

Tracking Drought Recovery and Resilience in McCook, NE

A Community Capitals
Framework Approach

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Part I: Executive Summary

Natural disasters affect scores of towns across the Great Plains each year. Media accounts describe the devastating impacts of these disasters and the initial attempts toward recovery. These accounts of disaster recovery regularly emphasize the importance of volunteer help from neighboring communities, services and materials provided by local governments and faith-based organizations, and financial assistance from federal agencies.

The Community Capitals for Disaster Recovery and Resilience project was funded by the North Central Regional Center for Rural Development (NCRCRD). The project brought together a group of researchers taking a scientific approach to assess the internal and external resources available to rural communities to help them successfully respond to and recover from natural disasters.

This multidisciplinary team, comprising faculty research associates, extension specialists, student researchers, and nonprofit facilitators from North Dakota State University, the University of Nebraska-Lincoln, South Dakota State University, Kansas State University, Oklahoma State University, and the Heartland Center for Leadership Development, conducted a series of case studies to analyze and document how three communities responded to and recovered from natural disasters. The three rural communities are Breckenridge, MM, which experienced devastating flooding in 1997; McCook, NE, affected by the widespread severe to extreme drought of 2012; and Pilger, NE, which experienced an EF-4 tornado in 2014.

The team conducted in-depth and focus-group interviews, photographed the community, and analyzed community documents, government data, and reports to discover community assets in place and how leaders have used them to respond to and recover from the shocks their communities faced. The study uses the Community Capitals Framework (CCF), an analytical tool used in disaster recovery, to inventory each community's assets and the impacts natural disasters had on those communities (Figure 1). The CCF was used to advance understanding of how communities mitigate, respond to, and recover from the impacts of a disaster.

In McCook, the team worked with a stakeholder advisory team to identify key community members important in making decisions related to the negative impacts of drought. The advisory team process worked to identify key leaders in the town, and what their contribution to the project was (e.g. time to discuss the layout of the town, the various organizations, policies, and procedures that make up the governance structure) The team indicated that those impacts can include municipal water use restrictions, agriculture and livestock sales and losses, the risk of water main breaks, heat and respiratory illnesses in vulnerable populations, and wildfires.

In May 2016, the research team traveled to McCook and spent two days becoming familiar with the community, gathering information, and conducting interviews. Based on recommendations from the advisory team, focus group interviews were used to gain perspectives from key community members on drought management as it relates to municipal utilities, city governance, natural resource management, and public health. To collect more detailed information, in-depth interviews were conducted with the mayor, YMCA director, community

and economic development personnel, fire chief, emergency management, and 4-H extension representatives. Follow-up telephone interviews continued through the summer.

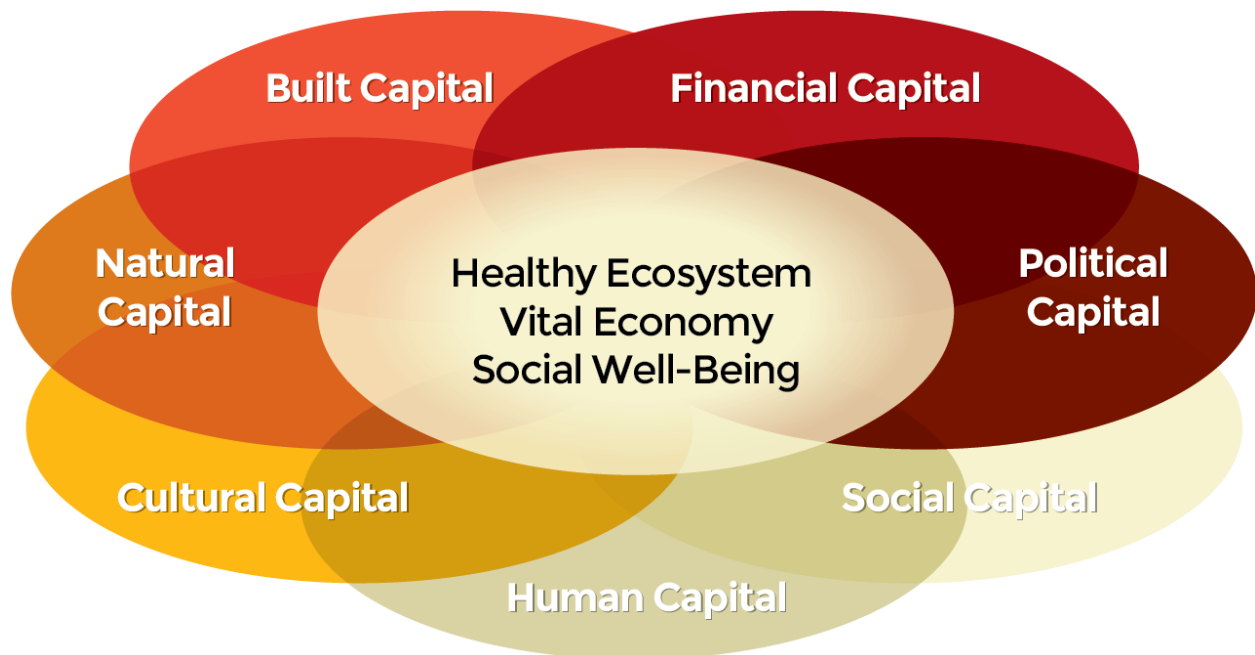


Figure 1: The Community Capital Framework Model is a lens that researchers and communities can use to understand the full complexity of what helps a community stay healthy and resilient.
Source: Flora, Flora, and Gasteyer, 2015.

Case study results have been framed according to type of community asset—natural, built, financial, social, human, political, or cultural—and how these assets contribute to McCook’s resilience and vulnerability, how they were impacted during the 2012-2014 drought, and how they were used in response to and recovery from drought.

From a CCF perspective, McCook is rich in natural capital. It lies within the Republican River basin, which provides fertile soils, clean air, available surface and groundwater supplies, and abundant wildlife. This natural capital lends financial capital to agricultural producers, businesses, and tourism outlets and increases the community’s resilience to natural hazards. Extended droughts challenge that resilience by reducing lake and pond levels, which can then have rippling effects such as reducing surface water supplies, increasing toxic blue algae, and decreasing fish and wildlife populations. To respond and recover from drought, McCook drew from its human capital—Nebraska Game and Parks and Emergency management personnel—to monitor drought closely, provide educational and pond management materials, and implement tailored habitat and wildlife protection to improve recovery times.

In terms of built capital, the city has up-to-date water and utility infrastructure that enables it to provide a safe and consistent supply of water to its residents. The McCook Public Water System receives its water from numerous wells in the Republican River Valley. The

recent drought challenged the city's ability to meet user demands for water. The city was able to respond to the drought and successfully maintain a safe water supply by using a variety of capitals such as a mitigation-based "water conservation, drought and an emergency plan" that identifies triggers related to drought stages (evidence of political capital), a strong sense of community and voluntary water restrictions (social capital), and effective leaders and highly trained utilities personnel (human capital).

The project team shared their findings with community officials and leaders to incorporate their feedback before releasing the final report to the general public. In addition to research findings, this report will include methods and materials to assist officials and leaders in creating an inventory of assets for use in building resilience for other natural hazards such as floods and tornadoes, as well as community development efforts. A public webinar, arranged by NCRCD, was used to disseminate findings and allow communities to learn from each other's experiences.



