

SOUTHEASTERN ARIZONA RANCHERS' EVERYDAY LIFE EXPERIENCES AND THE
INFLUENCE IN ADOPTION OF INNOVATIVE DROUGHT PRACTICES

by

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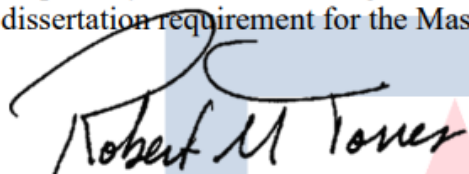
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As members of the Master's Committee, we certify that we have read the thesis prepared by *Revecca Rioux*, titled *Southeastern Arizona Ranchers' Everyday Life Experiences and the Influence in Adoption of Innovative Drought Practices*, and recommend that it be accepted as fulfilling the dissertation requirement for the Master's Degree.



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Date: 8-9-2023



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Final approval and acceptance of this thesis is contingent upon the candidate's submission of the final copies of the thesis to the Graduate College.

I hereby certify that I have read this thesis prepared under my direction and recommend that it be accepted as fulfilling the Master's requirement.



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Date: 8-9-2023

Land Acknowledgement

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

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Abstract

Southeastern Arizona ranchers' biggest climate related concern is drought, and it can impact their everyday ranch practices. By using two theoretical frameworks, Schein's (2010) hierarchy of organizational culture and Sociology of everyday life (Alder et al., 1987; Mars, 2020) the study was able to identify how everyday ranch routines will impact the rancher's willingness to adopt innovative drought practices. The two research questions that guided the study are 1) how does drought management influence Southeastern Arizona ranchers' everyday ranch practices, and 2) how, if at all do Southeastern Arizona ranchers' everyday life routines influence their willingness to adopt innovative drought management practices? After interviewing and conducting direct observations with four ranches located in Southeastern Arizona there were four themes that directly impacted ranchers' decision-making. Short-term persistence and generational sustainability, problem-driven ingenuity and resourcefulness, environmental synergy, and everyday interactions and community involvement provide insights into the innovative characteristics of the ranchers. With drought and other climate related factors threatening ranching operations it is important to know how ranchers' decision-making will be influenced on the everyday level.

Introduction

In the state of Arizona there are a total of 19,000 farms and ranches (USDA, 2022). A rancher provides food for the growing population and are stewards of the land. A rancher's complex career and lifestyle can inhibit a rancher's willingness and ability to adopt innovative practices and strategies (Didier and Brunson, 2004).

Ranchers are the implementers of policy partnerships and policy regulations (Roche et al., 2015a). It takes a community of ranches that work together along with public agencies to conserve and maintain habitats and water on the working landscapes (Brunson and Huntsinger, 2008; Roche et al., 2015a). Some ranchers may view environmental policy as an area of uncertainty for their operations, this can lead to changes in decision-making during a time of economic stress (Eakin and Conley, 2002). Environmental policy can cause a rancher to change their current land management practices. Rancher decision-making has been assessed by evaluating economic, social, and/or ecological factors (Coles and Scott, 2009; Wardropper et al., 2021; Bruno et al., 2022; Vasquez-Leon et al., 2003; Eakin and Conley, 2002). In this study I am not directly looking for data that falls under those characteristics, but rather will address the daily ranch experiences and activities.

Challenges that ranchers can face include economic hardships, changing political-legal forces, and ecological conditions threaten the sustainability of ranches (Didier and Brunson, 2004). There is a growing demand for a sustainable multifunctional working rangeland, these are areas that can continue to produce food and conserve the land (Roche et. al., 2015a). For long-term sustainability ranchers must use adaptive management strategies to cope with changing agricultural and conservation goals. The World Commission on Environment and Development (1987) defined sustainability as meeting the needs of the present without

compromising future generations needs. This definition guides my understanding of sustainability across the community, economic, and environmental contexts of the ranchers' daily routines and everyday realities. To maintain a sustainable landscape and ranching operation the operation should be financially viable and continue to provide a resource (beef and natural resources) to future generations. The rangelands will maintain biodiversity and have plentiful forage for cattle and wildlife. Some challenges that Southeastern Arizona ranchers face include economic forces (e.g., product markets), weather- and climate- related factors (e.g., drought), water scarcity, and invasive plant species (Coles and Scott, 2009). Climatic variability, specifically drought in Southeastern Arizona, are often areas of uncertainty for a rancher (Wardropper et al., 2021).

Drought is the most important climate-related concern among Southeastern Arizona ranchers (Coles and Scott, 2009). Ranchers will change land and livestock management practices due to drought (Saliman and Petersen-Rockney, 2022). This can be seen through changes in their herd sizes and grazing patterns. Drought can cause a shortage of water and forage on the range, which can lead to changes in their water supply systems (e.g., digging water wells, water storage tanks) and providing supplemental feed (Eakin and Conley, 2002; Saliman and Petersen-Rockney, 2022).

Innovation, according to Rogers (2003), can be defined as an idea, practice, or object new to an individual and/or unit of adoption. On a ranch, innovation adoption can be influenced by the ranchers' personal characteristics, operation characteristics, and their social system (Didier and Brunson, 2004). Types of drought innovation can include the use of water monitoring, water exchanges (Glenmon, 2018), drought preparedness, integrated water resource management, and adaptive management (Engle, 2010). For this study I am not looking for a specific type of

drought innovation but will focus on what the ranchers in Southeastern Arizona are implementing on their ranches. I will also see how drought will influence the daily ranch practices of Southeastern Arizona ranchers.

There is a gap between theory and practice when it comes to ranching management. There are numerous research recommendations, provided by researchers, that there needs to be more active rancher participants in research design, implementation, and interpretation (Bruno et al., 2022; Roche et al., 2015b; Saliman and Peterson-Rockney, 2022). The purpose of the study is to explore how Arizona ranchers' everyday ranch experiences influence their adoption of innovative drought management strategies. The study is guided by a theoretical framework composed of constructs from the sociology of everyday life (Alder et al., 1987; Mars, 2020) and Schein's (2010) hierarchy of organizational culture. The research questions are 1) how does drought management influence Southeastern Arizona ranchers' everyday ranch operation practices, and 2) how, if at all do Southeastern Arizona ranchers' everyday life routines influence their willingness to adopt innovative drought management practices?

Literature Review

Innovation is the process of changing something that is already established and introducing something new with the intent of creating value (O'Sullivan and Dooley, 2009; Mars & Hoskinson, 2013). Innovation can be applied to any existing process, product, or service within an organization or culture or can be enacted in the creation of completely new technologies of various types (O'Sullivan and Dooley, 2009). Innovation can be considered an outcome, process, and/or mindset. An innovation outcome is the sought delivery, usually a new product or service (Kahn, 2018). An innovation process is an improved or entirely new way of creating or delivering a product or service. Lastly, an innovation mindset is when innovation is

internalized by members of an organization and thus becomes a core element of their daily routines and practices.

