WATER CONSERVATION:

TRANSFORMING INFORMATION AND ATTITUDES INTO ACTION

by

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DEDICATION

To my husband, Mark, who stayed by my side throughout this journey. Thank you for the wonderful meals, for literally keeping the home fires burning, and for taking care of the dogs while I was buried in books.

To my children, thank you for supporting me with love and understanding.

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GLOSSARY

COB	City of Bozeman
HCF	Hundred Cubic Feet
HWU	High Water User
HOA	Home Owner Association
IWRP	Integrated Water Resources Plan
LWU	Low Water User
MWU	Medium Water User
WDM	Water Demand Management

ABSTRACT

Scientists face the daunting challenge of communicating information to policy makers and the public. The challenge becomes even more difficult when that information suggests that behavioral, social, or structural changes are necessary. While an educated audience may be more informed, the increased level of information does not necessarily motivate behavioral changes. Education and outreach are valuable tools, but unless additional barriers which hinder the transformation of information into behavioral changes are also addressed, the impact is reduced. My research goal is to discover the barriers which hinder people's willingness to engage in water conservation. Additionally, I analyze narratives that are used in educational brochures to understand the narrative strategies that are used to motivate people to conserve water. The narratives are analyzed using insights from social marketing, community based social marketing (CBSM) and Narrative Policy Framework (NPF). My thesis also draws on critical social theory to examine the concepts of constrained choices and hegemony. Twenty-seven semi-structured interviews were conducted with randomly selected water users in single family households who use municipal water supplies in Bozeman, Montana. Participants included low, medium and high water users. All but one participant (a high water user) was concerned about their water use and interested in engaging in conservation behaviors. My research found that barriers to water conservation include: information deficits, inconvenience, lack of trust, social norms, constrained choices and hegemonic relationships. My analysis of the City of Bozeman's water conservation brochures reveals the use of hero language that focuses on what individuals can do to conserve water for the entire community. Future research should test narratives using social marketing, CBSM, or NPF with citizens to understand how they would respond to the strategies outlined in this thesis.

CHAPTER ONE: INTRODUCTION

Climate change impacts water resource availability by altering precipitation types, amounts, and timing (Lee et al., 2011). As climate change alters historical cycles of drought and precipitation, stationarity models become obsolete, creating more challenges for managing water supplies (Carpenter et al., 2009; Grimm et al., 2013; Milly et al., 2008; Polebitski & Palmer, 2013; Singh et al., 2015). Climate impacts are especially troubling in arid locales experiencing rapid urbanization (Brooks et al., 2009; Lengoasa, 2016; U.S. Dept. of Agriculture, 2013).

Although education and outreach can propel communities towards conservation goals and sustainability (Schwab, 2013; Syme et al., 2000), information alone does not necessarily motivate people to action (Barr, 2004; Burgess et al., 1998; Lorenzoni et al., 2007; Lybecker et al., 2016; Scruggs & Benegal, 2012; Whitmarsh, 2009; Whitmarsh et al., 2011). Researchers must also consider that when people self-report behaviors or actions, they usually report on their behavioral intent, not their actual behavior (DeYoung, 1993). And contrary to the Theory of Planned Behavior, more recent studies show that attitudes do not necessarily predict behavior (Ajzen and Madden, 1986; DeLorme et al., 2003; Fielding et al., 2012).

The gulf between thought and behavior is one that can be bridged only when barriers to specific actions are addressed (American Water Works Association, 2010; Barr, 2004; McKenzie-Mohr, 2000; Silva et al., 2010). Since the ability to motivate behavioral change is the cornerstone of sustainability campaigns, it is vital to overcome complacency

by developing strategies which address barriers to action (Burgess et al., 1998; Ajzen & Madden, 1986; McKenzie-Mohr et al., 2014).

The research questions that motivate this thesis are two-fold. First, what are the barriers that hinder people's willingness to engage in water conservation? Second, what are the narrative strategies used in water conservation brochures that aim to change people's behavior?

CHAPTER TWO: LITERATURE REVIEW

Barriers

Asking someone to engage in a new behavior is a complicated issue. Human nature, cultural practices, attitudes, social norms, and institutional forces influence the decisions people make (Ajzen, 1991; Barr, 2004; DeYoung, 1996). In this thesis, I examine barriers which hinder behavioral changes and explore strategies which motivate water conservation efforts. Barriers to action can include information deficits, inconvenience, lack of trust, social norms, constrained choices, and hegemony (Barr, 2004; DeYoung, 1996; Syme et al., 2000; Warner et al., 2016).

Barrier: Information Deficit

Today, words like sustainability, climate change, and conservation permeate the news cycle. But does familiarity with these terms or awareness of these issues translate into a change of behavior? While public awareness of these topics has risen, attempts to change behavior by utilizing large scale information campaigns have essentially been unproductive (Cone et al., 2013; Lorenzoni et al., 2007; Lybecker et al., 2016; Scruggs & Benegal, 2012; Whitmarsh, 2009).

Although people may be knowledgeable about environmental issues and entertain positive attitudes about environmentally responsible behaviors, rarely is information alone enough to catalyze a change in behavior (DeYoung, 1996; Jacobson et al., 2015; Millock & Nauges, 2010; Warner et al., 2016). DeYoung (1996) posits that it is difficult to motivate

people to embark on new behaviors because people want to feel competent in their abilities; that is why people stay with what is familiar.

Research confirms there is little relationship between attitudes, knowledge, and corresponding behavior (American Water Works, 2010; Barr, 2004; Burgess et al., 1998; DeLorme et al., 2003; Lorenzoni et al., 2007; Whitmarsh, 2009). However, information designed for a specific audience proves to be more effective than broad messages delivered to general audiences (Andreasen, 2006; McKenzie-Mohr, 2000; Warner et al., 2016). Thus, target audiences provide an opportunity to design customized messages which address distinct barriers (Huang et al., 2016; Lee & Kotler, 2011; Monaghan et al., 2013).

Water conservation efforts are plagued by a lack of information, misperceptions, and misinformation (American Water Works, 2010; EPA & Water Research Foundation, 2010). For instance, people's perceptions of their water conservation efforts are not a reflection of actual use (Attari, 2014; Icaro, 2013; Larson et al., 2010). Typically, water use is underestimated by a factor of two (Attari, 2014; Mitchell & Chestnut, 2013). When high water consumption is discussed, fingers get pointed in many directions, but rarely inward (DeLorme et al., 2003; Icaro, 2013; Larson et al., 2009). In fact, most consumers assume their use of water is normal and typical of others' use (Allcott, 2011; Mitchell & Chestnut, 2013).

Users' lack of accurate information about their water use may be partially explained by auto-pay options which eliminate a physical bill (Goetz, 2011; Icaro, 2013). A study conducted by East Bay Municipal Utility District shows that paper bills are more effective

than digital correspondence at conveying important information (Icaro, 2013; Mitchell and Chesnutt, 2013).

Information Deficit: Water Bill. Studies show that the design of the water bill impacts how easily the information is understood and that, in turn, directly affects water conservation (Gaudin, 2006; Goetz, 2014; Icaro, 2013). The clarity of information determines the ease in which it is assimilated (Icaro, 2013). For instance, 'gallons used' is a better metric than 'hundred cubic feet' (HCF) because a gallon is a measurement people can comprehend and envision (Attari, 2014; Goetz, 2014). Syme et al. (2000) found that few households understood their consumption rates or the billing structure. When East Bay Municipal Utility Department conducted a survey, 55 percent of those surveyed did not know how much water their household used on a daily basis (Mitchell & Chestnut, 2013). For instance, a Georgia study revealed that 48 percent of customers incorrectly identified their rate structure (Jordan, 2011). For conservation-based rate structures to be effective, people have to understand the correlation between the amount of water used and the price charged (Gaudin, 2006; Goetz, 2014; Harlan et al., 2009; Icaro, 2013).

Information Deficit: High Efficiency Fixtures. Misinformation about the effectiveness of low-flow, high efficiency toilets, showerheads, and clothes washers results in missed opportunities to conserve water (Attari, 2014; Icaro, 2013; Millock & Nauges, 2010). For instance, toilets use the most water indoors. Yet, people usually think the shower is the fixture which uses the most water (Lee et al., 2011; Price et al., 2014). When people underestimate the positive impact of using a high-efficient fixture repetitively, such

as a low-flow showerhead or toilet, they may ignore infrastructure modifications which conserve significant amounts of water (Attari, 2014; Lee et al., 2011; EPA WaterSense, 2018).

Information Deficit: In-ground Sprinkler Systems. Because the popularity of in-ground sprinkler systems has skyrocketed since 1980, misinformation about their efficiency, inexperience with the technology, and ignorance about appropriate settings has severe consequences for water conservation (Endter-Wada et al., 2008; Mayer et al., 2015; Monaghan et al., 2013). In 1980, only 10 percent of new homes installed irrigation systems. By 2008, 90 percent of new homes were equipped with in-ground sprinkler systems (Friedman et al., 2013). Although irrigation systems are now commonplace, the increase of in-ground sprinklers does not translate into more efficient irrigation practices (Bremer et al, 2011; Friedman et al., 2013; Inman & Jeffrey, 2006). In fact, it is the opposite. Research shows that manual watering is more efficient (Bremer et al., 2011; Romero & Dukes, 2013; Water Research Foundation, 2016).

Since most homeowners actually increase outdoor water use after installing in-ground sprinkler systems, water conservation efforts are hindered even further (Bremer et al., 2011; Endter-Wada et al., 2008; Mayer et al., 2009). Additionally, 62 percent of people with irrigation systems overwater their lawns (Endter-Wada et al., 2008; Romero & Dukes, 2013; Water Research Foundation, 2016). A study in Los Angeles revealed that single family households with automatic sprinkler systems used 11.2 percent more water than those watering by hand (Inman & Jeffrey, 2006). Exacerbating the excessive watering are several problems resulting from lack of information: growing plants with different water

requirements in the same irrigation zone; installing sprinkler heads with different precipitation rates in the same zone; and programming watering schedules which result in pooling water, shallow roots, and run-off (EPA & Water Research Foundation, 2010; Monaghan et al., 2013; Olmsted and Duke, 2011; Thomas et al., 2009).

Since irrigation systems can seem complicated to use and homeowners may have limited knowledge, most people are not utilizing all of the technology available (Harlan et al., 2013; Maheshware, 2012; Mayer et al., 2015). These items include rain sensors, smart controllers, and soil moisture sensors. Weather based controllers can save up to 50 percent of irrigated water (Al-Ajlouni et al., 2012); soil moisture sensors (SMS), when correctly used, can save up to 92 percent of irrigated water (Dukes et al., 2008); and rain features can reduce irrigation by 41 percent (Rutland and Dukes, 2012). Because distribution uniformity is sensitive to water pressure, it is important to select the correct sprinkler heads for adequate coverage and to install sprinkler heads with the same precipitation rate in each zone (Baum, 2005). Otherwise, overwatering can occur (Monaghan et al., 2013; Water Research Foundation, 2016).

In these instances, lack of information and incorrect use of technology represent barriers to water conservation (Syme et al., 2000). Although more information does not necessarily result in action, water conservation studies do support claims that clear information which targets specific actions can provide enough stimulus to result in behavioral changes (EPA & Water Research Foundation, 2010; Warner et al., 2016). For example, specific information of how to properly program the irrigation controller can save

thousands of gallons of water each summer (EPA & Water Research Foundation, 2010; Monaghan et al., 2013).

Barrier: Inconvenience

Doug McKenzie-Mohr, Professor of Psychology at St. Thomas University and chair of the American Psychological Association Task Force on Sustainable Development, discovered in his research (2000) that lack of convenience is the most common barrier to behavioral changes. Sustaining a change in behavior is challenging when it requires that some element of comfort be sacrificed.

Verdugo's (2012) research confirmed that, regardless of incentives, social norms, or prompts, if the activity is deemed too inconvenient, it will not be adopted. Therefore, the key is to design an activity which is more convenient and less costly than the established, non-desirable practice (McKenzie-Mohr et al., 2012).