Photo 1: NDMC Research Team (Nicole Wall, Deborah Bathke, Bimal Paul, Duane Gill, and Tony Mucia) listening to various response stakeholders discussing the impacts on health during times of drought. Not pictured: Theresa Jedd.

Photo by Jake Petr (NDMC), at the Southwest Nebraska Public Health Department.



Photo 2: A field visit for the Drought & Pheasants Recovery Tour to examine impacts of dryness on grassland wildlife habitat.

Photo provided by T.J. Walker, UNL Extension (Trenton, Nebraska).

Part II: Pre-event Community Description of McCook

McCook, NE, is a community with abundant community capitals. Located in Red Willow County (2010 population 11,055) in the southwestern part of the state, McCook is a service hub for the region, including counties in northwest Kansas. It was established in 1882 when the Lincoln Land Company plotted the town's boundaries (Hawkins, n.d.). The city was named for Alexander McDowell McCook, who was a brigadier general in the Union Army during the American Civil War (City of McCook n.d.). A land office opened in 1883, allowing settlers to take land ownership rights under the Homesteading Act (Hawkins, n.d.). With a diverse set of economic activities, and an enthusiastic and vibrant public, it is a thriving community on the prairie landscape. This section presents an analysis of the elements that comprise each of the capitals for the city of McCook.

Natural capital refers to the surrounding ecosystem and natural resources, including soil, topography, water, plants, animals, biodiversity, and climate. McCook is situated in the High Plains region of the United States, with topography, soils, and climate generally suitable for agricultural activities. Red Willow County's natural capital is further characterized by rivers, streams, lakes, and reservoirs, as well as aquifers and groundwater resources. The Republican River, Medicine Creek, Swanson Reservoir, and Red Willow Lake are important water sources. The region provides habitat for abundant wildlife such as pheasants, waterfowl, turkey, and deer. The region is known as the "great lakes of southwest Nebraska" and is home to popular fishing, hunting, and boating destinations for surrounding communities. The natural capital of Red Willow County supports agricultural activities. Approximately 95 percent of the county's 458,240 acres is used for agricultural crop and livestock production. This heavily influences McCook's other community capitals, especially financial capital. Recreational uses of natural capital contribute to the local economy to a lesser degree.

The natural capital available to McCook contributes to community resilience through its highly productive agriculture. At the same time, however, the ecosystem reveals vulnerabilities from a variety of natural hazards. The region is prone to low precipitation, water shortages, drought, and heat waves. Risk of wildfires increases during these periods. Other natural hazards in the region include severe thunderstorms, hail, tornadoes, ice storms, snowstorms, blizzards, and floods. These natural hazards, particularly drought, put agricultural production at risk and represent a form of vulnerability.

Built capital refers to the human-constructed infrastructure, including homes, buildings, transportation systems, telecommunications, and utility systems. When considering resilience, a community's "lifelines" are important. Lifelines are infrastructure systems essential for a community to operate. Four basic lifelines are energy and electricity; water; transportation; and telecommunications. These infrastructure systems are interconnected and damage to one system can affect others and have a cascading effect. In a drought context, water systems can become stressed and potentially fail. Heat waves that often accompany drought can strain energy systems as the demand for electricity to cool buildings and residences increases. Other lifelines include systems built to provide law enforcement, fire protection, medical services, and other social services.



Photo 3: A view of the McCook water tower.
Photo provided by Nicole Wall, NDMC, May 2016.

McCook has relatively strong built capital. The most prominent feature is the newly constructed Municipal Center, which houses city offices, the police department, fire department, city council chambers, and community meeting rooms. The building was in the planning stages prior to the 2012 drought, when these entities were housed in older, less efficient buildings.

Basic lifelines in McCook are provided through a variety of infrastructures. The city utilities department maintains the water delivery infrastructure. A key feature of the system is the transmission of water from the drinking water plant, located roughly 1.5 miles south of town, to the main distribution system. Prior to the 2012 drought, a single 24-inch line was responsible for the water delivery, but plans were underway to upgrade the system.

McCook is served by U.S. Highways 6, 34, and 83; the BNSF railroad; Amtrak; and the Ben Nelson Regional Airport. The county has a modern farm-to-market road system and easy access to public recreation areas. The community has telephone, internet, and television services through a variety of local, regional, and national providers. McCook is home to six radio stations and the *McCook Gazette* newspaper.

McCook serves as a regional medical hub. Community Hospital is a 25-bed private room facility with a surgery wing, pharmacy, and outpatient area that was completed in 2012. The community is served by a medical clinic, a general surgery clinic, and an urgent care center. Other medical services are provided by dentists, orthodontists, vision specialists, physical therapists, pharmacies, and other specialists. The built medical infrastructure includes a nursing home and three assisted living facilities.

The McCook Municipal Center was built in 2012; it houses both the fire and police Departments. The fire department consists of a fire chief, seven full-time firefighters, and twenty-seven volunteer firefighter/EMS providers. Fire department equipment includes three ambulances, three fire engines, other response vehicles, hazmat suits, and other response gear. The police department is equipped with seven marked and three unmarked cruisers equipped with radio, scanner, and radar.

McCook has a self-sustaining school system comprising one private and two public elementary schools, a junior high school, a senior high school, and a community college. In addition, McCook has a learning center and library with 35,000 resources and an average circulation of 100,000. The library was renovated in 2013.

According to the Multi-Jurisdictional Hazard Mitigation Plan (2015), the housing stock in McCook is insufficient for the population. The housing stock is relatively old, with more than half of the homes constructed prior to 1960. These homes are more vulnerable to severe thunderstorms, tornadoes, and high winds. The city has two mobile home parks that represent approximately 5 percent of the housing stock, presenting another category of housing vulnerable to severe weather.

Vulnerabilities to built infrastructure from drought events primarily focus on water and wastewater infrastructure and energy systems. Continued maintenance and upgrading of these infrastructures can mitigate some of the vulnerability. However, the aging housing stock in McCook may present problems for individual homeowners. More broadly, built infrastructure, particularly lifelines, require specialized human capital to operate and maintain them.

Financial capital refers to wealth, financial savings, income, investments, and available credit to support businesses, entrepreneurship, and other forms of community development. Financial capital is usually measured in currency such as dollars, but employment and poverty rates also provide insights. Financial capital is closely tied to the other forms of capital, particularly natural and built capital.

Agriculture is the economic base of McCook and the surrounding region. Agricultural production and ag-related businesses and industries make up the core of the community's financial capital. Valmont Industries and Parker Hannifin are major industries that provide more than 600 jobs. As a regional hub, McCook is home to multiple businesses that support agriculture, ranging from grain elevators, implement dealerships, mechanics, and fertilizer suppliers to agriculture consultants, veterinarians, real estate agents, and financial advisors.

McCook is home to businesses and employers outside of agriculture such as the Community Hospital, the Nebraska Department of Corrections Work Ethic Camp, McCook Community College, and public and private schools. McCook is also a retail hub for the region and is home to many local and national chain stores.

Interviews with economic development and banking leaders reveal a solid level of financial capital in McCook. Three large banks in McCook are locally owned and they have well-established relationships with farmers. These banks have the financial capacity to provide credit and restructure debt, as well as the understanding of the risks of drought, hail, and other natural hazards. Conservative financial practices have created fairly stable economic conditions in the area.

U.S. Census data for 2009-2013 reveals McCook's per capita money income was \$22,979 and median family income was \$41,055, compared to \$26,899 and \$51,672 for the entire state. During this time, 14.1 percent of the population was below the poverty level in McCook, compared to 12.8 percent for the state.

