV perspective was corroborated. The first question addressed whether or not CC affects agriculture in Mesa County as an attention attractor or problem indicator and the relationship to YRG and a local food and farm plan.

Attracting Attention

According to the LLVV, attention to problems or potential problems is a key concept in agenda-setting with several factors that can attract the attention of decision-makers, such as the intrusion of new information into the process, focusing events feedback, and budgetary considerations. These are pervasive, necessary, and powerful

indicators of problems, although the LLVV highlighted the idea that indicators are not necessarily a straightforward recognition of the facts. Kingdon (2003) said, "Precisely because indicators have such powerful implications, the methodology by which the facts are gathered and the interpretations that are placed on these facts become prominent items for heated debate" (p. 94). The first question was based on the effects of climate change as indicators of a possible future problem for agriculture.

Climate Change and YRG

Climate change is an indicator that has been discussed on the national stage as a potential problem, and interpretations of the science of climate change are based on facts that have become prominent items for heated debate as suggested. At the local level in Mesa County, there is not a debate about CC; instead, the general attitude has been that unpredictable growing seasons are considered to be "normal" for local farmers. The interviewee responses to this question were unusually one-way across respondents who had knowledge of agriculture and the unpredictability of growing seasons in general. Several respondents indicated that growing year-round is worthy of consideration, but not on the basis of climate change. Interviewee PRIV2 commented:

> The reality is that even in this past growing season with a late frost there was still a lot of foodstuffs produced in the valley. It is more saleable as a concept to the community as a way to increase overall population health to have locally grown fresh produce available for consumption. Mesa County has one of the highest rates of obesity in the State.

Obesity and food deserts are currently a genuine concern in Mesa County; these are two issues that the health department is pursuing. Interviewee PUB2 felt that CC does pose a problem for agriculture, stating that, "acquiring food should be identified and recognized as a possible problem for ordinary citizens as a result of unpredictable growing seasons." Many of the respondents expressed their opinions that the science of climate change is political in nature and gave reasons why it would not affect agriculture in Mesa County. PRIV5 stated:

> The intriguing thing about CC is [that] I was fascinated [when] the [polar] ice [was found to be receding] there were man-made structures [still there from an earlier time in history]. I struggle with having a clear conviction of what is happening, based on the evidence. I'll hold my conclusions. I suspect this is a little chicken, big frog scenario. If I look at the challenges that face us with sustainable food, it would be difficult to assess our ability for a few to feed many. World population graphs show that we have quadrupled from 1 billion to 7 billion people [this was due largely to the increase in food production in the past]. The health of humanity has improved. If we had a failure of the grid, we are 4 to 5 days away from total chaos. Farmers aren't any better prepared than anybody else to survive and are just as dependent upon Wal-Mart as anybody else. We are all vulnerable [at that point].

Another reason CC is not a concern was expressed by PRIV6, who said, "farmers have dealt with those issues [unpredictable growing seasons] for centuries and have adapted quite well," while PRIV8 stated, "CC will affect agriculture over time." PUB10

took the opposing position and stated that "local crops could potentially be affected if CC is fully realized. It would be a problem if CC affected regional growing seasons while minimizing crop production." In contrast, PRIV3 stated:

> At this point in time, I find it difficult to conclude that we have realized any permanent changes in climate patterns in Mesa County. The climatologists that I have heard speak are still somewhat uncertain about this as well, thus my opinion. CC regardless of the cause, is an integral variable in the process of producing food. Agriculturalists will always have to adjust to climatic patterns.

PUB4 thought the opposite:

> CC affects agriculture globally. Acquiring healthy food is a problem for many people in Mesa County. CC and unpredictable growing seasons can drive up produce costs and much of our local produce is shipped out of the area to places that can pay a higher cost.

PUB9 suggested that "most citizens do not consider CC as a possible problem for acquiring food. CC will impact agriculture slightly over time. It's not severe yet. Frankly, many citizens have a difficult time understanding how agriculture provides them with food." In contrast, PRIV7 countered with, "CC will always affect citizens and farmers as weather patterns change and are cyclical."

As indicated by the respondent's' answers, climate change is not considered to be an indicator that constitutes a problem. According to Kingdon (2003), "The values one brings to an observation plays a substantial role in problem definition" (p. 110). Many interviewees did not view CC as having an effect on their food supply. The evidence

failed to support the LLVV framework of CC as a problem indicator. In the next paragraph, Joe Ramey from the National Weather Service addresses CC in Mesa County.

The National Weather Service on Climate Change in Colorado

According to the LLVV, various experts are found to be influential participants in the policy process. One such interviewee named Joe Ramey currently works for the National Weather Service and gave his permission to use his study about CC across Eastern Utah and Western Colorado over the past 100 years:

> Since 1911, the climate in Eastern Utah and Western Colorado has become warmer, especially the minimum temperatures. There is also some indication that the region has seen increased precipitation. After a cooling trend from the 1940s through the 1960s, the trend towards warmer and wetter conditions has occurred since the 1970s. These general trends in regional temperatures and precipitation are matched in surrounding sites. Large decade-to-decade and site-to-site variability was noted in the temperature and precipitation data. (Ramey, 2013).

I asked Joe about the effects of CC on Mesa County. He stated:

> Things are changing here, but any way you slice the data we do get big changes here in the high desert [in general]. Anywhere I've looked back, we've had radical big events, from floods, to droughts, to wind….adding energy to the systems increases weather events. Land use may be changing the weather; [as noted] in haboobs or the disruption of soils. I've noticed that dirt is often found in the snow on the Mesa, which makes the snow melt faster----this has been occurring starting in the 1980s----less in Steamboat Springs, more down south in

> Telluride, but very noticeable here. The Earth is only 24,000 miles around. How many miles are on everyone's cars? It's not rocket science to say we are having some effect, but it's harder to say how fast greenhouse gases are changing us. It's like trying to calibrate vitamin C. Do people live longer because they have access to more vitamins? Better health care? Unfortunately, we have one sample set, Earth, with infinite variables. Climate scientists try to find variables vs. impacts. Climate models continue to be worked on. Some things are becoming very clear----forecasting is fraught with problems. There are going to be surprises in the future because there are so many sub-variables. As the models become more robust, the Earth's climate will continue to warm, sea levels will continue to rise.

Joe Ramey also suggested that I look to the government's' climate change impacts on the Southwest. The impacts on agriculture for California (one of the largest regions in the U.S. for commercial growing):

> Though climate change can benefit some crops through less freezing and increased productivity, warming beyond modest increases will likely harm the region's agriculture. California grows several temperature-sensitive specialty crops, such as apricots, almonds, artichokes, figs, kiwis, olives, walnuts, and wine grapes. Increased temperatures may make the regions that currently grow these crops unviable. The Central Valley in California produces a significant portion of the nation's food. Crop failure in this region could impact the food supply and the price of food (EPA, n.d.).

This year the Intergovernmental Panel on Climate Change reported that CC will pose a threat to global food stocks, including the western and mid-western United States, which will also pose a threat to human security (IPCC, 2014). That said, many interviewees commented that CC may ultimately benefit the Western Slope of Colorado. PRIV5 stated:

> One fascinating thing, after listening to incredible speakers of world economics…we may begin to raise wheat up into Alaska, with dramatic increases in production – the opportunity (if there's water) is tremendous. The other thing is 'what does it really mean in terms of benefits or consequences?' We can only speculate.

In contrast, PRIV8 stated:

> I believe in CC, but I think there's a 'disconnect' – people don't realize where their food comes from. When there's a shortage, then it will be viewed as a problem. I think the public as well as decision-makers might explore it, yet food is [currently] such a big system. We get much of our food from South America and them from us here in the U.S. We rely upon each other in reverse seasons for now.

While interpretations of the data indicators are not a straightforward recognition of the facts, data can be transformed from statements of conditions to statements of policy problems. CC appears as a less systematic indicator because it registered as a low-scale condition among the respondents. The next question explored sustainability and growing year-round through the use of greenhouses. The indication is that YRG may be

one of many ideas that could bubble to the top around the community and become a consideration in some way, somewhere along the line (Kingdon, 2003).

Sustainability and Greenhouses

The next question sought opinions about year-round-growing through the use of greenhouses as a way toward sustainability in Mesa County. Many respondents believed that a 'food movement' is beginning to take hold due to community gardens, farmer's markets, and the new marijuana market. Local farmers have already been trying to extend seasonal growing. PRIV2 said, "the idea of YRG of food products is worthy of consideration." PUB8 agreed that "this would be a fine idea to improve local food availability year-round." PUB5 simply said, "no." PRIV5 suggested that:

> If a farmer finds a good geothermal source [of energy] and definitely goes subterranean, somewhere like Glenwood Springs – it may work. Detroit has a huge greenhouse business, yet it would be difficult because today food is a fashion show – it must be pretty, before taste. A person would have to be very careful with what they chose to grow and be close to a good source of heat – it would work then.

PRIV 3 thought that greenhouses have proven to be an effective way to grow and they can produce a variety of food products. "in my opinion, greenhouses are a good option for growers to consider, especially for fresh produce such as vegetable products, and cool season plant products in the offseason." PUB 4 agreed that, "exploring year-round growing [provides] an option toward making more produce available to locals; however, it is costly to maintain proper temperatures in greenhouses…and it also takes a

great amount of expertise to do it efficiently and effectively." PUB3 added, "It sounds exciting and we are kicking around local economic development ideas. We believe that we should capitalize on our biggest community asset, which is agriculture." PUB6 thought that it could be tied to Colorado's rapidly growing marijuana business. PUB10 stated that, "YRG should be considered but there are also financial considerations for capital purchases." In contrast, PUB7 stated:

> I know that we already have a few greenhouse operators around that tend to stretch out the seasons. We know it can be done – it just takes someone who is willing to invest. On the Front Range, there is a huge industry…they have the population who is willing to pay more for produce. CSU has a huge greenhouse…you would have to find people who would work really hard and make questionable returns; however, there is a considerable 'back-to-the-land movement.' If the opportunity exists….if people will pay…or pay the extra costs…then, it'll get done. The demand will dictate that, but the economics would have to drive it.

PUB5 suggested, "Frankly, many citizens have a difficult time understanding how agriculture provides them with food. I would also guess that most citizens would not see year-round production through greenhouses as a way towards sustainability." PRIV1 said, "I am in support of studies that would encourage year round food production as a means to extend the growing season as well as support local food sustainability. It also offers our growers a source of revenue year-round." PRIV8 thought that "decision-makers should explore YRG. Policy-makers will eventually 'get it.' We have the sunlight

and technology to pursue YRG." PRIV6 added that, "growing through the use of greenhouses would increase sustainability, food sources, quantity and jobs. It is absolutely something that should be explored."

Almost all respondents believed that YRG was worth further exploration. This finding was not in sync with the LLVV definition of attention attractors, except the respondents' answers did include the aspect of the intrusion of new (or previously overlooked) information that could affect the policy agenda setting process, which is usually associated with changing social conditions. The interviewees would like to explore YRG for reasons largely associated with the health and well-being of local citizens. This attention attractor still did not support the framework of the LLVV by way of previously overlooked information associated with changing social conditions for agenda-setting, yet the concept of YRG and sustainability held potential for being explored.

Problems are not self-evident by indicators and oftentimes they need a push to get the attention of people in and around government. Events such as a disaster or crisis can draw attention to a problem (Kingdon, 2003). The next set of responses were based on types of weather events that pose recurring problems for agriculture in Mesa County as well as a question about the potential effects from CC in the future, if any. This segment looked at local weather in Mesa County as a focusing event indicator.

Weather Events and Agriculture

PRIV2 stated, "I cannot conceive a recurring problem for agriculture that citizens and farmers' alike feel is a problem. In my personal opinion, I do not see CC affecting

agriculture in the immediate future (over the next 20 years).” PUB8 agreed that CC will not affect agriculture in the foreseeable future - “the current threats are drought and early freezes.” PUB5 also felt that drought is a recurring event, especially in Colorado. PUB2 thought that drought was a recurring weather problem and in contrast stated “that CC will affect agriculture in the future.” Joe Ramey from the National Weather Service commented on this question:

> The first thing that comes to mind is the hay farmers during monsoon season from mid to late July (it started earlier this past year). Drought or rain and when will it come? The fruit (peaches and grapes) is impacted by early and last freezes. The wine industry was hurt by the severe cold last year, so temperature extremes and precipitation extremes will offset all climate models. When energy is added to systems, it causes more extreme events to occur – this is happening in pockets around-the-world. Eastern Utah and Western Colorado show that inversions are a phenomenon that is going to happen in certain regions – they are less likely to occur in New Mexico, for example. Inversions are a natural phenomenon, although there may be more pollutants in them, which makes them more visual. Populations have tripled. Per capita, we are driving more, have built bigger houses”
>
> In contrast, PRIV3 found that:
>
> At this point in time, I find it difficult to conclude that we have realized any permanent changes in climate patterns in Mesa County. The climatologists that I have heard speak are still somewhat uncertain about this as well, thus my opinion.

> CC, regardless of the cause is an integral variable in the process of producing food. Agriculturalists will always have to adjust to climatic problems.

PUB4 noted that, "the spring freeze has always been a problem for farmers and growers – greenhouses would solve this problem." PUB10 looked to drought conditions, extreme heat and cold fluctuations and that, "local crops could potentially be affected if CC is fully realized." PUB9 stated that:

> Even though Mesa County has a diverse mix of agricultural enterprises, many citizens associate fruit production with agriculture in Mesa County, thus late spring frost is the main weather event that impacts production. Drought is the other weather event that consistently impacts production. CC will impact agriculture slightly, over time.

PRIV1 corroborated that statement, "early below-freezing temperatures before trees and vines have gone dormant can cause 'winter kill' or damage that affects crop yields. Late frost in spring after blossoms emerge causes loss of fruit. PRIV6 stated, "CC could affect the predictability of spring freezes which would impact fruit crops and to a lesser extent other food crops. Drought is our biggest threat." PRIV7 suggested, "CC will always affect citizens and farmers as weather patterns change and are cyclical." In contrast, PRIV8 stated, "CC might benefits us; heating up would benefit us, but water may become a problem – we are dependent upon the snowpack – if we don't get snow, we don't grow."

Drought is considered to be a crisis and a focusing event that may be serving as an early warning sign, yet drought alone will not carry the topic of YRG to policy-agenda

prominence by itself. However, if it were accompanied by a subsequent water shortage, CC might be considered to be a widespread condition that needs attention. Water from Colorado's upper and lower basins is predicted to become problematic in the future based upon population alone, as indicated in earlier chapters of this study. The evidence failed to support the LLVV framework relative to focusing events. Responses to questions about the issue of water and internal feedback follow in the next paragraph

Internal Feedback and the Issue of Water

According to the LLVV, another attention attractor is based upon feedback, or messages and signals which are looped back to policymakers from existing government programs and the potential for new public problems. Water from the Colorado River is an attention attractor that elicited responses about future water restrictions, as is dividing the use water between agricultural and energy interests. An additional question in this category asked whether or not greenhouses would pose a threat to traditional farmers or oil and gas companies.

PRIV2 believed that there would not be future water restrictions:

> With the recent drought being officially over, I do not see a need to talk about potential water restrictions. I do not believe that greenhouses would be considered [to be] a threat to water supplies. Energy, in fact, is actually producing water with some of their deep well projects that is beginning to lessen their dependence on surface water for hydraulic fracturing.

PUB8 agreed that, "there are excellent water rights and agricultural infrastructure, and yes, measures have been taken by local government; also, greenhouses would have to

follow current Colorado Water Law when using water for agriculture." PUB5 concurred by stating, "We have not considered any future water restrictions in Palisade and don't have a need to do so at this point." PUB1 indicated that:

> Senior water rights rest with the State of Colorado. Lake Powell is the savings account for the upper river basin. Lake Mead takes care of the lower river basin. States such as Arizona and Nevada are working together to save water by re-electrifying their aquifers while local governments encourage people to practice xeriscaping. There is little to no tension between 'fracking' and farming because each has something the other wants. Greenhouses would not pose a threat to oil and gas, nor traditional farmers – there is plenty of water here on the Western Slope. It would be difficult to assess whether water for greenhouses should be deemed agricultural or commercial. The further a person goes West in the valley the more water would be available to growers, while the further East an operation goes, the less water is available. The question is 'can water be run year-round?' The answer is 'they are leaning toward allowing it.'

In contrast PRIV3 stated that, "local governments - no, although through Colorado Mesa University, we have provided a number of forums/seminars related to present and projected water issues. These have been well advertised and relatively well-attended." As to the question regarding agriculture and energy and dividing the use of water, PRIV3 further added:

> Good question. Two variables will drive the answer to this: (a) the cost of water and (b) the water efficiency of the greenhouse. As water becomes a more scarce

> resource, its value will inevitably increase. If left to the free-market, the cost of water may become a major variable expense related to additional greenhouse systems. Thankfully, we have a variety of greenhouse designs that can be very efficient users of water.

PUB4 added that there will always be water issues in the area, "it seems that much of the restrictions and/or regulations come as a response after-the-fact. I don't believe growing in greenhouses would be a threat to existing industries. Water is much easier to control in a greenhouse environment." In contrast PRIV4 felt that local governments have attempted to inform citizens about water restrictions through TV commercials, "however, I can see how year-round growing could be considered [to be] a threat to the water supply." PRIV4 added, "Many greenhouse operations across-the-country have already adopted capture and recycling systems. A common method of collection and reuse of water is the installation of retention basins, storage ponds, storage tanks and additional pumping capacity."

The content of feedback messages comes in the form of systematic monitoring, complaints, and bureaucratic experience, but the information that flows through channels that constitute a problem are mandates, a failure to meet stated goals, the cost of a program, or the unanticipated consequences of a public policy, as are anticipated consequences which already pose burdens on state governments (Kingdon, 2003). In Mesa County, most respondent feedback about water did not meet with these tenets, although PUB3 thought that the issue might be water for YRG because it's not available in the winter. "There may be areas of the valley where some water can be pumped

straight out-of-the-river. We supply water to Kannah Creek. There may be a way to get water from them – or year-round water from Ute Water, but can we access it? What is the cost?" PRIV1 delved into the issue and stated:

> The Colorado Water Commission and the CSU Research Center have communicated with growers, and local media keep citizens informed as to what is current with water levels and snow pack that will affect the season's water supply and river flow. Growers would have the option to buy into the concept or not of greenhouse planting. Fruit growers, especially may not because they have responsibilities all-year-round to prepare trees for the season and may not choose to branch out to another crop. Greenhouse farmers would have to own water rights or irrigation on the property they own or purchase property with them. Domestic water is not allowed to be used for agricultural purpose however gray water is not a new concept.

In contrast, PRIV6 suggested that:

> Some measures have been taken but I don't feel that enough has been done. We read about it in the newspaper or hear about it on the news but there aren't enough 'true' (non-political) forums where this is discussed. I don't feel that year-round-growing in greenhouses is a threat to existing industries. Water rights are well-defined and with cooperation between everyone as well as extensive conservation efforts, they can all work together. Some legal challenges present themselves but if the citizens, industry and policy makers work together, there can be a win-win

> situation. Water for greenhouses can be re-cycled through water storage and utilization of current waste ditch runoff.

PUB9 states that, "most citizens and almost all farmers are aware of water supply issues in Western Colorado – the Colorado Roundtable efforts are effective in informing people about water issues in the state." PRIV8 talked at length about water:

> I don't think that the local government has made a big deal about water – there are some restrictions. Everyone still 'flood' irrigates. I think that most people don't pay attention to water because we have a lot of it. Local government doesn't do too much to enforce conservation of water; however, if there's no water, there's no food. I just returned from a conference in Denver regarding water law. Western Colorado still has pre-1920s water rights – we are secure – it's publically-owned, unlike California [however it should be noted that] the population will double on the Front Range. As farmers, we will have to be responsible in the future, but we do have a renewable source of water in Colorado from the snow pack.