Although outdoor irrigation offers the greatest potential for water conservation, significant opportunities to save water are missed because of inconvenience (EPA & Water Research Foundation, 2010; Monaghan et al., 2013). Many homeowners delegate the watering and chemical schedule to landscape contractors (Huang et al., 2016; Warner et al., 2016). Landscape contractors usually set the timers for the entire season, thereby eliminating conservation opportunities (Al-Ajlouni et al, 2012; Monaghan et al., 2013). For instance, when it rains irrigation systems can be adjusted to stop until the ground dries (Devitt et al., 2008). But, those who rely on the professionals may water during rain events because it is more convenient to "set it and forget it" (Monaghan et al., 2013: 11; Silva et al., 2010).

Barrier: Lack of Trust

Paul Slovic, a professor of psychology at the University of Oregon and president of Decision Research, is renowned for his research into risk perception and decision making. In 2016, Slovic was elected into the National Academy of Sciences. His work illuminates the link between how humans manage risk and trust. He says:

> Trust is fragile. It is typically created rather slowly, but it can be destroyed in an instant – by a single mishap or mistake. Thus, once trust is lost, it may take a long time to rebuild it to its former state. In some cases, lost trust may never be regained (Slovic, 1993:677).

When people discuss ideas with or see behaviors performed by those they trust, the influence for change is greatest (Gockeritz et al., 2010; Schultz et al., 2007). Trust determines how readily people accept new technologies (Fragkou and McEvoy, 2016) or new policies (EPA, 2008). For people to trust the information they receive in a water conservation campaign, they must trust the messenger (Syme et al., 2000). Since drinking water is primarily supplied by local government utilities, it is vital that the utility department maintain its credibility with residents (EPA, 2008).

In arid regions, lack of trust can sabotage requests to conserve water and engage in water wise solutions (Silva et al., 2010). Seeds of mistrust can germinate when residents feel city officials are not leading by example or if residents do not trust the decisions of the policy makers (EPA, 2008). Mistrust can be magnified in districts experiencing rapid development (DeLorme et al., 2003) because growth is associated with scarcity (Larson et al., 2009). This is especially troubling in areas where water supplies depend upon conservation. When citizens feel powerless in the face of their

government's decisions, the tendency is to relinquish personal responsibility and abandon any attempts to conserve water (Larson et al., 2009).

Barrier: Social Norms

Social norms are the behaviors that a particular group or society find acceptable (Barr, 2004; Burgess et al., 1998; Gockeritz et al., 2010). People judge the normalness of their own behavior by comparing how far their actions deviate from the behavior of their peers (Nolan et al., 2008; Schultz et al., 2007). Humans are influenced most by those we view as similar to ourselves; therefore, people are heavily influenced by their families' and friends' opinions and actions (DeYoung, 1996; Schultz et al., 2007). Consequently, when a person's social circle requests a change in behavior, it is weighted more heavily than a stranger's requests (Ajzen & Madden, 1986; Barr, 2004; Jacobson et al., 2015).

Social norms can influence how readily someone will adopt new behaviors (Andreasen, 2006; DeYoung, 1996; Gockeritz et al., 2010) or maintain an expected status (Larson et al., 2009). People can be hesitant to act in a manner outside their social norm because it violates their sense of community (Barr, 2004; Schultz et al., 2007). The strongest predictor of someone's behavior is his/her belief about others' actions (DeYoung, 1996; Gockeritz et al., 2010). So much so that studies prove people will change an answer they know to be correct to an incorrect answer if several others are giving the wrong answer (McKenzie-Mohr, 2000).

Even when people think they are not affected by others' opinions and actions, research shows that they likely are influenced (Mitchell & Chestnut, 2013; Nolan et al., 2008). Since people naturally observe others' actions and compare them to their own

(Andreasen, 2006; Gockeritz et al., 2010; Schultz et al., 2007), social norms and peer pressure are effective tools for creating changes in behavior (Andreasen, 2006; Gockeritz et al., 2010; Jacobson et al., 2015; McKenzie-Mohr et al., 2012; Schultz et al., 2007).

Income and house values are the biggest predictor of water consumption (Harlan et al., 2013; Lyman, 1992; Polebitski & Palmer, 2013). Affluent households use 16 percent more water than low income houses due to larger lots and additional water features (Harlan et al., 2013; Lavee et al., 2013). In the case of landscaping, cultural norms affect preferences for design and plant choice (Monaghan et al., 2013). As a result, social status and income directly affect water use (Monaghan et al., 2013; Nassauer et al., 2009). Even if wealthy homeowners prefer water efficient landscaping, they may choose instead to follow the landscaping designs of their neighbors, especially if they are concerned about the market value of their homes or Homeowner Association (HOA) regulations (Harlan et al., 2013; Huang et al., 2016; Nassauer et al., 2009).

Yards are more visible than home interiors and therefore, more susceptible to the pressures of social norms (DeLorme et al., 2003). Attitudes can sweep over a community one yard at a time (Harlan et al., 2013). However, it usually takes a leader to start the trend (Icaro, 2013; Jacobson et al., 2015; McKenzie-Mohr et al., 2012). Changing the lawn culture requires changing the social norms and diffusing the information across a community (Robbins, 2007). When one family replaces their front lawn turf with drought tolerant plants, the neighbors might think, “What a novel idea.” When another neighbor decides to convert to water-wise plants, it is easier because they are not a lone wolf embarking on a journey to change the social norm (McKenzie-Mohr and Schlutz, 2014).

Once numerous residents have replaced lawns with drought tolerant plants, a new social norm has been established and diffused (Harlan et al., 2013; McKenzie-Mohr, 2000).

Peoples' actions are greatly influenced when they witness other's actions (DeYoung, 1993; Mitchell & Chestnut, 2013; Nolan et al., 2008). Commitments made by a cohesive group, such as a church or school group, are extremely effective due to the combination of social norms (peer pressure) and social diffusion (lots of people are doing it) (Harlan et al., 2013; Jacobson et al., 2015). When enough people embrace a new paradigm, social pressure to conform to the new standards stimulates social diffusion (Andreasen, 2006; McKenzie-Mohr and Schlutz, 2014).

Social diffusion accelerates the adoption of new behaviors (Andreasen, 2006; Gockeritz et al., 2010; McKenzie-Mohr et al., 2012). Increasing peoples' exposure to an idea or activity escalates acceptance rates of the new norm (McKenzie-Mohr et al., 2012). Although social norms and diffusion have been studied extensively for public health campaigns, they have received minimal attention for sustainable behavior issues (Andreasen, 2006; Gockeritz et al., 2010; McKenzie-Mohr, 2000; Mitchell & Chestnut, 2013).

Norms are most effective when they are noticeable and used to encourage positive behavior, rather than discourage harmful practices (McKenzie-Mohr, 2000; Schultz et al., 2007). Enduring changes in behavior happen when two types of social norms are employed: injunctive and descriptive (McKenzie-Mohr, 2000).

Injunctive norms are social norms which are deemed appropriate by a community (Alcott, 2011). Communities, whether they are comprised of members from churches,

social clubs, political groups, schools, or towns, form expectations of behavior within these peer groups (Allcott, 2011; Fielding et al., 2013). Messages which employ injunctive norms have been effective in energy conservation, curbside recycling, and hotel towel re-use (Fielding et al., 2013; Nolan et al., 2008). Water bills which compare neighbors' use against each other have been shown to affect water use via social norms and pressures (American Water Works Association, 2010; EPA & Water Research Foundation, 2010). Typically, water consumption is adjusted to mimic their neighbors' use (Nassauer et al., 2009). Allcott (2011) found the same phenomena to be true with energy consumption.

Descriptive norms illustrate what behaviors are commonly practiced (Nolan et al., 2008; McKenzie-Mohr, 2000). As shown in Nolan et al. (2018) research, when participants were asked how much the behavior of neighbors influenced their own, they said it did not. However, the results of the research showed that the descriptive norm actually had the most profound effect on their conservation behaviors (Mitchell & Chestnut, 2013). Schultz (1999) illustrated in his study on neighborhood recycling that people increased the frequency and amount of recycling due to the social pressure they felt when neighbors placed recycling bins on the curb. Mitchell & Chestnut (2013) also found this to be true during a pilot study by the East Bay Municipal Utility District. The pilot study implemented a strategy where neighbors could compare their water use with others, thereby utilizing a descriptive norm. The pilot program successfully reduced water use by five percent in its first year.

Effective use of injunctive and descriptive norms can promote sustainability (McKenzie-Mohr, 2000; Nolan et al., 2018). However, if used incorrectly, the wrong

message takes precedence and can be counterproductive (McKenzie-Mohr et al., 2012). For instance, the 1970s Keep America Beautiful campaign against litter portrayed a Native American with a tear rolling down his cheek and his horse traipsing through trash (see Figure 1).[1] The shed tear clearly shows that the injunctive norm is to refrain from littering. But, the trash laying on the landscape depicts the idea that most people litter, the descriptive norm. Therefore, the ad promotes a conflicted message: "Littering is bad, but most people do it." Unwittingly, the ad encourages littering because it is portrayed as the normal behavior. Therefore, descriptive norms should be avoided when it makes the undesirable behavior seem commonplace (Fielding et al., 2013; McKenzie-Mohr, 2000).



Figure 1: The Ad Council 1971 Keep America Beautiful campaign

Barrier: Constrained Choices

Karl Marx posits, "Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances

[1] Finis Dunaway. *Commentary: The 'Crying Indian' ad that fooled the environmental movement.* (*Chicago Tribune*, November 21, 2017). Although critiques of the ad include the fact the actor is Italian-American and that the Keep America Beautiful organization was funded by Coca-Cola and Dixie Cup, Co., for the purposes of my thesis it remains an excellent contrast between injunctive and descriptive norms.

existing already, given and transmitted from the past" (Waterstone, 2010: 877). Sometimes, the decisions people make are based on factors other than their own preferences. Choices may be conspicuously constrained by regulations or by less conspicuous institutional forces (Blaha, 2015).

Constrained choices can curb environmental activities even when citizens want to participate in water conservation (Blaha, 2015). For instance, HOAs dictate lawn practices with enforceable codes and regulations which may restrict xeric or native landscaping designs (Monaghan et al., 2013; Nassauer et al., 2009). In this section, I will use the American Lawn to examine constrained choices.

Barrier: Constrained Choice: Lawn Care. Over 163,800 square kilometers of turf carpets urban areas in the United States (Bremer et al., 2011; Larson et al., 2010); that is enough turf to blanket the state of Texas (Wile, 2015). In arid regions, over fifty percent of the water used during the summer months is for irrigating turf (American Water Works Association, 2010). Caring for lawns stresses water supplies and lawn care chemicals compromise a healthy environment (Robbins, 2007).

Paul Robbins, the director of the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison, concentrates his research on the convergence of humans, politics, and natural resource management. In 2007, Robbins wrote the award-winning book, *Lawn People: How Grasses, Weeds, and Chemicals Make Us Who We Are.* His book explores the social mechanisms and economic processes which manipulate a person into becoming one of the "lawn people." Robbins defines lawn people as those who care for lawns in a manner which violates their belief systems and preferences. Although

individuals understand the hazards involved in lawn maintenance, especially when it involves chemicals, they continue to engage in the behavior anyway (Nassauer et al., 2009; Robbins, 2007). Robbins' study (2007, 2012) reveals that those who use the most chemicals on their lawns are the same people who profess to worry about them the most. Similarly, an Australian study showed that those most concerned about water scarcity actually used more water (Larson et al., 2010). In research conducted by Fielding et al. (2012), participants believed they were saving more water than they were. In fact, the more they felt they were saving, the more water they actually used.

Robbins (2007, 2012) utilizes the American lawn to dissect the complicated economic knot between homeowners, chemical companies, landscape contractors, HOAs, and real estate market values. Robbins argues that the fusion of capitalistic economics, cultural/social norms, and ecological concerns creates "subjects" whose actions, at times, are in direct conflict with their environmental concerns.

Robbins (2007) explores the multitude of decisions people make about lawn care: which type of plants and turf to plant; whether or not to use herbicides, pesticides, or fertilizers; whether to hire a landscape contractor or embrace the do-it-yourself approach; whether to xeriscape or plant turf; how short to mow the lawn; and how often to water their grass. Although individuals face a plethora of choices for their yard, the landscaping design of the neighbors is the dominant factor in their decision making process (Nassauer et al., 2009). When the neighbors have picture perfect lawns, lawn owners feel they have little choice but to apply chemicals and water their lawns (Robbins 2007, 2012).