An example of a ranch innovation process is the use of satellite fencing to graze livestock. Virtual fencing is the use of a collar device operated by a GPS that will signal, either using audio cues and/or electrical stimuli, to avoid or move into desired areas (Boyd et al., 2022; Campbell et al., 2018; Lomax et al., 2019). The goal is to allow managers to control plant species, wildlife habitat, save time and labor. An example of a drought innovation product is the use of precipitation monitoring and drought condition tools. Monitoring tools offered in Arizona include Precipitation Logbook Generator, myRAINge Log, and the Standardized Precipitation Index (SPI) Explorer Tool (Crimmins et al., 2022).

Ranchers will adopt innovative practices based on where they fall within the adopter categorization (Rogers, 2003). There are five categories of adopters: innovators, early adopters, early majority, late majority, and laggards. Innovators are those who can apply new technological knowledge and can accept the uncertainty with the innovation. The innovators will often step out of their peer network. The early adopters are those who have a large amount of respect within an organization/group. The early adopter's role is to reduce the uncertainty for their peers. Next is the early majority who will follow in adopting innovations but will seldom lead the adoption. The late majority are those who adopt an innovation after most of their peers do, this could be due to peer pressure. The last category are laggards who are the very last group to adopt an innovation. Laggards tend to focus on tradition and can be suspicious with innovations.

There is existing research that addresses rancher decision-making factors (e.g., economic, social, political, and ecological influencers), climate change vulnerabilities and responses, and advancements in ranching strategies and technology (e.g., innovation). A rancher's career and

lifestyle are synonymous and often multi-generational, thus deeply connecting them to their land and livestock (Bruno et al., 2022). This mixing of legacy and lifestyle often inhibits rancher willingness to adopt innovative practices and strategies, especially when doing so conflicts with established approaches and routines (Didier and Brunson, 2004).

Ranching varies by geography and landscape and is dependent on the health and productivity of the land. Specific to the Southwest U.S., ranchers depend on the natural vegetation for cattle forage and that vegetation has a sensitivity to climatic variability, especially drought (Eakin and Conley, 2002). Drought can negatively affect forage, limit the availability of drinking for livestock, and decrease overall herd productivity (Saliman and Petersen-Rockney, 2022; Eakin and Conley, 2002). Water scarcity in the Southwest U.S. has pushed ranchers in the region to invest in long-term water resources (e.g., digging new wells and water storage tanks) (Didier and Brunson, 2004; Eakin and Conley, 2002).

Ranchers deal with financial constraints, resource management challenges, and social decision-making daily (Wilmer and Fernandez-Gimenez, 2016). Financial constraints are the most common barrier to rancher adoption of innovative drought management techniques. Marginal income makes it difficult for ranchers to maintain their operations. Some ranchers have sought out an outside secondary income to aid in the financial hardship (Saliman and Petersen-Rockney, 2022). While there may be ecological value to certain innovations, most ranchers have prioritized economic stability over environmental advancements (Roche et al., 2015a). In short, limited income and time scarcity will decrease the chance of the adoption of innovative ranch practices (Didier and Brunson, 2004).

Most ranches are embedded within a complex socio-ecological system that will impact management decisions and adaptation (Didier and Brunson, 2004; Roche et al., 2015a; Roche et

al., 2015b; Wilmer and Fernandez-Gimenez, 2016). This system includes interactions between peers, community values and beliefs, and policy. Ranchers are most likely to trust those they deem credible and knowledgeable, usually those within their community. Oftentimes it is through word of mouth from peers that will influence practice adoption (Didier and Brunson, 2004). If innovations are presented from someone not within the community, an ‘outsider’, then they may interpret the information as a threat, an opportunity, or neither (Yates and Oliveira, 2016).

Ranchers directly work with the production of food, comply with policy and regulations, and partner with companies and government agencies in land and business management (Roche et al., 2015a). This intersectionality across the agricultural system is likely to influence the ranchers’ everyday ranch routines and practices. For example, various policies and regulations can limit and alter the land and business management strategies pursued on ranches (Roche et al., 2015a). For a rancher to adopt an innovative practice it would need to align with both operational needs and rancher goals and values (Kennedy and Brunson, 2007). The current study aims to understand how various socio-ecological variables influence the daily ranch routines, decision-making, and drought management innovation adoption patterns of Southeastern Arizona ranchers.

Theoretical Framework

My research is guided by a conceptual framework composed of constructs from two theoretical sources: Schein’s (2010) hierarchy of organizational culture and Sociology of everyday life (Alder et al. 1987; Mars, 2020). By using Schein’s (2010) hierarchy of organizational culture, I am better able to understand the ranching culture as it pertains to innovation adoption. The sociology of everyday life constructs enables my observation and

comprehension of the realities that influence and shape ranchers' everyday decision-making processes.

Organizational culture has a strong influence over innovation adoption decisions and processes (Drucker, 2014). Accordingly, I use Schein's organizational culture hierarchy model to gain insights into how organizational culture, as well as field-wide norms and values influence rancher decision-making specific to drought management innovation adoption. In the organizational context, culture is the norms and values that shape and coordinate member activities, decisions, and practices (Schein, 2010). Within a culture the group has shared assumptions that stem from the beliefs and values being accepted as true. These assumptions guide member responses to internal challenges, opportunities, routine demands, and any external pressures. Organizational culture has three levels: artifacts, espoused beliefs and values, and basic underlying assumptions.

The first level of Schein's (2010) hierarchy is artifacts, which include readily observed traits, behaviors, and/or events within an organization and its immediate environment. Examples of such artifacts include architecture, clothing, ceremonies, emotional displays, language, manners, myths and stories, technology and products, and rituals. Within the ranching culture some artifacts could include the type of livestock, size of ranch, business products, logo, and brand (both in cattle marking and marketing senses).

The second level of organizational culture is composed of espoused beliefs and values (Schein, 2010). This level includes beliefs and values that are shared between members of the organization, though also broadcasted out to external audiences, and are viewed as critical elements of mission and performance (Schein, 2010). The exposed beliefs and values will help guide decision making for the group and its members. Examples of espoused beliefs and values

can include a mission, vision, and values statement. These can be proposed by the leaders/founders of the group but will not be adopted as a belief or value until there is a shared perception amongst the group (Schein, 2010).

The third level of organizational culture entails underlying basic assumptions (Schein, 2010). Shared beliefs and values result in organization members collectively adopting and continually reinforcing a set of norms and values that are overtime internalized and acted on with little to no awareness (Schein, 2010). These assumptions are difficult to challenge or change, especially by those outside of the organization and its culture (e.g., innovators and researchers (Drunker, 2014; Rogers, 2003)). Challenges to a group's basic assumptions (e.g., innovative practices or products) can compromise the cognitive stability of organization members, which can lead to anxiety and defensive responses (Schein, 2010; Highmore, 2004). Though the purpose of innovation is to recognize and solve an existing or future problem or need (Rogers, 2003). Innovation has the potential to create a more efficient process, product, or mindset (Kahn, 2018).