A lack of economic diversity is a source of vulnerability for McCook's financial capital. An extended period of drought would have serious adverse impacts on the local and regional agricultural-based economy. Ag-related businesses and services would experience loss of revenues and retail sales would decline. The nonagricultural economic sector is not an adequate buffer to long-term declines in agriculture.

Social capital refers to the value of social interactions, relationships, and networks among people, groups, and organizations and the ability to accomplish mutually beneficial goals and objectives. Social capital bonds similar people together and is a bridge between diverse people. Social capital also links a community with other communities and outside organizations. Social capital is embedded into a community's structure through established networks, roles, rules, procedures, and precedents. Social capital is embedded in individuals through commonly held beliefs, attitudes, and values that encourage people to work together.

Observations and conversations in focus groups and interviews reveal a strong sense of community attachment and pride in McCook. This is supported by data indicating a relatively high number of nonprofit and 501C organizations in McCook, which ranks 22nd among all Nebraska cities in asset amount (\$93 million) and reported income (\$54 million). Almost one-half are charitable organizations and there are religious, educational, fraternal, VFW, and social welfare organizations as well.

Other indicators further reveal strong social capital. Almost 70 percent of all housing units in McCook are owner-occupied, compared to 64 percent nationwide. The community has relatively low rates of violent crime and property crime. The majority of McCook's population is white (96 percent), which suggests few marginalized groups based on race and ethnicity, but may result in greater marginalization.

Drought conditions can create psychosocial stress among individuals, families, and other groups. Drought affects patterns of interaction, routines and rituals, norms of reciprocity, and

trust that form the core of social capital. Sometimes there are positive impacts, but often the impacts are adverse. Stress and changes in interactions have potential to strain social capital as people withdraw or express their anger, frustration, depression, or other feelings in threatening ways.

Human capital refers to the individual and collective knowledge, skills, intelligence, training, health, physical ability, and wisdom of a population. This form of wealth includes leadership and the ability to access knowledge and information from beyond the community. Human capital is fundamental to community resilience in that economic development and capacity building require a skilled, trained, and healthy workforce.

McCook has a solid foundation of human capital. It maintains a relatively stable, but slightly declining, population with 7,698 in the 2010 Census—down 3.7 percent from 2000. Among residents 25 years and older, 93 percent have a high school diploma or higher and 18 percent have a bachelor's degree or higher. Life expectancy in Red Willow County as measured in 2013-14 is relatively long—76.3 years for males and 81.3 years for females, which ranks 45th and 57th, respectively, among all 93 Nebraska counties (<http://www.worldlifeexpectancy.com/usa/nebraska-life-expectancy>).

There are a variety of professionals in financial, medical, legal, real estate, business, educational, social service, and emergency management sectors of McCook. For example, McCook Community Hospital has a medical staff consisting of fifty-two medical professionals including primary, family practice, physicians' assistants, and surgeons. McCook's police department has a chief, four patrol sergeants, two detectives, and eight officers. The fire department has a fire chief, seven professional firefighters, an administrative assistant, and twenty-seven people who are EMS providers and volunteers. Human capital is strong in terms of effective leadership in local government—elected and appointed.

In terms of resilience to drought, McCook and Red Willow County have residents with expertise in agriculture and weather. There are agricultural extension agents associated the University of Nebraska Lincoln and there are agents employed by state agencies such as the Nebraska Department of Natural Resources and Nebraska Wildlife Services. Moreover, there is a wealth of local knowledge among locals who have experienced previous droughts, water shortages, and other natural hazards.

Although McCook's human capital contributes to community resilience, there are vulnerabilities within the population. Vulnerable categories of people include those under 18 years (23 percent), over 65 years (19.5 percent), and living in poverty (11.8 percent). Vulnerabilities within the population under age 65 include persons with a disability (8.6 percent), the uninsured (13.7 percent), and those who are linguistically isolated (3.4 percent). The community's human capital is also vulnerable to out-migration of youth and general population decline.

Political capital refers to the ability and power to influence resource acquisition and distribution, and the ability to engage external entities in efforts to achieve local goals. Political capital is used to develop, establish, and enforce rules, regulations, and policies. Effective

political capital fosters resilience through networking with local, state, and federal governments and agencies that can provide assistance in disaster preparedness, response, recovery, and mitigation. Community resilience is enhanced when political capital involves the public in pre- and post-disaster planning and by ensuring that traditionally underrepresented groups have a voice.

McCook is located in Nebraska's Third Congressional District. The city has a council-manager form of government in which five council members are elected at large and one of the five is elected by the council to serve as mayor and another to serve as vice president. There are eight offices and departments (administration, building and zoning, fire, library, police, public works, senior center, and utilities) and fourteen appointed advisory boards and commissions. The community is linked with various government agencies, including the Nebraska Department of Natural Resources, the Middle Republican Natural Resource District, USDA-FSA, and various University of Nebraska-Lincoln Extension services.

McCook serves as the county seat for Red Willow County (Figure 2), and the municipal and county governments are interlinked. The Red Willow County Zoning Resolution approved in 2012 contains sections that address water and wastewater issues (http://www.co.red-willow.ne.us/pdfs/planning_zoning/zoning_regulations.pdf). The community also has inter-agency agreements that facilitate cooperation. For example, the McCook Fire Department has agreements with rural volunteer fire departments and the county sheriff's office has agreements with the McCook Police Department. McCook is also part of governmental agreements regarding water sharing between Nebraska and Kansas.

McCook is part of the Quad Counties Multi-Jurisdictional Hazard Mitigation Plan (<http://jeo.com/wp-content/uploads/2016/02/McCook-min.pdf>). As noted in this plan, McCook has basic organizations, plans, and other political capital assets in place to deal with the multiple natural hazards that occur in the region.

The city's official policy pertaining to drought is Code of Ordinances §52.60-52.66. It includes triggers and specific response measures that clarify the role of the city manager during a drought. This plan is a good example of what a standing policy can accomplish. After the severe 2002 drought, city planners incorporated lessons in monitoring to take a proactive, rather than crisis-driven, approach. The plan pays attention to early indicators of drought before its impacts are felt. In 2004, the city council passed an ordinance establishing a simple but effective plan that divides water consumption into three classes: outdoor watering (public or private), commercial and agricultural production, and domestic use. A series of actions is put into place when particular indicators are noted; these include high consumption, leaks in infrastructure, power outage, wildfire, and factors beyond a meteorological drought declaration. These "triggers" will prompt the utilities department and water users to clear conservation measures in three stages. The plan is enforced by the city manager and utilities director. In a small city like McCook, it is an effective way to ensure compliance.