Robbins (2007, 2012) also found that choices can be constrained by lawn specialists. Lawn companies want to deliver beautiful green lawns to preserve their reputations. Therefore, lawn applicators pressure lawn owners to use the chemicals and watering schedules they recommend. When homes are located within HOAs, these choices can become further constrained by codes and regulations (Harlan et al., 2013; Monaghan et al., 2013).

Barrier: Constrained Choices: Homeowner Associations. HOAs are a form of private government comprised of homeowners in a planned community and designed to protect property values (Dyckman, 2008; Turner and Ibes, 2011). Typically, HOAs are linked to wealthy, white populations who use non-native vegetation on larger lots and may possess outdoor water features like hot tubs or fountains (McCabe, 2005; Monaghan et al., 2013). HOA members are less likely to adjust their landscaping practices because green lawns can be seen as a status symbol; because members do not want to raise the ire of their neighbors; nor, do they want to violate their HOA covenants (Huang et al, 2016; Lamm et al., 2016; McKenzie-Mohr et al., 2012; Robbins, 2007; Turner & Ibes, 2011).

HOAs are the fastest growing quasi-government entity in the United States (Lerman et al., 2012; McCabe, 2005). By 2012, more than 62 million people in America were members of an HOA (Lerman et al., 2012). HOA membership is mandatory and constitutional rights are not compulsory (Lerman et al., 2012). In 2008, 40 percent of new homes were located in HOAs (Dyckman, 2008). Because developers use HOAs to ensure the integrity of their development, almost all new subdivisions in the United States utilize them (Lerman et al., 2012).

In an effort to maintain aesthetic uniformity, a significant portion of HOA codes address outdoor requirements which homogenize the landscape (McCabe, 2005; Monaghan et al., 2013). These codes usually mandate turf for the front yard which is then required to stay green throughout the summer months (Harlan et al., 2013; Larson et al., 2009; Turner and Ibes, 2011). The HOA contract may regulate the type and height of turf; insist on a turf yard rather than xeriscape; eliminate choices like ground cover or native species, and require a weed free lawn which obligates the owner to use chemicals (Dyckman, 2008; McCabe, 2005). Property owners within HOAs must follow the rules and regulations set forth in the covenants or face consequences, which can include foreclosure (Lerman et al., 2012; Turner and Ibes, 2011). Although HOAs could be advocates for water conservation and utilize their contracts to ensure that owners conserve water, many times HOAs' regulations constrain the choices of members who want to landscape with water wise plants or allow their lawns to go dormant (Christiansen, 2015; Lamm et al., 2016).

Although the lawn owner may feel chemical applications are detrimental to his/her family's health, dangerous for their pets, and a source of pollution in the water supply, owners may be compelled to use chemicals to maintain HOA standards (Robbins, 2007, 2012). If lawn owners are required by their HOAs to apply chemicals, their choices have been constrained. Alternatively, when a homeowner chooses to forego chemicals for a less than perfect lawn, he may be portrayed as neglecting his civic duty because he is violating the social norm (Robbins, 2007).

To prepare for climate change's fluctuating weather patterns and diminishing water supplies, municipalities are employing demand management strategies, such as water

conservation practices (Turner and Ibes, 2011). Water management practices are strongly influenced by HOA restrictions (Huang et al., 2016; Turner and Ibes, 2011). If HOAs pursued water-wise landscaping as a cohesive group, they have the opportunity to successfully conserve resources (Harlan et al., 2013). However, the goal of HOAs is to preserve property values, not encourage sustainability (Lerman et al., 2012).

Members of HOAs are a unique set of water users since HOA regulations can constrain outdoor practices (Dyckman, 2008; Larson et al., 2010). HOAs can potentially influence resource use which is inconsistent with owners' desires (Lamm et al., 2016; Monaghan et al., 2013; Turner and Ibes, 2011). For this reason, HOAs are a powerful institution which can greatly influence water management by the landscaping codes they enforce (Huang et al., 2016; Lerman et al., 2012). When homeowners perceive HOA regulations as an obstacle to water conservation, they may feel powerless and disregard all water conservation efforts (DeYoung, 1996; Lamm et al., 2016).

Even in communities without HOAs, residents expect others to maintain the neighborhood standard to protect property values (Fielding et al., 2013). Robbins (2007, 2012) concluded that neighborhood monitoring and social ostracization force a person to adhere to their community's expectations and conform with the social norms. His research confirms that individuals will sacrifice their personal beliefs about engaging in environmentally destructive behaviors in order to be accepted by their community. Housing values and social cohesion are perceived to be worth the sacrifice.

Barrier: Hegemony. According to *The Dictionary of Human Geography, 5th edition*, hegemony is "the dissemination of the values and cultural practices of the elite in such a

way that they become unquestioned" (2009: 237). Hegemony occurs when a dominant state or social group coerces others into unknowingly accepting the culture, ideology, and opinions of the elite group (Menga, 2015; Sica, 2015). Hegemonic relationships make it appear that the elite's agenda is based on the majority's opinion (Menga, 2015; Sica, 2015). However, inequality is inherent in a hegemonic relationship (Sivaramakrishnan, 2005). It's a non-violent take-over where subjects willingly turn their power over to the elites, whether they realize it or not (Robbins, 2007). The support of policies which subvert one's own best interests in favor of the state, of capitalism, or industry is what Foucault describes as governmentality (Inda, 2005).

Althusser, a French Marxist philosopher, posits that people become who they are through their interactions with political webs of power (Gregory et al., 2009). In politics, the elite may initiate policies that benefit only them; yet, the masses support and reinforce these values until they become social norms. The masses continue to endorse these policies, even to their own detriment (Waterstone, 2010). When the weak come to believe that the ideals and values of the strong are the right and true ones, hegemonic power is established (Menga, 2015). Once these ideals become a common part of the social fabric, they become a social norm that is rarely questioned (Gregory et al., 2009; Sklair, 1997; Waterstone, 2010). At this point, the non-elite become self-governing and will perpetuate these social norms, even when they do not benefit from them (Robbins, 2012).

Barrier: Hegemony: The American Lawn. Hegemony is alive and well in suburbia and can be seen in the ubiquitous green lawns, the fastest growing landscape in the United States (Robbins, 2012). In the 18th century, lawns were a representation of a garden

paradise for the elite. Andrew Jackson Downing, a 19th century landscape architect and father of the suburban lawn (Nassauer et al., 2009), viewed lawns as a fortification against class upheaval (Robbins 2007). Even as far back as Rome, well-kept landscapes symbolized the elite status of the owner (Nassauer et al., 2009). Frederick Law Olmsted, the architect who designed Central Park, felt that the contiguous monocultural open spaces of lawn nurtured social and moral order (Beveridge and Racheleau, 1998). In other words, these 19th century landscape architects felt tidy lawns drove moral behavior. Green, monocultured lawns became the social norm (Robbins, 2007). By the end of the 19th century, morality and the lawn were linked. American lawns represent the unconscious expression that nice lawns equal nice people (Beveridge and Racheleau, 1998). Today, lawns continue to act as a public arena to showcase the homeowner's status (Larson et al, 2010).

Do we have a choice when it comes to our lawns? As Robbins (2007) argues, lawns beckon us to water them, to fertilize them, to keep them pest free. Social expectations obligate homeowners to unwanted maintenance schedules (Larson et al., 2010). Even though nurturing a lush green plot of land may clash with their environmental concerns, people pursue the perfect lawn because, socially, it is an outward expression of being a good, responsible citizen and a reflection of one's social values (Larson et al., 2010). As Robbins (2007, 2012) reveals, our social norms and cultural pressures tell us that having a pretty, green lawn makes us a good neighbor, and therefore, a good person. Media confirms and diffuses these social norms (Sklair, 1997).

In order to preserve the ideals associated with green lawns, Americans succumb to social and economic pressures (Fielding et al., 2013). The production of a green lawn is comprised of ecological, economic, political, and social relationships between homeowners, the lawn care industry, chemical manufacturers, retailers, turf grass businesses, and communities (Larson et al., 2010; Robbins, 2007). According to Marxism, capitalism inherently undermines the conditions for its success (Gregory et al., 2009). In this case, the American lawn industry is a capitalistic system which inflicts hazards upon the consumers and the environment it depends upon for survival (Robbins, 2007).

As Robbins (2007) concludes, chemical companies perpetuate the green lawn as the symbol of an upstanding American by inundating homeowners with images of happy families relaxing in their yards. Since it is next to impossible to cultivate the ideal American lawn without fertilizer, herbicides, pesticides, cutting, raking, and watering, people can be oppressed by their lawn.

Robbins (2007) also argues that the fusion of capitalistic economics, cultural norms, and ecological concerns creates "subjects" whose actions, at times, are in direct conflict with their environmental concerns. His research shows that those who use the most chemicals on their lawns are actually the ones who worry most about the detrimental effects on the health of their families and pets and the degradation of water quality. This dichotomy creates a perpetual source of anxiety. Since there is nothing natural about the uniform, weed free lawn sought after by the masses, Robbins (2007) proposes that it may

not be possible to align our contradictory desires to be good citizens, good parents, good consumers, and good environmental stewards.

Having a nice lawn is so inherently instilled in the suburbia lifestyle, people don't realize that the unease they experience when applying chemicals onto their lawns actually signifies a hegemonic relationship (Robbins, 2007). Even when people have the best of intentions, efforts can be waylaid by constrained choices and hegemonic relationships (Blaha, 2015). In sum, choices can be influenced by lack of information, what is most convenient, lack of trust, our peers, by accepted social norms, by rules and regulations, and affected by media.

I have examined some of the challenges which impede people's ability to act according to the beliefs they hold or the information they possess. To erase the inertia and promote action, strategies to overcome these barriers are necessary. Two approaches, social marketing and community based social marketing (CBSM), combine principles from the disciplines of marketing, psychology, social sciences, and behavioral sciences. Although social marketing was originally utilized for health care messages, environmental coalitions are adopting the principles set forth in social marketing and CBSM.

Strategies to Initiate Action: Social Marketing and Community Based Social Marketing

Cultivating a culture of conservation is complex. Developing successful methods to encourage and enhance conservation requires that aspects from several disciplines coalesce into effective strategies. Information-focused campaigns address only one or two barriers: lack of knowledge and/or unsupportive attitudes (McKenzie-Mohr et al., 2012). However, as discussed previously, a behavioral change can be fraught with many barriers.

For instance, installing a smart irrigation system can face barriers which include: lack of information about the system; lack of expertise to install and use the system; not knowing who to hire to install the system; the expense of the system; the inconvenience of having the system installed; and not understanding how to maintenance the system (Endter-Wada et al., 2008; Monaghan et al., 2013). Collecting and using rainwater for outdoor use requires different barriers to be addressed: selecting an aesthetically pleasing container that does not violate neighborhood norms; buying an affordable container to collect rainwater; deciding where to place the container; devising a system to use the collected water; and overcoming the inconvenience of using it versus turning on a faucet.

Strategy: Social Marketing

Alan Andreasen, a professor of marketing in the McDonough School of Business at Georgetown University, is considered the "father" of social marketing. His interest in advancing the science of behavior change inspired his foray into social marketing as a way to influence social change (Georgetown University, 2015). Social marketing is more than a communication strategy; it modifies traditional marketing techniques and applies them to social issues (Andreasen, 2006; Huang et al., 2016; Jacobson et al., 2015; Lee & Kotler, 2011). The key objective of social change campaigns is to influence individual behavior patterns (Andreasen, 2006; DeYoung, 1996). Lee & Kotler (2011) explain that the goal is to influence one of six types of behavior: (1) accept a new behavior; (2) reject an undesirable behavior; (3) modify a behavior; (4) abandon an existing behavior; (5) switch a behavior; or (6) continue a desired behavior.

Social marketing has a record of successfully changing behavior in the sector of health and safety issues, such as teenage tobacco use and alcohol consumption (Andreasen, 2006; Jacobson et al., 2015; Lee & Kotler, 2011). Recently, environmental outreach organizations have begun implementing tools from social marketing to craft more effective campaigns which not only raise awareness, but also motivate behavioral changes (Andreasen, 2006; Silva et al., 2010; Warner et al., 2016).