Innovation adoption within an organization requires a strategy that supports each of the three levels of culture (Hogan and Coote, 2014). In the current study, I use the organizational culture framework to first identify the apparent innovativeness of each ranch according to the identification and analysis of artifacts. The outward presentation of innovativeness ascertained from the artifacts will be further analyzed through the espoused norms and values described by the interview participants from each ranch, as well as those made evident through relevant documents, promotional materials, and internet sites. Lastly, actual innovativeness will be explored according to the basic assumptions expressed through the routine activities and practices of participants performed during site observations. Understanding the organizational

culture of the ranches included in the sample enables my analysis of how everyday routines and practices are shaped and reinforced and the implication of such on the adoption of drought management innovations.

Analytically exploring everyday life experiences and routines can help identify relationships between individuals, their organizational affiliations, and places of work. Sociology of everyday life theorizes the “what, how, and why” of social interactions and encounters (Karp et al. 2016). People most often seek to live in predictable, rhythmic ways with their routines being a primary source of order and control. Disruptions to everyday routines, such as through the introduction of innovations to one’s daily practices, can cause anxiety and defensive responses (Schein, 2010; Highmore 2004). An individual's daily routine largely involves unconscious decision-making, functioning in ways like the basic assumptions that guide and reinforce actor enactment of organizational cultures (Schein, 2010).

Sociology of everyday life has three theoretical construct levels: reflexivity, contextualism, and interactions (Alder et al. 1987; Mars, 2020). Reflexivity is how an individual and/or group routinely behaves and interacts with the world around them (Mars, 2020). The way an individual acts in a situation is based on the shared espoused beliefs and values from their organization/culture. An individual's perceptions from the organization/culture will help create personal feelings and emotions which will then guide their perceptions and practices (Alder et al., 1987). For example, if a ranching practice has worked for multiple generations, then there might be hesitation to accept an innovative approach to that practice.

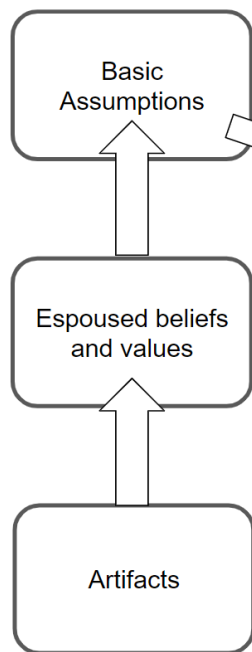
Contextualism is the natural interaction between group members and can be observed through perceptions, feelings, and experiences (Alder et al. 1987). These observations will be seen directly through the members' social environment. This construct seeks to explain the ‘how

and why' a group will position themselves within social environments. A group member will align their values, beliefs, and feelings to balance their activities with external pressures and societal expectations and mores (Alder et al., 1987; Mars, 2020).

Interactions are how the group members will convey daily activities in relation to personal feelings, beliefs, and social pressures (Mars, 2020). Social pressures can include government policy and regulations and the basic assumptions of their affiliated organization/group. Observing ranchers' daily interactions will help in seeing how economic limitations (e.g., income), personal/professional goals, and ecological limitations (e.g., space and climate) will influence operation decision-making. All three of the everyday sociology constructs are recursive and intersectional with each shaping and being shaped by the others (Alder et al., 1987).

The three preceding everyday sociology constructs will guide my assessment of how Southeastern Arizona ranchers make decisions throughout their daily ranch activities and practices and how they handle routine human interactions, both within and outside of the immediate context of their ranches. First, I will assess how the rancher views themselves. Then how their personal goals align with social pressures. Lastly, how their goals and social pressures influence their daily actions. By understanding the sociology of everyday life across the sample of ranches, I will gain a better idea of how the expression of ranching culture at the everyday level influences drought innovation adoption. This is where Schein's hierarchy of organizational culture comes into play. By identifying and analyzing patterns of everyday operations and interactions across the sample, I can gauge how espoused beliefs and values and basic underlying assumptions influence drought innovation adoption among Southeastern Arizona ranchers.

Hierarchy of organizational culture:



Sociology of Everyday:

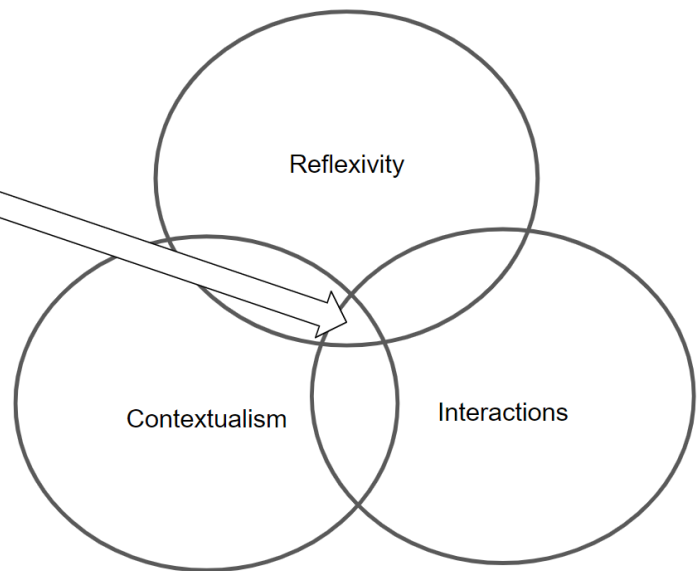


Figure 1. Conceptual framework map created by the author, adapted from Schein (2010) and Alder et al. (1987).

Methodology

This research relies on a qualitative, case study design (Yin, 2003) specific to Southeastern Arizona ranchers and their everyday ranch experiences and how that influences innovative drought adoption. A single case study is utilized since the ranches are representing a common locale and ranching community. This study took place within Cochise County specifically in and around Willcox, AZ. Cochise County is approximately 6,219 square miles with 1,083 farms reported in 2017, and 829,598 acres of pastureland (University of Arizona Cooperative Extension, 2020). According to the National Weather Service (2023) the average rainfall between 2000 to 2023 is 12.04 inches in Willcox, AZ. The average high temperature is

107 degrees Fahrenheit, and the average low temperature is 25 degrees Fahrenheit. The most common type of farm in Cochise County is beef cattle ranching and farming at a total of 373 farms (University of Arizona Cooperative Extension, 2020). The ranchers who participated in this study ran cow-calf ranching operations and their ranch sizes ranged from 100 acres to 70,000 acres, this included deeded and leased land. Based on whether the land is deeded or leased can impact the way that a rancher will manage the land and therefore impact their decision-making (e.g., infrastructure placement, grazing intensity, rules and regulations with leased land). The breed of cattle common on the ranches are Angus and Brangus crosses.

The primary source of water for Cochise County is groundwater and most of the county's water is not regulated by the Arizona Department of Water Resources (ADWR) (Water Resources Research Center, 2022). In the 1980's Cochise County had been working on reducing overdraft and sustaining surface water. In 2007 the county elected to become a mandatory adequacy jurisdiction where a 100-year water supply is required by all developers and is then reviewed and approved by the ADWR. In 2015 the Cochise Conservation and Recharge Network (CCRN) was established and worked to conserve and recharge water by utilizing stormwater and reclaimed water in the San Pedro Riparian National Conservation Area.