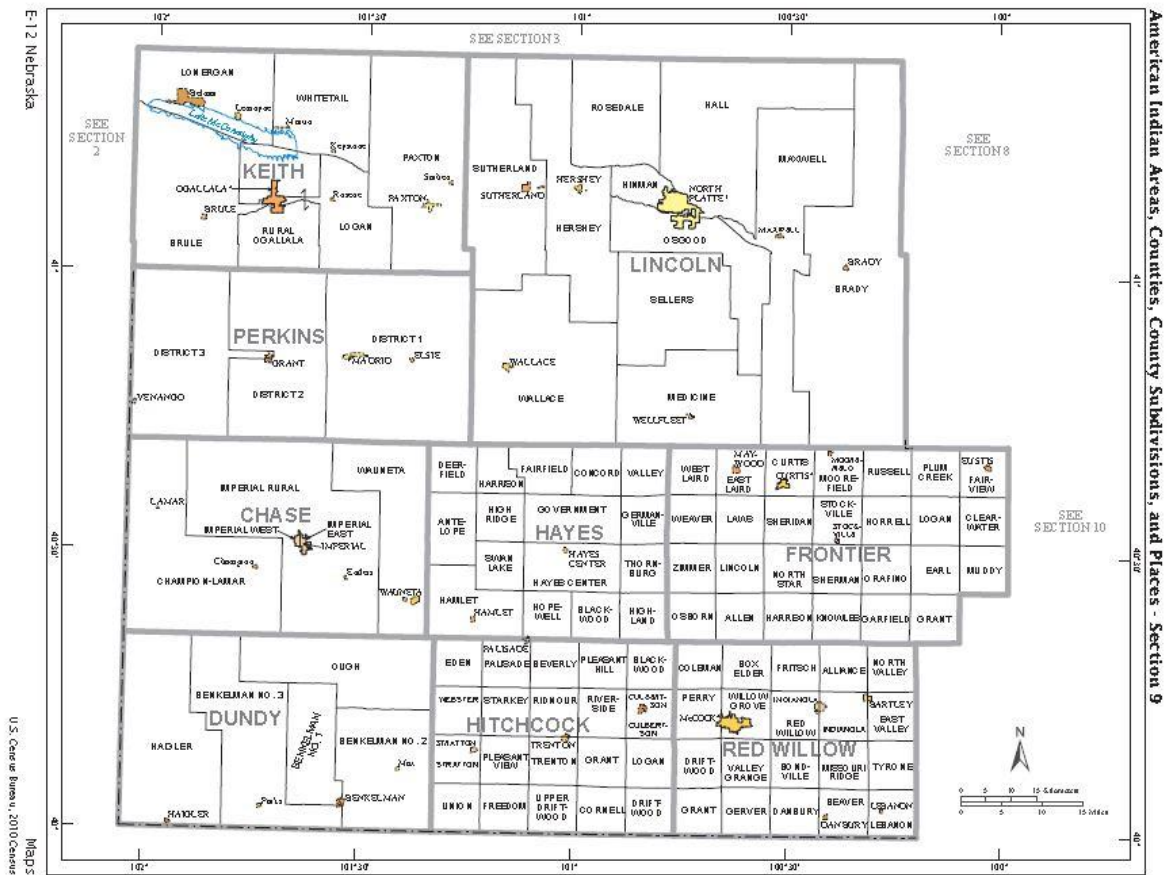


Figure 2. Red Willow County is part of U.S. Census Section 9 for the state of Nebraska.
 Source: U.S. Census 2010 Census of Population and Housing, 2012,
www.census.gov/prod/cen2010/cph-2-29.pdf.

The overall purpose of the policy is to “adopt a plan for the declaration of a water supply watch, warning, or emergency and the implementation of voluntary and mandatory water conservation measures throughout the city in the event such a watch, warning, or emergency is declared.” The class use categories and restricted uses are listed in Table 1.

Table 1. Class use definitions and included purposes.

§ 52.62: Classes of Water Use	Included Purpose
Class 1:	Outdoor watering, parks, lawns, golf courses, swimming pools, recreational areas
Class 2:	Commercial or industrial purposes, including agricultural
Class 3:	Domestic use, for applications necessary to maintain human and domestic pet life

Source: McCook Code of Ordinances 2004.

Political capital in McCook is vulnerable to drought through its interconnections with other community capitals. A decline in agricultural production would diminish financial capital and result in lost tax revenues during an economic downturn. Lost tax revenues could pose restrictions on built capital by limiting or delaying new projects and diminishing the quality of maintenance on existing infrastructure. Government officials must strive to maintain social and cultural capital during drought and other natural hazard events.

Cultural capital refers to assets community members use to understand and make sense of their world. This “worldview” provides a sense of purpose that guides individual and group behavior. Cultural assets include language, heritage, ethnicities, traditions, religion, symbols, and local knowledge (Flora and Flora 2015). Cultural capital influences a community’s capacity to draw on its collective experiences and shared values, which enhances resilience.

McCook’s cultural capital is rooted in its recent settlement history, which began in 1882 with an agreement to form a railroad center halfway between Omaha, Nebraska, and Denver, Colorado. As a newly formed center of commerce, McCook attracted settlers to the region, many of German origins. A shared cultural background and set of customs and language provided the early context for McCook’s cultural capital. As one long-time resident stated, the culture today is one of “Christianity meets Capitalism.” The combination of open markets and freedom from religious restrictions was an attractive feature for the original settlers. As the German settlers were exposed to democracy and capitalism, they laid the foundation for the outlook today.

Religion is a major pillar of cultural capital. McCook has more than twenty churches, most representing Protestant Christianity and two representing Catholicism. Likewise, political parties are an important source of cultural capital. More residents are affiliated with the Republican Party than the Democratic Party, but many are willing to cross party lines for the perceived good of the community.

Contemporary cultural capital is characterized by a “can do” spirit, civic pride, and a variety of civic events and opportunities. Civic pride is manifested in public spaces and buildings around town. For example, several historic buildings in McCook are designated and cared for under the Nebraska State Historical Preservation Office. The community hosts several holiday celebrations such as Memorial Day, the 4th of July, Veterans Day, and Christmas. The community also hosts the Buffalo Commons Storytelling Festival and other special events. These activities serve to reinforce the social and cultural bonds and cohesion within the community.

Cultural capital is also derived from relations to natural capital, particularly regarding farming and ranching. These occupations and lifestyles tend to involve risk-taking and high levels of individualism. These cultural capital traits are generally positive, but can have adverse impacts when people become reluctant to ask for assistance. This creates a type of vulnerability during extreme events like drought.

McCook’s assets are synthesized by mapping them to the CCF framework (Figure 3). This analysis reveals sources of resilience and vulnerabilities within the community, particularly as they pertain to drought.