Strategy: Community Based Social Marketing

Doug McKenzie-Mohr, a professor at St. Thomas University and the recipient of the American Psychological Association's inaugural award for innovation in environmental psychology, developed a hybrid process to transform information into action. McKenzie-Mohr modified concepts from social marketing and psychology to develop programs which can result in behavioral changes. He named this process Community Based Social Marketing. McKenzie-Mohr (2000) designed this approach to identify target audiences who possess a specific barrier to overcome. Strategies are customized for both the target audience and the barrier.

Strategy: Target Audiences

Rarely is a "one size fits all" campaign adequate for evoking change (Andreasen, 2006). Rather than simply increasing the distribution of general educational materials for a broad audience, social marketing employs methods which design programs specifically for a subgroup, the target audience (Lee & Kotler, 2011; Warner et al., 2016). Audience

segmentation is well documented as a tool for behavioral change (Huang et al., 2016; Warner et al., 2016).

To develop a successful program for the target audience, social marketers must listen carefully (DeLorme et al., 2003) to understand what the audience members know; to recognize what members see as the costs and benefits of engaging in a particular activity; to ascertain how members' families and friends feel about the topic; and to be knowledgeable about competing ideas (Andreasen, 2006). This knowledge can be gained through interviews, surveys, and focus groups (Jacobson et al., 2015; McKenzie-Mohr, 2000).

One advantage of audience segmentation is that resources can be allocated to achieve specific behaviors within a target population (Andreasen, 2006; Huang et al., 2016; Lee & Kotler, 2011). To motivate people into action, program designers must understand the target audiences' barriers and discern why they are not already engaged in the desired behavior (DeLorme et al., 2003; Jacobson et al., 2015; Warner et al., 2016). Understanding the barriers allows the message to be customized to reflect the unique characteristics and concerns of the target audience (Jacobson et al., 2015; Silva et al., 2012).

Following CBSM protocol, the program manager then strategically addresses that audience's motivation, opportunity, and ability to act (Aceti Associates, 2005; McKenzie-Mohr et al., 2012; Warner et al., 2016). For example, a water conservation campaign which targets the general public with a mass message is less impactful than a campaign designed specifically for single family households' outdoor watering practices (Monaghan et al., 2013; Silva et al., 2010; Warner et al., 2016).

Although people know water is necessary for life, indifference and apathy in the general public is prevalent (Lamm et al., 2016; Silva et al., 2010). Across the country, communities are struggling with water supply challenges (Huang et al., 2016; EPA & Water Research Foundation, 2010). Finding a way to motivate outdoor water conservation could eliminate the need for municipalities to expand expensive infrastructure or find sources of new water (Goetz, 2014; Warner et al., 2016). Water users may not conserve water because they do not realize how their landscape practices impact the environment, they may perceive water conservation as a sacrifice, or they may be unaware of available options (Lamm et al., 2016; Warner et al., 2016).

Because suburban water use typically increases by two to four times in the summer, when lawns are being watered, targeting outdoor water use provides the largest segment for conservation (EPA WaterSense, 2018; Monaghan et al., 2013). Residential landscape water conservation programs should be directed towards the audience segment which has the largest potential to alter outdoor watering behaviors (Huang et al., 2016; Fielding et al., 2012; Warner et al., 2016).

To study the selection process in more detail, my research examines which segment is best for a water conservation campaign: high water users; medium water users; low water users; or HOA members (Huang et al., 2016; Turner and Ibes, 2011). It is essential to understand each categories' unique attitudes and behaviors in order to develop an effective program (Lamm et al., 2016; Warner et al., 2016).

Three studies conducted in 2016 utilized audience segmentation for the social good of water conservation (Huang et al., 2016; Lamm et al., 2016; Warner et al., 2016). Their

studies broke water users into separate categories and examined the characteristics of each. Warner et al. (2016) extensively examined three target audiences and their use of landscape irrigation: (1) water savvy conservationists or low water users (LWU); (2) water considerate majority or medium water users (MWU); and (3) unconcerned water users or high water users (HWU). Huang et al. (2016) and Lamm et al., (2016) concentrated on the relationship between HOA membership and high water use. Water conservation strategies among these four target audiences are examined.

Target Audience: Water Savvy Conservationists/Low Water Users. Warner et al. (2016) concludes that LWUs are very engaged in landscape water conservation practices and are usually involved in advocacy. LWUs view conservation practices as a personal obligation and understand their impact on water resources. Because there is little room for these savvy users to conserve more water, they do not make a good target audience. Silva et al. (2010) argue that money for campaigns would be better spent on those who have more room for improvement. However, recruiting water savvy conservationists to help change the social norms and encourage conservation behaviors in the water considerate majority is a productive strategy. Messages for these volunteers can be complex because they are very knowledgeable about the issues (Warner et al., 2016).

Target Audience: Water Considerate Majority/Medium Water Users. As Warner et al. (2016) explained, MWUs are the largest segment of water users. MWUs assign importance to water quality and water quantity. Typically, they practice limited landscape water conservation, but are likely to adopt other practices once they become aware of them

(Silva et al., 2010). MWUs have the potential to engage in additional conservation behaviors with minimal effort (Warner et al., 2016). Since they combine willingness to conserve with the capacity to increase conservation, MWUs Warner et al. (2016) felt they are the best target audience. An effective campaign would be designed to build on the users' existing attitudes and to provide concrete actions to pursue (EPA & Water Research Foundation, 2010; Goetz, 2014). Messages to this group can be moderately complex, appeal to their emotions, and outline specific steps to conservation (Warner et al., 2016).

Target Audience: Unconcerned Water User/High Water Users. All three of the 2016 studies posited that while HWUs have the most opportunity to save water, this can be the most difficult segment to reach with conservation messages (Huang et al., 2016; Lamm et al., 2016; Warner et al., 2016). The HWU group is especially difficult because the members prioritize landscape aesthetics, are concerned about upholding their contractual duties to HOAs, keeping the neighbors happy, and usually hire professionals to care for their lawns (DeLorme et al., 2003; Huang et al., 2016). Typically, these unconcerned HWUs have the lowest likelihood of conserving water because they do not feel a personal obligation or social expectation to practice sustainable water use (Warner et al., 2016). Generally speaking, HWUs are wealthier, more educated, older, white, live in communities with HOAs, use landscaping contractors, and, in some cases, are unaware of the environmental impact of their watering practices (Huang et al., 2016; Lamm et al., 2016). Because the unconcerned HWUs are unlikely to engage in water conservation and place a low importance to clean or plentiful water, they do not make a good target audience (Warner et al., 2016).

Target Audience: HOA Members. Increasingly, municipalities are struggling to find enough water to serve their constituents (Silva et al., 2010). Many cities are turning to Water Demand Management (WDM) strategies which influence water conservation by controlling demand (Gleik, 2002; Turner and Ibes, 2011). To date, informational campaigns driven by WDM have focused on individual households (Turner and Ibes, 2011). Unfortunately, the programs neglect to address institutional actors, like HOAs, which have the potential to serve as environmental resource management institutions (Dyckman, 2008).

Some of the greatest challenges to water conservation come from HOAs; a membership which increased 600 fold between 1960 and 2009 (Turner & Ibes, 2011). Design review committees usually govern the landscaping and planting palates in HOA neighborhoods (Dyckman, 2008; Fokidis, 2011). Instead of primarily focusing on aesthetics, some researchers argue that HOAs should include quality of life components, such as water quality and quantity, into their agendas (Fokidis, 2011; Turner & Ibes, 2011). In other words, HOA covenants should prioritize and regulate outdoor water conservation (Dyckman, 2008; Lamm et al., 2016; Turner & Ibes, 2011). One approach could be to emphasize the potential economic benefits of using native palates and less thirsty turf (Fokidis, 2011).

Focusing education initiatives on this group is complex, requiring a strategy which addresses the HOA's codes, educating the landscape contractors who set the watering schedules, and developing new social norms among members (Huang et al., 2016; Lamm et al., 2016; Monaghan et al., 2013). A program developed for this segment would need to

emphasize the importance of institutional change (Warner et al., 2016) and target HOA board members who can then distribute information to the homeowners (Turner & Ibes, 2011).

HOAs, if approached properly, could be a tool for water conservation (Warner et al., 2016). HOAs could change lawn requirements to reflect water conservation principles as well as be a source of information and education (Dyckman, 2008; Monaghan, et al., 2014). There is a huge potential for conservation and to change social norms if HOAs use their contracts to encourage water smart lawns (Fokidis, 2011).

Target Audience: State and Local Policymakers. State and local policymakers have the potential to enhance water conservation through regulations (Dyckman, 2008; Fokidis, 2011). Several governments are now regulating HOAs. Since government laws supersede HOA covenant laws, this can be an effective strategy (Dyckman, 2008; McCabe, 2005). Colorado, Florida, Nevada, and Texas have implemented statutes which invalidate HOA covenants if they infringe on water conservation (Dyckman, 2008; Silva et al., 2010). Florida and the City of North Las Vegas prohibit HOAs from covenants which restrict xeriscaping, native plants or other water efficient landscaping (Dyckman, 2008). Texas Property Code, Title 11, Section 202.007, page 4 voids HOA regulations if they impede members from composting, rainwater harvesting, or installing efficient irrigation systems:

> a) A property owners' association may not include or enforce a provision in a dedicatory instrument that prohibits or restricts a property owner from (2) installing rain barrels or a rainwater harvesting system; (3) implementing efficient irrigation systems; (4) using drought-resistant landscaping or water conserving natural turf. b) A provision that violates subsection a) is void.

Target Audience: Subdivision Developers. Perhaps, the best strategy to engage HOAs in water conservation efforts is to devise a campaign aimed at developers of new subdivisions. Developers and the subsequent HOAs could be contractually required to plant drought tolerant turf, use native plants, or xeriscape the yard (Silva et al., 2010). Municipalities could strengthen this strategy by offering financial incentives for developers who incorporate WDM strategies into the HOA covenants (Turner & Ibes, 2011; Warner et al., 2016).

Once the target audience is selected and the barrier to address is chosen, it is time to develop a compelling message which overcomes barriers and motivates people into action.

Strategy: Narratives

Although communication exists in many forms, research into the power of narratives is burgeoning (Olson, 2015). Since narratives are structured similarly to life's experiences, people organize concepts, gauge congruence, remember events, and structure their world in narrative form (Jones et al., 2014; Jones & Song, 2014; Shanahan et al., 2014). Narratives provide the best format for messages because they capture peoples' attention, simplify complex issues, illuminate power structures, stimulate responses, and create social meaning from events (Crow & Lawlor, 2016; Gray & Jones, 2016; Hillier et al., 2016; Jones et al., 2014; Shanahan et al., 2014).

Maximizing the speed and scope of social diffusion can be facilitated through effective communication (McKenzie-Mohr et al., 2012). Storytelling is a universal form of human communication which permeates all aspects of culture (Hillier et al., 2016; Jones

et al., 2014; Olson, 2015). We communicate about the world and persuade each other through narratives (Crow & Lawlor, 2016). Narratives which strategically use language and symbols to evoke strong emotions can garner support for particular issues, as well as guide policy and behavior (Crow & Lawlor, 2016; Shanahan et al., 2011). Powerful narratives have shaped attitudes about war, acid rain, smoking, climate change, and disabilities, to name but a few (Jones & McBeth, 2010).

Although a litany of policy details conveys pertinent information, people care more about human experiences than abstract concepts. Therefore, public opinion is more readily influenced by a persuasive story that appeals to their emotions than listening to a list of facts (Crow & Lawlor, 2016). Compelling narratives readily engage their audiences (Luna, 2015) and make scientific facts relative, usable, and attainable (Olson, 2015).

In Olson's book, *Houston, We Have A Narrative*, he posits that scientists should adopt principles developed by Hollywood when presenting their research to general audiences (2015). Because citizens primarily make decisions according to their values rather than a list of data, scientists can increase information applicability by utilizing narrative formats (Olson, 2015). Therefore, when narratives are used to connect facts with values, a greater degree of acceptance and relevance emerges (Jones et al., 2014).