Sampling and data collection

Using purposeful sampling (Patton, 2014), four (4) ranches from in and around Willcox, AZ will be included in the study (n= 10). The participant recruitment was initiated by an email invitation initiated by a trusted individual from the community and chain sampling (Biernacki and Waldorf, 1981) to participate in the study. Each rancher participated in one or more semi-structured interviews or focus groups about their everyday ranching practices and multiple direct observations of their operations. Specific interview protocols for the ranchers were

constructed using Schein's (2010) hierarchy of organizational culture and the previous principles of everyday sociology (Alder et al. 1987; Mars, 2020). Depending on participant preference, interviews were conducted either in-person or using the Zoom platform. All interview protocols were reviewed by a panel of experts that did not take part in the study. The rancher interview protocols have been designed using the study's conceptual framework. Each interview was audio recorded with the participants consent and then transcribed for data analysis. During the direct observation I focused on the daily interactions and practices of each participating ranch. Field notes were taken during each observation then recorded into memo format for analysis purposes (Maxwell, 2013). There were a total of nine (9) direct observations conducted which totaled 97 observation hours, two of the ranches' direct observations were conducted together similar to a focus group. While on the direct observations I emerged myself into the ranching experience and attended cattle auctions, external organization meetings (e.g., Cowbells), participated in branding and ear tagging, fenceline checking, water level monitoring, water pump programming, feeding cattle, herding and sorting cattle, and more. My involvement within the participating ranch operations and prolonged observations has allowed me to gain a rich and trustworthy understanding of the basic assumptions of ranching culture (Schein, 2010). Basic assumptions can only be identified through observations of the participants. The direct observations also allowed me to create trust and transparency within the study's participants.

Data analysis

The data were analyzed using both deductive and inductive strategies. The preceding constructs from Schein's (2010) hierarchy of organizational culture and everyday sociology (Alder et al. 1987; Mars, 2020) were relied on to deductively analyze the data (Mars, 2020). Data were then coded using inductive strategies to find any patterns that did not fall under the

frameworks. An inductive approach is in constant interaction with the study data and can capture new insights using “open coding” (Maxwell, 2013). According to Maxwell (2013) open coding is when coding categories are developed based on the data collected within the study rather than following categories of a framework.

Trustworthiness and positionality

All patterns and trends revealed within this qualitative, multi-case study are only applicable to the individuals and ranches sampled. To develop the trustworthiness of the study, I used a set of techniques to enhance the transferability, credibility, dependability, and confirmability of the findings (Morrow, 2005). To enhance transferability, I will provide the reader with enough information about me and the research context (Morrow, 2005). I was born and raised in Arizona and within the agricultural industry. I was actively involved in the Future Farmers of America (FFA) in high school and showed livestock at local county fairs. I then pursued an environmental degree in forestry which provided a good understanding of current environmental events (e.g., drought). There is a possibility of biases toward both the agricultural and environmental sides of the study. The memoing process will help track and reduce potential biases. The findings will be presented using rich descriptions and detailed information and an audit trail will be kept, which will strengthen transferability. My study will be adding to the existing literature and frameworks and expanding the knowledge of Southeastern Arizona rancher daily ranch routines and the adoption of innovative drought management practices. I will build the credibility of the study by engaging in prolonged observations, completing member checking, and conducting triangulation (Morrow, 2005). By having prolonged observations, I will be spending more time with a smaller sample group which will allow for the generation of richer and more complex insights (Crouch & McKenzie, 2016). By using member checking, I

will ensure accurate representation of their perspectives and worldviews specific to climate change and innovation (Carlson, 2010). Member checking will entail memos of interviews and observations being shared with participants to confirm accuracy and add anything that the primary research instrument had missed. The use of triangulation will reveal intersectionality in the insights generated through the various data sources (Creswell, 2007). To establish dependability, I will keep an audit trail of all procedures followed and record in a memo format insight generated throughout data collection and analysis (Creswell and Miller, 2000). To establish confirmability, I will state my positionality and address my relationship to the topic and any personal biases.

Findings

The findings revealed insights into the innovative characteristics of Southeastern Arizona ranchers' everyday ranch routines. The ranchers' priorities balance short-term persistence with longer term generational sustainability. The ranchers are problem-driven and utilize their ingenuity and resourcefulness in every aspect of the ranch. Areas driving this problem-driven orientation include slim financial margins, problem prevention, and resource stockpiling. The ranchers were able to establish environmental synergy as part of their everyday ranch routines. Environmental synergy involves ranchers integrating the environment with their everyday work routines. Such synergy entails the sustainable management of water resources, vegetation, supplemental feed, environmental grants, and wildlife. The rancher's everyday interactions and community involvement address the social aspect of the ranch and how daily social interactions can influence ranch management practices.

Short-term persistence and generational sustainability

All the ranchers show reflexivity when identifying their personal and professional goals for the ranches, especially when it comes to their visions for the future. The common theme was immediate persistence and generational sustainability, meaning they want the ranches to be multi-generation and to continue to provide for their families and the surrounding community for many years to come. Ethan stated, “Sustainable, I want this ranch to be around in 100 years. I would like it to be in my family but if not, somebody that loves the ranch as much as I do.”

Likewise, Alexander stated,

[The] main overall goal is to make it successful for future generations, like my daughters and hopefully, their kids pass that and infrastructure is definitely huge and trying to figure out new ways of doing things that make it easier for less people to do the same amount of work and just kind of leave it better than you found it kind of philosophy and keep moving forward.

Each rancher indicated that ranching is a stressful but rewarding career and lifestyle. Benjamin stated, “24/7, very stressful... But yeah, we do it because we love it. I mean, it's not something that is a real high paying job or anything. In fact, it just gets harder and harder to get help.” The ranchers acknowledge that there are highs and lows to ranching that must be dealt with daily.

Alexander stated,

I just loved being able to care for and manage the cattle as well as the wildlife... It's a lifestyle that can break you down because there are stressful times and really hard times. But there's also very gratifying times as well. That at the end of your day, you see what you've accomplished. And while it may not look like much, there's still fences that need fixed, you know that you've done everything for those cows that you can do.

The ranchers’ personal and professional goals paired with their acknowledgement of outside pressures of the ranch will influence their everyday decision-making process.

Problem-driven ingenuity and resourcefulness

The ranchers in the case study all approached their daily ranch routines with the intent of “making things better” via ingenuity and resourcefulness - working to create a better working

landscape, breeding for stronger genetics, installing more efficient water systems, and maintaining healthy, diverse wildlife habitats, all while remaining financially viable. Emma stated,

We just want to have the ranch get better within itself and hopefully get bigger one day, but at the very least just have everything we're doing get better. Have the land be more useful, better for wildlife and our cattle.