Most respondents did not view water as a foreseeable problem in the future and most believe that sharing water is not currently an issue between traditional farmers and hydraulic fracturing. Many interviewees thought that there was plenty of information regarding possible water restrictions in the future. Almost all of the respondents did not view greenhouse growing as a potential problem for future growing due to water recycling. (See Appendix I for information regarding water recycling). Internal feedback will be on-going as the population grows and water usage changes. Drought may play a

role in future internal feedback about water as time progresses. Water laws and water rights have not changed in Colorado since the mid-1920s. The evidence failed to support the LLVV factor about internal feedback. Internal and external feedback are both important to policymaking bodies and counted as the second most effective mechanism to attract attention to an issue. External feedback is explored in the next paragraph.

External Feedback

This question asked respondents what may enhance the likelihood of a particular public issue, such as year-round growing through the use of greenhouses, of drawing policy elites' attention to an issue and propel it towards prominence in the agenda-setting process. All respondents agreed that public input should be gathered from public surveys, listening sessions, initial workshops, and through local media to see what citizens thought about year-round growing.

PRIV2 suggested that, "public input could be gathered with all of those vehicles…my guess is that a survey would be most successful as we all suffer from time poverty, so unless someone is already passionate about the concept they will not be very likely to show up for workshops or listening sessions." PUB4 agreed, "There has to be a tremendous amount of local input. The effort would need to be community driven. Workshops with information about other communities that have this kind of initiative would be extremely helpful. This would gather input and avoid re-creating the wheel." PRIV1 cautioned:

> A public survey, promoted with local media channels could be initially conducted to see what the public thinks about a local food plan, but I would be very careful

> not to allow public comment on processes currently in place for our growers. The growers already face many regulations and policies about how they handle food. The general public does not always have an accurate idea of where their food comes from.

PUB9 stated, "I am not sure of the most effective way to educate the public about this topic. Perhaps a session at the Western Colorado Horticulture Society meeting would be a good place to start." PRIV4 thoughtfully expressed, "introduce the issue via TV commercials before conducting public surveys and encourage people to contact their local City Councilmen." PUB5 thought that, "this should be explored at the farmers level based on the market and economics; also, energy should be factored into the considerations. Open air growing is far more affordable than greenhouse production."

PUB10 stated, "All of the above-mentioned examples are excellent opportunities, including the establishment of a local YRG association. PUB8 concurred and said, "A well-though out information campaign would be required." PRIV8 stated, "Social media would help out here; like 'Facebook' – that's how people keep up with what's going on.

Many respondents were in favor of exploring all avenues that supported gathering input from the community about YRG. This feedback would be critical in order for this concept to move forward onto a local agenda towards policy. The evidence failed to support the LLVV framework about external feedback specifically for agenda setting. The next question discussed factors that enhance the likelihood of a particular public issue to draw policy elites' attention towards prominence.

Attracting Policy Attention to YRG

The responses to the following set of questions address whether or not placing an initiative on the ballot supports the development of local food systems to attract policy attention to YRG. The respondents were asked to portray factors that contribute to low/high economic growth or low/high unemployment rates in Mesa County. The third part of the question asked interviewees if there were current businesses that might work in tandem with YRG.

PRIV2 addressed these issues in length:

- No, to placing an initiative on the ballot. I see no need for a ballot initiative unless the intent is to use government funds to build a local system...something that this Chamber and others would likely oppose as it competes with the private sector.
- My question back to you is why we need policy-maker attention for the development of local food systems. If it is financially viable we have the expertise in the farming community to make it happen. I don't see this as a government issue.
- Factors impacting economic growth and employment rates locally include diversity of the economy that includes more 'recession proof' industries like health care and higher education coupled with attracting higher paid jobs to the area. Agriculture in all of its forms does not tend to contribute to higher wages.

- Our recent unemployment has been driven by large layoffs in several energy sectors including natural gas and coal. Those layoffs have affected many local businesses from auto dealers to insurance agencies. In total we have now lost almost 6000 people from the labor force that went elsewhere to see employment. Job creation that encompasses high wages has to be the top priority for building the economy.
- Yes, there are ideas that work in tandem with existing businesses for job creation. We need companies that can service our existing manufacturing base, take advantage of our abundance of energy to increase manufacturing jobs (which pay much more than service jobs), and capitalize on our hub as a health care center. With regard to your concept of YRG, we have one facility in Palisade that currently does that and their employment base is small. Existing restaurants could potentially be customers of YRG facilities, but otherwise I see no major connections.

In contrast, PRIV6 stated the following:

- Yes, Mesa County officials should consider placing an initiative on the ballot that supports the development of local food systems; however, politicians are not the best group to take the lead. This must be citizen and industry-driven with the role of local government as a conduit to the ballot.
- A well-rounded advocacy group consisting of the agriculture/energy/ranching interests and various citizen groups might attract policy attention. Mesa County tends to vote ‘no’ on anything that appears to be a tax, subsidy, or

radical idea. Voters need to be convinced by their neighbors 'there's something in it for everyone,' and bringing those groups together to advocate to their neighbors is key. The local culture contributes greatly to this challenge.

- Since the energy bust in the 1980s the economy of Mesa County has diversified, but not to the extent that we're balanced enough to withstand economic downturns. We need more industries that are not as impacted by seasonal and short term economic swings. I think that Mesa County is doing a good job of being an attractive community to business. We just need to 'grow up' and get into the twenty-first century. Mesa County is still heavily resistant to change.

Most of the respondents did not see YRG as an issue that should be driven by the government. PUB8 stated that, "public interest would attract policy attention to YRG." PUB 5 answered with a definite, "No, there should not be a ballot initiative. This is a private industry issue and the government in no way should be encouraging or forcing the burden and expense of greenhouse production." PRIV3 added, "No, there are a number of existing opportunities for people to learn about producing food, or starting a new business. The economic environment is such that there is room for local producers to be profitable, thus I don't see the logic behind the subsidization of new growers." PUB4 agreed, "I don't see this as a county government-driven issue. It seems to be along the lines of nonprofits and CSU extension activities." PRIV4 contributed this, "the Mesa County government officials could consider a tax break or some other incentive that

would support the development of local food systems. Raising taxes would not be an incentive." Again, the opinion of PUB6 is in concurrence, "if there is a food movement, the locals would have to supply it. It might be a better idea to apply for grants and make a model so that commercial growers don't get their hands on it (the concept of growing in greenhouses)." PUB7 stated directly, "I'm a free-market kind of person, not a proponent of the Federal government being involved." PUB 9 stated:

> In my opinion, Mesa County government should not place an initiative on the ballot to support local food systems. I believe the Colorado Department of Agriculture should continue to be responsible for developing programs to assist Colorado agriculture market locally, regionally, nationally, and internationally. YRG, like any other agricultural enterprise, needs to be economically profitable and independent of policy incentives.

PRIV1 suggested, "I would not support government control of the food supply or production unless the role of local government would be in the form of grants or tax incentives to participate in YRG for the grower. Community gardens and CSAs should be encouraged and supported." PRIV7 thought that a ballot initiative is unnecessary, "policy attention to YRG might be attracted by one-on-one discussions with local officials." PRIV8 stated:

> No to placing an initiative on the ballot for a local food system; however, I do think there should be more of a movement to encourage young people [to farm]. Farm land is decreasing. It's hard to get the government involved, but they [have the power] to promote the use of programs.

It became evident that most of the respondents did not want the local or federal government involved with YRG through the use of greenhouses, although many good suggestions came as a result of this question. The evidence failed to support the LLVV factors failed to support placing an initiative on the ballot. The final question of this category of attention attractors addressed the costs, benefits, challenges, and opportunities of building a local food and farm plan that included YRG in greenhouses, as well as suggestions for financial resources to generate such a plan.

The Costs and Benefits of YRG

Budgetary considerations were answered in a question which asked about the costs and benefits or the challenges and opportunities of building a local food and farm plan that included YRG in greenhouses. Budgets were mentioned in the context of being either favorable or unfavorable relative to generating a local plan. PUB8 believed:

> It could increase the fresh food availability, decrease transportation energy costs and increase tourism dollars. The cost of infrastructure could be enormous; also the lack of water could be another major issue. The financial resources could be generated through existing operations with capital, loans from banks, and state or federal grants.

Many respondents did not feel qualified to answer budgetary questions. PUB5 stated, “This should be a business decision by the business and not supported by government.” In contrast, PRIV4 suggested:

> There is a growing need for safe, healthy, and natural food items, and what seems like a decreasing amount of space to grow healthy organic food in nutrient-rich

> soil. Growers are always looking for methods which will save energy, reduce pollution, grow more and higher quality crops, and they want something affordable. Underground greenhouses are a preferred method for the environmentally conscious grower.

PUB9 was very succinct:

> The potential benefits would include fresh, local foods, and local economic benefits. The costs would be the initial investment and increased risk. The opportunities would be a better utilization of local resources and demand for local food products. The challenges would be profitability, markets, production techniques, and competitive advantage.

The LLVV found that budgetary concerns were considered to be the most critical factor in shaping the local policy agenda and shifting policy priorities. In their study, budget realities dictate local priorities and might become a focal point for citizens due to the increase of federal funding for large scale, local projects, which held true in Mesa County as well. Most of the respondents did not want the federal government involved for this very reason.

PUB10 stated:

> Costs would be the initial capital investment of land acquisition, the plants, greenhouse constructions, coolers, loading equipment, lighting, fertilizers, irrigation systems, including site permits and design, utilities, waste removal, water rights, transportation, advertising, and labor. The benefits would be fresher

local produce, and a smaller carbon footprint. Financial resources might come in the form of private funds, state and federal grants.

PRIV6 commented:

> Most benefits have a cost associated with them. The true question is, 'are the benefits worth the cost?' I'm not sure what the costs are but the benefits in my eyes are increased employment/decreased unemployment, increased exports from the county, increased tax revenue, locally grown, healthy food for our citizens and potential partnerships with education (School District 51 and Colorado Mesa University).

PRIV8 concurred:

> I'm a little bit biased, but it would be good for [local consumers] to know where their food comes from, the retail outlets…there'd be more business, it would create jobs (maybe not tons of jobs), but it would teach and educate people about the process…there are tons of benefits…it would encourage growth.

PRIV7 was not entirely sure, "but I would think that locally grown food would be less expensive. I think that creating a task force might be helpful to assess the challenges and opportunities. I would think that state and federal grants might be available." PRIV 1 did not know that the costs of a plan would be:

> It would depend on what the plan looked like, what the anticipated yield of produce was, how many families would have access to the food and what their investment would be. The resources as I said earlier could come from grants or the community where the greenhouse would be established.

The LLVV believed that local and state budget allocations affect agenda setting and policy formation, especially if a project relied upon federal funding. Kingdon (2003) said that a proposal must be shown to have tolerable costs (even though he was addressing the issue of a federal budget); in addition, proposals must be acceptable to the public. The LLVV stated the importance of fairness, equitable sharing of costs and benefits, effectiveness, and efficiency as being important attributes for policy survival or selection. The evidence failed to support the budget portion of the LLVV framework toward agenda setting, but again did support YRG.

Alternative Attributes

Technical Feasibility

Technical feasibility is concerned with the technical aspects of a proposal, such as its technical specifications, logical consistencies and practical feasibilities. PRIV2 responded, "Only if such a feasibility study does not come at the cost of other economic development activities currently being funded with tax dollars. I think a study may be premature until there is a greater buy-in of the concept…otherwise it will simply languish on a shelf." PUB8 answered, "I think the technical aspect is not the difficult one; the real issue is adoption by producers." Again, PUB5 stated, "this should be a business decision by the businesses and not supported by the government." PUB2 responded, "No, I think the political will needs to be measured and confirmed long before any technical analysis is undertaken." In contrast, PRIV4 stated, "a technical feasibility study should be conducted to see if it is possible." PRIV3 cautiously stated, "I'm not sure what all may be behind the term technical feasibility study. I would suggest developing a group of like-

mined individuals to explore the questions." In contrast, PUB10 thought, "yes, a technical study should be conducted, including financial considerations." PUB9 stated:

> In my opinion, every business venture should prepare a business plan to determine its potential opportunity for success. I am not sure how a feasibility study for a local YRG food system would be conducted unless it would help determine if there is a local market for year-round-grown food products at a profitable price.

PRIV1, 7, and 8 thought a technical feedback study would be appropriate, and especially if grant money could be obtained to conduct such a study.

"Even faulty ideas can be trial balloons" (Kingdon, 2003, p.130). The author believes that advocates of a proposal must delve deeply into the details and technicalities, while paying close attention to the feasibility of implementation as well as the actual mechanisms the idea demands. He further contemplated that without this step, a proposal will probably not survive. For the most part, interviewees supported a feasibility study as the LLVV framework indicated, but not for agenda-setting, but rather YRG. Many respondents believed that it would be an appropriate step in moving forward in the infancy of the concept of YRG.

Value Acceptability

According to Kingdon (2003) "some of the participants' values are composed of their view of the proper role or size of the federal government vis-à-vis the states and localities and their view of the proper size of the public and the private sector" (p. 133). The author indicated that views on the above-mentioned issues affect the alternatives that

are proposed or opposed; hence liberals often support larger government roles, while conservatives often oppose them. The next segment includes the responses to the question regarding placing a local food and farm plan with YRG being placed on an agenda for local farmers and growers.

PRIV2 stated that, "people should be shown the cost/benefits of such a plan…they will then make their own choices as to whether to participate or expand in that direction." PUB8 said, "People have to adopt the idea. First adopters need to show success and the mainstream producers will follow over time." In contrast PRIV5 stated, "The political strength or power of food producers is practically 'nil' due to overzealous regulatory state/local agencies with layers of regulations." PRIV3 supported this approach:

> To begin with, identify an economically realistic segment of the food production system that can be supported by local growers. Assuming that this segment of the food system can be successfully supplied by local growers [then] work to expand it [to include] additional food products. This would involve a combination of additional growing/marketing expertise, along with active marketing with the consumers to convince them of the benefit of consuming the locally grown products.

PRIV4 believed that, "discussing YRG with local farmers would be a good place to start. This would help to set-up an agenda." PUB10 offered, "I would think it would depend on the interest level and the feasibility of YRG indicated by the initial studies and surveys." In contrast PUB7 stated:

> An agenda won't dictate YRG; the demand will dictate that, and the economics will drive it. I'm curious about what you might learn from the Front Range because they have 4 million people who have the income to spend the extra dollars. I'm not a big supporter of government subsidies…big commodity crops are all subsidized. I'm a free-market-type-of-person, not a proponent of the federal government being involved.

PUB9 felt that interest might be generated at the Western Horticulture Society meeting. PRIV1 stated, "There is a week-long conference of the Horticultural Society and CAVE Association that includes most of the growers on the Western Slope every January. I think contacting them and having this topic included in a seminar would be a place to start." PRIV6 wasn't really sure, "but without the effort, the idea would struggle. In my industry projects require a 'sponsor,' someone within the company that has influence, passion, and a level of authority to move a project forward. This might work." PRIV7 wasn't sure that an agenda for local farmers and food growers could be developed. PRIV8 added, "You know, it's a hard thing. People don't like being forced. The importance of education is paramount, then let [the people] make a decision."

The LLVV noted that technical feasibility, value acceptability, and anticipation of future constraints were cited as important attributes for a proposal's success, which concurred with respondent sentiment. Technical feasibility is concerned with technical specifications, logical consistencies, and practical feasibilities, while value acceptability refers to a proposal's fitness in the mainstream values of a policy community, and future constraints are generally budgetary, based upon public acquiescence and support or

opposition of elected officials (Kingdon, 2003). This portion of the LLVV framework failed to support the factor of value acceptability as being important to agenda-setting, but to the concept of YRG.

Anticipation of Future Constraints

Kingdon (2003) noted that as an initiative's saga unfolds, some constraints will be imposed on proposals that are adopted, so therefore proposals must be acceptable to the public. The next set of responses includes attitudes relative to warehousing, storage, and delivery systems, as well as the advantages and disadvantages of using technology with growing and the use of renewable energy in greenhouses.

PRIV2 stated, "Warehousing, storage, and delivery systems would have to be economically viable." PRIV3 asserted:

> Governmental participation should be limited to safety in food processing and handling of warehousing, storage, and delivery systems. Technology is a very broad term. Certainly many forms of technology can be used to enhance the efficiency of a greenhouse system. Although greenhouses can be easily adapted to incorporate 'alternative' sources of energy, from an economic point of view there are few if any competitive advantages in the short-term, unless the capital expense can be off-set through tax credits, or incentives. The energy required for light and ventilation can be generated through alternative energy systems (solar, geo, wind, etc.). The major limitation in alternative energy technology continues to be the storage of the energy. The university could work with local interest in the design and development of a model system for the purpose of educating future farmers.

PRIV4 looked at future constraints another way:

Local grocery stores already sell locally grown foods. YRG would allow these stores to sell locally grown foods all year round. This system is already in play and should not pose a problem. YRG would provide more income for local farmers and increase business for local truckers. Also, it could possibly cut the cost of produce for local stores. An education in greenhouse growing and technology could be advance through our university. It would be a great way to help the university generate revenue for Mesa County.

PUB10 suggested that:

Surveys at farmer markets and input from local produce sellers might produce better results. Establish a network of private local haulers and transport when the produce is freshly picked to minimize storage requirements. Technological advantages would include: reduced operating expenses, additional revenue sources, marketing to various segments of the community, more support from industry [and the political sector] and greater involvement from local partners. The disadvantages: the upfront costs for the initial installation or lack of technology. There may be opportunities for the university to expand current agricultural curriculums which may potentially increase enrollment at the college.

PRIV1 stated:

The popularity of our farmers markets during the summer months proves that there is a desire to purchase locally grown produce fresh from the grower. The ability to have it year-round is a wish come true. Transportation would be no

different than it's done now. The challenge would be for the big box stores to purchase locally for a higher price than they are paying for volume purchasing through national contracts with commercial growers. Solar energy used in greenhouses can save on overall costs; however, a disadvantage would be the initial cost of installation and ROI. If the greenhouse was subterranean the annual costs of controlling temperatures and growing conditions would be lower. Lighting would be a factor for subterranean growing. I think CMU is already ahead in agricultural curriculum and research.

PRIV6 added:

I can't state anything specific but technological advances should make this project possible. The valley has multiple energy source potentials including renewable (sun, wind, hydro, methane recapture). A hybrid approach would most likely be necessary. Cost may be a disadvantage, which is why I believe a hybrid will be necessary.

PRIV7 suggested that:

One way to assess consumer interest would be for CMU to conduct a consumer study. Perhaps tapping into the Incubator and the Chamber of Commerce would be a good resource to find a way to create trucking, storage, and various support systems. Technology and renewable energy would be a great benefit for YRG. I can't see any disadvantages. I would think that CMU would want to consider this as an option for the technical institute. A year-round-growing-season would benefit any community.

The LLVV framework did not support the anticipation of future constraints as a factor in agenda-setting. Policy compatibility was also an important attribute for an alternative's survival at the local level of government to be in tandem with national policy. The LLVV suggested that all local politics and policymaking are operated under federalism and alternatives are usually required to be in accordance with a higher level's policies, regulations, and programs. New proposals that are compatible with state or federal policies have a greater chance to survive the policy process.

Political Factors

According to the LLVV, major components and events in the political stream include swings of political mood, interactions among organized political forces, personnel changes in government, battles over issue jurisdictions, stresses and crises, and consensus and coalition building. National and regional events can determine how issues are prioritized at the local level of government. The next discussion addresses the local social climate.