Research in the fields of communication and psychology reveal that when a person is deeply immersed in a story, they are more easily influenced (Crow & Lawlor, 2016). Marketing strategists use moral narratives and imagery more than any other technique to sway opinion (McBeth et al., 2017). Narrative communication enhances the audience's ability to process and understand the concepts being presented (Hillier et al., 2016). When

a good story is told, humans' brains become involved (Olson, 2015). Neuroscience has demonstrated that stories activate a very specific region of the brain which enhances the uptake of the information (Hillier et al., 2016).

Since value systems differ, the narrative has to be culturally compatible for it to impact its target audience, (Jones et al., 2014). Narratives create emotional connections when people see their beliefs, identities, and values reflected within it (McBeth et al., 2016). Narratives can significantly enhance the understanding of cultural, political and institutional processes (Jones et al., 2014). Narrative Policy Framework (NPF) was first developed at Idaho State University's Department of Political Science to scientifically study public policy narratives (Jones et al., 2014; Shanahan et al., 2011; Shanahan et al., 2014).

Strategy: Narrative Policy Framework

NPF combines theories and research from public policy, political science, psychology, marketing, communication, and narratology (Jones et al., 2014). Although NPF is an open framework and embraces the integration of multiple theories, it also relies on traditional social science techniques (Jones et al., 2014; Shanahan et al., 2014). NPF employs scientific methods to dissect narratives. Its measurable, systematic, and falsifiable framework allows hypotheses to be developed (Shanahan et al., 2011; Shanahan et al., 2014). Using content analysis and statistics, NPF founders sought to determine whether public documents include narrative elements which are quantifiable (Shanahan et al., 2014).

NPF provides a common language to evaluate concepts in narratives (Shanahan et al., 2014). NPF posits that the form and content of a narrative can be objectively studied and generalized because narratives are comprised of common elements: settings, plots, characters, and morals (Jones & McBeth, 2010; Shanahan et al., 2014). According to Crow & Lawlor (2016), Gray & Jones (2016), Hillier et al. (2016) and Shanahan et al. (2014), the core elements of a narrative contain:

- Setting – The setting sets the stage and provides context for the issues.
- Characters - Characters can be humans, but can also include anthropomorphized abstractions or categories like the environment. In a narrative, there must be at least one character who is either a hero, victim, or villain.
    - Villains cause the perceived harm, intended or not. They are divisive and expand the scope of the conflict.
    - Victims play a vital role in effective storytelling. Innocent victims are especially adept at influencing public opinion.
    - Heroes are the key factors in the success or failure of a narrative. Heroes are less divisive and are more concerned with finding remedies than assigning blame. When the hero's journey resonates with the audience deeply enough, preferences can be changed.
- Plot – The plot establishes the relationship between the characters and assigns blame to the villain. The plot establishes the hero's mission and outlines the moral to the story.
- Moral - The moral of the story embodies the solution to the dilemma.

Shanahan et al.'s (2011) research posits that innocent victims and heroes play the most important roles in a narrative. Empathy for victims can influence public opinion and motivate change. However, heroes have the most significant role. According to NPF framework, when people relate to the hero, empathy is triggered, the message is more readily heard, and ultimately minds can be changed.

There are three levels of analysis in NPF: micro (individual, meso (group or coalition), and macro (culture and institutional) (Jones et al., 2014). Primarily, this thesis will concentrate on Jones' et al. (2014) description of the micro analysis/individual scale of the narrative, as well as the meso analysis/group scale of the narrative. Both scales are relevant in developing water conservation campaigns because individuals physically conserve water, but it is the group who establishes social norms which encourage water conservation.

NPF: Micro Analysis. The homo narrans, the "storytelling person," is a component of micro level analysis. The homo narrans model assumes narratives play a central role in human communication, reasoning, and information processing. The micro level of analysis focuses on how individuals process information, how they inform narratives, and how narratives influence individual opinions.

NPF: Meso Analysis. Meso analysis, aka agora narrans, studies how groups and coalitions utilize narratives to persuade public opinion and shape the policy process. NPF analyzes groups' policy beliefs, coalition stability, strength, cohesion and decision making processes by examining narrative content. Because the narratives mirror the beliefs of the

group, understanding them sheds light on how the narratives shape behavior (Shanahan et al., 2014).

Narratives strategically weave a story which assign blame and responsibility. Coalitions use narratives to persuade audiences by framing their arguments in a strategic format designed to change or reinforce public opinion. Symbols, metaphors, and images consolidate complicated issues into simpler, memorable forms (Jones et al., 2014). The primary goal of narratives from coalitions is to divide opponents rather than attracting allies (Shanahan et al., 2011).

Jones et al. (2014) also explains that narratives illuminate whether the group believes it is winning or losing against competing ideals and public opinion. Strategies employed by coalitions include the devil and angel shift. The devil shift demonizes the opponents and portrays them as more powerful and malicious. The angel shift exaggerates the virtues and power of its allies and emphasizes their role as the hero who fixes the problem (Jones et al., 2014).

In the Literature Review, I examined the barriers which hinder water conservation efforts and explored strategies to overcome those barriers. Now, I use those tools to discover the barriers of twenty-seven randomly selected low, medium, and high water users of single family households in Bozeman, Montana.

CHAPTER THREE: METHODS AND CASE STUDIES

For my research, I examined water use practices of 27 randomly selected low, medium, and high water users from single family households in Bozeman, Montana. First, I conducted semi-structured interviews. Next, I used an inductive approach to code the interview transcripts to discover the conservation practices and barriers present among those I interviewed. This was followed by a second round of coding that used a deductive approach to examine attitudes towards COB. Lastly, I analyzed eight water conservation brochures from the City of Bozeman (COB) to examine their narrative characteristics.

Methods: Participant Selection and Semi-Structured Interviews

After receiving permission from Montana State University's Institutional Review Board to conduct semi-structured interviews, I contacted the City of Bozeman's Water Conservation Division to propose a partnership. I needed the City of Bozeman (COB) to provide a list of randomly selected city water users I could reach out to via a postcard and request their participation (see Appendix A). The City of Bozeman's Water Conservation Division used billing data to divide single family households into three divisions of low, medium, and high water users. In each division, the middle third of users were selected to be randomized. By choosing the middle third of the low, medium, and high categories, outliers were eliminated. Then a randomizing function of Excel was used to pick 100 users from each category. The amounts of water used by each category is found in Table 1. I chose single-family homeowners because they typically receive municipal water bills, have lawns, and have the most control over their water usage. In total, I interviewed 27 water

users. Interviews lasted approximately forty minutes and were conducted at a place of the participants' choosing.

I conducted semi-structured interviews in lieu of focus groups and survey questionnaires because the interview format provided more flexibility and opportunities to clarify answers (Berg, 2009; Neuman, 2006). The questions I used during the interviews (see Appendix B) concentrated on water conservation attitudes and practices of Bozeman residents who owned single family homes.

Conducting semi-structured interviews is one way of collecting qualitative data. Semi-structured interviews were chosen in lieu of focus groups and survey questionnaires because interviews provide more flexibility and opportunities to clarify answers (Berg, 2009; Neuman, 2006). Semi-structured interviews begin with a set of predetermined questions and topics, but questions can be reordered, reworded, or eliminated as the researcher deems fit (Berg, 2009; Neuman, 2006). When the interviewer wants to probe into a topic further, he or she can adapt the interview guide to accommodate (Berg, 2009; Neuman, 2006). This method maximizes communication opportunities between the respondent and researcher (Berg, 2009; Neuman, 2006). Research shows that face to face interviews result in the highest response rates and allow for the longest questioning period (Neuman, 2006). The disadvantages include expense and the potential for bias (Neuman, 2006).

When developing questions for the interview process, the researcher considers the focus of the study and what the information reveals (Berg, 2009; Neuman, 2006). Typically, the interview begins with warm-up questions which are used to relieve tension,

develop rapport, or extract a more complete story (Berg, 2009). During the interview, interviewees' assumptions can be addressed and perceptions can be explored (Berg, 2009; Neuman, 2006).

Success of a semi-structured interview relies on the connection between interviewer and interviewee (Berg, 2009). It is important to establish common ground and be aware of non-verbal clues as well as spoken ones (Berg, 2009). Best practices for conducting semi-structured interviews include simplifying questions to accommodate the least sophisticated participants; use the phrase "how come" instead of "why"; ask one question and wait for an answer before asking another; and avoid questions which can be answered by a simple "yes" or "no" (Berg, 2009; Neuman, 2006). If permission is granted by the interviewee, interviews may be recorded then transcribed verbatim. The transcripts are then inductively or deductively analyzed to highlight emerging patterns and concepts (Gray & Jones, 2016).

Methods: Coding and Analysis of Semi-Structured Interviews

Qualitative research focuses on the "meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things" (as opposed to quantitative research which focuses on the "counts and measures of things" (Berg, 2009: 3). The researcher's approach to qualitative inquiry reflects his/her knowledge base (Saldana, 2009). Once qualitative data is collected, there are a variety of methods which can be employed to organize and interpret it (Berg, 2009; Lune & Berg, 2009). Systematic coding of qualitative data is a method for analyzing qualitative data (Berg, 2009; Lune & Berg, 2009; Neuman, 2006). While, coding is a subjective process (Saldana, 2009), the analysis

must be consistent enough that other researchers would arrive at similar results (Berg, 2009; Neuman, 2006).

One challenge in coding qualitative data is establishing confidence in the accuracy of the determined patterns and themes (Berg, 2009). Organized, systematic coding and categorization enhances the data's ability to reveal trends and concepts (Berg, 2009; Saldana, 2009). The overwhelming frequency of a theme or a crystal clear pattern can be used to gauge its veracity (Berg, 2009).

In qualitative research, a code is developed and applied when it indicates a word or phrase that epitomizes an attribute pertinent to the research (Saldana, 2009). The researcher develops a codebook which delineates how raw content components are to be coded (Neuman, 2006). The codebook constantly evolves as the codes are organized and reorganized into categories (Saldana, 2009).

Coding enables the researcher to group coded data into categories according to shared characteristics (Saldana, 2009). The goal is to discover repetitive patterns, commonalities and consistencies (Saldana, 2009). Coding links ideas to the data (Saldana, 2009). After notes and transcripts are coded, the discovered patterns and themes are then used to develop hypotheses (Berg, 2009).

When beginning the coding process, detailed coding is preferred (Berg, 2009). Minutely coding the text line by line in the initial open coding process establishes a more thorough grounding in the data (Berg, 2009). Inductive coding is advantageous because codes are developed as the transcripts are read. Deductive coding is limited to pre-determined concepts and patterns (Gray & Jones, 2016). Even though the process is not

replicable according to a scientific definition, the process is repeatable (Gray & Jones, 2016).

Open coding is the initial pass through the text to condense the data into categories (Neuman, 2006). During this process, preliminary themes are determined (Neuman, 2006). The next phase of coding reviews and examines the initial codes, identifies key concepts, and identifies concepts which cluster together (Neuman, 2006). This second cycle coding classifies, integrates, prioritizes, and synthesizes data to aid in conceptualizing themes and theory building (Saldana, 2009). During this phase, linkages between categories are established, but new questions may arise (Neuman, 2006). Selective coding occurs in the last examination of the data (Neuman, 2006). At this point, major themes are identified (Neuman, 2006).

Computer Assisted Qualitative Data Analysis (CAQDAS) software programs aid the researcher by tracking coded texts. Although CAQDAS will not code the data, it will maintain a list of codes, define them, and help the researcher easily locate patterns (Saldana, 2009). CAQDAS allows complex coding systems to be organized into hierarchies and networks for easy reference (Saldana, 2009). NVivo (Version 11) was the CAQDAS software used in coding the transcripts of the semi-structured interviews for this research. According to the company's website, NVivo is "software that supports qualitative and mixed methods research. It is designed to help you organize, analyze and find insights in unstructured, or qualitative data like: interviews, open-ended survey responses, articles, social media and web content."