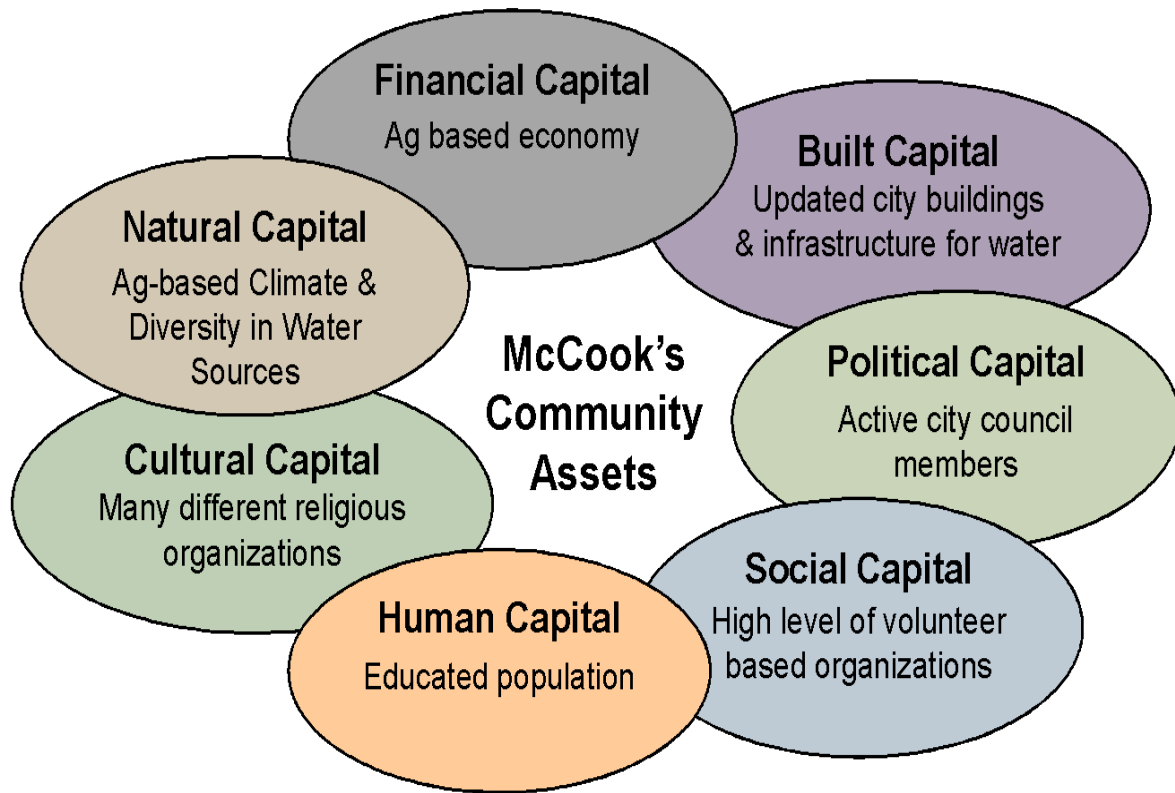


Figure 3. McCook's assets mapped onto the CCF framework.

In the remaining sections we summarize McCook's drought history and exposure during the 2012-2013 drought (Section 3), discuss the impact that this drought had on McCook's capitals and the role that they played in the response to and recovery from the drought (Section 4), and conclude by summarizing the findings (Section 5).

Part III: 2012 Drought in McCook, NE

The climate of McCook is characterized by marked seasonal variations in temperature and precipitation due to its latitude and interior continental location. In the summer months, average monthly high temperatures are in the mid- to upper 80s (Figure 4); in winter, average monthly low temperatures are in the teens. Over the 50-year period of record (1967-2016), extreme temperatures have varied from a record high of 115 degrees Fahrenheit in June 2012 to record lows of -23 degrees Fahrenheit in both November and December 1983. Precipitation is distributed throughout the year, with the highest monthly totals occurring in the spring and summer months (Figure 4) because of convective rainfall produced by thunderstorms. Over the 50-year period of record available for the McCook area, the average annual accumulation is 20.44 inches. However, annual totals vary widely from year to year. Annual totals varied from as little as 9.36 inches in 2012 at the McCook Municipal Airport to as much as 32.3 inches in 1993 at the nearby Red Willow Dam (McCook Municipal Airport precipitation data was missing in the early to mid-1990s).

Droughts are a part of McCook's climate. Simply defined, drought is an extended period of deficient rainfall that results in water shortages causing adverse effects to a sector, group, or the environment (Wilhite & Glantz, 1985). While drought is often viewed as a rare, random phenomenon, it is actually a normal, recurrent feature of climate that occurs in virtually all climatic zones. Drought is "relative" and is defined in terms of what is "normal" or expected for a particular region or time of year. Thus, drought means different things to different people. For example, a drought year in southwest Nebraska may still be wetter than the wettest year on record for locations in the Desert Southwest.

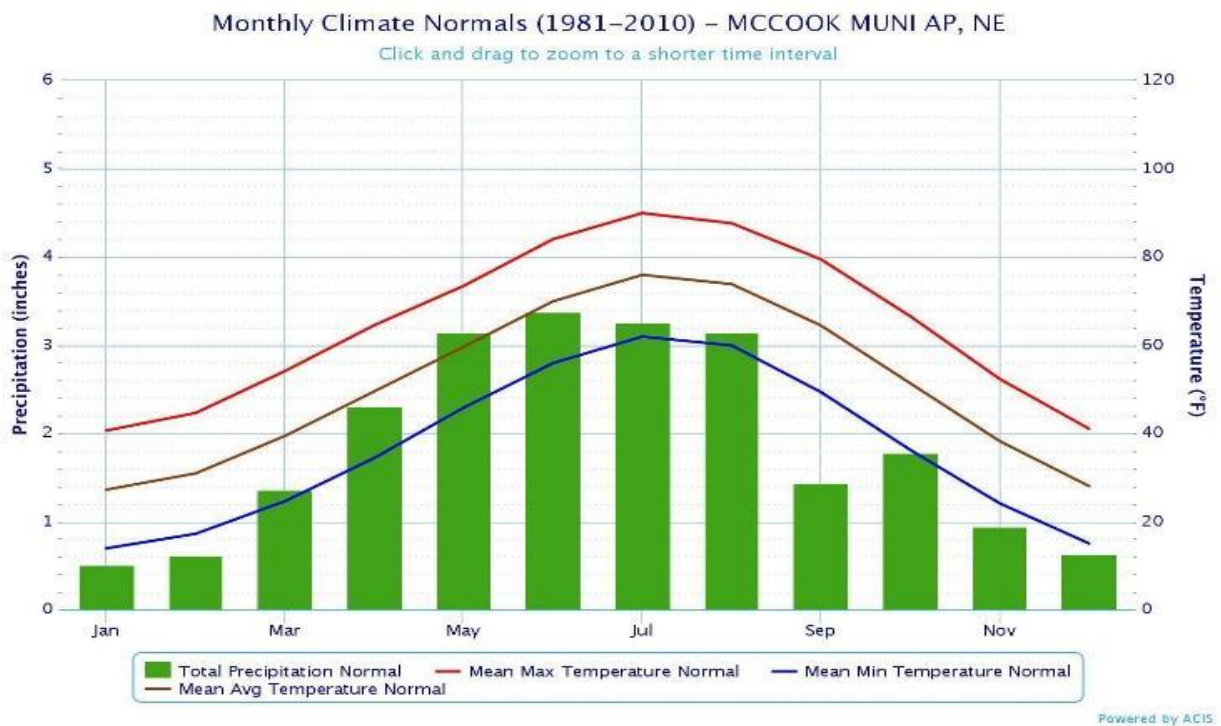


Figure 4. Climograph for McCook, NE.

Source: ACIS/High Plains Regional Climate Center: <http://climod.unl.edu/>.

The U.S. Drought Monitor (USDM), available since January 2000, assesses the spatial extent and intensity of dryness across the United States by synthesizing many types of climate information, impact reports, and expert assessments made by scientists. For each state and region, the USDM tabulates the percent area affected by different drought statuses, enabling the comparison of conditions through time. Figure 5 shows the percent area in drought for the contiguous United States, the state of Nebraska, and Red Willow County from January 2000 to July 2016. According to the USDM, severe drought (or worse) has affected the McCook area during nine years since the turn of the century (Figure 5). The most intense category, exceptional drought, was present twice—from July 2002 to March 2003 and August 2012 to September 2013.