The Social Climate

Creating fertile ground to promote some items on policy agendas or to restrain others from rising to prominence may come in the form of the initial receptivity to the idea of YRG. The social climate will affect the outcome when making new proposals (Kingdon, 2003). The following responses answer the question about factors that would best describe the social climate in Mesa County. PRIV2 said, "Socially and financially conservative." PUB5 stated, "Conservative, independent, and community-oriented." In contrast PUB2 said, "economically, we are still in a recession, but our overall quality of

life is higher than average." PRIV3 added, "Lower income, high level of unemployment or underemployed." PRIV1 countered, "Mesa County has a social climate that revolves around outdoor recreation, art and theater, and festivals. As an organization that deals with tourism, the feedback from visitors is that this is a very friendly community." PRIV6 suggested that, "it's conservative but caring. In my opinion it's too heavily focused on 'let the churches take care of it.' This is a very cautious community that resists change regardless of the benefits it may bring." PRIV7 agreed, "Conservative." PRIV8 finished this segment:

> I think that we have a very...not super diverse group. We are white America in Mesa County – there's not a huge gap in financial class. The majority of the population is middle-class, hard-working people – it's not Aspen. We have a population that is quite poor; they're just trying to eat, get the most food at the least cost. It would be great to get this part of the population involved with fresh food.

The social climate in Grand Junction portrays a community that is not conducive to change; however, the LLVV factor based on social mood failed to support the evidence for agenda-setting. In the next paragraph, organized political forces will be addressed as the next tenet.

Organized Political Forces

The LLVV noted that well-organized political forces with power and influence from money or from existing systems can significantly impact local policy issues, and citizens might have a difficult time competing against well-financed interests. Kingdon

(2003) suggested that, “much of the time a balance of organized forces mitigate against any change at all” (p151). The following responses address the prominent issues in Mesa County.

PRIV2 stated, “Jobs and the economy, infrastructure, including roads and cultural assets such as the Avalon [Theatre], planning and future growth. Agriculture is not a frequent issue other than insuring that urban sprawl does not infringe on agricultural growth areas.” PUB2 suggested that, “agriculture is an issue that frequents policy agendas.” In contrast, PRIV3 stated, “the most prominent issues seem to be good employment opportunities. I don’t believe that agriculture is a major policy issue at the county level.” PRIV4 suggested, “Buying locally is a prominent issue and this could be an avenue to pursue for YRG.” PUB10 said, “I don’t know this answer completely, but Mesa County prides itself in its variety of agricultural activities; from peaches, apples, corn, additional crop types, to wine production.” PUB3 added, “A new agricultural product is marijuana. Pot production… could be tied-in with YRG.” In contrast, PUB9 stated, “energy development is the prominent issue in Mesa County. In my opinion, agriculture is not a major local issue.” PRIV1 stated:

> The future supply of water is number one; growth, employment, air and ground transportation, and air quality. I don’t believe agriculture needs to be on the forefront of local policy-makers' agendas unless it is about land conservancy or irrigation runoff. Again, growers are regulated by federal standards and policies that do not need added local policies.

PRIV 6 stated, “Underemployment and unemployment are probably tops but future opportunities for our youth are close behind, and in some cases go hand-in-hand.” In contrast PRIV7 said:

> As agriculture is one of the top three industries in Mesa County, it is discussed on a regular basis. Mesa County Land Trust was founded to assist in buying up agricultural land that could potentially be developed for residential or commercial use.

PRIV8 suggested that, “I’m all about agriculture and [the onset] of development. When it comes to farmland, we won’t be expanding into the desert. The diminishing farmland is an issue – when it disappears, it’s gone.”

The LLVV noted that national and regional moods also play a role in issues that compete for agenda status and that national or regional events can determine how issues are prioritized at the local level of government. The social mood can characterize the policy community for an entire region, which is in line with the attitudes of Mesa County, as the organized force of energy development has held the attention of the local community for decades. The LLVV framework failed to support organized forces as a tenet to achieve placement on an agenda. The next paragraph addresses changes in government.

Changes in Government

Some of the most powerful turnover effects are those involving key personnel or a change in administration because the administration is at the top of the list of actors involved in policy-making (Kingdon, 2003). Competition of issue jurisdiction is very

important in local agenda setting and alternative specification. Observers noted that well-organized political forces, with power and influence can significantly impact local policy issues (LLVV, 2010).

The responses to the question about a change of regime in county commissioners or city officials were mixed. PRIV2 stated, "Neither commissioners or city officials should change…you are giving both boards too much credit for a concept like this…it must be embraced by the private sector." PUB5 agreed that neither the city nor the county should change. PUB2 thought that a change of regime "had never been brought up as a critical policy issue, so I would guess no at this point." PRIV3 said, "I have no idea. It would depend upon who would replace them." PRIV4 thought, "There is always room for improvement. The current councilmen do have experience in water irrigation and maybe they would help to promote the local food and farm plan." PUB10 offered, "Any support from local/regional/state politicians can help with promoting and encouraging YRG." PUB9 thought, "Probably, depending on who gets elected and their backgrounds." PRIV1 was thoughtful, "a change in regime on any level would sway support either way. The need would be to recruit the right candidates who support the policy in the first place…or have a very strong public outcry for change." PRIV6 stated:

> Regarding county commissioners: Absolutely, we are about to lose the most prominent advocate for agriculture on the commission in the past 10+ years. The recent makeup of the commission has been too focused on political and polar issues. I've felt for a long time that the commission should be a non-partisan election, like city council. Mesa County is way too political and politics come

> first with most of our influential citizens. Mesa County needs some 'true' leaders that can put politics aside. Regarding city council: Not so much so but still reflective of the comments above. Although you didn't ask one of the biggest detriments to this effort could be the GJ area chamber of commerce. They are too involved in the politics of the city/county to the detriment of small and minority businesses.

PRIV7 added, "These are elected officials that would need to be educated on the potential of this new industry." PRIV8 concurred, "I think when you get someone in there who has lived the farm life, not just a hobby farm, then the passion would change the direction of growing and more attention would be paid to farming."

The evidence failed to support a change in regime of local elected officials and was not considered to be critical to agenda setting. Most of the participants did not believe that local government affected local issues either way. In the next paragraph, Jurisdiction will be explored.

Jurisdiction

In addition to changes in the regime, the second central governmental process involves jurisdiction due to the impact of constitutions, charters, statutes, and most importantly at the local level of government, regulations. Therefore, the question that was asked was about YRG being placed on an agenda, or if the concept should be a free-market enterprise. Almost all of the respondents thought that YRG should be a free-market enterprise and did not want the government to become involved due to over-regulation. PRIV2 thought, "It should be considered a free-market enterprise." PUB5

said, “free market - do you know how many acres are in agricultural production in Colorado? Have you thought about how big/many greenhouses it would take to make a significant impact?” The fact is greenhouses and layered LED lights can produce massive amounts of food with less energy, according to the greenhouse grower interviewed. PUB2 stated, “No, it should not be on an agenda. To my knowledge, this is not a legislative issue, so no, I don’t believe so.” PRIV3 agreed, “Free-market enterprise.” PUB9 and PRIV8 both said, “Free-market enterprise.” PRIV1 pointed out, “always a free-market enterprise – I would never support a federal mandate to force communities to grow food supplies.” PRIV6 agreed that it should be, “a free-market enterprise because if done properly it can be a stepping stone to a better Mesa County.” PRIV7 was the only interviewee to state, “A public-private partnership.” PUB7 stated:

> I’m a free-market-type-of-person; not a proponent of the federal government being involved. I think local growing must be driven by the market and I believe that our health mecca concept is already happening. I think there is a great deal of an increasing awareness in consumers (regarding food). The produce departments in all of the supermarkets have grown. If you go to a more boutique-type market like Sprouts, you find organic food in them. It’s more expedient to grow in the Imperial Valley in southern California and Mexico – economics favors the way it has always been done – it supplies 89 to 90% of our produce. Well, there would be a demand for year-round produce, but the economics of growing in a warm climate makes more sense. Then we put it on trucks and ship it in.

According to LLVV "The balance of organized political forces, key personnel turnovers in government and competition of issue jurisdiction are also very important to local agenda setting and alternative specification" (p.84). Kingdon (2003) believed that all participants have a stake in preserving current sources of funding and jurisdictions. The evidence failed to support the factor of jurisdiction as being important for agenda-setting. Most participants viewed YRG as a free market enterprise.

Consensus or Coalition Building

Kingdon (2003) believed that consensus is built through the processes of persuasion and diffusion. In addition, a good idea can catch on, while a bad idea can do the same. Potential coalition supporters are enticed to support a concept based on promises of benefits, while others do not want to be left behind. According to the LLVV, the local policy process is influenced the most by consensus and coalition building. The interviewees responded to a question that asked how supporters might become enticed to support a local food and farm plan with YRG starting in the next paragraph.

PRIV2 thought that, "if the farmers are on-board, the rest of the community will likely support them." PUB5 stated, "Contract with a farmer to buy their goods directly and be willing to pay 200-300% more for your food." In contrast, PUB2 stated, "stakeholders need to be talked with and organized with a cohesive set of plans and ideas." PRIV3 said, "To begin, identify an economically realistic segment of the food production system that can be supported by local growers – convince consumers about the benefits of locally grown foods." PRIV4 added, "Generating more revenue for the county and themselves would entice potential coalition supporters." PUB10 agreed, "In

my opinion, the level of financial impact for their particular business plan can expand their revenue opportunities and create new markets." PRIV7 stated:

> The bulk of our consumers get their groceries from big chains; however, during the summer months, the big chains can't compete with local farmers. If they don't have local peaches, they don't sell peaches. They respond to consumer demand. Did you know that the wineries and peaches are what this area has become about…tourism, not [to see] the Monument, but [to take tours about] farming.

PUB9 said simply, "Education." PRIV1 said, "have conversations with them as to why it is important and how it could benefit the community; but they would need the support from those promoting the idea." PRIV6 stated:

> That's the $10,000 question and unfortunately I don't have an answer. I do know that it'll take a good 'sales pitch.' I remember the first time the new Public Safety complex was introduced and the selling point was, 'it'll cost you less than a meal at McDonalds.' I found that insulting, demeaning and condescending. For some families, a meal at McDonalds is an extravagance and something they save up for. I feel this type of approach dooms a project from the start.

PRIV7 suggested, "Education, education, education." PRIV8 stated:

> Education – people should know how their food is produced. It starts with young kids. When you ask them where their chicken sandwich comes from, they say, 'the store.' When it's explained, the seed is planted. This generation wants to make a difference – the goal is a good thing for many.

The LLVV emphasized the importance of consensus building and considered this to be the most powerful factor in agenda-setting at the local level of government. They also agreed with Kingdon (2003) noting that a community must 'buy-in' with 60 percent of the people agreeing to vote in favor of an issue and still, controversies can erupt when one group gleans benefits over another. Most of the respondents in this study believed that educating citizens about YRG would be the best method for beginning to build a consensus to grow year-round. The LLVV framework failed to support evidence regarding the importance of coalitions and consensus building for agenda-setting, but instead as a way to promote the concept as a free market enterprise.

Conceptual Agenda-Setting Framework

	Descriptor 1		Descriptor 2	Descriptor 3	Descriptor 4
	Problem Indicator		Focusing Events	Internal Feedback	External Feedback
	CC	Sustain	Weather Events	Water Issues	Public Input
PRIV2	x	x	x	x	x
PUB8	x	x	x	x	x
PUB5	x	x	x	x	x
PUB1	x	0	0	x	0
PUB2	x	x	x	x	x
PRIV5	x	x	0	0	0
PUB12	x	0	x	0	0
PRIV3	x	x	x	x	x
PUB4	0	x	x	x	x
PRIV4	0	x	x	x	x
PUB10	x	x	x	x	x
PUB3	0	0	0	x	0
PUB6	0	0	0	x	0
PUB9	x	0	x	x	x
PRIV1	0	x	x	x	x
PRIV6	x	x	x	x	x
PRIV8	x	x	x	x	x
PRIV7	0	x	x	x	x
Total	12	13	14	16	13

PUB11 Expert Participant
PUB12 Expert Participant
NON-1 Church Participant

Conceptual Agenda-Setting Framework continued.

	Descriptor 5	**Descriptor 6**	**Descriptor 7**	**Descriptor 8**
	Budget Local Food Systems	Costs/Benefits Food & Farm Plan	Tech Feasibility 'How To'	Value Accept. Delivery System
PRIV2	x	x	x	x
PUB8	x	x	x	0
PUB5	x	x	x	x
PUB1	0	0	0	0
PUB2	x	x	x	x
PRIV5	0	0	0	x
PRIV3	x	x	x	x
PUB4	x	0	x	0
PRIV4	x	x	x	x
PUB10	x	x	x	x
PUB3	0	x	0	0
PUB6	x	0	0	0
PUB7	x	x	x	0
PUB9	x	x	x	x
PRIV1	x	x	x	x
PRIV6	x	x	x	x
PRIV7	x	x	x	x
PRIV8	x	x	x	x
Total	15	14	14	12

PUB11 Expert Participant
PUB12 Expert Participant
NON-1 Church Participant

Conceptual Agenda-Setting Framework continued.

	Descriptor 9	**Descriptor 10**	**Descriptor 11**	**Descriptor 12**
	Future Constraints Agenda	Political Mood Social Climate	Political Forces Issues	Regime Change Officials
PRIV2	x	x	x	x
PUB8	x	0	0	0
PUB5	x	x	0	x
PUB1	0	0	0	0
PUB2	x	x	x	x
PRIV5	x	x	0	0
PRIV3	x	x	x	x
PUB4	0	0	0	0
PRIV4	x	x	x	x
PUB10	x	x	x	x
PUB3	0	0	0	0
PUB6	0	0	0	0
PUB7	x	0	0	0
PUB9	x	0	x	x
PRIV1	x	x	x	x
PRIV6	x	x	x	x
PRIV7	x	x	x	x
PRIV8	x	x	x	x
Total	14	11	10	11

PUB11 Expert Participant
PUB12 Expert Participant
NON1 Church Participant

Conceptual Agenda-Setting Framework continued.

	Descriptor 13	**Descriptor 14**
	Policy Objectives Agenda/Free Market	Coalition Support
PRIV2	x	X
PUB8	0	0
PUB5	x	x
PUB1	0	0
PUB2	x	x
PRIV5	0	0
PRIV3	x	x
PUB4	0	0
PRIV4	x	x
PUB10	x	x
PUB3	0	0
PUB6	0	0
PUB7	x	x
PUB9	x	x
PRIV1	x	x
PRIV6	x	x
PRIV7	x	x
PRIV8	x	x
Total	12	12

PUB11 Expert Participant
PUB12 Expert Participant
NON1 Church Participant

Figure 10. Conceptual agenda-setting framework.

A Blueprint for Mesa County

The Iowa Local Food and Farm Plan (ILFFP) is a well-researched approach for agenda-setting and policy that was designed for the State of Iowa. The Leopold Center for Sustainable Agriculture offered an advanced strategy which outlines some of the necessary actions a state may want to consider in order to implement such a concept, while this study portrays Mesa County at the earliest stage of an idea's conception. Many regions of Colorado have coined the phrase, 'a food movement' to describe a rise in the demand for freshly grown food produced in their local communities. In Mesa County, the demand for local food is becoming more evident by the amount of citizens who attend local farmers markets and CSAs each summer. Local food commerce is a driver of local and state economic growth, yet there could be many peripheral benefits that may also surface that currently do not exist. Fresh fruits and vegetables that are grown locally could provide a wide range of benefits for a community's health, such as: food security, the elimination of food deserts, and a way to combat childhood obesity.

The 'inputs' portion of ILFFP assesses the challenges involved with building a robust local food economy, including policy and regulatory changes, state investments, such as the leveraging of federal, foundational, and private investments (grants and loans), the coordination of research, education, and planning. The Leopold Center's recommendations provided a roadmap for the many complexities that are involved with making subtle changes to large systems. In order to increase local food sales across the state of Colorado, it would be critical for farmers to have systems they could utilize. Mesa County interviewees agreed that growing year-round through the use of

greenhouses would be worth exploring because it could extend the growing season. In addition to growing year-round, building a local food infrastructure would be a requirement, yet in turn it might also help create jobs, provide business opportunities for young, technological farmers and offer opportunities for outlier businesses to grow.

Public awareness campaigns would be necessary to explain the costs and benefits of providing a local food system for Mesa County. Conversations about farmer training, business planning, laws of land (commercial or agricultural business), labor, equipment, and financing are highlights of ways to inform citizens. Higher education is essential for future growers, plus it provides an avenue to ascertain help from state agencies or to secure resources for research, education and technical knowledge. Entrepreneurs and business will face the challenge of creating building supply chains capable of delivering large volumes of farm products to regional markets (2011).

Today, greenhouses are already being utilized around-the-world to provide continuity in local growing with the goal of achieving sustainability; most notably in Spain, Australia, and Denmark. Two greenhouse observations were conducted for this study and follow on the next two pages. Greenhouse Observation A was designed by a church (Figure 11). Greenhouse Observation B is a commercial greenhouse (Figure 12).

Observation A

Nonprofit Greenhouse
Length of Activity: 90 minutes
10/11/2013 1:00 p.m.

Descriptive Notes	Reflective Notes
8 acres that connect the community 8000 square feet of growing space	Will grow under worst of conditions
10,000 pounds of food in the first year Hydroponics - 10,000 fish Aquaponic - no chemicals Pipes go through compost to heat greenhouse	Share knowledge Plants and seeds donated Does not leach- grow on parking lot 2 acres can grow thousands of pounds of food
Church representative gives a brief background on unique system. Tub with goldfish fills and flushes to bring all nutrients to plants; pulls down oxygen for plants and fish. The overflow kicks on as the water fills, which causes a vacuum and takes all the water out of the tub. Pump cost $75.00. Just need to circulate the water. One unit takes 175 gallons of water/ 35 pounds of fish; 5 tubs to accommodate the fish. Lava rock acts as the filter, is not expensive and is pH controlled. To break down the waste, ammonia changes to nitrites and worms are used to break down dead roots.	Tilapia fish are also used. Can't put fertilizer on the plants; it would kill the plants, fish or worms. All natural.
The plants are grown at 65 degrees but can go as low as 35 or 40 degrees for tomatoes.	
This greenhouse was originally a calving barn. The skin includes 2 layers of plastic with sections of insulation on bottom hips. A boiler system is used instead of heating the air. If the greenhouse was subterranean, it would be around 4 feet into the ground to control for heat and cold.	A homeowner could do this. It is not difficult to grown self-sustaining communities.
The church is a training center (an educational tool) used for teaching growing in other regions, and teaches exchange students to grow this way. Teach one person, teach a community.	Don't need a large greenhouse. Grow-beds used for filtration.

Figure 11. Observation A: Nonprofit greenhouse.

Observation B

Commercial Greenhouses
Length of Activity: 90 minutes
1/18/2014 2:00 p.m.

Descriptive Notes	Reflective Notes
20 greenhouses	Temperature in mid-20s outside
4 heaters to heat all greenhouses	Very warm - forced heat
Uses domestic water. It is possible to recycle water, but need a holding pond for the excess water and a sophisticated filtering system.	
There is a seed library that has been collected over the years for house plants and flowers.	
Only one tractor is necessary to move soil, after it has been sterilized outside.	
Small amounts of pesticides are used - twice weekly.	
This facility grows many flowers and plants for the state of Colorado, especially Aspen and Glenwood Springs. Each greenhouse supports unique flowers (such as Easter lilies for the upcoming holiday). Ferns were in another greenhouse and tomatoes in another. Seeds are screened and brought into the appropriate grow room. Each greenhouse is the size of a basketball gymnasium.	This system has the ability to produce more vegetables than in a field through the use of LED lights. The Dutch already use this method and layer the plants. The light was plentiful, even on an overcast day.