For this thesis, I transcribed the recorded semi-structured interviews and then coded the transcripts using Nvivo (Version 11) (see codebook in Appendix C). The first round of coding used an inductive approach to discover the conservation practices and barriers among interviewees. Adhering to Berg's (2009) advice, I considered themes, key words, and attitudes towards water conservation. Specific themes, such as types of barriers to water conservation, were also coded. The coding categories were drawn inductively from the raw data (i.e., interview transcripts) (Berg, 2009). The second round of coding focused on the participants' attitudes towards the COB. Using a deductive approach, I specifically examined the interviews for instances of whether the participant felt the COB was a hero or a villain. A third round of coding, without NVivo, was conducted to confirm that there were no major differences in barriers between the three water user groups (HWU, MWU, LWU). The third round of coding was done by creating a hand-drawn grid, which listed the barriers across the top (e.g., information deficit, inconvenience, etc.) and the water user group category in a column on the left-hand side. This analysis confirmed that there were no major differences between groups in terms of the barriers they faced.

Methods: Coding and Analysis of Water Conservation Brochures

Eight water conservation brochures from the City of Bozeman (COB) were examined for their narrative characteristics. Nvivo software was not used for the analysis of brochures. Instead, the text was read carefully to identify elements that are important in the Narrative Policy Framework literature. Specifically, I focused on the use of hero language and language directed at actions an individual can take.

Case Study Location: Bozeman, Montana

My thesis focused on water users' conservation efforts in Bozeman, Montana. The COB is located in the Gallatin Valley, near the headwaters of the Missouri River. Since the Gallatin Valley is located in a closed basin, no more water is available for purchase from the State of Montana (Montana DNRC, 2018). Hence, additional water supplies for Bozeman must come from water conservation or be purchased from those who currently possess water rights.

Bozeman's management of water resources directly influences water quality and supply downstream. According to the Census Bureau, the COB is experiencing a rapid 4.3 percent annual population growth. To meet the challenges of climate change and explosive growth, the COB adopted the Integrated Water Resources Plan (IWRP) in 2013. The IWRP outlines the strategies for water supply and water use for the next fifty years.

Water conservation is the cornerstone of Bozeman's IWRP (City of Bozeman, 2013). One scenario places the 50-year projected water gap at approximately 17,500 acre feet (AF). The COB's approach calls for water conservation to fill approximately 10,000 AF of that gap. This strategy not only conserves water, but also saves money. Because conserved water costs significantly less than "new" water, the COB utilizes water use efficiency and conservation programs as key components of its sustainable resource management strategy to meet both current and future demands (Ahlstrom, 2018).

Case Study Participants: City of Bozeman Single Family Homeowners

Once the COB Attorney approved the research project, the COB Water Conservation Division used billing data to divide single family households into three divisions of low, medium, and high water users. In each division, the middle third of users was selected to be randomized. By choosing the middle third of the low, medium, and high categories, outliers were eliminated. Then a randomizing function of Excel picked 100 users from each category. The amounts of monthly water used by each category is found in Table 1.

Monthly Water Used in Gallons	**Low Water User (LWU)**	**Medium Water User (MWU)**	**High Water User (HWU)**
Water Used By Each Category	76 - 4551.2	4551.5 - 7783.2	4551.5 - 133600.9
Participants' Use	2528.5 - 3547.7	5561.6 - 6585.8	9332.86 -11624.2

Table 1: Water User Categories

One hundred postcards were mailed by the COB to water users in each category, for a total mailout of 300. The postcards instructed the recipients to contact me directly if they were interested in participating in my research. Twenty-three people responded within two weeks of receiving the postcard and the remaining four contacted me after four weeks had passed. Table 2 shows the number of LWU, MWU, and HWU I interviewed in my study.

	Total Respondents	**In Person Interviews**	**Emailed Interviews**	**Phone Interviews**	**Recording Failed/ Used Notes**
LWU	10	8	2	0	0
MWU	9	9	0	0	3
HWU	8	7	0	1	0

Table 2: Semi-structured participants

Respondents suggested both the time and place that was convenient for them to meet. I informed participants that I would need approximately an hour of their time. Interviews averaged 40 minutes, including warm-up questions and wrap-up comments. No monetary compensation was exchanged for their time or participation. Twenty-three participants were either retired, owned their own business, or were stay at home parents. Eighteen interviews were conducted in coffee shops or at a restaurant; nine respondents preferred to be interviewed in their home. After spending four months working with COB and meeting with research participants, I transcribed the interviews. The NVivo software illuminated patterns between water users in the three categories and identified common threads among the interviewees.

Case Study: COB Water Conservation Division Brochures

I collected eight different brochures from COB's Water Conservation Division which discussed various aspects of water conservation. Using NPF guidelines, I examined them for messages containing micro and meso characteristics, rhetoric referring to hero or victim status, and looked for instances of the angel or devil shift.

The results are detailed in the next section.

CHAPTER FOUR: RESULTS

My research focused on the barriers which deter water conservation efforts and examined strategies for developing effective water conservation campaigns. Barriers to water conservation discovered during interviews included information deficits, inconvenience, lack of trust, the pressure of social norms, and constrained choices by HOA codes. This research could aid the COB when designing future water conservation campaigns.

Results: Conflicts Between Attitude and Water Use

As discussed in the literature review, a person's attitude towards water conservation may not be reflected in their actual water use patterns. The perceptions of the participants in my study were consistent with Fielding et al.'s (2012) study: concerns about water supplies and a belief in the virtue of water conservation were not reflected in the amount of water used. Larson et al. (2010) revealed that those who worry the most about water tend actually to use the most water; a pattern I also found in my research.

My results reveal that regardless of the participants' water user category, all but one felt that they practiced water conservation. This HWU admitted to neglecting water conservation efforts and stated that she would have to be forced to conserve water, even though she felt bad about it. She explained, "I feel bad. I flush the toilet a lot. I don't conserve. I'm not in that mind frame. I know we need to, especially with Bozeman growing. And we have drought. That's a concern." As DeLorme et al. (2003) observes,

this type of water user does not have personal motivation to change; therefore, efforts to modify the existing behavior will be minimally effective.

Many of my interviewed HWUs expressed confidence in their water conservation efforts, as evidenced by quotes from three different interviewees:

> "I tell the landscape contractor that I do not want the greenest lawn in the neighborhood. In fact, I want mine to be the worst looking."
>
> "Even in the winter, I throw water in my yard, rather than put it down the sink."
>
> "We remodeled and … put in a high efficiency washing machine. We also put in a high efficiency dishwasher that takes four hours to run."

Even those who think of themselves as strong environmentalists may still prefer lush turf grass. As one MWU confirmed by saying, "I mean I'm an environmentalist and conservationist. But, I do like my green lawn, so I water. We think about what we are doing with water even though we may not always adjust our behavior. But, we think about it."

Results: Information Deficit

Information Deficit: Water Bills. Barriers created by information deficits were evident among participants. Three HWUs were convinced they were LWUs, even though Bozeman's water bill contains a graph which compares customers' use against other single family households so they may get a sense of their relative water use. Participants of my study were not told which water use category they belonged in, but it is information they could access from the COB. As Icaro (2013) posits, users may lack accurate information about their water use due to auto-pay options which eliminate a physical bill. Twenty-five

percent of interviewees used auto pay. Three participants admitted to ignoring the extraneous information found in their water bill.

Information Deficit: High Efficiency Fixtures. As Attari (2014) concluded, misinformation about how much water is used by each fixture affects water conservation efforts. According to Inman & Jeffrey (2006), installing high efficiency fixtures throughout the home can save 35-50 percent in water consumption. Although the COB's website states that toilets use the most water indoors, only one participant in my study was aware of this. Confirming Price et al. (2014) results, eighteen interviewees listed showers as the activity which used the most water indoors, seven thought it was the laundry, and one admitted to having no idea.

Information Deficit: In-Ground Sprinkler Systems. Typically, the COB's water use increases by 240 percent during the summer months of June, July, and August (Ahlstrom, 2018). The increased use is reflected in significantly higher water bills for these months. Although studies from the Water Research Foundation (2016) confirm that manual watering of the yard is more efficient than sprinkler systems, nineteen participants thought that automated sprinkler systems conserve more water than hand watering. As one HWU stated, "We try to minimize our impact, that is why we put in the irrigation system."

The newer versions of irrigation systems offer a wide variety of technological options that enhance efficient watering, but equipment is rarely used correctly or is not used to its fullest extent (Maheshware, 2012). Of the nineteen participants who own in-ground sprinkler systems (See Table 3), none of them utilized all of the conservation

irrigation technology available. In these instances, lack of information and incorrect use of technology represent barriers to water conservation. Even a LWU questioned his/her own knowledge, stating: "I'm using a rain gauge and thinking [I should be applying] an inch [of water] for every irrigation set I do. Maybe, I've been putting on too much or too little. I don't really know."

OWNERS OF IN-GROUND SPRINKLER	LOW USERS	MEDIUM USERS	HIGH USERS
Yes	4	8	7
No	5	1	2

Table 3: Participants with in-ground sprinkler systems

Results: Inconvenience

Participants in my research confirmed McKenzie-Mohr's (2000) assertion that inconvenience is the largest hurdle to motivating behavioral changes. The most prevalent convenience barrier among participants was collecting water indoors to use on plants and gardens. Carrying buckets through the house to the outdoors was not worth the effort. One MWU shared:

> Our water heater is in the garage. You have to run a gallon of water to get hot water. I know I should save that and water my plants. We run water several times a day [to get hot water]. I should put buckets under the sink and collect it. It's just carrying the pots down the hallway. They're heavy and spill.

However, one participant, a HWU, collects water left from dinner glasses to use for her plants. Additionally, three participants (one from each of the three water use

categories) had taken the time to install high efficiency fixtures or appliances. Although six participants, evenly dispersed across the three water use categories, conscientiously adjusted sprinkler schedules to accommodate precipitation events, lack of convenience was the main reason people did not alter watering schedules for their in-ground sprinkler systems.

Results: Lack of Trust

A majority of participants expressed frustration with the COB on two fronts: they felt that the COB fails to lead by example and that city leaders nullify conservation by allowing rampant development. The lack of trust was consistent across participants in all water use categories. Syme et al. (2000) demonstrate how important it is for citizens to view their municipality as trustworthy. And DeYoung (1996) warns that when people feel powerless and feel their actions are futile, they are in danger of giving up. One LWU participant summed up a common theme expressed by interviewees, "I think if the city pushes people to conserve, they have to change what they are doing." One HWU said, "I don't think the water situation is stressed enough by the city."

Participants noted instances where the COB's sprinklers water pavement, continue to water city grounds and parks even when it is raining, or overwater so heavily the ground is slushy. One LWU observed, "We walk our dogs past City Hall and it's a swamp. It squishes when you walk. No one is paying attention." Another LWU participant lamented, "It doesn't matter if it's raining or snowing, the sprinklers are still going. I think the city needs to lead by example." When citizens are conserving water, but feel that the COB is

not, a sense of powerlessness is possible, as evidenced by this quote: "I don't need the city to tell me how to act, especially the way they water the library grounds."

DeLorme et al. (2003) suggest that effective educational campaigns address consumers' concerns about population growth. Larson et al. (2009) found that residents associate population growth with scarcity. All interviewees were concerned about the effects that Bozeman's rapid population growth has on water quality and quantity. When asked if they felt they had the power to make a positive difference by conserving water, twenty-six of twenty-seven participants agreed that when the community unites to conserve water, it does impact supplies.

Consistent with Fielding et al. (2013), participants expressed concern about conserving water just to aid expansive development. Participants felt conservation should mean there is more water banked in the reservoir. In other words, they felt if the conserved water is consumed by increased development, then, ultimately, the water has not been saved. The frustration is evident in this quote by a LWU: "Water which is conserved by the individual does not necessarily translate into water conserved by the city. If individuals conserve just so more houses can be built, then that is not conservation at all, is it?" However, other LWUs were less concerned about Bozeman's rapid growth and its effect on supplies as compared to the MWUs and HWUs I interviewed, who were more concerned about growth.

When I asked how the COB could help them with conservation efforts, the participants gave an extensive list, which included:

(1) plots of land planted with drought tolerant species so they can easily envision incorporating them into their yards and be assured that the species work well in Bozeman's climate;

(2) a display showing how to incorporate rain barrels into irrigation methods;

(3) educational efforts reminding people we live in a semi-arid climate;

(4) city ordinances limiting HOA restrictions which require lawns to be kept green throughout the summer;

(5) city ordinances encouraging HOA and new development to include xeriscape and native plants;

(6) a guide for best practices to conserve water; and

(7) a visible monitor or water index, similar to the one used for fire conditions, which would inform the public about how much water is in the reservoir and how much has been conserved.