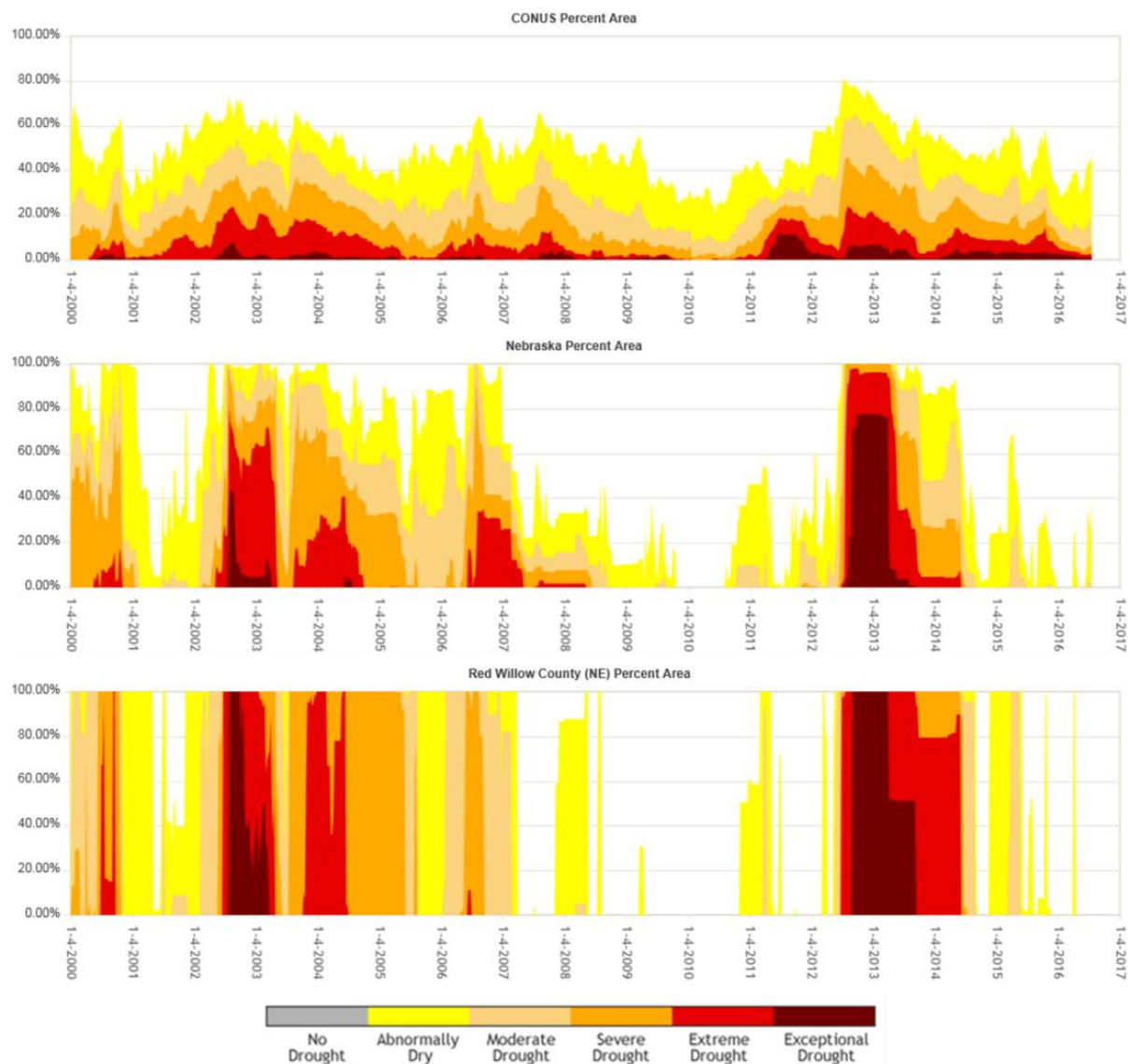


Figure 5: U.S. Drought Monitor statistics for the contiguous U.S., Nebraska, and Red Willow County, January 2000 to July 2016.

Source: U.S. Drought Monitor, <http://droughtmonitor.unl.edu>.

To look further back in time, it is necessary to turn to another drought monitoring index, such as the Standardized Precipitation Index (SPI). The SPI is a probability index that uses precipitation as the only input to characterize the rarity of drought (or extreme wetness) across a range of time scales. A 12-month SPI, as shown in Figure 6, is a comparison of the precipitation for 12 consecutive months with the same 12 consecutive months during all the previous years of available data. SPIs of these time scales are most likely tied to stream flows, reservoir levels, and groundwater levels. This index shows that with the exception of the 1980s, severe drought has occurred in every decade in the McCook area.

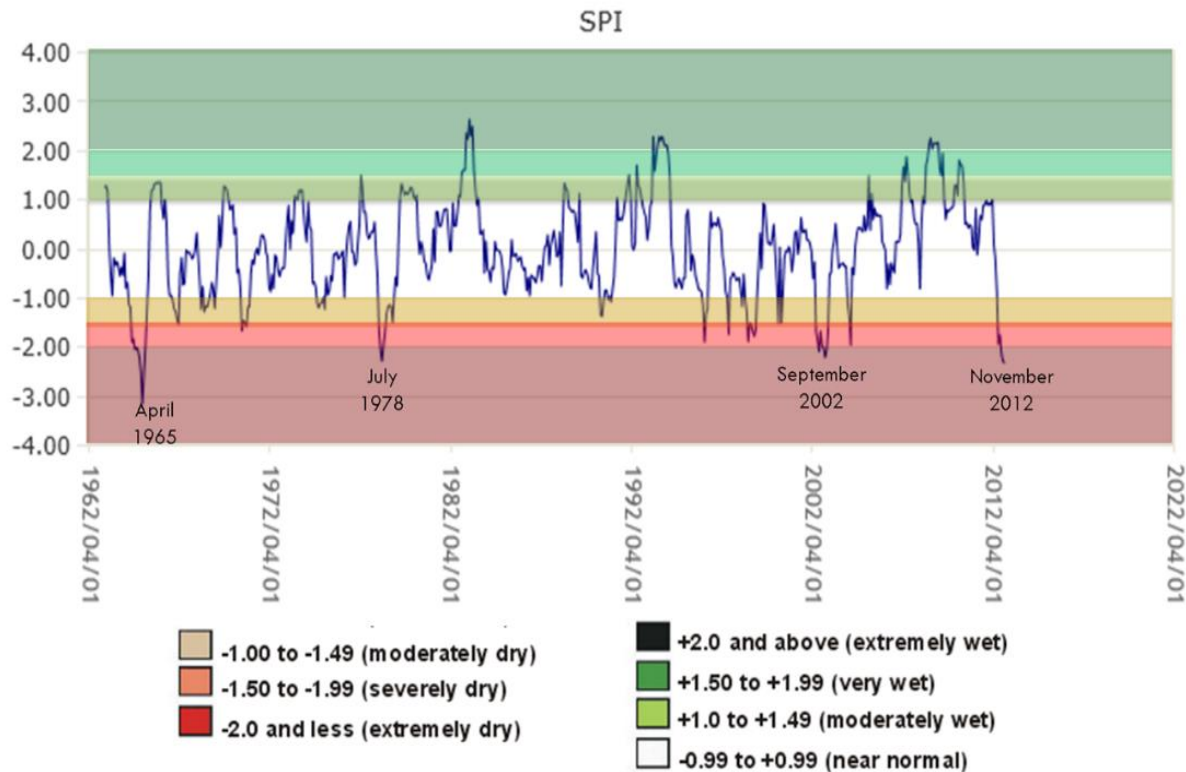


Figure 6: Standardized Precipitation Index (SPI) for the weather station at Red Willow Dam in Red Willow County.