Ranching has lots of moving parts that require daily monitoring and maintenance. Alexander stated, "For a lot of the day-to-day stuff, you just find a system that works good for you to check everything in the morning. Your day kind of plans itself after." The ranchers in the case study are problem-driven, which entails confronting both routine and unusual challenges with a reactive mindset. Benjamin stated, "I guess I'm not going to anticipate anything, [problems] just show up. Start with checking the waters first thing every morning, that sometimes dictates [the day]. It can change your plan, just like that." The ranchers' daily routines often center on identifying and solving problems that range from broken fence lines to leaking water infrastructure to injured animals. Pressing challenges that extend beyond the immediate control and responses of the ranchers, such as constant fluctuations in the economy and unpredictable weather patterns and the growing effects of climate change, demand more proactive, innovative approaches. Contextually, the ranchers must make decisions in ways that balance outside pressures and their own personal goals and objectives. While a reactive mindset, necessary ingenuity and resourcefulness characterize all four ranches, variations in each rancher's daily ranch routine and overall perspective complicate the understanding of how change occurs within the ranching sector.

The biggest contributor to a rancher being problem-driven is financial scarcity. Profit margins are remarkably thin when operating a ranch and the meat market that supports the

industry is volatile. Likewise, the prices for feed, fuel, property, building supplies, and other standard operating materials are highly sensitive to inflation. Ranchers consistently monitor the market for changes in prices of feed and for beef. Ethan stated, “When protein costs go up 75% and the price of cattle only goes up 20%.” It can be financially difficult when the price of feed does not reflect the price of cattle or beef. Such changes in the market directly impact the everyday operations of the ranches. Hikes in the price of feed create higher expenses and revenue is lost if cattle price increases do not match. Contextually, the ranchers consistently watch feed price changes, deciding where to buy from, how much, or if they will need to rely on the forage from the land. Indeed, this is a daily practice that was routinely observed during fieldwork – e.g., both Ethan and Emma were observed calling around to various hay farmers and feed stores looking for the lowest local feed prices.

The ranchers prioritize problem prevention, when funds and time allow it, by bringing efficiency and durability to their operations (e.g., building infrastructure, such as buildings and fences, ‘the right way’). Doing so reduces the amount of maintenance needed in the future. Infrastructure maintenance can be observed within the rancher’s everyday through the interaction lens. The ranchers are actively working to maintain infrastructure on the ranch that is often broken or altered by bulls, people, and weather. Oftentimes fence lines will fall, vehicles will not start, waterlines and water troughs leak, and machinery (e.g., solar and electrical water pumps, hydraulic chutes, tractors, forklifts, excavators) fail. Benjamin described a time when he tried to save money and time by building a water lot in a new way. He stated that,

Instead of building a square you already had the corner fence and the two fences were there, and instead of building a square water lot like most people would do it. There's already posts there, all I need is posts here and then I can make it a triangle and it saves me a couple of posts putting in. Back then it was before I had the post hole digger stuff and equipment so I was doing it by hand. They haven't worked out the best. I wouldn't do them again.

Less maintenance frees up time to complete other ranch tasks. Ethan explained during a field observation how he is in the process of putting up a new building and corrals and instead of “throwing something together” he has decided to make the structures permanent and sturdy by using concrete around the fence posts and poles.

Resource stock piling was observed on all four ranches. Stockpiling entails collecting and storing materials in anticipation of future projects and required maintenance. The ranchers’ social interactions are what helps them acquire and stockpile such resources as water tanks, troughs, and building materials. The materials are purchased from businesses or other ranchers or traded with other ranchers. The ranchers re-purposing of stockpile resources in ingenious ways to help offset financial uncertainties and challenges and continue projects even when finances are low. Benjamin stated, “[ranchers are] a jack of all trades,” while Alexander indicated “there’s no one job of a rancher, you’re a welder, you’re an electrician, you’re a plumber, you’re a caregiver, you’re a construction worker and operator, though the job duties of a rancher is endless.” Emma and Andrew chose to use old trailers and water tanks to create shelter for their other livestock. Likewise, Luna and Benjamin bought and repurposed old train and truck fuel tanks as water storage tanks. Stockpiling also falls within environmental synergy since the materials were (or will be) repurposed in ways that secondarily benefited surrounding wildlife habitats. For instance, Ethan used old electrical wire to finish the last stretch of wildlife friendly fencing when finances and building resources ran low. In general, everyday monitoring of the ranch involves utilizing resource stockpiles to maintain infrastructure quickly, cheaply, and often environmentally.

Ranchers make routine decisions by watching economic markets and using technologies that make daily routines more efficient. The ranchers use mobile apps, sale barn employees, and

market reports to watch the fluctuation in the market and this occurs on an everyday level. Sale barn employees are those who help operate and run local cattle auctions, they are also a source for current cattle market information for the ranchers. Benjamin stated,

At lunch for just 30 minutes to an hour everyday I'll just watch [the markets]. CattleUSA and DV Auction are the two that I follow mostly because they have weekly sales. I watch from Kansas to Oklahoma and South Dakota on Friday. Thursday is Willcox and Wednesday is Marana.

There are weekly local livestock auctions that allow the ranchers to sell their cattle and watch the local market for beef. This helps the rancher decide when to sell and buy their cattle. Emma states,

[We're] really good about watching the markets and seeing as they start to go up and they start to go down. It's a lot of watching the nation's markets, our personal markets, and calling the sale barn owner and asking: Is it gonna be a good run of cattle? Do you have yearling buyers?... It's who you know and see what everyone's buying and what everyone wants. Part of it's just by the time of year and what size's they're going for?

Some technologies that the ranchers are implementing are RanchBot, Onx Hunt, and AgriWebb.

These platforms enable the ranchers to remotely monitor water levels across the ranch and to digitally map their pastures and property lines. These technologies save the ranchers time and help them more efficiently and effectively keep, analyze, and monitor daily operational data.

Other practices the ranchers use include adapted rotational grazing, breaking cattle into smaller more manageable herds, and providing cattle with vaccinations.

Environmental synergy

Water is an especially valuable resource among the ranchers and is a priority when conducting their daily monitoring. Ethan stated, "water is always a challenge. So, I'm always trying to figure out how to best use the water and how to conserve the water." Similarly, Luna stated, "[we are] trying to manage the water sources better." All the ranchers use dirt tanks and soil areas to collect rain for their cattle and wildlife and to recharge underlying aquifers. Other

water management practices include underground pipelines, solar/ electric water pumps, above ground storage tanks, and water troughs made of metal, plastic, or recycled mining tires that are strategically placed across their grazing land. Emma stated, “[we] have pipelines with drinkers so when it hasn't rained and our dirt tanks dry up, we still have consistent water for our cattle.” The water infrastructure provides cattle with multiple water resources in each pasture, and the ability to bring more water to grazing areas appeared endless. According to Andrew, spreading out the water troughs and dirt tanks on a pasture pushes cattle to graze the grass more evenly. If there is only one water resource available on each pasture, then the cattle will likely not venture far from the water and overgraze one area within the pasture. Ethan echoed this strategy when describing how he rehabilitated a recently purchased pasture that had a small amount of forage available and was rehabilitated by evenly placing water troughs across the site. All the ranchers chose to keep water present in all the pastures even when the cattle are not actively grazing to help sustain wildlife activity. Doing so also helps maintain the functionality and availability of water systems in times of emergencies. Likewise, Luna discussed during field observations the importance of keeping backup pumps running and available during inevitable times when primary pumps fail.