One LWU participant suggested an informational campaign which tracks the amount of conserved water, similar to the United Way donation thermometer. The interviewee thought it would encourage people to save. "I think a sign would make you want to conserve. It's the sheep mentality. Visuals are helpful. Trends are helpful." This is similar to findings by DeLorme et al. (2003) whose focus groups requested the city provide updates on water conservation efforts because progress reports reassure

homeowners that their actions have an impact. Signs, similar to the above mentioned United Way donation thermometer, also serve as instruments of social diffusion by displaying the degree of social norm that water conservation holds.

Results: Social Norms

Twenty-six of twenty-seven participants agreed that water conservation should be a priority. Positive attitudes towards water conservation are the social norm for those I interviewed. Over 90 percent of the participants in all three water use groups said their friends and family favored water conservation efforts. One LWU expressed a common sentiment:

> "I believe I read something saying that Bozeman is scheduled to not have enough water by 2040 or something like that. In the same article it said that half the water supply is being used to irrigate. To me, this is madness. The majority of people aren't irrigating crops, we are trying to keep our yards green. We live at 5,000 feet, grass is not supposed to be green and lush all summer long. I don't understand why we wouldn't start now, slowly cutting back on superfluous water waste to avoid running out of water. It would be much easier to start now in small calculated steps than to go from having water to running out of water and then seeing massive restrictions. Rather than turning a blind eye, I feel like now is the time that we can take steps to make sure we are being good stewards of the water we have."

Only two participants, one HWU and one LWU, discussed water conservation or lawn practices with neighbors. Those conversations originated when the LWU was installing rain barrels and the HWU had to completely replant his yard after his water lines were replaced by the COB. Essentially, these two participants became block leaders, as outlined in McKenzie-Mohr's (2012) research. Even though the other participants did not engage in conversations with neighbors, they definitely had opinions:

> "We do have several people here in the neighborhood who are into the lawn culture. The guy comes by with his spray truck carrying his fertilizer and herbicide. I wouldn't want my grandchildren playing on some of the lawns here."

> "Last summer, we were laughing [when a new owner moved in and did not keep his lawn green] as we were saying, 'That [new] guy must have to pay for water because his lawn is brown.'

> "There's a lot of people in our neighborhood who let their lawns go brown by mid-summer."

Overwhelmingly, participants wished a paradigm would emerge which allowed brown lawns in the heat of summer to be acceptable. This HWU expressed his desire for a new social norm, "If everybody would just agree to not water their lawns, then there wouldn't be the comparisons. You wouldn't have to worry if your lawn wasn't as green as other peoples."

Results: Constrained Choices & Hegemony

As Dyckman (2008) showed, HOAs can influence outdoor irrigation practices. In my study, some participants felt the HOA's effect on their water use. Respondents from all three water use groups were concerned about HOA requirements to keep their lawns green and weed free. (See Table 4 for HOA membership information). In some instances, HOA rules and regulations require sod and prevent participants from installing drought tolerant, native plants or allowing their turf to go dormant and turn brown. For instance, Colter's Run Subdivision's Declaration of Covenants, Conditions and Restrictions, Article 10, Section 4, page 18 states:

> h) Each lot owner shall have an underground sprinkler system. All grass shall be kept green, healthy, and mowed, at all times, during growth months.

One LWU participant explained how her irrigation practices are constrained by HOA regulations, "If I had my own yard and was able to abide by my own rules, I would not water nearly as frequently and would manually turn it on and off more." Another HWU interviewee shared what happened when several members in their HOA neighborhood wanted to transform turf into water wise plants: "We tried here [to remove turf and plant native grasses] … and it ended up the grasses had to be removed and the turf replaced."

Four HOA members expressed frustration at the codes and regulations which required they keep a green, weed-free, mono-culture turf lawn throughout the summer months:

> "It would be nice if HOAs would encourage yards and plants which are less water intensive."
>
> "We would really like to not irrigate as much as we are. We would much prefer to minimize watering to save those resources."
>
> "And they [HOA] want you to spread herbicide and fertilizer…anything to encourage that stupid grass."
>
> "The problem is that we are required to maintain our grass to a certain level by the HOA."

HOA MEMBERS	**LOW USERS**	**MEDIUM USERS**	**HIGH USERS**
Yes	3	5	5
No	6	4	4

Table 4: Participants residing in HOA neighborhoods

Results: NPF Evaluation of Interview Transcripts

Narratives must have either a victim, villain, hero or some combination of characters (Gray & Jones, 2016). Analysis of the semi-structured interview transcripts show that the COB was often portrayed as the villain. One participant was especially disturbed by his perspective of COB's leadership: "The city leaders are all about the money, not about preserving our resources, like water." In this situation, the COB is a redeemable villain who could easily become the hero once citizens feel leadership is responsibly controlling development and leading water conservation efforts by example.

Sometimes, the COB was cast as the hero for offering water conservation rebates and contacting water users if the city suspected a leak. The COB called two interviewees when they suspected a leak. One LWU explained, "I bought a brand new house and they put a lawn in. The city called and asked if I wanted them to come out and check for leaks. I thought that was really nice." Another LWU received a call when he turned on his irrigation system for the first time. He said, "They thought I had a leak because my use jumped. I told them thanks for calling. I wanted a couple of months to track it. But, I thought that was cool they called." Another interviewee expressed his gratitude for COB's outreach efforts. He said, "Just seems recently in the past few years the city is making an effort [with education and rebates]. I'm glad they are doing it."

Interviewees who perceived themselves to be avid water conservationists saw themselves as heroes, regardless of whether they were low, medium, or high water users. It became apparent during the interviews that HWUs are concerned about water conservation, even if their use did not reflect this. This is not surprising if we recall that

Attari's (2014) research showed that people underestimate their water use by a factor of two. One HWU implied that she is an educated, conscientious water user when she observed, "There's a lot of people who live here who don't understand conservation, climate or agriculture." Another HWU who felt she had the power to make a difference said, "Yes, every choice, every day! Small choices add up to big changes." Another HWU installed high efficiency toilets "because we have been worried for many years. We try to minimize our impact… I think we will be facing a crisis in the city." One HWU goes to extremes, "I can't pour water down the sink. I just won't do it. Even in the winter, I throw water in my yard rather than put it down the sink."

Victim status was most often ascribed to the agricultural sector. Participants are concerned that fertile agricultural ground is being paved over for subdivisions and stores. Three different interviewees expressed it this way:

> "I personally think it is frustrating how Bozeman is growing on top of prime ag[ricultural] land."
>
> "We need to recognize that farmers have a lot better value growing on the land than building houses on it."
>
> "When the city is making plans, they need to include agriculture as well. You need to educate people in Bozeman about agriculture."

After utilizing NPF to examine the transcripts of the semi-structured interviews, I collected eight brochures designed by the COB Water Conservation Division. The subject matter included indoor rebates, outdoor rebates, irrigation practices, landscaping strategies, and high efficiency fixtures.

Results: NPF Evaluation of COB Brochures

Examination of COB's brochures revealed texts which emphasized individual's ability to be a hero by practicing water conservation for the good of the community. I also found economic based brochures which outlined the financial rewards for water conservation practices. The brochures' dialogue avoided villainization of community members or businesses who do not engage in water smart activities. Instead, the brochures relayed positive information and encouraged residents to become local heroes by making water smart decisions. Examples from the brochures include:

> "Green up your scene without wasting water, save money, and get some cash back too."
>
> "Becoming a part of Bozeman's Water Smart Community is a great way to save water and money for yourself and for our community."
>
> "Lower your water bills without sacrificing your lawn and landscape."
>
> "Our water is crucial --- now, and for Bozeman's future. New infrastructure is more expensive than simply being smart about conserving what we have. We literally can't afford to waste our water."

Analysis on COB's brochures also reveals that the micro, homo narrans component (Jones et al., 2014) encouraged individuals to enhance their community's water quality and quantity with general informational messages. This strategy reinforces an individual's belief that they have the power to make a difference in their community.

> "Preserving the water quality as this water travels down the drainage and eventually out of your tap is paramount for a healthy forest and healthy community water supply. This starts with YOU!"
>
> "You could tackle our whole list of indoor upgrades, but even one little update can make a big splash."

> "Nearly 50 percent of household water goes into our yards. You can help save water right in your own lawn, landscape, and garden."
>
> "Choosing drought tolerant plants can cut your watering by fifty to seventy-five percent."
>
> "Upgrade to high efficiency indoor fixtures and appliances and we'll reward you with a cash rebate (not to mention lower bills) for helping conserve water."

Further analysis on COB's water conservation brochures reveals that the meso, agora narrans component speaks strongly to a sense of community. COB promotes a cohesive effort to conserve water for the entire community, humans and non-humans alike (Jones et al., 2014). The brochures present facts about Bozeman's water supply and then recruits allies in its effort to act responsibly towards fellow residents, the animals who share this environment, and for future community members:

> "We at the City are prepared to do what it takes to ensure that we have enough water as we welcome new Bozemanites to our semi-arid region."
>
> "Thank you in advance for contributing to Bozeman's drought resilience by planting water-sipping plants, watering your landscapes with care, taking advantage of rebates, and setting your landscapes up for success. With your help, we're ready to face the future."
>
> "The City of Bozeman has identified water conservation as the single largest source of water for Bozeman's future. Water conservation creates additional supplies. It's the cheapest, most expedient, and environmentally friendly way to thrive through drought and to ensure a reliable water supply for the future."
>
> "The City of Bozeman encourages all citizens to become active in protecting our water sources and to participate in the decisions affecting Bozeman's drinking water."
>
> "Healthy forests lead to clean water for our community. The City of Bozeman and the Gallatin National Forest are partners in our watershed."

> "Treat your Bozeman backyard with respect, so we can all enjoy it for many years into the future."
>
> "We share our community watershed with many critters who dwell within the national forest. Bears, mountain lions, elk, trout, fox, and wildflowers and flora are all partners with us in our watershed. This is their home. Treat it with care."

Results: Bozeman Residents Compared to Typical Water Users

Admittedly, my qualitative sample of single family households was small. Yet, I found that Bozeman water users participating in my study were qualitatively different than how water users are typically discussed (Silva et al., 2010; Warner et al., 2016). The majority of participants in my research group, regardless of whether they were high, medium, or low water users, were concerned about water conservation and eager to obtain information to learn how to conserve more water. Even HWUs seemed eager to learn and were not flippant about high water bills.

Although Warner et al. (2016) encouraged using different levels of complexity to relate to low, medium, or high water users, I found the capacity to understand complex issues consistent among the three groups. Bozeman may be an exceptional community which does not follow the norms. One participant expressed it this way*:* "I think a lot of Bozemanites value our setting. Most people are here because of the quality of life, so you make choices to keep that quality. Most people want to maintain the beauty of the area."

CHAPTER FIVE: CONCLUSION & DISCUSSION

Conclusion

Now, more than ever, communities must unite to face the challenges presented by changing weather patterns. Municipalities bear the responsibility of providing water to their citizens. Increasingly, utility districts are employing water conservation as a strategy to maximize water supplies. My research goal was to discover the barriers which hinder people's willingness to engage in water conservation. Additionally, I examined narratives used in water conservation brochures to analyze how narrative strategies are used to spur people to action.

The results of this research show that motivating people to engage in a desired behavior is complex and requires addressing numerous barriers. Barriers can include information deficits, convenience factors, financial challenges, peer pressure, institutional regulations, and lack of trust. All but one of the participants in my study, regardless of whether they were a HWU, MSU, or LWU were willing to conserve and do their part. However, they also expect the city to lead by example.

My research identified interviewees' expectations of their city officials and utilities. These citizens expect the city to be a leader in conservation efforts by utilizing smart irrigation practices, educating citizens, and governing growth responsibly. Participants showed a willingness to conserve for the greater good of the community, but wanted to know that they were not just saving water to support rampant growth.