Figure 12. Observation B: Commercial greenhouses.

Greenhouse Comparisons

Greenhouse A was constructed by a local church and cost $850.00 to build. The building itself was an old calving shed that was put on a strip of narrow land that was not being utilized by the church. Originally, growing was conducted outside and those gardens still exist. The greenhouse is not only used for growing, but also for germinating seeds during the off-season. The entire system is organic and self-maintaining, with very little heat being pumped-in. The church had many students visiting from Africa to learn

how to use this design. In addition, the church members have traveled to Africa to help implement the system. This design shows how easy it would be to start growing.

Greenhouse B was a commercial operation of twenty greenhouses. The buildings were the size of basketball courts and were very well-maintained. Some new building items had been implemented over time to make the system more efficient. The young greenhouse farmer appreciated the many things that had been implemented to the greenhouses, but said that with technology, this could become the way people grow in the future. He had the technical expertise to use compost to supply energy, the use of LED lights (wherein you would not need a greenhouse to grow; instead, the plants grow in a layers of LED lights). This operation would incur middle-of-the-road costs.

Greenhouse growing has the capability to start in a simple fashion and the potential to use technology to maximize volumes of food as business improves. There have been great strides made in ventilation, temperature control, water storage, thermal storage capacity, and energy efficiency. A farmer in Nebraska grows lemons, oranges, pears, avocados, and figs in his underground greenhouse which is buried 5 ft. below ground (Farm Show Magazine, 2013).

Evidence of Quality

This study was conducted in the manner in which the protocol was established. The study protocol was carefully designed and vetted prior to the beginning of the study. It was important that the protocol was followed to ensure that a high quality of data was generated for the study. The data was collected, managed and analyzed in a consistent manner, as described in the protocol.

Each interview was recorded and transcribed in an identical manner. The data files were stored in a consistent and organized way in case they need to be retrieved for further examination. Triangulation, or the process of using multiple perceptions to clarify meaning, was used in the interviews to seek additional interviewees throughout the study. Several interview candidates were identified and contacted as a result of triangulation, or to obtain an in-depth understanding of agenda setting in the study. Some individuals identified through the triangulation process were not contacted, as it was ascertained that their perspective would be redundant to other interviewees. It is important to note that toward the conclusion of the interview process, the names being provided during the triangulation questions were individuals who had already been interviewed or had been identified by multiple interviewees. Two interview candidates who were recommended by several individuals responded but wished to speak only 'off-the-record.' In light of this, other individuals with similar associational alignments were interviewed to ensure their perspective was adequately covered. This provided further reassurance of the rigor and thoroughness of the study.

Summary of Data Analysis

The purpose of this study was to evaluate ways to initiate the process of agenda-setting for YRG through the use of greenhouses and the expansion of local farm systems. The study explored agenda-setting as an avenue to make local changes in rural farm policy in first the local and secondly at the national levels of government. In exploring this, the LLVV framework about agenda setting in the local policy process failed to support interviewee responses overall. Kingdon's (2003) 13 tenets defined valuable

aspects of the policy-making process as a way to breakdown areas of importance and to formulate the research questions. Additionally, those same tenets were utilized for analyzing the second research question about a local food and farm initiative for rural farm policy at the national level of government. The evidence failed to support either hypotheses of the LLVV framework.

LLVV found that governmental actors and interest groups comprised the first-tier of most important agenda-setters, while the general public, experts, and election-related actors were perceived as the next-tier of importance and the media were seen as having little to no importance. That said, the media were seen by respondents as being a key to educating the public about the concept of YRG. The evidence failed to support the idea that the media do not play a large role in local agenda setting; many respondents felt the media are a very important tool for educating the public and building coalitions. The attitudes about actors in politics failed to support the LLVV framework. The respondents did believe that budgetary considerations shaped local priorities, yet they did not support agenda-setting for YRG based on the budget. The other three attention-attractors; problem indicators, focusing events, feedback, both internal and external evidence failed to support the LLVV agenda-setting framework. Additionally, problem indicators and focusing events evidence failed to support the LLVV framework according to respondent answers. Technical feasibility, value acceptability and anticipation of future constraints did play a role in YRG and a local food and farm plan, but not towards agenda-setting. Policy compatibility was described by the LLVV as being the most important factor for agenda-setting, but the evidence did not support this tenet. According to the LLVV the

local policy process is most influenced by consensus and coalition-building, yet evidence showed that this failed to support agenda-setting; however, it did support the concept of YRG. All respondents believed that education about the issue would be the first step in exploring the attitudes and opinions of local citizens.

The second research question addressed an initiative for YRG be placed on the legislative agenda for rural farm policy at the national level of government. This was the point in the study where defining climate change as a problem at the national level of government came into question. According to Kingdon (2003) "decision-makers and those close to them use the indicators in two major ways: to assess the magnitude of a problem and to become aware of changes in the problem" (p. 91). Crises and focusing events based on unpredictable weather events have been reported on in the media over the past decade and should possibly serve as an early warning that climate may pose a widespread problem. That said, many citizens do not acknowledge that climate is different than it has been over past decades or even centuries because it has always been unpredictable. Kingdon (2003) may be right when he said, "Conditions become defined as problems when we come to believe that we should do something about them" (p. 109). Problems are not only external events, but also touch on internal conservative and liberal values, where lines are drawn-in-the-sand regarding the use of government or not using government to resolve the many issues that might be assigned to CC, such as budgetary considerations. The budget is currently being used to aid in weather disasters across the nation after a weather event, yet very little planning has been accomplished, even after-the-fact. If Kingdon (2003) is correct about the definition of a problem as the beginning

of the process of agenda-setting, then CC may not be a well enough defined problem at the national level of government, or perhaps citizens find that CC as an indicator of a problem may be symbolic in nature which forces exaggerated effects on policy agendas. The interviewees expressed their non-concern about the problem of CC at the local level of government with only four respondents acknowledging CC as a potential problem.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The study began by establishing background information about key factors that affect local agenda setting, such as problem identification, alternative policy selection, and political factors for YRG and rural farm policy. These factors identified the need for further research into local food and farm plans as political tools for social change as portrayed by the LCSA. ILFFP was designed to forge an initiative for the State of Iowa and served as an academic model for this study. Its recommendations for future social food and farm initiatives could have been challenged or corroborated at the end of this study. The goal of this research was to contribute to the body of knowledge about local food policy and to better understand factors affecting the successes and failures encountered when attempting to develop local sustainable food and farm systems.

The LLVV framework helped to establish a basic understanding of factors that impact policy at the local level of government. There are many obstacles that face local and regional food system sectors, according to ILFFP, such as; a lack of knowledge for diversifying operations, or processing barriers for small producers, or a lack of facilities; also, a lack of funding for planning and building network systems; or even a lack of awareness of local food systems by local governments. Due to these findings by the ILFFP, the above-mentioned obstacles had to be considered before interviews were conducted in Mesa County; even with the knowledge that local food and farm plan initiatives have the capability to open new avenues for achieving community transformations. LLVV noted that a proposed solution should be compatible with policies

from higher levels of government as a way to gain support and receive serious consideration for placement on an agenda at the national level of government. All sectors of the agricultural community, private business, and government at the local level of Mesa County were included and evaluated for this study.

Review of the Study

The purpose of this research was to gain a greater understanding about how local food and farm plan initiatives evolve. Building a strong local food sector might expand agricultural opportunities by establishing new markets, encouraging young farmers, keeping more food dollars spent in the state, and, ultimately, helping to leverage federal programs to bring more federal money into the state's economy. The negatives are as strong as the positives, yet local food systems could provide the flexibility that may be required to absorb unprecedented environmental upheavals and facilitate CC adaptation by altering current systems. The main goal of this study was to explore and challenge the strengths and weaknesses of the LLVV agenda-setting framework and to provide clarity on the factors that lead to agenda-setting policy and ultimately social change. This study sought to answer the following research questions:

1. How might YRG impact agenda-setting for local rural farm policy and, ultimately, legislation for the expansion of local farm systems in an effort to mitigate CC?
2. Why is a local food and farm initiative that includes YRG not on the legislative agenda for rural farm policy at the national level of government?

The study was conducted using a qualitative research methodology to review documentation and interview stakeholders in the agricultural sector of Mesa County, Colorado. Interviews were conducted with stakeholders that provided many different viewpoints, including city officials, farmers, elected county officials, water agencies, gas and oil executives, NOAA, greenhouse operations (observations), colleges, the federal government, and nonprofit organizations. Twenty-one interviews were conducted and transcribed over a period of 3 months. The findings and conclusions from this research were presented in detail in Chapter 4. The following section provides an interpretation for the study results.

Interpretation of the Findings

The first research question was concerned with how YRG might impact agenda-setting for local rural farm policy and, ultimately, legislation for the expansion of local farm systems as a way to mitigate CC from the LLVV factors for local agenda setting. The research showed that the LLVV factors were extremely useful for identifying challenges and successes likely for agriculture in small communities. The four factors suggested; local policy participants, attention attractors, alternative attributes, and political factors ----were consistent with local policy challenges as predicted by the LLVV. The two that did not directly correlate to LLVV's findings were still consistent with agenda-setting, but did not carry the same weight as did the other factors. Other than placing importance on local policy participants, the LLVV factors at the local level were correlated with Kingdon's (2003) design of agenda-setting at the national level.

Mesa County Participants

The first factor in the LLVV framework included policy participants from an insider conceptual first-tier ranking of federal, state, sub-state, intergovernmental, and other governmental actors. The second tier was composed of outsider interest groups, academics, researchers, election-related participants, the media, and nongovernmental participants. Mesa County participants were selected for interviews based on these LLVV factors. All levels of government play an important role in the local policy process; this was evident from the governmental actors who agreed to be interviewed. Additionally, oil and gas entities are among the most important participants outside of government that hold influence on county commissioners, as discussed in the LLVV as a critical factor. The general public is perceived as being more influential than experts in Mesa County because citizens have more direct contact and frequent access to local decision makers. The media were found to be the least important participants in the local policy process according to the LLVV; however, in Mesa County social media are beginning to play a larger role in terms of consensus, while the television medium is still being used for education about issues.

Attention in Agenda Setting

The Problem

The LLVV framework predicted that the intrusion of new or previously overlooked information into the policy agenda setting process is relevant to problems, as new information is associated with both changing social conditions and problem indicators. New information about CC should be a problem-indicator that emphasizes the

size and scope of a warming climate. Unusual weather, such as the harsh winter experienced in the Midwest, the drought in California, and freezing rain in Georgia over this past 2013-2014 season, is not always treated as evidence that the climate may be changing. Many local respondents disassociated "their weather, with our weather." Weather and policy at the local level of government did not appear to be synergistic with CC or the findings of the IPCC, nor did weather present a way to attract the attention of decision makers on policy at the national level of government. Several respondents did not perceive CC as affecting agriculture in the near future, as climate has always been an issue for farmers and is cyclical in nature. Many residents believe that CC may benefit Mesa County, especially in regard to agriculture. CC appears to be a less systematic indicator because it registered as a low-scale condition. Exploring YRG was found to be worthy of consideration, but not based on the issue of CC.

NOAA and Western Slope Weather

Joe Ramey at the National Weather Service studied weather over the past 100 years, (since 1911), on the Western Slope of Colorado. He found that the climate has become warmer, especially the low temperatures. Warmer and wetter conditions have occurred more frequently since the 1970s. It is important to note that radical events, from floods to droughts to wind, often do happen in the high desert in general, so these were not considered to be anomalies of any sort. He did add that, "land use may be changing the weather as well as populations by way of the amount of energy each storm carries" however, he also stated that, "there are so many sub-variables used in calculating the future of climate, that predictions about the impacts of weather on agriculture are

infinite." A possible alternative solution to the problem of unpredictable growing seasons may be greenhouses, which would provide a way to grow year-round.

Greenhouses and Sustainability

New information is associated with changing social conditions according to the LLVV, which fits the traditional concept of greenhouse growing (as a hobby) transforming to become a viable new concept to grow healthy food year round as a way toward sustainability, a term that has become a part of every community's green vocabulary. A large portion of respondents believe that YRG in greenhouses should be explored for many reasons. Sustainability is important for farmers who want to extend seasonal growing and citizens who would like to have the opportunity to purchase local food year round. Greenhouses have proven to be an effective way to grow a wide range of food and can be subterranean (underground) or built above-ground to glean a variety of products (even trees and hay). However, it would be necessary to further explore energy for greenhouses because temperatures would need to be maintained in order to grow year-round. One respondent said that agriculture is already Mesa County's largest asset and should be capitalized upon. The study showed that growing year-round through the use of greenhouses should be explored, but only by way of free-market enterprise rather than via agenda-setting. Weather is a premiere focusing event for agriculture and is discussed in the next paragraph.

Weather as a Focusing Event

The LLVV emphasized the importance of focusing events based on the occurrence of natural or manmade crises or disasters as a key concept in agenda setting.

The current threats to agriculture are droughts, winter inversions (many pollutants stay at the ground level during winter months), late spring freezes, and monsoons in July as recurring problems. The crops that are generally affected in Mesa County are peaches, grapes, and hay. The wine industry was damaged by severe cold temperatures last season; hay was hurt by too much moisture from the monsoons; and peach farmers lost more peach trees in the production of peaches due to the cold spring. These are events that happen on the Western Slope every year; however, it has become a question of when the rain will come; how bad the winter will be and how long it will last; or whether the hay can be picked-up before the rain comes or powerful winds blow it away? These events will not carry the topic of YRG as a way to mitigate CC to agenda prominence. The next paragraph addresses internal or governmental feedback.

Water and Internal Feedback

The LLVV noted that feedback refers to messages and signals that are looped back to policymakers from existing governmental programs. New public problems come from social venues such as public opinion polls. Water from the Colorado River is an attention attractor that elicited responses about future water restrictions, dividing the use of water between agricultural and energy interests, and whether or not greenhouses would pose a threat to traditional farmers or already-established oil and gas companies. Citizens of Mesa County were content about the future of Colorado River water. Potential water restrictions are not considered to be a threat, as there are excellent water rights for this part of the river from the early 1920s. There have been forums and seminars held to discuss projected water issues, which have been advertised and well attended.

Greenhouse water can be recycled and does not pose a problem to existing businesses or traditional agriculture, although it should be noted that farmers maintain the highest level of water rights. Very few respondents felt that water was an issue, even during drought years. Citizens of Mesa County do not disapprove of using the land for fracturing for natural gas and believe that farmer/fracturing interests should maintain their partnership and continue to share water interests. The Colorado Roundtable informs citizens about water issues such as the depth of snow packs that will affect each growing season. Public input is very important for agenda-building and is addressed next.

The External Feedback of Public Input

External feedback comes from public opinion polls or citizen complaints as a way to draw policy attention to a public issue and gain prominence in the agenda-setting process. Almost all of the respondents agreed that public input should be gathered from public surveys, listening sessions, initial workshops, and local media to find out what citizens feel about YRG, because the effort would have to be community driven. The LLVV emphasized the importance of external feedback from the public because at the local level, both individual and collective policymakers interact with ongoing public programs, their constituencies, and various sectors in local communities, with messages looped back to government, yet this is not well understood at the local level. The LLVV noted that the local media exert far less power than expected in agenda-setting, although the media make up the one vehicle that can drive the education of an issue, as observed by many respondents. External feedback continues in the next paragraph.

Policy Attention for YRG Versus the Economy

Several respondents did not want to place an initiative on the ballot that supported the development of local food systems to attract attention to policy and YRG. In addition, the respondents were asked to address economic growth and the economy in Mesa County. The responses were mixed. Many interviewees said no to placing an initiative on the ballot due to the use of government funds that would be required to build a local food system, or the belief that agriculture in all of its forms does not contribute to higher wages. Instead, something in the health field or education might help the community be more recession-proof. One respondent said that the community should look more toward marrying energy with manufacturing to ensure the economic success of the region. The general attitude was that officials should consider placing an initiative on the ballot without the politicians being involved; instead, a well-rounded advocacy group consisting of agricultural interests, energy interests, ranching interests, and various citizen groups would offer a better route for attracting policy attention. Mesa County tends to vote no on anything that has a tax or subsidy attached. LLVV pointed to the notion that business and commercial groups are often dominant in setting local development plans and policies, and in this research it was found that the influence of oil and gas entities holds sway over Mesa County Commissioners and the economic development of the region. During the past economic downturn, 6,000 oil workers left Mesa County and moved to South Dakota, a second bust from an oil boom in so many years. Many interviewees believed that the government should not become involved in a local food plan, yet at the same time stated that the Department of Agriculture should

continue to remain responsible for developing programs to assist the agricultural market locally, regionally, nationally, and internationally, which revealed that the policy process can be difficult to fully understand. An important consideration in the agenda-setting process includes the budget, which is addressed in the next paragraph.

Budgetary Considerations

LLVV believe that budgetary concerns are the most critical factor in shaping the local policy agenda and shifting policy priorities. The answers in this study were extrapolated from a question about the costs and benefits of YRG. Everyone agreed that an increase in fresh food availability coupled with a decrease in transportation energy costs would be a benefit; however, the cost of infrastructure might be enormous. While many respondents did not feel qualified to answer this question, many forged ahead. One interviewee said that there is a need for growing safe, healthy food items in ways that will save energy, reduce pollution, and provide many local economic benefits. The challenges would involve risk-taking by the grower, profitability after taking risks, negotiating new markets, learning new production techniques, and figuring out how to maintain a competitive advantage. Costs would include the initial capital investment of land, plants, greenhouse construction, coolers, loading equipment, lighting, fertilizers, irrigation systems, site permits, utilities, waste removal, water rights, transportation, advertising, and labor. Benefits would include increased employment, increased exports from the county, increased tax revenue, locally grown healthy food for citizens, and potential partnerships with education. Financial resources could come from private funds (including marijuana growers, as suggested by city representatives), state and federal

grants, or a public-private partnership. A technical feasibility study would help to decipher the parameters of YRG, which are discussed in the next paragraph.

Survival and Selection of YRG

A Feasibility Study

Feasibility is involved with the consequences of implementation. It may have been too soon in to ask such a question of the respondents relative to the agenda setting process for YRG. The concept is in its infancy, so it is difficult to imagine specifying the actual mechanisms by which an idea such as YRG would be brought into practical use. Once again, the issue is based on the financial aspect of the cost of determining if it is something that can be done. Before a feasibility study would be conducted, many respondents wanted to know if there was a local market that could support local farmers. Value acceptability was addressed in the next paragraph.

Policy and Community Values

This portion of the study aligned with both Kingdon (2003), and LLVV principles. Kingdon stated:

> Some of the participants' values are composed of their view of the proper role or size of the federal government vis-à-vis the states and localities, and their view of the proper size of the public sector vis-à-vis the private sector. Their views on these issues directly affect the alternatives they propose or oppose. Those we usually classify as liberals support larger government roles, while those we usually classify as conservatives oppose larger government roles (2003, page 133).

The common theme suggested that people would have to 'buy in' or adopt the idea. One area that was consistently discussed was a genuine fear of overzealous regulatory state and local agencies who may burden farmers with layers of regulations. Respondents believed that an agenda would not dictate whether or not YRG would succeed; instead a demand for fresh foods by consumers would substitute for an agenda, while the economics would drive the marketplace. The next tenet was about anticipation of future constraints, which is addressed in the next paragraph.