All the ranchers strongly understood the vegetation ecologies within their pastures. They know when different plant species are the most nutritious and at what point the plants will be toxic to cattle. Armed with this knowledge, the ranchers can implement adapted rotational grazing systems that vary from ranch to ranch. The rotational grazing systems are primarily developed and maintained based on visual observations of vegetation growth patterns. Andrew stated that it is important for a rancher to “learn their country,” which allows them to effectively identify what pastures to use in the summer and winter months. The ranchers are actively out in their pastures enough to see the vegetation changes and patterns across seasons, working to

maximize the payoffs of accumulated land knowledge. For example, Andrew described a strategy of fencing off an area where favorable grass is growing so that cattle can be securely moved from one area to the next. This allows him to watch the vegetation and make sure that the cattle do not over-graze the grass to the point that it does not reseed and return the following year. All the ranchers agreed that cattle should be moved off a pasture before they graze the entire plant and when there are still green leaves present at the base of the plants. More specifically, Ethan follows a rule that there should be 40-60% of grass left on the pasture when the cattle are moved. Luna stated, “we always try to reserve grasses.” Without grasses on the pasture, the ranchers would have to supplement feed or cull their herds.

Ranchers will purchase supplemental feed (hay, vitamin, protein supplements) during droughts that limit the availability of forage on their grazing lands. The amount of money spent on feed changes by rainfall. If it is a good monsoon year, there will likely be more green vegetation available for the herd to graze and purchasing supplemental feed is reduced. Then if there is less supplemental feed being purchased it is expected that the feed prices will decrease due to lower demand. Another option during drier years is to cull part of the herd, selling some of the cattle to reduce headcounts to numbers the land can support. Significant investments of time and hard work went into building their herd, and in extreme drought conditions the ranchers are working to maintain a sustainable landscape and it can demand herd culling – an option ranchers prefer to avoid. Drought years make financial management difficult. Ethan stated, “cutting back [herd] numbers it’s cutting back [your] income.” Emma expanded upon the impacts of drought on herd sizes and the herd’s genetics when stating, “On drought years we need to cut back, but it depends on how bad the drought is. But we don’t manage year to year to 100% because otherwise you’re losing all your genetics.” When building a herd, ranchers

intentionally purchase cattle from genetic lineages that are either similar or distinct from their existing herds. The purpose of adding new genetics into the herd will change between ranchers and what their goals are. Specifically, ranchers seek genetic combinations with the promise of producing more beef on the same or less amount of land and resources. Culling a herd due to drought reduces genetic optimization, taking ranchers years afterward to recoup the makeup needed for an efficient and productive herd.

The ranchers all look to grants to generate additional income without selling their cattle. Ethan stated, “grants mean a big deal to ranches.” Grants were often awarded by environmental and/or wildlife focused organizations to improve wildlife habitat on ranches. The grants that Ethan had received help with funding the installation of his water system and increase the size of the herd and ranch. Reciprocally, improvements in wildlife habitats can also benefit cattle. All the ranchers indicated that the wildlife grants can directly benefit their herds. Examples of projects that the grants funded include the removal of mesquite trees, installation of water troughs and renewable energy technologies (e.g., solar water pumps), use of wildlife friendly medicines, and construction of wildlife friendly fencing. Sometimes financial scarcity will lead to the need to acquire financial aid which gives the ranchers an opportunity to be environmentally focused.

Everyday interactions and community involvement

Everyday interactions and community involvement are integral elements of daily ranching. Within the everyday, the ranchers interact with employees at the local cattle sale barn (a place where local ranchers can bring cattle to sell to auction buyers), buyers at livestock auctions, large game hunters, employees at feed stores, other ranchers and neighbors, family, agricultural and environmental organizations, and social media. Luna and Emma value the use of

sharing their operations and herds on social media both for marketing themselves and educating the public about the beef industry. Both ranchers were actively taking pictures of their cattle, projects, and involvement with agricultural and environmental organizations outside of the ranch during the field observations. Social media is an easy outlet for the ranchers to share ranch updates with their peers and inform the public on where their beef is being raised.

Communication and involvement with neighbors and other ranchers are equally important to their everyday routines. All the ranchers are actively engaged with neighboring operations, helping each other with mesquite removal, pipeline installation, branding and vaccinating cattle, calling when there is a fire or if the livestock have gotten out of a pasture, and exchanging information about weather, technologies, markets, grazing practices, medicines, and feeding schedules.

All the ranchers pointed to the benefits of being involved with local and regional agricultural and environmental organizations (e.g., Arizona Cattle Growers Association, American Angus Association, Natural Resources Conservation Service, Natural Resource Conservation District, Arizona Farm Bureau, Arizona Cowbells, local 4-H and FFA chapters/clubs). Some organizations allow the ranchers to advocate for their industry and educate other ranchers about innovative practices. Alexander stated,

I do a lot to get education going about the Angus breed, where the genetics are heading, and try to give support to the Angus community in the state... I tried to work really closely with the youth and the [agriculture] advisors to try to promote the industry and stuff and get our youth coming into the industry.

Not only does Alexander assist other ranchers with cattle genetics and herd production improvements, but he also works to introduce local youth and community members to the beef industry. Similarly, Luna stated,

[It] keeps me pretty busy and makes it really hard to keep up with the ranch stuff and that right now, but I figure now's the time to do my community service on that. And then hopefully, I do my service and then slow down, come back and then spend more time on the ranch. But I think it's good for everybody to [be involved], these organizations are important. Someone's got to do it to keep up with what's important for our communities or ranching. There's cattle growers, there's Farm Bureau that he's part of, but to keep these organizations strong and fight for our causes, in this case resource conservation. Someone's got to do it and someone's got to take a turn. So, I figured this is the best time for me to take my turn. So, I'm doing it. Taking my turn.

The ranchers engage in various external organizational activities to advocate for their community and industry on the local, state, and national level. Andrew stated, "I don't think people understand how much of a role politics in Washington can hurt us on a day-to-day basis here with our markets. And with our management strategies." Emma further expanded,

People don't realize the little things that we use to help our cattle change dramatically to our whole cost basis on everything. It's not just politics about beef, but it's politics about anything, we feed our cattle to keep them in better condition.

Political and external organization involvement enhances the power the ranchers must improve their daily operations. They can bring daily operational problems to light in hopes of making change for all ranchers who experience the same problems.