Source: NDMC Drought Risk Atlas.

Early Warning

The first indication that McCook could be headed into a dry spell came with the release of the March 13, 2012, USDM (NDMC 2016). This map introduced D0 (abnormally dry) in Red Willow County in response to below-normal rainfall and abnormally high temperatures in the preceding weeks (Figure 7). By April 10, 2012 enough rain had fallen to eliminate the short-term dryness (Figure 7b). In the following weeks, warm, dry weather returned, causing conditions to once again deteriorate. In the first half of May, the weather station at the McCook airport recorded just 0.07 inches of rain, about 5 percent of normal. This led to the reintroduction of D0 on May 15. Dryness continued to develop in the region as rainfall remained well below normal and temperatures exceeded normal values on all but a handful of days. By May 29, 2012 D1 (moderate drought) was introduced in Red Willow County on the USDM. Conditions continued

to deteriorate throughout the summer. On June 26, 2012 the drought status was downgraded to D2 (severe drought) and just one week later, on July 3, 2012 the USDM depicted D3 (extreme drought) conditions as triple-digit temperatures combined with limited precipitation depleted soil moisture levels and caused a decline in crop conditions (NASS 2012). Three weeks later, on July 24, 2012 D4, exceptional drought encompassed the entire state, resulting in additional impacts to the agricultural sector. Statewide, irrigators struggled to meet water demands for crops as 95 percent of the topsoil was short or very short of moisture. Additionally, 72 percent of the state's pasture/rangeland was in poor to very poor condition, causing the release of CRP lands for emergency foraging and the selloff of livestock. On September 4, the USDM depicted D4 (exceptional drought) over Red Willow County, meaning that conditions fell in the 2nd percentile, equating to a 1 in 50 year event.

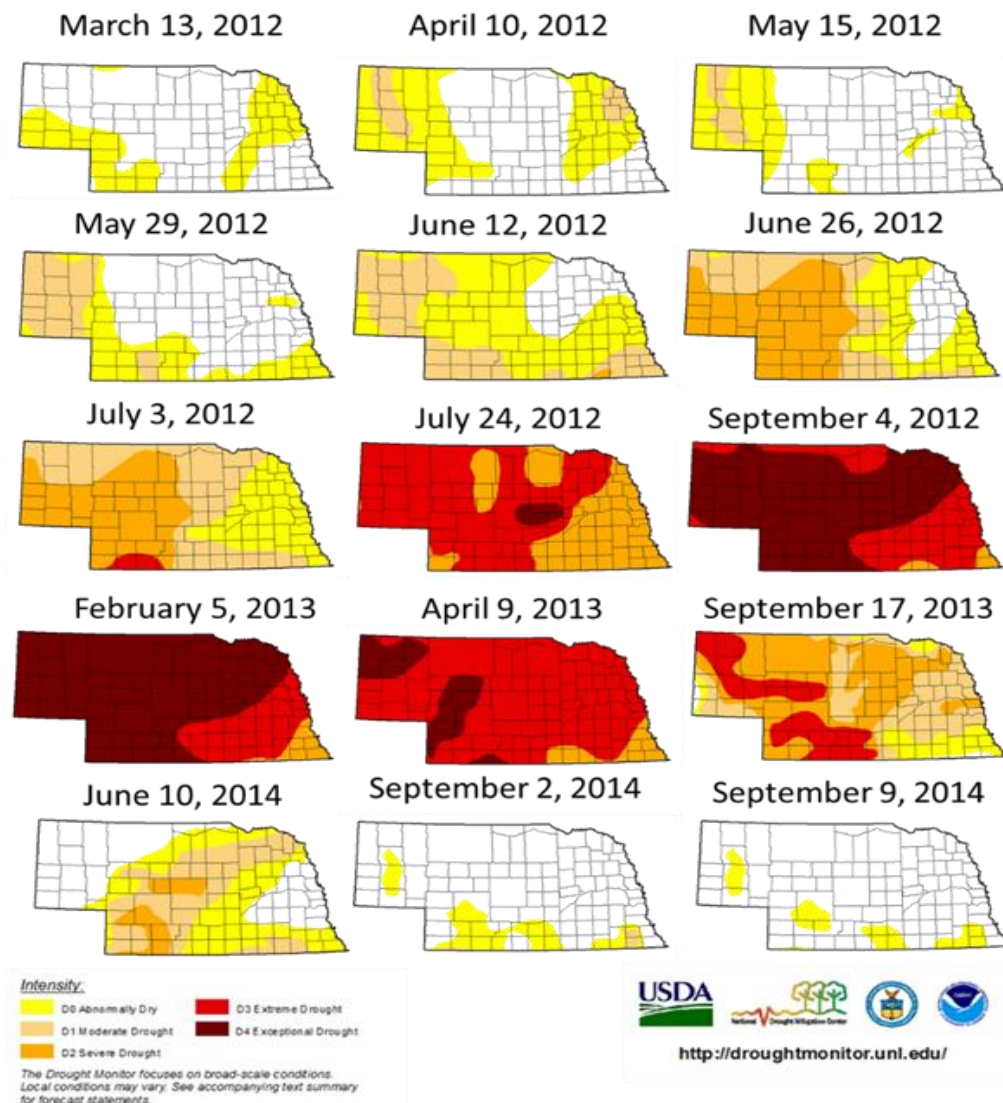


Figure 7. U.S. Drought Monitor for selected dates during the 2012-2014 drought in Nebraska.
Source: U.S. Drought Monitor, <http://droughtmonitor.unl.edu>

Over the period from the end of May to early September, a weather station in McCook recorded a record-breaking 43 days with temperatures greater than or equal to 100 degrees (HPRCC 2016) and rainfall values below 50 percent of the normal amount (Figure 8). These dry and warmer than normal conditions continued through the winter. At the end of the year, 2012 marked the record driest and warmest years since 1895 (NOAA 2013) in the state. These climatic extremes caused an estimated loss of a quarter billion dollars to the state's corn crop.