Future Constraints

The study aligned with theorists' ideology that constraints are placed on a concept when it becomes a serious consideration; such as a budget constraint, which adds further proof that a proposal must show tolerable costs. It was noted that governmental participation should be limited to safety in food processing, and the handling of warehousing, storage, and delivery systems. A second test was whether or not a proposal might align with public sentiment. Many local grocery stores already sell locally grown foods, therefore respondents did not feel that YRG or a local food and farm plan was inconceivable because the system is already in play and would not pose a problem. YRG provides the opportunity to maximize income for local farmers and increase business for local truckers. Additionally, it could possibly cut the cost of produce in local stores. Greenhouse growing could be advanced through education and existing technology classes at the local university. Additionally, interviewees acknowledged that renewable energy advantages would be numerous for greenhouse farmers, as it would be fairly easy (although expensive to start) to incorporate alternative sources of energy, such as; solar,

geo, wind, etc. In the next paragraph the political mood of Mesa County will be addressed.

Politics

The Political Mood

The initial receptivity to YRG would assist in YRG being placed on a local agenda, which supports the LLVV perspective, or views about local government. Mesa County was self-described by many of the respondents as being; politically conservative, financially conservative, and socially conservative. The social climate portrays a cautious community that resists change regardless of the benefits it may bring. Mesa County is currently experiencing a low income, high unemployment, and underemployed community, concerned about inflation and wasteful spending by big government. In the next paragraph the prominent issues of Mesa County and its organized forces will be addressed, including the topic of agriculture.

Organized Forces

The LLVV noted that, well-organized political forces with power, and influence from money, or existing systems, can impact local policy issues, because as Kingdon (2003) pointed out, a balance of organized forces can also mitigate against change. The research found this to be accurate. Energy development has been the prominent issue in Mesa County, whereas agriculture has not. The marijuana industry may change agriculture from being one of the top three industries to becoming the top industry in Colorado. It may be interesting to observe future interest group pressure, political mobilization, and the behavior of political elites. Land use has always been an issue in

Mesa County, while diminishing farmland has recently become evident, yet as one respondent said, “When it [the land] disappears, it’s gone – we won’t be growing in the desert.” Local changes in government might assist in making agricultural changes to policy and will be addressed in the next paragraph.

Local Changes in Government

The LLVV was not in concert with the responses on the turnover effects of key personnel, or a change in administration. Competition of issue jurisdiction is important in agenda setting, and power can impact local policy issues; however, respondents did not feel that local government should be replaced, “because there is no difference amongst the actors,” according to most citizens. One respondent believed that, “neither commissioners nor city officials should change because they would be given far too much credit for understanding a concept like YRG.” Change in jurisdiction does not play a very big role in Mesa County, possibly because there are not enough competing issues for there to be a struggle over turf, which is addressed in the next paragraph.

Local Jurisdiction

At the local level of government, regulations play a large role, and due to this, the answers to the question coincided with the LLVV theory. However, when asked if YRG should be placed on an agenda, or if the concept should be approached through free-market-enterprise, the respondents largely said, “free-market-enterprise.” The struggle for issue turf and policy objectives were not a concern, but mandates and priorities were a concern. Building a coalition of supporters is a process that may work relative to agenda-building in Mesa County.

The Potential of Coalitions

The LLVV believed that the most powerful political factor in the local policy process is consensus and coalition building. Consensus and coalition building provides a way to mobilize similar interests and offers a way to settle conflicts involving multiple stakeholders, because in many cases local decision making involves a full range of stakeholders. Kingdon (2003) suggested that:

> To bring up legislation you have to have about 60 percent of the vote. In other words, you have to have 60 percent of the people say they're going to vote for it….there's still some disagreements, but really controversial things like something that's going to benefit one area, probably is not going to be brought up except as part of some sort of deal. I'll give you some additional seawall in Galveston for a medical school in El Paso (p. 184).

YRG would be in an embryonic stage of conception, which may be an ideal time for coalition-building. Many respondents believed that educating local citizens would be a good way to begin to generate interest about the benefits of locally grown foods and to provide a way to create a marketplace to sell them. It would also be important to identify an economically sound segment of various food production systems in Mesa County that could be supported by local growers. Stakeholders would need to meet and become organized to be able to present a cohesive set of plans or ideas in order to begin to gather support. The evidence failed to support agenda-setting for YRG or a local food and farm plan at the local level of government.

Recommendations for Action

The implications of the study portrayed YRG as providing a possible way to extend farming beyond traditional growing seasons, offering a process which may create a sustainable, local food and farm system. Commercial agriculture is being impacted by growing populations in the inter-mountain West, and the growing cost associated with oil and gas, which in turn affect costs associated with growing and transporting food. The Agricultural Act of 2014 supports small businesses and beginning farmers or ranchers with training and access to capital. The bill also will reduce regulatory barriers for job creators while making critical investments in land stewardship, rural electric, water, and other infrastructure needs that grow job capacity (ag.senate.gov/nd). These actions at the national level of government could provide some certainty for new ways of growing year round and the creation of local food and farm systems.

An idea whose time has come will be tested in many ways before it reaches the agenda-setting stage. In Mesa County, the prospects for growing year-round would require agenda-building in the early stages of planning. Kingdon (2003) suggested that "ideas may sweep policy communities like fads, or may be built gradually through a process of constant discussion, speeches, hearings, and bill introductions" (p. 17). In small communities such as Mesa County, the public tends to set agendas based upon media coverage of local issues, as local media is the communicator within smaller policy communities. Community newspapers and television news act as educators as well as informants in the middle of most local controversies. They report on problems from the perspective of the community. Local news also covers local fiscal issues (fiscal issues

often drive policy in small communities) which in turn, ignite the public sector to talk to pollsters and write to congressmen to voice their opinions. The media would, however have to become enabled to act as a conduit that reinforces issues of public concern (Wilson, 2011). Utilizing the media would be imperative for explaining the concept of YRG and a local food and farm plan. Additionally, the media could also provide clarity about the process of agenda setting and public policy. The next steps of action would be to gather public input through workshops, public surveys, and listening sessions.

As witnessed in this research, climate change is not considered to be an issue in Mesa County and it is proving to be an issue where little action has been taken at the national level of government. Actions taken at the state and local level of government conduct a variety of functions related to planning that contribute to environmental outcomes. For example:

> Local authorities will decide whether streets are aligned so houses achieve maximum solar gain, and eaves are designed so that at specific latitudes so they let in maximum light in the winter and shade in the summer. They will decide building standards that determine whether glazing is optimized, and landscaping organized to buffer against winds, etc…..the sum of these activities will determine the infrastructure of communities for the next century and influence the global climate, in the aggregate, is profound (Burtraw & Shobe, 2009, page 6).

Local policies on climate change are often driven by local interests that are not related to climate change. However, actions taken by state, and local governments are important to achieving policies aimed at reducing greenhouse gases, and for reducing the

cost of achieving national-level goals. State and local governments are capable of providing the venue for innovation in policy that will determine the way people interact with their environment and associated use of energy. Local food and farm plans as well as YRG could provide a plan of action that reduces GHGs and if many communities participated in such a plan, the benefits could accumulate by using new forms of energy, as well as food miles traveled, as well as promoting a more efficient use of water.

Implications for Social Change

YRG and a local food and farm plan have positive implications for social change, although it cannot be stated enough; changes that appear to be uncomplicated (because agricultural systems already exist) are very complicated. The process is complex and involves starting up many new systems that would have to work, not only for farmers who would have to absorb many of the economic risks, but also for the community as a whole. It would require a unique mindset for communities that are used to buying their groceries from big box stores; those stores, for the most part are dependable, structured, and this has been the way food has been supplied for a long time. That said, there are many implications for YRG and a local food and farm plan relative to social change:

- The ability to have fresh produce year-round.
- The improved health of citizens.
- Provides a way to combat obesity.
- Could help to eliminate food deserts.
- Could help to feed the homeless more nutritious food.
- Encourages opportunities to utilize renewable energy.

- Encourages better water practices by recycling water.
- Provides a way to generate new businesses: trucking, storage of food, and the ability to generate local dollars.
- Encourages the creation of new supply chains.
- Encourages the creation of new local, corner grocery stores.
- Ushers-in the capability to grow more food on less land.
- Provides the use of new technology that is capable of moving farming into the future.
- Helps to create new farming practices for the next generation of farmers.
- Opportunity for local university to expand education and teach technological farming to young farmers.
- Opportunity for farm and food sector job creation and retention.
- New opportunities to sell food outside of the area, or regionally.
- Leaves less of a carbon footprint.
- Provides a way to combat CC by growing year-round indoors.
- Helps a community to become self-sustaining.
- Provides a way to become consistent growers instead of seasonal growers only.
- Helps promote Colorado through agricultural tourism, outdoor recreation, medicinal marijuana, and overall health features that can draw-in tourist dollars.

- The possibility to change the way food is packaged to help and reduce plastic trash.

Recommendations for Future Research

The research viewed the LLVV framework against the backdrop of ILFFP in order to see if their tenets would be helpful for agenda-setting at the local level of government. The findings were very supportive of the strength of the LLVV framework, however in order to further understand agenda setting at the local level, it would be useful to focus on coalition building. The key advantages of coalitions include:

- A coalition of organizations can win on more fronts than a single organization.
- It can bring more expertise and resources to bear on complex issues.
- It can develop new leaders.
- It can increase the impact of each organization's effort; the activities of a coalition are more likely to receive media attention than those of an individual organization.
- It can build a lasting base for change.
- A successful coalition is made up of people from diverse backgrounds who bring valuable contributions to strategies (Spangler, 2003, p. 2).

Consensus and coalition-building offers a way for citizens to advocate for an idea and involve new stakeholders in policy formation. It would also be valuable to further investigate the use of social media in tandem with coalition-building. Social media offer a way for ideas to travel and people to meet quickly. The teaming of social media,

traditional media, and coalition building could change the way items are placed onto agendas towards citizen success at the local level.

Climate change is just as much a local issue with local solutions as it is a global issue, however, it will be the combined efforts of many individual initiatives that will begin to shift the ways humans relate to their surroundings. Local governments have a great advantage over larger governments because they are more flexible and able to experiment more readily with innovative policies. If local governments have a tangible goal where progress can be measured, are able to develop a formal plan of action through a coordinated effort, the ability to involve the public and various sectors throughout the process, form partnerships within and among communities, the greater the number of resources, skills, and points of view that will be brought to the table. Local jurisdictions must be willing to innovate and adjust (Linstroth & Bell, 2007). Agriculture is just one aspect of climate change. More research into climate change is necessary on all levels, but perhaps the most important research would be to find out why many people do not believe that climate change is occurring.

Researcher Reflections

The purpose of this research was to evaluate factors of the LLVV framework. The result was a thorough evaluation of the framework coupled with a new concept of YRG through the use of greenhouses as a pathway to a local food and farm plan. The LLVV factors were supported by the ILFFP's completed initiative, yet the evidence in Mesa County failed to support the factors for agenda-setting. These factors may be helpful to those communities who want to develop and implement an initiative for a local food and

farm plan. YRG is an idea that proved to be pre-agenda-setting in nature, yet a roadmap emerged for generating coalition building as a way to begin the process.

I approached this study as a stakeholder in farming/ranching and as an observer of greenhouse growing in an attempt to find a way to extend agricultural production throughout all 4 seasons. Also, the researcher is biased and does believe that climate change is occurring. Additionally, CC was the impetus for the concept of YRG and a local food and farm plan. A large percentage of the sample questioned for this portion of the study did not believe CC was an issue; however, YRG through the use of greenhouses was viewed as a viable way to implement modern technological farming practices, utilize renewable energy and pursue a local food and farm plan. Additionally, communities such as Mesa County want to transition towards new avenues of sustainability and may be willing to accept the implications for social and environmental change. I would predict that citizens working together at the grass-roots-level of government will become the future leaders of their own communities' fate if they learn to build agendas together. This may require a better understanding of public policy for those involved in the process of agenda setting in a small community such as Mesa County.

The endeavor of making an academic contribution and the notion of 'self as instrument' has been fraught with challenges and rewards. First, the timing of the interviews coincided with the beginning of the holiday season, starting with Halloween, Thanksgiving, Christmas, and New Year's week. Interviewees were frantic with balancing their own careers, families, and handling the onset of the holidays. One respondent said that "we are all suffering from time poverty." That said, most of the

interviewees did take the time to meet with me. Often times the individuals who 'only had a few minutes' to sit down, found the time to speak to me for two hours. Additionally, those people who didn't relate to the concept at the beginning of the interview could visualize it by the end of the interview and would suggest other people that I should speak with – the snowball effect. I had forgotten how much I like the process of interviewing people and hearing others' opinions, as it was a large part of my history when I worked as an agent in the writing department at the William Morris Agency. It was invigorating to arrive at this stage of the journey because I had been living inside of my computer throughout the dissertation process!

Conclusions

Agenda setting is an important step for policymaking and has the potential to drive social and environmental change at the local level of government, which may eventually translate to agenda-setting at the national level of government. Academics might agree that there is little clarity when it comes to what makes people in and around government pay attention to certain topics while choosing to disregard others. This study sought to evaluate the LLVV agenda setting factors at the local level in accordance with ILFFP's initiative to see what approaches may work for putting YRG and a local food and farm plan onto a local agenda. The success of ILFFPs initiative also portrayed the challenges for moving forward with state planning.

The study identified climate change as a threat to farming, yet it was treated by participants as a non-factor in the original hypothesis. YRG through the use of greenhouses would not be something locals would pursue because of climate change.

Instead, many other reasons were given for wanting to pursue YRG with a local food and farm plan. The LLVV framework showed strength when predicting several new components that were not identified in Kingdon's (2003) national tenets; however the framework did turn out to be a guideline for local policymaking. Unfortunately, the authors did not delve into their stance on policy compatibility with any depth; however, stating:

> In the local policy processes, we think that policy compatibility may constitute another advantageous attribute that would enhance the probability of alternative survival and selection. In the United States, local governments exercise autonomous authority and self-governance within statutory and constitutional provisions. However, all local politics and policymaking are operated under federalism, in which policy alternatives proposed at lower level of government are usually required to be in accordance with a higher level's policies, regulations, and programs. New proposals and alternatives that are compatible or consistent with state or federal policies would have a greater chance to survive in the local policy selection process.

This may be another area to research. The second hypothesis for this study proposed a question that addressed the above LLVV quote and asks why a concept such as YRG does not translate to the national level of agenda-setting. My original thinking was based on the concept that actions taken locally could incite a form of bottom-up farming innovations as well as resource conservation. It could act as a microcosm for potential national policy. Demonstrations of the effectiveness of greenhouse growing at

the local level could make it more feasible for higher levels of government to adopt similar policies which might enrich local sustainability that ultimately strengthens the nation as a whole (a new map for growing). Research has indicated that there is a history of local governments that are capable and have demonstrated the effectiveness of local policy that in turn, may also work at the national level. Perhaps the national level of government should look for alternatives to commercial growing that are compatible with new, innovative agricultural systems at the local level.

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Appendix A: Research Questions

Interview Questions

How might YRG impact agenda-setting for local rural farm policy, and ultimately legislation for the expansion of local farm systems in an effort to mitigate CC?

LLVV Agenda Factors	Correlating Factors of LFFP	Interview Questions
Problem Indicators	Unemployment rates, no economic growth	Q1: What factors contribute to low/high economic growth and low/high unemployment rates in MC?
Focusing Events	Drought, Wind Industrial Accidents	Q2: How has climate change affected agriculture in MC? Q3: What measures might be taken to ensure the quality of water for farmers worried about 'fracking?'
Internal Feedback	Government Officials	Q4: What are the various forms of governmental feedback that attract policy attention to MC issues, such as YRG & LFFP?
External Feedback	Public Opinion Polls	Q5: When a new project comes up, are there public meetings in an attempt to get citizens involved?
Budgetary Considerations	Costs, Funding Assessment of challenges and opportunities. Policy and regulatory changes. Coordinated research, education & planning. Loans & financial incentives	Q6: What tools would be required to build a LFFP? For YRG in greenhouses?
Technical Feasibility	Practical mechanisms/ implementation LFFP fund, advisory board, business models, financial assistance, education & training programs established?	Q7: In your opinion, what mechanisms would need to be put into place before YRG would be taken seriously?
Value Acceptability	Equity & efficiency Redress inequities, imbalance New incentives for local farmers	Q8: What would be the proper size and role of the government to implement a LFFP?
Anticipation of Future Constraints	Tolerable costs	Q9: In your opinion, would the costs of a LFFP offset the benefits of YRG?

Why isn't a local food and farm initiative that includes YRG on the legislative agenda for rural farm policy at the national level of government?

LLVV Agenda Factors	Correlating Factors of LFFP	Interview Questions
Political Mood	Social Climate	Q10: What factors would best describe the social climate of MC?
Organized Political Forces	Mobilize to Promote or Organized to Block?	Q11: What are the prominent issues of MC? Is agriculture an issue that frequents policy agendas?
Changes in Government	New County Commissioners	Q12: In your opinion, would a change in the regime of county commissioners help to promote or discourage a LFFP?
Changes in Jurisdiction	Struggle over issue turf Struggle over policy objectives	Q13: In your opinion, can a new issue such as YRG gain so much attention that it actually drives the competition toward preservation of other ideas?
Consensus or Coalition Building	Processes of persuasion and diffusion	Q14: How can potential coalition supporters become enticed to support a LFFP?

It should be noted that the original framework for the questions were taken from Kingdon's (2003) agenda setting process at the National level of government and then converted to the local level of government through Liu, et al. (2010).

Additional Open Ended Questions:

1. What competitive advantages does MC have for building a robust local food economy?
2. What disadvantages does MC have for building a robust local food economy?
3. How would local food systems need to move from the current emphasis on small scale, direct markets to include larger, mid-scale operations that can supply larger-volume buyers?

4. Would a public awareness campaign for YRG and a LFFP benefit more from traditional media to inform the public? Would social media be more productive?
5. What participants should be included to gather public input for YRG and a LFFP?
6. How might existing or beginning farmers access land and water to initiate YRG or expand existing operations?
7. In your opinion, could education of greenhouse growing and technology be advanced through Colorado Mesa University?
8. In your opinion, could local food system efforts be coordinated across organizations and agencies?
9. What is your perception of how consumers will respond to a LFFP and YRG?
10. Can you think of anyone else who is particularly knowledgeable about the evolution of LFFP or YRG?

Appendix A-1: Revised Research Questions

1. Should acquiring food be identified and recognized as a possible, problem for ordinary citizens as a result of climate change or unpredictable growing seasons? In your opinion, would the public as well as decision-makers consider exploring year-round-growing through the use of greenhouses as a way toward sustainability in Mesa County?

2. What type of weather events would citizens and farmers alike feel is a recurring problem for agriculture and growing in Mesa County, if any? In your opinion, will climate change affect agriculture in Mesa County in the future?

3. Have measures been taken by local government to inform citizens and farmers about potential, future water restrictions that may be placed on water from the Colorado River? Agriculture and energy interests already divide the use of water in the Western Slope of Colorado; would growing in greenhouses be considered a threat to already existing industries?

4. In your opinion, should Mesa County government officials consider placing an initiative on the ballot that supports the development of local food systems? What might attract policy attention to YRG and a local food and farm plan? Are there any current ideas that might work in tandem with year-round growing and already existing businesses in Mesa County?

5. How should public input about year-round-growing be gathered to reach a broader audience interested in a local food and farm plan that might affect local agricultural policy? For example, should there be an initial workshop, listening sessions, or a public survey conducted?

6. What are the costs and benefits of building a local food and farm plan that includes year-round-growing in greenhouses? How would you assess the challenges and opportunities? Where might the financial resources necessary to begin a local food and farm plan be generated?