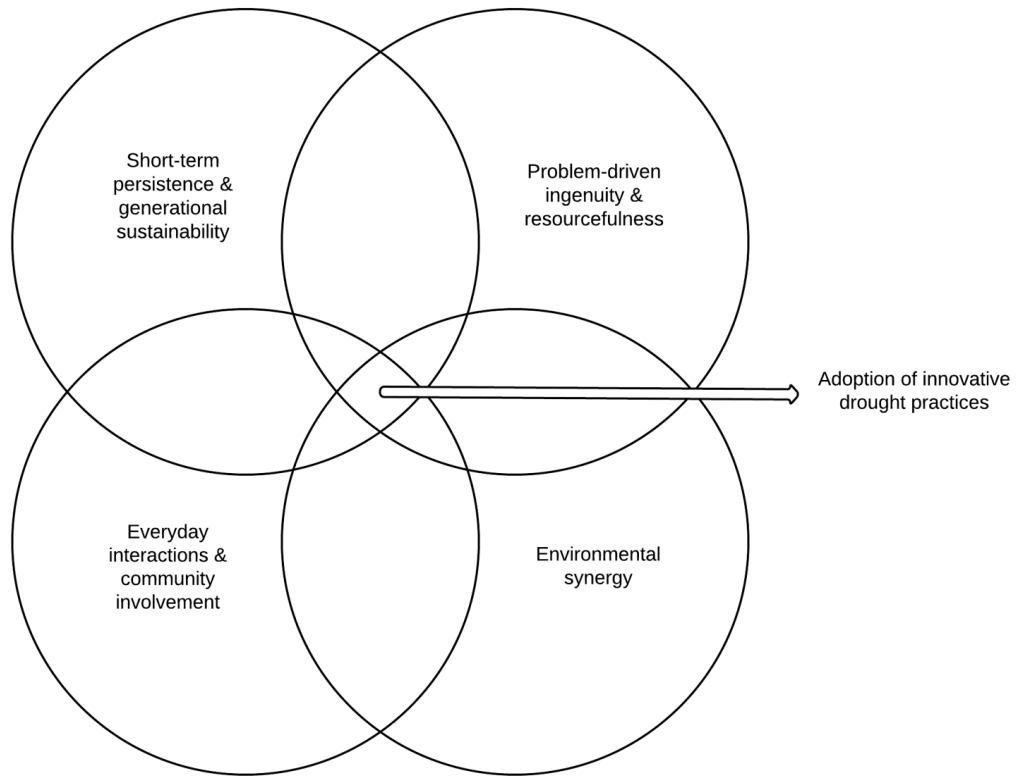


Figure 2. The four themes within the findings can directly impact each other and the adoption of innovative drought practices.

Discussion

Many factors influence the decision Southeastern Arizona ranchers make throughout their everyday ranch routines that impact their abilities to adopt innovative drought practices. Such factors identified in the findings included short-term persistence and generational sustainability, being problem-driven and resourceful, environmental synergy, and everyday interactions and community involvement.

Short-term persistence and generational sustainability

Personal and professional goals vary between the participating ranches. Goal setting is considered a part of the reflexivity element of everyday life, which consistently influences rancher decision making (Alder et al. 1987; Mars, 2020). The participating ranchers in this study explained that they hope for long-term sustainability of the ranch through generations. To this end, they are constantly making decisions regarding infrastructure, vegetation, herds, and so on, all of which are aimed at sustaining operations. The contextualism element involved the ranchers continually negotiating outside pressures such as weather, drought conditions, available forage, market fluctuations, personal finances, and politics with their personal and professional goals. In the interaction element, the ranchers rely on their everyday social interactions to explore and adopt ingenuities and innovations. These interactions include discussions or partnerships with neighboring ranchers or industry peers (e.g., feed store employees, sale barn employees, external organizations, etc.) that allow the ranchers to experiment with and observe firsthand how different drought technologies and ranching practices stand to contribute to their operations and longer-term goals (Kennedy and Brunson, 2007).

Problem-driven ingenuity and resourcefulness

A common theme while conducting interviews and field observations is that each rancher had a daily monitoring plan that works best for them. Even though many of the ranchers stated that their to-do lists are endless, they always started their day with monitoring the pastures and herds and prioritizing the remediation of any problems or issues that arose since the previous day's rounds. The ranchers wait for the problems to show themselves before acting, reflecting a reactive mindset. The reactive mindset pushes the ranchers to be ingenious in their responses to unexpected problems and issues that must be addressed with short notice and limited resources. Daily monitoring on the ranch falls under the reflexivity element of the sociology of everyday framework (Alder et al., 1987; Mars 2020) with ranchers interacting with the world that immediately surrounds them.

Financial scarcity caused ranchers to be problem-driven. Within the contextualism element of the sociology of everyday framework (Alder et al., 1987; Mars, 2020), financial scarcity is an external factor that directly impacts the ranchers' routine decision-making processes. The ranchers consistently review their goals and weigh their available finances to decide what projects and resources will be prioritized. The ranchers check markets daily, allowing them to gauge when the best time to buy or sell cattle. It is also important for the ranchers to watch on a daily basis the prices of feed, fuel, and other vital inputs so that they can decide when and where to apply their scarce operational funds. In addition to watching the daily fluctuations in the market, the ranchers monitor their local and regional marketplaces for the best prices for instance calling local sale barns, checking online websites, and watching online cattle auctions. This allows the ranchers to get real time market information and ultimately help the decision-making process on when to buy or sell cattle. Sometimes ranchers try to find ways to

save money and building materials. This requires the ranchers to utilize their ingenuity and problem-solving skills. The everyday realities of financial scarcity and limited time reduce ranchers' capacities to adopt innovative drought practices (Didier and Brunson, 2004). In this study financial scarcity influenced ranchers to seek funding through agricultural and environmental organizations. These funds allow the rancher to implement environmentally friendly practices, which will be further discussed under the environmental synergy section.

The ranchers work to prevent future problems when time and funds allow it. Problem prevention falls within the contextualism element of everyday sociology since the strategies are directly shaped by the specific conditions and challenges of each individual ranch. Problem prevention primarily involved ranch infrastructure (e.g., buildings, fence lines, corrals), by creating something more permanent and sturdier against cattle, people, and weather. Creating a more permanent infrastructure could free up more time and resources in the future and allow the ranchers to focus on other projects. If a rancher was able to save money and free up time, the adoption of innovative drought practices was more likely to be prioritized.

The ranchers were able to utilize resource stockpiling for supplies on the ranch. The most common resource stockpiles were building materials and resources for above ground water storage. These stockpiles allowed for the ranchers to take immediate action when something needed repair or improvement. Problems that needed immediate action included leaky water tanks and pipelines, installing more water troughs for wildlife and cattle, and fixing broken pasture fence lines. Environmental benefits to having resource stockpiles include keeping the recycled materials from entering the landfills, repurposing, and extending the materials lifespan. Stockpiles saved the ranchers money in the short term and helped finish projects where finances were tight.