Although social marketing and CBSM stress modifying the complexity of the messages for LWU, MWU, and HWU, I found that participants in all three groups were equally capable of understanding the complexity of water conservation. This may be due to Bozeman's high education rate. According to the website Town Charts, 98.7 percent of all residents have at least a high school education and 85.4 percent of residents have a college education (accessed 10/12/2018). Another aspect which could affect my results is the type of people who had the time, interest, and willingness to participate. Those who contacted me after receiving a letter from the COB were predisposed to caring about their community and water conservation.

One weakness of this study is that I did not test how participants would respond to the narratives used in the COB water conservation brochures. Future research should compare the current narratives used in the COB brochures and test them against other narratives that utilize additional insights from social marketing, CBSM, or NPF.

Another weakness is the limited sample size. While this study did capture responses from HWUs, MWUs, and LWUs, a larger qualitative study and/or a representative quantitative survey would provide more information.

Lastly, while this study did not find much difference between HWU, MWU, and LWU, future research and analysis should pay closer attention to potential differences among water user groups. As discussed in the literature review, identifying a target audience can increase the effectiveness of a communication campaign. However, based on the research and analysis presented in this thesis, it is not clear that there are major differences in terms of the barriers to water conservation among the HWUs, MWUs, and

LWUs interviewed for this research. It is possible that this is a result of sample bias, since interviewees contacted me to participate in the study. It is also possible that residents of the Bozeman are different than residents in other cities. The latter suggests that there may be opportunities for COB's water conservation department to target all water users, including HWU for water conservation efforts.

Discussion

After spending this summer working with the City of Bozeman's Water Conservation Division, I have gained extensive information about how city government is structured, how changes can and cannot be accomplished, and what is being done by the COB to promote water conservation. Most importantly, I have interacted with thousands of Bozeman citizens while conducting outreach events and performing sprinkler audits. I am impressed by how many people seem to love their community and respect the vulnerable water supply.

Discussion: Suggestions for Municipalities

My literature review and qualitative research prompted several options municipalities could use to overcome the common barriers discussed in this paper. For example:

(1) Design water bills which are relatable and useful for water conservation. By using gallons for units instead of hundred cubic feet (HCF), customers can visualize how much a gallon of water is and set achievable conservation goals.

(2) Conduct sprinkler assessments of public properties to eliminate overwatering

and ensure efficient irrigation practices are being implemented. When citizens feel the city is following the practices they are recommending for customers, it elevates the level of trust customers have with their utility departments.

(3) Institute free classes which address the gaps in knowledge about in-ground sprinkler systems. Classes could include information about precipitation rates of sprinkler heads; explain why plants with similar water needs should be grouped together; demonstrate how to program the five most popular controllers; and teach customers how to create an efficient watering schedule by explaining what parameters they should consider.

(4) Encourage city officials to adopt a policy that voids any HOA contracts which prohibit water conservation efforts such as xeriscape, installing water wise plants, or minimizing irrigation in the heat of summer; make staff available to advise HOAs.

(5) Plant water wise gardens in public places so people can envision incorporating them into their yards.

(6) Install a visual monitor or water index, similar to the one used for fire conditions, which shows how much water is in the reservoir and how much water has been conserved.

(7) Disperse welcome packets to new community members that includes information about: where Bozeman's water supply comes from; how climate change may affect that supply; Bozeman's semi-arid climate; the water

conservation rebates for indoor fixtures and outdoor irrigation supplies; and the free sprinkler assessments offered through the Water Conservation Division.

(8) Coordinate a campaign which addresses the lack of trust citizens have with the COB's growth policy and how it affects the water supply.

With the insights I have acquired over the past several months, I would revise my interview strategy to concentrate more heavily on outdoor water use and include detailed questions about participants' knowledge of their irrigation systems. Another ingredient that would add weight to the social marketing, CBSM, and NPF strategies would be to present a series of water conservation messages and ask participants' opinions about the effectiveness of each.

My research and internship in water conservation has convinced me that this LWU's sentiment holds wisdom for a better world:

> "I subscribe to the Native American idea that any decision we make impacts seven generations. It's really irresponsible to say, 'Heck, why do I care, I'm not going to be around.' Totally irresponsible. *We* are here. *We* need to conserve water so others coming behind us have it."

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APPENDICES

APPENDIX A

LETTER TO POTENTIAL PARTICIPANTS

APPENDIX A: LETTER TO POTENTIAL PARTICIPANTS

The following letter was sent out from the City of Bozeman to the 300 randomly selected water users :

Dear _____,

The City of Bozeman is partnering with Montana State University on a project concerning water use, water conservation, and drought. We need your perspectives on these topics! Municipalities face the challenge of adeptly communicating with their users/consumers/citizens about vital issues, such as water conservation and drought. Research suggests that when people's sentiments and life experiences are considered, constructive communication emerges. Your participation will aid in research focused on developing educational information for water conservation issues. ***The goal of this project is to discover the variety of viewpoints held by water-users and use those insights to create effective communication strategies.***

You have been randomly selected to participate in research which seeks your opinions on these topics. Your participation in this study is voluntary. Any information you provide will be kept confidential. To help with this research, please call Valerie Sigler at xxx-xxx-xxxx or email her at xxxxxxxxx@gmail.com. Please provide her with the participant ID number listed at the top of this letter. The interview will be scheduled at your convenience and last approximately 45 minutes. During this time, Valerie will ask you questions about your perspectives on drought, water use habits, and water conservation.*

Thank you for your time and consideration in this matter.

APPENDIX B

SEMI-STRUCTURED INTERVIEW QUESTIONS

APPENDIX B: SEMI-STRUCTURED INTERVIEW QUESTIONS

DEMOGRAPHICS:	1. How many people live in your home? 2. Is your home located in a subdivision with a Homeowner's Association?
OUTDOOR WATER USE:	1. How do you water your lawn? 2. What type of technology does your irrigation system have? 3. How do you think an irrigation system affects your outdoor water use? 4. If you use a landscape contractor, who makes the decisions about watering schedules and herbicide use? 5. What type of plants or turf do you have in your yard? 6. If you are a member of an HOA, how do you feel the HOA rules affect your water use? 7. Which of your indoor activities do you think uses the most water in your home? outdoor? Between the two, which do you feel uses the most water, indoor or outdoor use?
DROUGHT:	1. How prone do you think Bozeman is to droughts or dry years? 2. What, if any, are your experiences with water restrictions related to a drought situation? 3. If Bozeman entered an extremely dry period, what voluntary measures would you take to reduce water use? a) Have you ever lived in an area where the city either requested voluntary restrictions or implemented mandatory restrictions on water use? b) Are you in favor of a city water plan that includes conservation measures even when the town is not experiencing drought? Such as designated watering days? 4. During times of drought, how would the policy of a "the more water you use, the more you pay" impact your water use? 5. What do you feel are the most effective water conservation strategies individuals can employ? 6. How likely are you to ….? From a scale of 1 – 5 where 5 is very likely and 1 is unlikely a) Reduce the size of turf being irrigated b) Replace thirsty plants or turf with drought tolerant plants or landscaped beds c) Install irrigation timers d) Install water sensor devices so irrigation won't turn on until needed e) support and obey water restrictions. f) Seek out information about water supply issues from websites, the news, g) Vote to support water conservation programs

SOCIAL NORMS:	1. How do the people closest to you (family and best friends) feel about protecting water resources? 2. What conversations do you have with your neighbors about water conservation?
DISTRIBUTING DROUGHT INFORMATION:	1. If water supply conditions change, what medium would be most effective for you personally to receive information about drought conditions? What is your preferred channel of communication about changing drought stages? · water bill insert · mail · email · website · social media · local broadcast media · local print media · town meetings

APPENDIX C

CODEBOOK USED FOR NVIVO, VERSION 11 ANALYSIS

APPENDIX C: CODEBOOK USED FOR NVIVO, VERSION 11 ANALYSIS

BARRIERS	· Finances · *HOA* · *Information (lack of)* · *Other Barriers* · *Social Pressures*
CITY INFORMATION	• **City Rebate Use** · yes · no · did not know about them · plan on using them in the future
	• **Growth of Bozeman** · concerned about growth ▪ other growth issues ▪ water quality/quantity ▪ sewage capacity ▪ traffic · unconcerned
	· **Water Management Plans** · Prefer pro-active plans · Prefer reactive plans
DEMOGRAPHICS	• **Home in a Home Owner's Association** · no · yes ▪ HOA dictates lawn practices · other concerns · lawn green in summer · restrict native plants · restrict xeriscape · sprinkler system · turf type ▪ HOA does not dictate lawn practices
	• **How many people live in your home** · 1 · 2 · 2-4 · 5+
	• **Lived in other areas that are arid**

	· **Time in Bozeman**
	  · less than 5 years
	  · more than 5 years

	· **Water User Categories:**
	  · Low water users
	  · Medium water users
	  · High water users

DROUGHT KNOWLEDGE	· **If Bozeman was in drought what would you do**
	  · ignore regulations
	  · unaware of restrictions
	  · voluntarily reduce use before stages implemented
	  · when implemented will obey restrictions

	· **Have you lived through a drought**
	  · no
	  · yes

	· **How do you feel about the more you use/the more you pay policy during drought**
	  · in favor
	  · not in favor
	  · unsure

	· **Do you think Bozeman is prone to drought or dry years**
	  · no
	  · yes

INFORMATION DISTRIBUTION	· email
	  · local broadcast media
	  · mail
	  · print media
	  · radio
	  · social media
	  · town meetings
	  · water bill insert
	  · website
	  ▪ unaware of website
	  ▪ occasionally
	  · only when drought threatens

NOTABLE QUOTES	· This is just a compilation of notable quotes to possibly use in the Results section
NPF: NARRATIVE	· Hero · Victim · Villain

POLICY FRAMEWORK	
PERSONAL RESPONSIBILITY	• **CURRENT ACTIONS AND ATTITUDES--HOW LIKELY ARE YOU TO:** · install efficient fixtures / efficient appliances ▪ likely ▪ not likely ▪ maybe ▪ already done · install irrigation timers ▪ likely ▪ not likely ▪ maybe ▪ already done · install moisture sensor devices ▪ likely ▪ not likely ▪ maybe ▪ already done · obey water restrictions ▪ likely ▪ not likely ▪ maybe ▪ already done · Reduce size of turf ▪ likely ▪ not likely ▪ maybe ▪ already done · replace plants/turf with native or drought tolerant plants ▪ likely ▪ not likely ▪ maybe ▪ already done · seek out information about water supply issues from website, news, meetings ▪ likely ▪ not likely ▪ maybe ▪ already done · support water conservation programs ▪ likely

	▪ not likely ▪ maybe ▪ already done
	• **DO YOU FEEL THAT ONE PERSON HAS THE POWER TO MAKE A DIFFERENCE** · no · yes
	• **WATER CONSERVATION STRATEGIES GENERATED BY THE INTERVIEWEES** · brush teeth – turn off water · change outdoor watering practices · dishes -- full loads of · drought resistant plants · efficient fixtures and appliances · laundry --- full loads of · less turf · raise price of water · shorter showers · wash car less
SOCIAL NORMS	· discuss water conservation with your neighbors ▪ no ▪ yes · feelings of those closest to you about protecting water resources ▪ differently – not interested in protection ▪ similar – should be protected ▪ unknown ▪ variety
WATER USE PRACTICES	• **Most Water Use (Interviewees generated answers; did not select from a list)** · What indoor activity do you think uses the most water ▪ dishwasher ▪ don't know ▪ how water use ▪ laundry ▪ running sink to brush teeth or wash dishes ▪ shower ▪ toilet · What outdoor activity do you think uses the most water ▪ lawn watering ▪ car washing ▪ trees, gardens, flowers only
	• **Outdoor Water Use**

	· Do you water your lawn ▪ no ▪ rarely ▪ yes • drip irrigation • hose or sprinkler • an inground sprinkler system ○ both tech used ○ moisture sensor used ○ no tech used ○ rain sensor ○ timer used • well for irrigation · Do you think an inground sprinkler system is more efficient than hand or hose watering ▪ don't know ▪ no ▪ yes · Do you use a landscape contractor ▪ no ▪ yes • chemical schedule • watering schedule · What type of plants do you have in your yard ▪ drought resistant/native plants ▪ drought resistant turf grass ▪ flowers ▪ garden ▪ groundcover ▪ other ▪ plants ▪ rocks ▪ trees ▪ turf grass ▪ unknown