7. In your opinion, should a technical feasibility study be conducted to see if a system for a local food and farm plan can be designed?

8. Would trucking, storage, and various associated systems need be changed to provide the support necessary to move agricultural products from greenhouses to local, corner stores such as LOCOs, Mavericks, Shop ‘n Go, etc., or big box stores? What are the advantages/disadvantages of using technology or renewable resources in greenhouses?

9. Should a local food and farm plan with year-round-growing be placed on a local agenda?

10. What factors would best describe the social climate of Mesa County?

11. What are the prominent issues of Mesa County? Is agriculture an issue that frequents policy agendas?

12. In your opinion, would a change in the regime of County Commissioners or City Councilmen help to promote or discourage a local food and farm plan?

13. In your opinion, should growing year-round through the use of greenhouses be placed on the agenda at the state level of government, or should it be considered to be a free market enterprise?

14. How can potential coalition supporters become enticed to support a local food and farm plan through year-round-growing?

Additional Questions:

1. What competitive advantages does Mesa County have for building a robust local food economy?

2. What disadvantages does Mesa County have for building a robust local food economy?

3. How would local food systems need to move from the current emphasis on small-scale, direct markets to include larger, mid-scale operations that can supply larger-volume buyers?

4. Would a public awareness campaign for year-round-growing and a local food and farm plan benefit more from traditional media to inform the public? Would social media be more productive?

5. What participants should be included to gather public input for YRG and a local food and farm plan?

6. How might existing or beginning farmers access land and water to initiate year-round-growing or expand existing farm operations?

7. In your opinion, could an education of greenhouse growing and technology be advanced through Colorado Mesa University?

8. In your opinion, could a local food system's efforts be coordinated across organizations and agencies?

9. What is your perception of how consumers might respond to a local food and farm plan and YRG?

10. Can you think of anyone else who is particularly knowledgeable about the evolution of a local food and farm plan or year-round-growing?

Appendix B: Data Anaylsis

A1 Response to question on interviewee involvement/background

PUB1	State Water Representative
PUB2	City Representative
PUB3	City Representative
PUB4	City Representative
PUB5	Town Representative
PUB6	City Representative
PRIV1	Chamber Representative
PRIV2	Chamber Representative
PUB7	Mesa County Representative
PUB8	USDA Representative
PRIV3	Community College Representative
PUB9	Colorado State University Extension Representative
PRIV4	Small Grocery Representative
PUB10`	Renewable Energy Representative
PRIV5	Farming Representative
PRIV6	Oil & Gas Representative
PRIV7	Tourism Representative
PRIV8	Greenhouse Growing Representative; Farm Bureau Representative; Farmer's Market Representative (Observation & Interview)
NON1	Church/Nonprofit Greenhouse Farming Representative (Greenhouse Observation only)
PUB11	Denver Water Recycling Expert
PUB12	NOAA Expert

A2 Response to question on problem indicators regarding the effects of climate change or unpredictable growing seasons on agriculture

PRIV2	I do not see climate change affecting agriculture in the immediate future. I think the idea of year round growing of food products is worthy of consideration, but not on the basis of CC or unpredictable growing seasons. The reality is that even in this past growing season with a late frost there was still a lot of foodstuffs produced in the valley. It is more saleable as a concept to the community as a way to increase overall population health to have locally grown fresh produce available for consumption. Mesa County has one of the highest rates of obesity in the State.
PUB8	I do not see climate change affecting agriculture in the foreseeable future. Planning for adequate food supply for the population should always be a

	concern; however, CC and unpredictable growing seasons do not seem to be an issue.
PUB5	No, not yet.
PUB1	Climate change does not pose a problem.
PUB2	Yes, CC does pose a problem. Yes, acquiring food should be identified and recognized as a possible problem or ordinary citizens as a result of climate change or unpredictable growing seasons.
PRIV5	The intriguing thing about climate change is (that) I was fascinated (when) the ice was receding (that) there were man-made structures (still there from an earlier time in history). I struggle with having a clear conviction of what is happening based on the evidence. They say that figures don't lie, but liars do figure. I hold my conclusions. I suspect this is a little chicken, big frog scenario. If I look at the challenges that face us with sustainable food, the question is 'how did that become possible?' It would be difficult to assess our ability for a few to feed more. World population graphs show that we have quadrupled, from 1 billion to 7 billion people (which is not a threat, but population has increased) (this was due to the increase in food production in the past). The health of humanity (also) improved. I would argue that if we had catastrophic scenarios, we would rebuild. We actually over-produce some food items today. If we had a failure of the grid, we are 4 to 5 days away from total chaos. Farmers aren't any better prepared than anybody else. Should we put our 'food up' in order to survive? The farmer is just as dependent upon 'Walmart' as anyone else. It would be an imprudent use of our time. We are not invulnerable.
PUB12	Meteorological response.
PRIV3	At this point in time, I find it difficult to conclude that we have realized any permanent changes in climate patterns in Mesa County. The climatologists that I have heard speak are still somewhat uncertain about this as well, thus my opinion. Climate change, regardless of the cause is an integral variable in the process of producing food. Agriculturalists will always have to adjust to climatic patterns.No, acquiring food should not be identified and recognized as a possible problem for ordinary citizens as a result of CC or unpredictable growing seasons
PUB4	Climate change affects agriculture globally. Acquiring healthy food is a problem for many people in Mesa County. Climate change and unpredictable growing seasons can drive up produce costs and much of our local produce is shipped out of the area to places that can pay a higher price.
PRIV4	No response.
PUB10	Local crops could potentially be affected if CC is fully realized. It would be a problem if climate change affected regional growing seasons while minimizing crop production.
PUB3	No response.

PUB6	No response.
PUB7	No response.
PUB9	In my opinion most citizens do not consider climate change as a possible problem for acquiring food. CC will impact agriculture slightly over time. It's not severe yet. In my opinion, most citizens do not consider CC as a possible problem for acquiring food. Frankly, many citizens have a difficult time understanding how agriculture provides them food.
PRIV1	No response.
PRIV6	I don't feel that acquiring food for ordinary citizens will be greatly effected as a result of CC or unpredictable growing seasons. Farmers have dealt with these issues for centuries and have adapted quite well.
PRIV8	I believe in CC but I think there's a 'disconnect' – people don't realize where their food comes from. When there's a shortage, then it will be viewed as a problem. I think the public as well as decision-makers might explore it, yet food is [currently] such a big system. We get much of our food from South America and them from us here in the U.S. We rely upon each other in reverse seasons.
PRIV7	No response.
PUB11	Archival information about water recycling
NON1	Greenhouse observation only
A3	**Response to question regarding year round growing through the use of greenhouses as a way toward sustainability in Mesa County.**
PRIV2	The idea of year round growing of food products is worthy of consideration
PUB8	In my opinion this would be a fine idea to improve local food availability year round. However, irrigation water is generally only available in the Grand Valley from April 1 – November 1. Any water would have to be supplied from other sources such as municipal water supplies.
PUB5	No (year round growing should not be considered as a way toward sustainability) yet.
PUB1	No response.
PUB2	Yes (year-round growing through the use of greenhouses should be considered as a way toward sustainability).
PRIV5	Find a good geothermal source and definitely go subterranean, somewhere like Glenwood Springs. Detroit has a huge greenhouse business, yet it would be difficult because today food is a fashion show. It must be pretty before taste. A person would have to be very careful with what they choose to grow and be close to a good source of heat – it would work, then.
PUB12	Meteorological information about Mesa County

PRIV3	Greenhouses have proven to be an effective way to grow and produce a variety of food products. In my opinion, greenhouses are a good option for growers to consider, especially for fresh produce such as vegetable products, and cool season plant products in the 'off-season'.
PUB4	Exploring year round growing is an option toward making more produce available to locals. However, it is costly to maintain proper temperatures in greenhouses. It also takes a great amount of expertise to do it efficiently and effectively.
PRIV4	Yes, exploring year round growing would be worth looking into for Mesa County.
PUB10	Year round growing should be considered but there are always financial considerations for capital purchases.
PUB3	Sounds exciting and we are kicking around local economic development ideas. We believe that we should capitalize on our biggest community asset, which is agriculture.
PUB6	We are always looking at ways to sustain food production.
PUB7	I know that we already have a few greenhouse operators around that tend to stretch out the seasons. We know it can be done - it just takes someone who is willing to invest. On the Front Range, there is a huge industry…they have the population who is willing to pay more for produce. CSU has a huge greenhouse…you would have to find people who would work really hard, with questionable returns however there is a considerable 'back-to-the-land movement.' If the opportunity exists…if people will pay….or, pay extra costs, then…it'll get done. The demand will dictate that, but the economics would have to drive it.
PUB5	Frankly, many citizens have a difficult time understanding how agriculture provides them food. I would also guess that most citizens would not see year round production through greenhouses as a way towards sustainability.
PRIV1	I am in support of studies that would encourage year round food production as a means to extend the growing season as well as support local food sustainability. It also offers our growers a source of revenue year round.
PRIV8	Decision-makers should explore year-round-growing. Policy-makers will eventually 'get it.' We have the sunlight and technology to pursue year-round growing through the use of greenhouses.
PRIV7	Yes, year-round-growing through the use of greenhouses could be a step towards sustainability.
PRIV6	Year-round growing through the use of greenhouses would increase sustainability, food sources, quantity and jobs. It is absolutely something that should be explored.
PUB11	Archival water recycling information.
NON1	Greenhouse observation only.

A4	**Responses to questions about types of weather events that are a recurring problem for agriculture in Mesa County and will CC affect agriculture in the future?**
PRIV2	I cannot conceive a recurring problem for agriculture that citizens and farmers' alike feel is a problem. In my personal opinion, I do not see CC affecting agriculture in the immediate future (next 20 years).
PUB8	Drought and early freezes; I do not think CC will affect agriculture in the foreseeable future.
PUB5	Extended drought would cause cultural changes. Drought is a recurring event especially in Colorado. That information is readily available through the state. This is still nowhere near the most severe or most extended drought seen by Coloradans.
PUB1	No response.
PUB2	Drought and yes, CC will affect agriculture in the future.
PRIV5	No response.
PUB12	The first thing that comes to mind are the hay farmers during monsoon season from mid to late July (it started earlier this past year). Drought or rain and when will it come? The fruit (peaches & grapes) is impacted by early and last freezes. The wine industry was hurt by the severe cold last year, so temperature extremes and precipitation extremes will offset all climate models. When energy is added to systems, it causes more extreme events to occur – this is happening in pockets around the world. Eastern Utah and Western Colorado show that inversions are a phenomenon that going to happen in certain regions – they are less likely to occur in New Mexico, for example. Inversions are a natural phenomenon, although there may be more pollutants in them, which makes them more visual. Populations have tripled. Per capita, we are driving more, have built bigger houses.
PRIV3	At this point in time, I find it difficult to conclude that we have realized any permanent changes in climate patterns in Mesa County. The climatologists that I have heard speak are still somewhat uncertain about this as well, thus my opinion. CC, regardless of the cause is an integral variable in the process of producing food. Agriculturalists will always have to adjust to climatic problems.
PUB4	The most common weather events that cause problems are drought and early/late freezes. CC affects agriculture globally.
PRIV4	The spring freeze has always been a problem for farmers and growers. Greenhouses would solve this problem.
PUB10	With my limited knowledge of agriculture in general, I would assume it would depend on the type of crops; drought conditions, extreme heat and cold fluctuations and time considerations. In my opinion local crops could potentially be affected if climate change is fully realized.
PUB7	No response.

PUB9	Even though Mesa County has a diverse mix of agricultural enterprises, many citizens associate fruit production with agriculture production in Mesa County. Thus, late spring frost is the main weather event that impacts production. Drought is the other weather event that consistently impacts agriculture production throughout Colorado. In my opinion, CC will impact agriculture slightly over time.
PRIV1	Early below freezing temperatures before trees and vines have gone dormant can cause winter kill or damage that affects crop yields. Late frost in spring after blossoms emerge causes loss of fruit.
PRIV6	CC could affect the predictability of spring freezes which would impact fruit crops in Mesa County and to a lesser extent other food crops. Drought is our biggest threat.
PRIV7	CC will always affect citizens and farmers as weather patterns change and are cyclical.
PRIV8	CC might benefit us, heating-up would benefit us, but water may become a problem. We are dependent upon the snow-pack – if we don't get snow, we won't have water to grow.
PUB11	Archival Water Recycling.
NON1	Greenhouse observation only.

A5	**Responses on factors related to water, future water restrictions, dividing the use of water between agricultural and energy interests, and whether or not growing in greenhouses would be considered to be a threat for existing interests?**
PRIV2	No….and with the recent drought being officially over I do not see a need to talk about potential water restrictions. I do not think that greenhouses would be considered (to be) a threat to water supplies. Energy, in fact, is actually producing water with some of their deep well projects that is beginning to lessen their dependence on surface water for hydraulic fracturing.
PUB8	There are excellent water rights and agricultural infrastructure, and yes measures have been taken by local government; also, greenhouses would have to follow current Colorado Water Law when using water for agriculture.
PUB5	We have not considered any future water restrictions in Palisade and don't have a need to do so at this point. I don't see greenhouse growing as a threat.
PUB1	Senior water rights rest with the State of Colorado. Lake Powell is the savings account for the upper river basin. Lake Mead takes care of the lower river basin. States such as Arizona and Nevada are working together to save water by re-electrifying aquifers while local governments encourage people to practice 'xero' landscape. There is little to no tension between fracking and farming because each has something the other

	wants. Greenhouses would not pose a threat to oil & gas nor traditional farmers – there is plenty of water here on the Western Slope. It would be difficult to assess whether water for greenhouses should be deemed agricultural or commercial. The further a person goes west in the valley the more water would be available to growers while the further east an operation goes the less water is available. The question is "can water be run year-round?" The answer is "they are leaning toward allowing it."
PUB2	Yes – measures have been taken by the government to inform citizens. No - greenhouses would not pose a problem for existing industries.
PRIV5	No response.
PUB12	Meteorological description.
PRIV3	No, local governments have not taken measures to inform citizens. Through Colorado Mesa University a number of forums and seminars (have been held) related to present and projected water issues. These have been well-advertised and relatively well-attended. Regional and economic trends are the factors that contribute to low/high economic growth and low/high unemployment rates in Mesa County. Greenhouse water can be recycled. There are a variety of closed-loop hydroponic systems that can be incorporated.
PUB4	There will always be water issues in the area. It seems that much of the restrictions and/or regulations come as a response after the fact. I don't believe growing in greenhouses would be a threat to existing industries. Water is much easier to control in a greenhouse environment.
PRIV4	The local government has taken some measures to inform the people about water restrictions such as on TV commercials. However I can see how year-round growing could be considered a threat to the water supply. Many greenhouse operations across the country have already adopted capture and recycling systems. A common method of collection and reuse of water is the installation of retention basins, storage ponds, storage tanks and additional pumping capacity.
PUB10	Yes - measures have been taken to inform citizens. In my opinion growing in regional greenhouses would not be a threat to the above mentioned industries for water usage.
PUB3	The issue is water because it's not available in the winter. There may be areas of the valley where some water can be pumped straight out of the river. We supply the water to Kannah Creek. There may be a way to get water from them – there may be water from Ute Water – but can we access it? "What is the cost?"
PUB6	Year-round water may be an issue.
PUB7	No response.
PUB9	In my opinion most citizens and almost all farmers are aware of water supply issues in Western Colorado. The "Colorado Roundtable" efforts are effective in informing people about water issues in the state. I have never

	heard anyone being concerned that growing in greenhouses could be a threat.
PRIV1	The Colorado Water Commission and the CSU Research Center have communicated with growers and local media keeps citizens informed to what is current with water levels and snow pack that will affect the season's water supply and river flow. Growers would have the option to buy into the concept or not of greenhouse planting. Fruit growers especially may not because they have responsibilities all year round to prepare trees for the season and may not choose to branch out to another crop. Greenhouse farmers would have to own water rights or irrigation on the property they own or purchase property with them. Domestic water is not allowed to be used for agricultural purposes; however, gray water is not a new concept.
PRIV6	Some measures have been taken but I don't feel that enough has been done. We read about it in the newspaper or hear about it on the news but there aren't enough "true" (non-political) public forums where this is discussed. I don't feel that year-round growing in greenhouses is a threat to existing industries. Water rights are well defined and with cooperation between everyone as well as extensive conservation efforts they can all work together. Some legal challenges may present themselves but if the citizens, industry and policy makers work together there can be a win-win situation. Water for greenhouses can be recycled through water storage and utilization of current waste ditch runoff.
PRIV7	I feel that local government has done a good job of informing citizens about water usage from the Colorado River. The uses of water and priorities for water will always be a point of discussion as Western Colorado grows both commercially and residentially.
PRIV8	*I don't think that the local government has made a big deal about water – there are some restrictions. Everyone still 'flood' irrigates. I think that most people don't pay attention to water because we have a lot of it. Local government doesn't do too much to enforce conservation of water however, if there's no water, there's no food. I just returned from a conference in Denver regarding water law. Western Colorado still has pre-1920s water rights – we are secure – it's publically-owned, unlike California, [however it should be noted that] the population will double on the Front Range. As farmers, we will have to be responsible in the future, but we do have a renewable source of water in Colorado from the snow pack. *I don't think that greenhouses would be a threat to existing business. There's so much technology to heat greenhouses and water can be reused or recycled – it's not a threat to traditional growers. We no longer really need greenhouses, we can use LED lights and grow in any building – it's even more efficient than a greenhouse is.
PUB11	Water recycling information.

NON1	Greenhouse observation only.
A6	**Response to questions on public input**
PRIV2	Public input could be gathered with all of those vehicles…my guess is that a survey would be most successful as we all suffer from time poverty so unless someone is already passionate about the concept they will not be very likely to show up for workshops or listening sessions.
PUB8	A well-thought out information campaign would be required.
PUB5	This should be explored and the producers (farmers) level based on market and economics; also energy should be factored into the considerations. Open air growing is far more affordable than greenhouse food production.
PUB1	No response.
PUB2	As with all public input processes, local stakeholders that are passionate and committed need to be identified first.
PRIV5	No response.
PUB12	Meteorological information
PRIV3	Sure initial workshops, listening sessions, or conducting a public survey would be a good way to gauge the level of interest.
PUB4	There has to be a tremendous amount of local input. The effort would need to be community driven. Workshops with information about other communities that have this kind of initiative would be extremely helpful. This would gather input and avoid recreating the wheel.
PRIV4	Public surveys, listening sessions and initial workshops could be ways for the public to be informed and give input on local agricultural policies. Introduce the issue via TV commercials before conducting public surveys and encourage the people to contact the local City Councilmen.
PUB10	All of the above-mentioned examples are excellent opportunities, including the establishment of a local YRG association.
PUB3	No response.
PUB6	No response.
PUB7	No response.
PUB9	I am not sure the most effective way to educate the public about this topic. Perhaps a session at the Western Colorado Horticulture Society meeting would be a start.
PRIV1	A public survey, promoted with local media channels could be initially conducted to see what the public thinks about a local food plan but I would be very careful not to allow public comment on processes currently in place for our growers. The growers already face many regulations and policies how they handle food. The general public does not always have an accurate idea of where their food comes from.
PRIV6	Mesa County is blessed with many experts that can speak to this better. I would re-emphasize my response in question 4A. We need an “all of the above” approach.

PRIV7	I think all of the listed options would be good to gather public input.
PRIV8	I think a public survey should be used to gather information – to get a broad spectrum. You know, the farm bureau talks about education, but farmers are really busy planting and working. Social media would help out here; like Facebook, that's how people keep up with what's going on.
PUB11	Archival information about water-recycling.
NON1	No comment.