Environmental synergy

During drought conditions the two main resources that are limited are water and vegetation. All of the ranchers in the study interacted with the environment each day with the primary focus being on water. The ranchers monitored water levels daily and prioritized water infrastructure repairs. Every rancher had their own unique water system. This aligns with previous research stating that ranchers in the Southwest U.S. invest in long-term water resources (Didier and Brunson, 2004; Eakin and Conley, 2002). The systems can provide water across entire ranches to include the construction of backup water systems (e.g., back up water pumps, extra water pipelines) to be called on in the event of extreme shortages or catastrophic technology problems. It is important to the ranchers that water is always available, therefore daily monitoring is a necessity so they can mitigate the potential of water loss. Not only does the water availability impact the ranchers' cattle but the wildlife. The ranchers stated that they always keep water troughs full of water even if there are no cattle in the pasture. Water monitoring and water distribution on the ranch falls under the interaction element of everyday life. These are ways that the ranchers have implemented different water management practices on the ranch. Managing water resources on the ranch conveys how the rancher values wildlife presence, cattle welfare, and utilizing the most out of the available water.

The ranchers used water to distribute grazing across their pastures, creating an even distribution of grazing disturbance. By spreading out the water troughs, cattle move from one water station to the next, grazing the vegetation in between. If there are a limited number of available water sources, then the cattle will overgraze areas close to the water which in turn damages vegetation. The ranchers do not want to overgraze their pastures to the point where

there will not be enough vegetation to sustain future herds. This is also why the ranchers will closely monitor the stages of their vegetation so that they know when to rotate between pastures.

With the constant monitoring of pasture vegetation and the understanding of vegetation ecology, the ranchers know what vegetation is both beneficial and detrimental to their cattle and wildlife. Some species of plants are nutritious during one stage of life and toxic during another. Knowing this the ranchers have been able to create pasture rotation schedules according to their observations of available forage. 'Learning the country' is vital to the ranchers' capacities to create and maintain a sustainable grazing system. Utilizing fences as a control method to keep cattle from overgrazing one species of plant allows the ranchers to maintain diverse pastures. The cattle will favor one plant over another and not being able to stop them from overgrazing will cause the plant presence to decrease. Interactionally, the rotational grazing system that the ranchers implement focuses on the ecological sustainability of their pastures, operational goals, and can impact their operation expenses. By implementing a rotational grazing system is a way that the ranchers have conveyed ecological and operational goals. If there is not enough available forage, the ranchers must buy supplemental feed to help sustain their herd sizes and overall cattle body score. Sustaining the herd size allows for more income in the future and more diverse genetics within the herd. Culling back a herd can be devastating. Genetics allow for the herds to grow and hopefully meet the ranchers' goals of the ranch. The ranchers in the study persistently worked toward growing more beef on the same or less amount of land. They did this by looking for bulls or breeding cows/heifers that have genetics that allow for small birth weights, high feed, and carcass weights. When there is financial scarcity, the ranchers looked to grants as a way to provide income and funding for the ranch. These grants allowed the ranchers to embrace

environmental synergy since the projects not only benefit the cattle, but also wildlife and the land.

Everyday interactions and community involvement

The ranchers surrounded themselves with a community of people and organizations who they trust, which directly influenced their everyday decision-making. Interactionally, the ranchers can identify any social pressures (e.g., policy or regulations, community/peer approval) that can impact the adoption of innovative drought practices and/or technologies. Social pressures are identified by talking with other ranchers, natural resource specialists, external organization members, and more. Social media allowed the ranchers to share their ranching operations with other ranchers and the public, enhancing the ranchers' individual reputations and brands and providing public education on the beef industry. These activities helped the ranchers to market their beef and provided buyers with opportunities to see how the cattle are being raised. The ranchers also stayed up to date on their peers, markets, weather, new technologies, and external organizations through social media interactions.

The ranchers also interacted frequently with their neighbors. These interactions enabled the sharing of experiences with feeding schedules, types of feed being used, weather and vegetation conditions, new technologies being tested, and market information. Such sharing encouraged and supported the adoption of new technologies or management practices. Indeed, such word-of-mouth sharing is a common way that ranchers exchange opinions on new technologies and practices and influence overall innovation adoption (Didier and Brunson, 2004). The ranchers were also open to helping each other with their operations during projects or cattle roundups. Such collaboration influences innovation adoption through opportunities for direct observations of the performance and limitations of new technologies and strategies. This

aligns with Rogers' (2003) adopter categorization, specifically the early adopter, early majority, and late majority adopter categories. In this study, if a trusted rancher adopts something and shares it with their peers then it is more likely that other ranchers will adopt it too.

Being involved in agricultural and environmental organizations created opportunities for the ranchers to advocate for themselves and their industry. The involvement with cattle breed organizations allowed the ranchers to share advancements in cattle genetics and how they can improve herds. The involvement in youth-based organizations allowed the ranchers to educate and engage youth in the beef industry. Some organizations will focus on rancher advocacy in politics. Politics can have a direct impact on the rancher's daily management practices (Roche et al., 2015a). The ranchers valued the role that these external organizations play within their daily operations. Though there can be time constraints due to completing daily ranch routines and traveling to meetings, the ranchers serve an important role in these organizations. External organizations can impact the types of management practices (e.g., types of feed, grazing systems, marketing/labeling of beef) that are implemented on ranches, locate funding of innovative technologies, and provide public support for the beef industry. If the ranchers were not involved in these organizations, then they would not be able to propose and support innovative solutions to industry problems and more specific to the current study – water scarcity and drought.

Conclusion

Using the sociology of everyday framework, I have identified four areas that influence the rancher's willingness to adopt innovative drought practices. Drought is a constant climatic threat for Southeastern Arizona ranchers. Additional research should be done with other ranchers across both the state of Arizona, the Southwest region, and all of the United States to gain a better understanding of the intersections between rancher's everyday decision-making and

climate adaptation innovation adoption. Such research would increase the scope and enhance the transferability of the findings generated here, which again are confined to Southeastern Arizona. Similarly, drought was used as an indicator of climate change in this study. Future research beyond Southeastern Arizona and the arid Southwest region should explore other climate change indicators (e.g., increased flooding, hurricane, and tornado activities, extreme heat and freezes). All the ranchers in this study are from multigenerational ranches. Further research that compares decision-making between generational ranchers and first-generation ranchers is encouraged. Studies of how age impacts the ranchers' decision-making and climate change innovation adoption would also likely be fruitful. By including ranchers in future research study and design areas that could possibly be overlooked by a researcher (someone outside of the ranching culture) can be addressed. This would help in providing research about climate-related innovations to ranchers that can address all aspects of the everyday ranching operation.

One recommendation for rancher practice is the proactive formation and planned coordination of diverse networks of trusted individuals who can help in the decision-making process for the adoption of innovative drought practices (e.g., economic market specialist, agriculturalist, animal welfare specialist, natural resources specialist). It is also recommended that ranchers shift from having a problem-driven mindset to a solution-driven mindset. This would allow the ranchers to be more proactive with innovations rather than being reactive when problems arise. Lastly, ranchers can work to incorporate environmental based goals within their personal and professional goals for the ranching operation. This will allow the ranchers to focus on longer-term sustainability efforts. Though the ranchers showcased that they are stewards of the land, formalizing and tracking environmental-based goals has the potential to increase the ill adoption of so-called 'green innovations.' Likewise, local government and environmental

advocacy groups are encouraged to play a more active role in integrating ranchers in community development and collective conservation initiatives.

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