A6 **Responses on questions regarding considering placing an initiative on the ballot that supports the development of local food systems; what might attract policy attention to YRG; factors that contribute to low/high economic growth or low/high unemployment rates; and current ideas that may work in tandem with already-existing businesses.**

PRIV2 No to placing an initiative on the ballot; I see no need for a ballot initiative unless the intent is to use government funds to build a local food system….something that this Chamber and others would likely oppose as it competes with the private sector.

My question back to you is why we need policy maker attention to the development of local food systems. If it is financially viable we have the expertise in the farming community to make it happen. I don't see this as a government issue.

Factors impacting economic growth and employment rates locally include diversity of the economy that includes more "recession proof" industries like health care and higher education coupled with attracting higher paid jobs to the area. Agriculture in all of its forms does not tend to contribute to higher wages. Our recent unemployment has been driven by large layoffs in several energy sectors including natural gas and coal. Those layoffs have affected many local businesses from auto dealers to insurance agencies. In total we have now lost almost 6000 people from the labor force that went elsewhere to seek employment. Job creation that encompasses high wages has to be the top priority for building the economy.

Yes there are ideas that work in tandem with existing businesses for job creation general if that is your question. We need companies that can service our existing manufacturing base, take advantage of our abundance of energy to increase manufacturing jobs (which pay much more than service jobs), and capitalize on our hub as a heath care center. With regard to your concept of year round growing we have one facility in Palisade that currently does that and their employment base is small. Existing restaurants could potentially be customers of year round growing facilities but otherwise I see no major connections.

PUB8	Public interest would attract policy attention to YRG. Availability of jobs contribute to low/high economic growth and low/high unemployment.
PUB5	No there should not be a ballot initiative. This is a private industry issue and the government in no way should be encouraging or forcing the burden and expense of greenhouse production.
PUB1	No response.
PUB2	No, I don't believe policy making is best done at the ballot box. I don't know, extension office activities, maybe?
PRIV5	No comment.
PUB12	Meteorological information.
PRIV3	No, they should not place an initiative on the ballot. There are a number of existing opportunities for people to learn about producing food, or starting a new business. The economic environment is such that there is room for local producers to be profitable, thus I don't see the logic behind the subsidization of new growers.
PUB4	I don't see this as a county government driven issue. It seems to be along the lines of nonprofit and CSU extension activities.
PRIV4	The Mesa County government officials could consider a tax break or some other incentive that would support the development of local food systems. Raising taxes would not be an incentive.
PUB3	No comment.
PUB6	If there is a food movement, the locals would have to supply it. It might be a better idea to apply for grants and make a model so that commercial growers don't get their hands on it (the concept of growing in greenhouses).
PUB7	I'm a free-market-type-of-person, not a proponent of the Federal government being involved.
PUB9	In my opinion, Mesa County government should not place initiatives on the ballot to support local food systems. I believe the Colorado Department of Agriculture should continue to be responsible for developing programs to assist Colorado agriculture market locally, regionally, nationally, and internationally. In my opinion, YRG, like any other agriculture enterprises, needs to be economically profitable independent of policy incentives.
PRIV1	I would not support government control of food supply or production unless the role of local government would be in the form of grants or tax incentives to participate in YRG for the grower. Community gardens and CSAs should be encouraged and supported.
PRIV6	Yes, Mesa County officials should consider placing an initiative on the ballot that supports the development of local food systems however politicians are not the best group to take the lead. Thus must be citizen and industry driven with the role of local government as a conduit to the ballot. A well rounded advocacy group consisting of the agriculture/energy/ranching interest and various citizen groups might

	attract policy attention. Mesa County tends to vote 'no' on anything that appears to be a tax, subsidy, or radical idea. Voters need to be convinced by their neighbors. There's something in it for everyone' and bring those groups together to advocate to their neighbors is key. The local culture contributes greatly to this challenge. Since the energy bust in the 80s the economy of Mesa County has diversified but not to the extent that we're not balanced enough to withstand economic downturns. We need more industries that are not as impacted by season and short term economic swings. I think Mesa County is doing a good job of being an attractive community to business. We just need to 'grow up' and get into the 21st century. Mesa County is still heavily resistant to change.
PRIV7	I am not sure that a ballot initiative is necessary. Policy attention to YRG might be attracted by one-on-one discussions with local officials.
PRIV8	*No to placing an initiative on the ballot for a food system; however. I do think there should be more of a movement to encourage young people [to farm]. Farm land is decreasing. It's hard to get the government involved, but they [have the power] to promote the use of programs. *When food becomes a serious problem – this is what will attract attention to policy.
PUB11	Archival information.
NON1	No comment.
A7	**Response to questions about costs, benefits, challenges, & opportunities of building a local food and farm plan that included YRG in greenhouses, as well as the financial resources to generate such a plan.**
PRIV2	I don't feel qualified to answer these questions.
PUB8	It could increase the fresh food availability, decrease transportation energy costs and increase tourism dollars. The cost of infrastructure could be enormous also the lack of water could be another major issue. The financial resources could be generated through existing operations with capital, loans from banks, and state and federal grants.
PUB5	Again, this should be a business decision by the business and not supported by government.
PUB1	No comment.
PUB2	I'm sorry, I don't know these answers off-the-top of my head.
PRIV5	No comment.
PUB12	Meteorological component.
PRIV3	The benefits would be in the access to locally-grown, fresh produce. The costs would be that consumers will need to be willing to spend a larger percentage of their income on food.
PUB4	No comment.

PRIV4	There is a growing need for safe, healthy, and natural food items, and what seems like a decreasing amount of space to grow healthy organic food in nutrient-rich soil. Growers are always looking for methods which will save energy, reduce pollution, grow more and higher quality crops, and they want something affordable. Underground greenhouses are a preferred method for the environmentally conscious grower.
PUB10	Costs would be the initial capital investment of land acquisition, the plants, greenhouse construction, coolers, loading equipment, lighting, fertilization and irrigation systems, including site permits and design, utilities, waste removal, water rights, transportation, advertising and labor. The benefits would be fresher local produce, smaller carbon footprint. Financial resources might come in the form of private funds, state and federal grants.
PUB3	No comment.
PUB6	No comment.
PUB9	Potential benefits: Fresh local foods, local economic benefits. Potential costs: Initial investment, increased risk. Opportunities: Better utilization of local resources, demand for local food products. Challenges: Profitability, markets, production techniques, competitive advantage.
PRIV1	I wouldn't begin to know what the costs of the plan would be. It would depend on what the plan looked like, what the anticipated yield of produce, how many families would have access to the food and what their investment would be. The resources as I said earlier could come from grants or the community where the greenhouse would be established.
PRIV6	Most benefits have a cost associated with them. The true question is "are the benefits worth the cost?" I'm not sure what the costs are but the benefits in my eyes are increased employment/decreased unemployment, increased exports from the county, increased tax revenue, locally grown healthy food for our citizens and potential partnerships with education (SD 51 & CMU).
PRIV7	I am not entirely sure, but I would think that locally grown food would be less expensive. I think that creating a task force might be helpful to assess these challenges and opportunities. I would think that state and federal grants might be available.
PRIV8	I'm a little bit biased, but it would be good for [local consumers] to know where their food comes from, the retail outlets, there'd be more business, it would create jobs (maybe not tons); but it would teach and educate people about the process – there are tons of benefits – it [would] encourage growth.
PUB11	Archival material.
NON1	No comment.

A8	**Response to questions about conducting a technical feasibility study to see if a local food and farm plan can be designed.**
PRIV2	Only if such a feasibility study does not come at the cost of other economic development activities currently being funded with tax dollars. I think a study may be premature until there is greater buy-in of the concept...otherwise it will simply languish on a shelf.
PUB8	I think the technical aspect is not the difficult one, the real issue is adoption by producers.
PUB5	This should be a business decision by the business and not supported by the government.
PUB1	No comment.
PUB2	No, I think the political will needs to be measured and confirmed long before any technical analysis is undertaken.
PRIV5	No comment.
PUB12	Meteorological information
PRIV3	I'm not sure what all may be behind the term "technical feasibility study." I would suggest developing a group of like-minded individuals to explore the questions.
PUB4	No comment.
PRIV4	A technical feasibility study should be conducted to see if it is possible.
PUB10	Yes, a technical feasibility study should be conducted, including financial considerations.
PUB3	No comment.
PUB6	No comment.
PUB7	No, a technical feasibility study should not be conducted.
PUB9	In my opinion, every business venture should prepare a business plan to determine its potential opportunity for success. I am not sure how a feasibility study for a local YRG food system would be conducted unless it would help determine if there is local market for year round grown food products at a profitable price.
PRIV1	It couldn't hurt.
PRIV6	Absolutely.
PRIV7	Yes, if the grant money could be obtained to conduct such a study.
PRIV8	Yes, I think this would be a good idea.
PUB11	Archival information/Water Recycling.
NON1	Greenhouse Observation.
A9	**Response to questions about warehousing, storage, and delivery systems as well as advantages/disadvantages in the use of technology or renewable energy in greenhouses.**
PRIV2	Warehousing, storage, and delivery systems would have to be economically viable.

PUB8	No response.
PUB5	Less energy expense through the use of technology.
PUB1	No comment
PUB2	Perhaps citizen surveys. I don't know.
PRIV5	Find a good geothermal source and definitely go subterranean somewhere like Glenwood Springs.
PUB12	Meteorological information.
PRIV3	*Governmental participation should be limited to safety in food processing and handling (warehousing, storage, & delivery systems). *Technology is a very broad term. Certainly many forms of technology can be used to enhance the efficiency of a greenhouse system. Although greenhouses can be easily adapted to incorporate 'alternative' sources of energy, from an economic point of view there are few if any competitive advantages in the short-term, unless the capital expense can be off-set through tax credits, or incentives. The energy required for light and ventilation can be generated through alternative energy systems (solar, geo, wind, etc.). The major limitation in alternative energy technology continues to be the storage of the energy. The university could work with local interest in the design and development of a model system for the purpose of educating future farmers.
PUB4	No comment.
PRIV4	*Local grocery stores already sell locally grown foods. YRG would allow these stores to sell locally grown foods all rear round. This system is already in play and should not pose a problem. YRG would provide more income for local farmers and increase business for local truckers. Also, it could possibly cut the cost of produce for local stores. *An education in greenhouse growing and technology could be advanced through our university. It would be a great way to help the university generate revenue for Mesa County.
PUB10	*Surveys at farmer markets and input from local produce sellers might produce better results. Establish a network of private local haulers and transport when produce is freshly picked to minimize storage requirements. *Technology advantages would include: reduced operating expenses, additional revenue sources, marketing to various segments of the community, more support from industry/political and greater involvement from local partners. The disadvantages: upfront costs for the initial installation or lack of technology. There may be opportunities for the university to expand current agricultural curriculums which may potentially increase enrollment at the college.
PUB3	No comment.
PUB6	No comment.
PUB7	No response.
PUB9	Probably a feasibility study.

PRIV1	The popularity of our farmers markets during the summer months proves that there is a desire to purchase locally grown produce fresh from the grower. The ability to have it year round is a wish come true. Transportation would be no different than done now. The challenge would be for the big box stores to purchase locally for a higher price than they are paying for volume purchasing through national contracts with commercial growers. *Solar energy used in greenhouses can save on overall costs however a disadvantage would be the initial cost of installation and ROI. If the greenhouse was subterranean the annual costs of controlling temperatures and growing conditions would be lower. Lighting would be a factor for subterranean growing. I think the CMU is already ahead in (a technological sense) in agricultural curriculum and research.
PRIV6	*(It's) not my area of expertise. No input. *I can't state anything specific but technological advances should make this project possible. The valley has multiple energy sources potential including renewable (sun, wind, hydro, methane recapture). A hybrid approach would most likely be necessary. Cost may be a disadvantage which is why I believe a hybrid approach will be necessary.
PRIV7	*One way to assess consumer interest would be for CMU to conduct a consumer study. Perhaps tapping into the Incubator and Chamber of Commerce would be a good resource for to find a way to create trucking, storage, and various support systems. *Technology and renewable energy would be of a great benefit for YRG. I can't see any disadvantages. I would think that CMU would want to consider this (CMU) as an option for the technical institute. A year-round-growing season would benefit any community.
PRIV8	Take surveys. Get out there and get diverse opinions.
PUB11	Water recycling archive.
NON1	No comment.

A10	**Response to question regarding a local food and farm plan with YRG becoming a part of an agenda for local farmers and growers.**
PRIV2	Show them the cost/benefits of such a plan…they will then make their own choices as to whether to participate or expand in that direction.
PUB8	They have to adopt the idea. First adopters need to show success and the mainstream producers will follow over time.
PUB5	Whose agenda?
PUB1	No comment.
PUB2	I don't know for sure; but I don't see the harm.
PRIV5	The political strength or power of food producers is practically 'nil' due to overzealous regulatory state/local agencies with layers of regulations.
PUB12	Meteorological information.

PRIV3	To begin, identify an economically realistic segment of the food production system that can be supported by local growers. Assuming that this segment of the food system can be successfully supplied by local growers, (then) work to expand into additional food products. This would involve a combination of additional growing/marketing expertise, along with active marketing with the consumers to convince them of the benefit of consuming the locally grown products.
PUB4	No comment.
PRIV4	Discussing YRG with local farmers would be a good place to start. This would help to set up an agenda.
PUB10	I would think it would depend on interest level and the feasibility of YRG indicated by the initial studies and surveys.
PUB7	(An agenda won't dictate YRG); the demand will dictate that and the economics will drive it. I'm curious about what you might learn from the Front Range because they have 4 million people who have the income to spend the extra dollars. I'm not a big supporter of government subsidies – big commodity crops are all subsidized. I'm a free-market-type-of-person, not a proponent of the federal government being involved.
PUB9	Western Horticulture Society Meeting.
PRIV1	There is a week-long conference of the Horticultural Society and CAVE Association that includes most of the growers on the western slope every January. I think contacting them and having this topic included in a seminar would be a place to start.
PRIV6	I'm really not sure but without it the effort would struggle. In my industry projects require a 'sponsor', someone within the company that has influence, passion and a level of authority to move a project forward. This might work.
PRIV7	I am not sure that you can develop an agenda for local farmers and food growers.
PRIV8	You know, it's a hard thing. People don't like being forced. The importance of education is paramount. Let them make a decision.
PUB11	Water Recycling Expert.
NON1	Greenhouse Observation.

A11	**Response to question about factors that would best describe the social climate of Mesa County.**
PRIV2	Socially and financially conservative.
PUB8	No comment.
PUB5	Conservative, independent and community-oriented.
PUB1	No comment.
PUB2	Economically, we are still in a recession, but our overall quality of life is higher than average.
PRIV5	No comment.

PRIV3	Lower income; high level of unemployment or under-employment.
PUB4	No comment.
PRIV4	The social climate in Mesa County is very narrow-minded from my observation when it comes to new technology.
PUB10	I think there are many factors to consider, including economic, political, and interest level of the public for YRG. How is it promoted to the community?
PUB3	No comment.
PUB6	No comment.
PUB7	No comment.
PRIV1	Mesa County has a social climate that revolves around outdoor recreation, art and theater and festivals. As an organization that deals with tourism, the feedback from visitors is that this is a very friendly community.
PRIV6	(It's) conservative but caring. In my opinion it's too heavily focused on 'let the churches take care of it". This is a very cautious community that resists change regardless of the benefits it may bring.
PRIV7	Conservative.
PRIV8	I think that we have a very…not super diverse group. We are white America in Mesa County – there's not a huge gap in financial class. The majority of the population is middle-class, hard-working people - it's not Aspen. We have a population that is quite poor; they're just trying to eat – get the most food at the least cost. It would be great to get this part of the population involved with fresh food.
PUB11	Water Recycling Expert.
NON1	Greenhouse Observation.

A12	**Response to questions about the prominent issues of Mesa County and if agriculture is an issue that frequents policy agendas.**
PRIV2	(The prominent issues are) jobs and the economy, infrastructure including roads and cultural assets such as the Avalon, planning and future growth. Agriculture is not a frequent issue other than insuring that urban sprawl does not infringe on agricultural growth areas.
PUB8	No comment.
PUB1	No comment.
PUB2	Agriculture is an issue that frequents policy agendas.
PRIV5	No comment.
PRIV3	The most prominent issues seem to be good employment opportunities. I don't believe that agriculture is a major policy question at the county level.
PUB4	No comment.
PRIV4	Buying locally is a prominent issue and this could be an avenue to pursue for YRG.

PUB10	I don't know this answer completely, but Mesa County prides itself in its variety of agricultural activities, from peaches, apples, corn, additional crop types, to wine production.
PUB3	A new agricultural product is marijuana. Pot production – could be tied to YRG.
PUB6	No response.
PUB7	No comment.
PUB9	Energy development is a prominent issue in Mesa County. In my opinion, agriculture is not a major local issue.
PRIV1	Water in future supplies is number one; growth, employment, air and ground transportation, and air quality. I don't believe agriculture needs to be on the forefront of local policy-makers unless it is about land conservancy or irrigation runoff. Again, growers are regulated by federal standards and policies that do not need added local policies.
PRIV6	*Underemployment and unemployment are probably tops but future opportunities for our youth are close behind and in some cases go hand-in-hand. *Not nearly enough. We need to be more proactive and looking towards the future.
PRIV7	As agriculture is one of the top 3 industries in Mesa County it is discussed on a regular basis. Mesa County Land Trust was founded to assist in buying up agricultural land that could potentially be developed for residential or commercial use.
PRIV8	I'm all about agriculture and [the onset] of development. When it comes to farmland, we won't be expanding into the desert. The diminishing farmland is an issue – when it disappears it's gone.
PUB11	Recycling water archive
NON1	Greenhouse Observation

A13	**Response to question about a change of regime in County Commissioners or City officials in order for new ideas to be considered.**
PRIV2	Neither…you are giving both boards too much credit for a concept like this…it must be embraced by the private sector.
PUB8	No comment.
PUB5	I don't think they should do either.
PUB1	No comment.
PUB2	I don't know that this has even been brought up as a critical policy issue, so I would guess no at this point.
PRIV5	No comment.
PUB12	Meteorological information.
PRIV3	I have no idea. It would depend upon who would replace them.
PUB4	No comment.

PRIV4	There is always room for improvement. The current Councilmen do have experience in water irrigation and maybe they would help to promote the local food and farm plan.
PUB10	Any support from local/regional/state politicians can help with promoting and encouraging YRG.
PUB3	No comment.
PUB6	No comment.
PUB7	Did not ask this question.
PUB9	Probably, depending on who gets elected and their backgrounds.
PRIV1	A change in regime on any level would sway support either way. The need would be to recruit the right candidates who support the policy in the first place…or have a very strong public outcry for change.
PRIV6	*County Commissioners – Absolutely, we are about to lose the most prominent advocate for agriculture on the commission in the past 10+ years. The recent make-up of the Commission has been too focused on political and polar issues. I've felt for a long time that the Commission should be a non-partisan election like City Council. Mesa County is way too political and politics come first with most of our influential citizens. Mesa County needs some 'true' leaders that can put politics aside. *City Council – Not so much so but still reflective of the comments above *Although you didn't ask one of the biggest detriments to this effort could be the GJ area Chamber of Commerce. They are too involved in the politics of the city/county to the detriment of small and minority businesses.
PRIV7	These are elected officials that would need to be educated on the potential of this new industry.
PRIV8	I think when you get someone in there who has live the farm life, not just a hobby farm, then the passion would change the direction of growing and more attention would be paid to farming.
PUB11	Water recycling archive
NON1	No comment.

A14	**Response to question about YRG through free-market enterprise or agenda-setting.**
PRIV2	It should be considered a free-market enterprise.
PUB8	No comment.
PUB5	Free market – do you know how many acres are in agricultural production in Colorado? Have you thought about how big/many greenhouses it would take to make a significant impact?
PUB1	No comment.
PUB2	No, it should not be on an agenda. To my knowledge, this is not a legislative issue, so no, I don't believe so.
PRIV5	No comment.

PUB12	Meteorological information.
PRIV3	Free market enterprise.
PUB4	No comment.
PRIV4	The less government the better - it should be a free-market enterprise, but the government could help promote the idea.
PUB10	In my opinion, it should be a free-market enterprise.
PUB3	No response.
PUB6	No response.
PUB7	I'm a free-market-type-of-person, not a proponent of the federal government being involved. I think local growing must be driven by the market and I believe that our health mecca concept is already happening. I think there is a great deal of an increasing awareness in consumers (regarding food). The produce departments in all of the supermarkets have grown. If you go to a more boutique-type market like Sprouts, you can find (organic food) in them. It's more expedient to grow in the Imperial Valley in Southern California and Mexico – economics favors the way it has always been done – it supplies 89 to 90% of our produce. Well there would be a demand for year-round produce, but the economics of growing in a warm climate makes more sense. Then we put it on trucks and ship it in.
PUB9	Free-market enterprise
PRIV1	Always a free-market enterprise – I would never support a federal mandate to force communities to grow food supplies.
PRIV6	Free-market enterprise – if done properly it can be a stepping stone to a better Mesa County.
PRIV7	Public-private partnership.
PRIV8	Free-market enterprise.
PUB11	Archival water recycling.
NON1	No response.

A15	**Response to question about how potential coalition supporters might become enticed to support a local food and farm plan through YRG.**
PRIV2	If the farmers are on-board, the rest of the community will likely support them.
PUB8	No comment.
PUB5	Contract with a farmer to buy their goods directly and be willing to pay 200-300% more for your food.
PUB1	No comment.
PUB2	Stakeholders need to be talked with and organized with a cohesive set of plans and ideas.
PRIV5	No comment.
PUB12	Meteorological information.

PRIV3	To begin, identify an economically realistic segment of the food production system that can be supported by local growers – convince consumers about the benefits of locally grown foods.
PUB4	No comment.
PRIV4	Generating more revenue for the county and themselves would entice potential coalition supporters.
PUB10	In my opinion, the level of financial impact to their particular business plan or expanding their revenue opportunities; creating new markets.
PUB3	No response.
PUB6	No response.
PRIV7	The bulk of our consumers get their groceries from big chains. During the summer, the big chains can't compete with local farmers. "If they don't have local peaches, they don't sell peaches." They are responding to consumer demand. "Did you know that the wineries and peaches are what this area has become about….tourism, not the Monument, but farming.
PUB9	Education.
PRIV1	Have conversations with them as to why it is important and how it could benefit the community; but they would need the support from those promoting the idea.
PRIV6	That's the $10k question and unfortunately I don't have an answer. I do know that it'll take a good 'sales pitch.' I remember the first time the new Public Safety complex was introduced and the selling point was "it'll cost you less than a meal at McDonalds." I found that insulting, demeaning and condescending. For some families a meal at McDonalds is an extravagance and something they save up for. I feel this type of approach dooms a project from the start.
PRIV7	Education, education, education.
PRIV8	Education - people should know how their food is produced. It starts with young kids. When you ask them where their chicken sandwich comes from, they say, "the store." When it's explained, the seed is planted. This generation wants to make a difference. "A good thing for many is the goal."
PUB11	Archival information.
NON1	No response.

Appendix C: Acronyms

BBS	Big Box Stores
CEF	Clean Energy Farming
CC	Climate Change
FM	Food Miles
G	Greenhouse
GG	Greenhouse Growing
HA	Hectares
HORT	Horticulture
FRKG	Hydraulic Fracturing (Fracking)
LF	Local Food
LLVV	Framework of the Study
MC	Mesa County
OBI	Open for Business Initiative
RE	Renewable Energy
SG	Smart Growth
SGP	Smart Growth Planning
SCD	Sustainable Community Development
SRA	Sustainable Rural Agriculture
TDRC	Multi-Jurisdictional Transfer of Development Rights
YRG	Year-Round Growing

Appendix D: Recruitment Letter

To Whom It May Concern:

Thank you for your interest in being a participant in my Dissertation research. My research will investigate year-round growing in Mesa County due to the possible onset of climate change. Growing year-round would require the implementation of greenhouses to achieve the goal of supplying residents of Mesa County with local food on a year-round basis. This may require a change in infrastructure and planning to create a small network of mini-markets or corner stores, in addition to local trucking, and warehouse capabilities. It is hopeful that this research will contribute to the understanding of the costs and benefits of growing year-round.

The interviews will be audio taped with your permission. All information from the interview process will be confidential, and your identity will be protected at all times. Participation is strictly on a voluntary basis, and you may withdraw participation at any time.

For this study I am seeking the following participants who are:

- Residents
- Public Officials
- Private Organizations
- Non-Profit Entities

If you meet the above criteria and would like to participate in this study, please return the response slip at the bottom of this page in the addressed, stamped envelope, or contact me by phone (970-778-9291) or email (kimberlie.brussa@waldenu.edu). After I receive your reply, I will contact you to arrange a date and time for our interview. If you do not wish to participate, no one will contact you and your anonymity will remain protected.

Thank you for considering participation in this study,

Sincerely,

Kimberlie A. Brussa

RESPONSE SLIP

___ Yes, I am interested in being a participant in your study. Please contact me to arrange an interview or for subsequent details.

Name: _____

Phone Number: _____

Email Address: _____

Appendix E: Consent Form

Researcher: Kimberlie Brussa

Research Title: Rural Year-Round Growing to Placate a Possible Negative Effect from Climate Change

You are invited to participate in a research study of "Rural Year-Round Growing to Placate a Possible Negative Effect from Climate Change." The researcher is inviting people who are associated with local, rural agriculture to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

The study is being conducted by a researcher named Kimberlie Brussa, who is a doctoral student at Walden University.

Background information:
The purpose of this study is to gain a better understanding of year-round growing in Mesa County as a way to placate a negative effect of climate change. This study seeks to understand the practice of utilizing greenhouses to grow food on a year-round basis to supply food alternatives to residents of Mesa County.

Procedures:
If you agree to be in this study, you will be asked to answer questions presented by the researcher, which will take approximately one hour and will be audio taped. The consent form must be signed by you in order for the interview to be conducted. Additionally, the researcher may request an observation of a greenhouse, solar panels, or any other technology you own that would be conducive to achieving year-round growing. This observation would be conducted by the researcher only with your consent.

Voluntary Nature of the Study:
Your participation in this study is strictly voluntary. Your decision as to whether or not to participate will not affect your current or future relationship with an institution, agency, or person. If you initially decide to participate, you are still free to withdraw at any time later without affecting those relationships.

Risks and Benefits:
Participation in this study carries the same amount of risk that individuals might encounter during their daily activities. This research will hopefully contribute to understanding what might be necessary to initiate a local food and farm plan which includes year round growing.

Payment:

There is no financial remuneration for your participation in this study.

Privacy:
The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept confidential through the utilization of a coding system and will be securely stored and used for professional purposes only. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any question you have now. Or it you have questions later, you may contact the researcher via email: kb@gvii.net. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden University's approval number for this study is:

Please keep this consent form for your records.

Statement of Consent:
I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By replying to this email with the words, "I consent," I understand that I am agreeing to the terms described above.

Printed Name of Participant _____

Date of Consent _____

Participant's Signature _____

Researcher's Signature _____

Appendix F: Potential Stakeholder Interviews & Addresses

Potential Participant Interviews:

8 Public Officials	12 Private Businesses	2 Nonprofit Organizations	Alternate Candidates
State Official	Talbot Farms	CSA	Media
Mesa County Official	Fisher Farms	Protect the Flow	Recreationists
Senator Mark Udall	Gobbo Farms		Environment
US Department of Agriculture	Grande River Vineyards		
National Oceanographic & Atmospheric Administration	Renewable Energy:		
Ute Water Conservancy	Wind		
County Commissioners	Solar		
Incubator Program	Water Recycling		
	Greenhouse Enterprises		
	Farmers' Market		
	Chamber of Commerce		
	Colorado Mesa University		
	Encana Energy		

Public Sector:

State Official Water Rights Administration
2754 Compass Drive #175
Grand Junction, CO 81506
(970) 245-5884

Mesa County Official Planning & Development Department
Land Use & Development Division
750 Main Street
Grand Junction, CO 81501
(970) 244-1636

Senator Mark Udall
Senator /Colorado
999 18th Street
Suite 1525
4th Tower
Denver, CO 80202
Washington D.C #: (202) 224-5941

U.S. Department of Agriculture
Farm Services
2738 Crossroads Blvd.
Grand Junction, CO 81506
(970) 242-4511

National Oceanographic & Atmospheric Administration
National Weather Service Forecast
792 Eagle Drive

Grand Junction, CO 81506
(970) 243-7007

Ute Water Conservancy District
2190 H ¼ Road
Palisade, CO 81526
(970) 242-7491

Mesa County Commissioners
Open for Business Initiative
544 Rood Avenue
Old Courthouse/Dept. 5010
Grand Junction, CO 81501
(970) 244-1800

Incubator Program
Small Business Assistance
2591 B ¾ Road
Grand Junction, CO 81503
(970) 243-5242

Private Businesses:

Talbot Farms Incorporated
3782 F ¼ Road
Palisade, CO 81526
(970) 464-5943

Fisher Farms
948 26 Road
Grand Junction, CO 81506
(970) 243-6546

Gobbo Farms
1155 22 ½ Road
Grand Junction, CO 81505
(970) 257-7477

Grande River Vineyards
I-70/Exit 42
Palisade, CO 81526
(970) 464-5867

Great Solar Works (Wind Energy)
www.solarwork.com
(970) 626-5253

Solar – Wind – Hydro
Renewable Energy Specialists
www.RESpecialists.com
(970) 241-0209

Denver Water (Water Recycling)

Damian Higham
Damian.hiham@denverwater.org
(303) 628-6537

Palisade Greenhouses
3895 N. River
Palisade, CO 81526
(970) 464-5133

Farmers' Market
Downtown Development Authority
248 S. 4th Street
Grand Junction, CO 81501
(All parties meet twice a month).

Public/Private/Nonprofit Sectors:

Chamber of Commerce
Grand Junction
360 Grand Avenue
Grand Junction, CO 81501
Email: info@gjchamber.org

Colorado Mesa University
1100 North Avenue
Grand Junction, CO 81501
(970) 248-1020

Encana Oil & Gas
19190 County Road 204
DeBeque, CO 81630
(970) 283-5720

Nonprofit Entities:

CSA Mesa County, CO
fieldtoforkesa@gmail.com
(970) 216-2642

Protect the Flow
molly@protectflows.com
(516) 398-8995.

Appendix G: NIH Certificate

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **kimberlie brussa** successfully completed the NIH Web-based training course “Protecting Human Research Participants”.

Date of completion: 06/23/2013

Certification Number: 1203146

Appendix H: Observation Protocol—Greenhouse Sample

Length of Activity: ___Minutes

Descriptive Notes	Reflective Notes
General: What are the experiences of a greenhouse grower?	I wonder if this is the "ideal" greenhouse for YRG?
The greenhouse layout and comments about the physical setting at the bottom of the page	
Time grower enters room.	Grower shows plants.
Grower gives background of what he/she knows.	
Suppliers show what supplies are necessary to grow.	How much do suppliers know about growing?
	Drawings

Researcher will observe as a participant.
Field-notes will be taken.
Quotes will be recorded.

Recycled Water Customer Training

Training Objectives

1. What is recycled water and why use it?
2. How is it treated and distributed?
3. How is it regulated?
4. How is its use managed?

1. Recycled Water

What is it?

- Treated wastewater for irrigation and some industrial & commercial uses.

Interchangeable with ‘reclaimed water.’

What is it not?

- Graywater: Untreated water from showers, clothes washers, and faucet uses. Kitchen sink and toilet water are excluded.

1. Historical Usage

- > 100 Locally Nationally years for crop irrigation
- > 70 years for l d i i i

More than a dozen communities

- > 40 years in Colorado Springs landscape irrigation
- > 40 years for drinking water augmentation
- 5 years in Denver

1. Why Recycled Water?

- Lessens load on drinking water system
- Delays requirement for developing new drinking water supplies
- Required for sustainable growth
- Lower cost alternative to customers
- Blue River decree
- Right water for the right use

1. Recycled Water Source

Metro Wastewater Treatment Plant

To Recycling Plant

1. Recycled Water Treatment

1. Distribution

- > 30 miles of pipe
- 2 pump stations
- 2 storage reservoirs
- 1 potable water back-up
- Purple pipes, valves, etc.
- Stamped “Recycled Water”

1. Distribution

- **Manhole rings & covers**
- **Stamped "Non-potable water"**
- **Entirely purple**
- **Valves**
- **Triangular lids**
- **Purple lids**
- **Open left**
- **Pentagon nuts**

2. Regulation 84

CDPHE – Oversight, Permitting,Enforcement
Denver Water – Reporting & Compliance
Customer – Compliance

2. Regulation 84

- **Recycled water is regulated by the Colorado Department of Public**

Health and the Environment (CDPHE) under Regulation 84

- 3 water quality categories under Regulation 84
- Denver Water produces Category 3 water, highest quality category

2. Regulation 84

Denver Water must:

- Provide annual training for all recycled water customers, including regulatory requirements & safe handling
- Submit Letters of Intent to CDPHE annually

- Treat the water to meet water quality standards
- Submit annual reports to CDPHE
- Conduct a representative number and type of annual audits at recycled water customer sites
- Report violations to CDPHE

2. Regulation 84

Customers must:

- Submit a User Plan to U l i i kl
  Comply and obtain a Notice of Authorization b f i l d
- Use purple pipe, sprinkler heads, and valve boxes for all repairs or modifications before using recycled water
- Ensure all recycled water system to recycled water system
- Provide emergency contact details to Denver operators are Water & respond to trained via Denver Water's recycled water

training program- emergency calls within 1 hour

- Participate in annual audits
- Provide signage indicating C tif l t use of recycled water
- Certify annual water usage
- Report violations to CDPHE

2. Regulation 84 Minor Violations

- Ponding/runoff
- Overspray
- Irrigation above agronomic rate
- Modifications/repairs not distinguished as g
- Supplementing recycled water with recycled water
- No backflow to other water sources without approved backflow prevention

- potable water
- Operation by Application or permeable storage within 100’ of p y water
unauthorized/
untrained personnel
domestic source
- No signage

2. Regulation 84 Minor Violations

- Self Reporting
- Written report to CDPHE within 30 days
- Denver Water Reporting
- 60-day period allowed for customer and DW to come to a resolution

- **If resolution is reached within 60 days, no reporting to CDPHE is required**

2. Regulation 84 *Serious* Violations

- **Discharge to surface water (includes storm water)**
- **Cross-connection without backflow prevention**
- **Irrigation outside an area approved in Notice of Authorization**

☐ **Customer provides verbal report to CDPHE within 24 hours**

- Customer provides written report to CDPHE within 5 business days of verbal report

3. Operating Rules and Engineering Standards

Operating Rules – Chapter 4

g

- Customer designates responsible person
- Use
- Signage: 12” tall x 13.5” wide

schedules must be adhered to

- Maintain current records for
- Golf courses: 1st tee, 10th tee, driving range, putting green recycled water system
- other irrigators:
- Obtain approval from Denver Water & CDPHE for modifications to recycled All vehicle/pedestrian entries to irrigated area, 1 sign/500’ of perimeter water system

- Plan review submission requirements
g p
- Non-irrigators: appropriate locations for worker notification

3. Operating Rules and Engineering Standards

Engineering 11

- Backflow prevention required 5’ downstream of meter for potable services at
- Pumping & storage not allowed without Denver Water approval recycled D l l t t water sites (per Chapter 6)
- Potable water back-up only available via Denver Water di t ib ti t
- Dual supply systems not allowed without Denver Water approval
- Separation from potable & distribution system
- No hose bib connections
- Purple colored exposed surface for g., spray p p sanitary sewer pipes:
- Potable: 10 foot horizontal separation, 1 foot above irrigators (e. spray painted valve boxes, sprinkler heads)
- Restricted public access recycled water mains

- Sanitary Sewer: 10 foot horizontal separation, 1 foot below recycled water mains

4. Cross Connections

- Definition (EPA): Connection between potable and non-potable (raw or recycled) water supply
- Risks: spread of disease, health hazards
- Avoiding cross connections:
- Backflow prevention devices
- Cross connection control surveys
- Water quality testing

5. Recycled Water Usage

- Safe for incidental contact with humans and animals
- Category 3 (highest quality class) defined by CDPHE
- Disinfected at treatment plant
- Higher quality than water at open swim beach

5. Recycled Water Hygiene

- Don’t drink recycled water

- Wash hands thoroughly after working with recycled water systems
- Avoid irrigating during high public use times
- Minimize volatilization exposure to workers

5. Maintenance Practices

- Use separate tools for recycled water and potable water OR
- Thoroughly disinfect tools after use on recycled water systems before using on potable water systems

Curriculum Vitae

Kimberlie Brussa

Education

Mesa Colorado University, Grand Junction, Colorado, Bachelor of Science; Parks and Recreation
Walden University, Minneapolis, Minnesota, 2007-2009, Master of Public Policy and Administration

Current Studies

Walden University, Minneapolis, Minnesota, 2009-2014, PhD Public Policy and Administration with anticipated completion in 2014

Professional History

Winterhaven Ranch at Matchett Farms — May 2003 – present
*Manager/Horse Business and Hay

*Managed 90 acres of farmland, including growing hay on 20 acres of the property.
*Managed horse business; including a riding school, personnel, and assisted in the arena.

U.S. Forest Service
*Technician 1 — June 1998 – October 1998

*Marked trees for sale.
*Measured trees

Colorado State Parks — May 1996 – August 1996

*Youth in Natural Resources Program
*Team Leader of a program that connects children with their environment. Deep observation of the environment, including following wild horses, working on trails, visiting fish hatcheries, camping skills, learning about native plants, plus a college visit.

Oscar's Salt of the Sea

*Manager of restaurant in NYC. — June 1988 – June 1991
The Broadway Diner

*Manager of restaurant in NYC — June 1988 – June 1991

The Nordic Lodge — January 1991 – March 1994

*Manager of hotel in Steamboat Springs, Colorado

Supplemental Positions held while in school: — April 1994 – August 2004

*Carpenter
*Bricklayer's Assistant
*Waitress
*Head Housekeeper
*Personal Assistant
*Caregiver to the Elderly
*Caregiver to Brain-injured Individuals

Early Professional Career: — October 1978 – October 1988

*The William Morris Agency
Talent Agent for Writers of Motion Picture & Television

*MAY Air National Guard – Reno, Nevada — January 1975 – March 1978
Administrative — (PT – Several more years)

Volunteer Contributions:

*Volunteered with new networks of people to create hospice environments and serve those suffering from AIDs in Los Angeles at the beginning of the epidemic.
*UNICEF and the CREO Society for Children with Aids in NYC.
Homeless organizations in NY, Los Angeles, and Colorado

Affiliations:

*Colorado Environmental Coalition (CEC). Protect habitats by combining resources with farmers and environmentalists.
*Protect the Flow. Recreationists work with environmentalists to help protect the interests of those with a stake in the Colorado River.
*Main Street Farmer's Market in Grand Junction, Colorado.