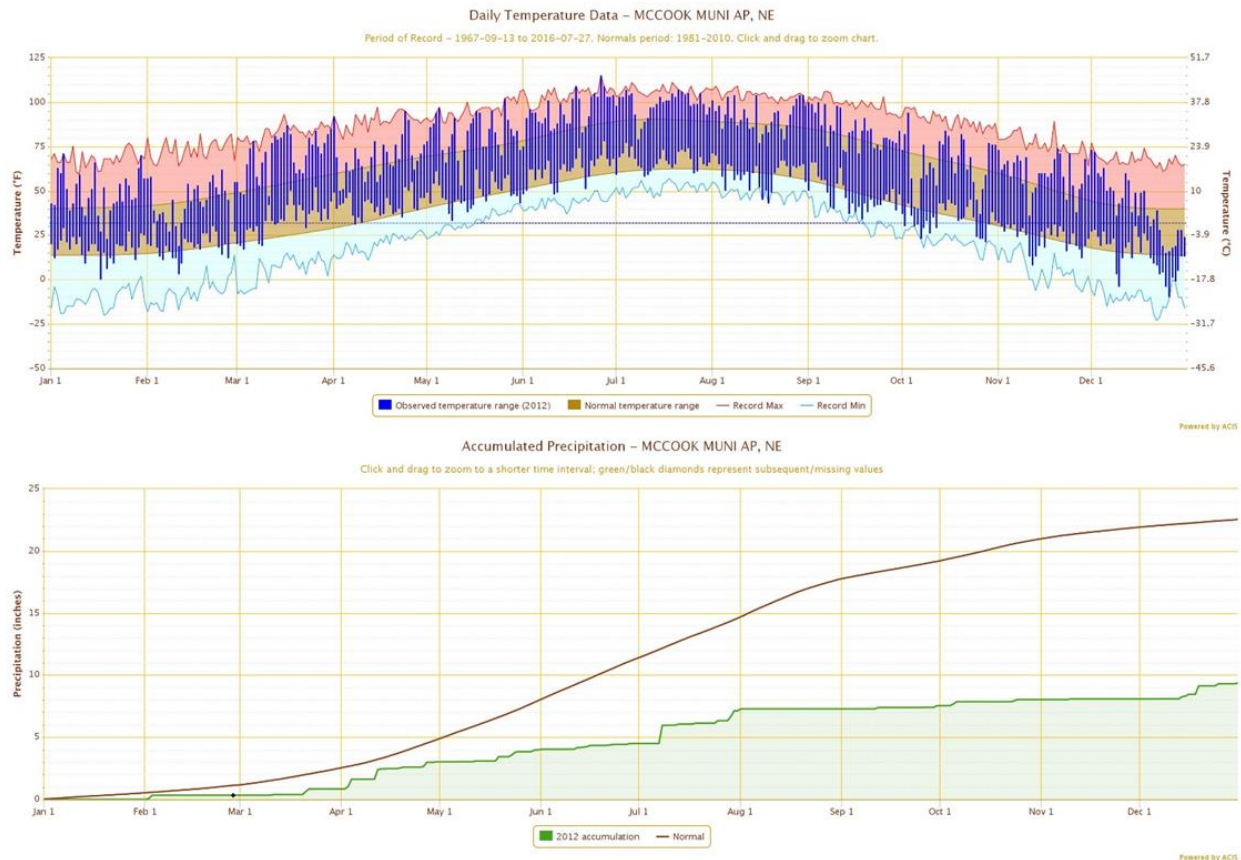


Figure 8. Daily temperature and precipitation data for the weather station at McCook Municipal Airport, 2012.

Source: HPRCC 2016.

Economic losses and meteorological data do not provide a complete picture of the devastation caused by the drought to society and the environment. For example, public water systems throughout the state initiated 22 mandatory and 57 voluntary water restrictions (Figure 9) during the height of the drought (NDHHS 2012). Decreased water releases for hydropower resulted in electrical outages in parts of the state. Lower water use also caused an increase in the amount of stagnant water sources, which resulted in an increase in the number of West Nile virus cases. Impacts to the environment threatened the viability of ecosystems because of decreased water quality and fish, wildlife, and tree die-off. Dry and/or subsiding land caused damage to private and public infrastructure. Additionally, the cancellation of fireworks displays impacted the socio-cultural identity of communities. Finally, the prolonged drought escalated mental

health issues because of increased financial burden, economic distress, and decreased recreational opportunities.

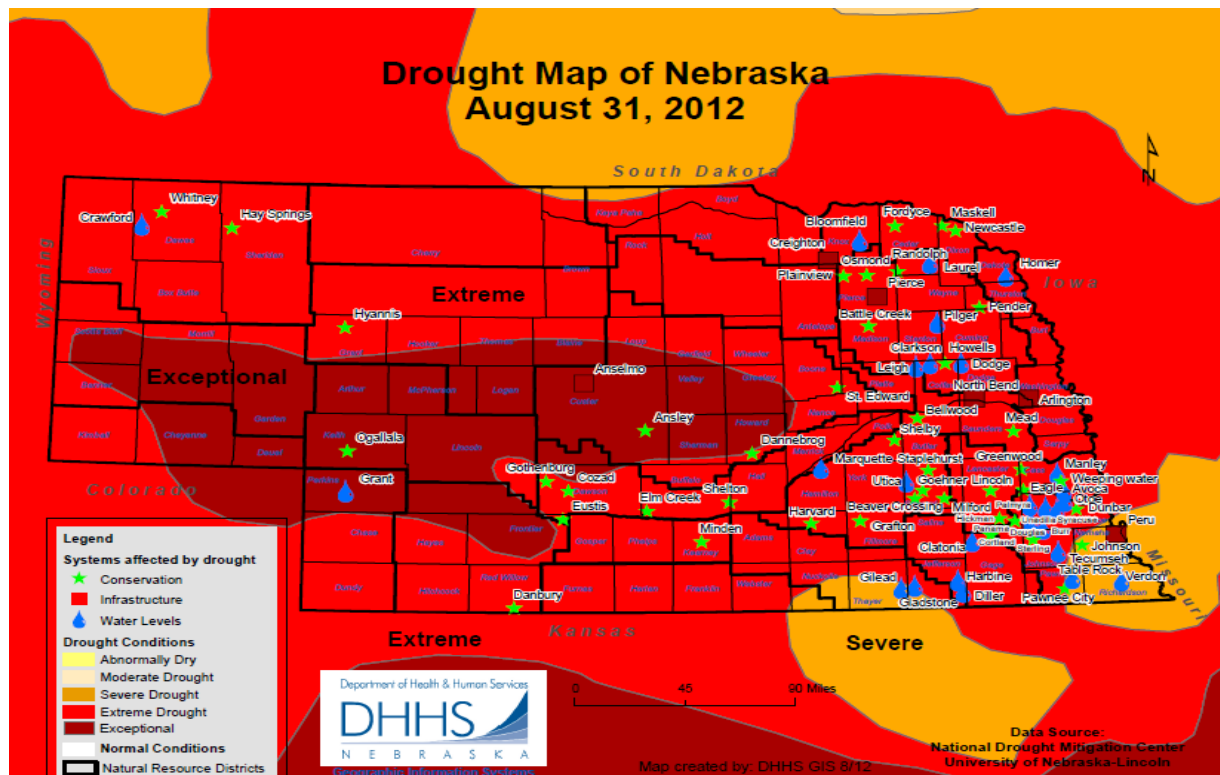


Figure 9. Nebraska voluntary and mandatory water restrictions in August 2012.
Source: DHHS, 2012.

Drought in 2012 was not limited to Nebraska. Nationwide, this drought made headlines as one of the most extensive droughts to affect the United States since the Dust Bowl in the 1930s, impacting more than two-thirds of the continental United States at its peak (Figure 10), carrying an estimated cost of \$31 billion dollars (NCEI 2017), and causing 123 deaths directly attributed to the associated heat wave. During 2012, over 80 percent of the productive agricultural land and half of livestock experienced drought conditions (USDA 2016). Costly drought impacts occurred across the central agriculture states, resulting in widespread harvest failure for corn, sorghum, and soybean crops, among others. The U.S. Department of Agriculture (USDA) declared more than 1,000 counties in 26 states as natural disaster areas (the biggest such declaration ever) and made several program improvements to deliver faster and more flexible assistance to farmers (USDA 2012).

While the drought is often referred to as the “2012 Drought,” drought conditions continued into 2014 for parts of the country. Nebraska reached its peak spatial extent February 5, 2013 (Figure 7 above), when the USDM depicted 100 percent of the state in D3 (extreme) drought or worse. The USDM did not begin to show an improvement in Red Willow County’s D4 (exceptional drought) status until April 9, 2013, seven months after first reaching peak intensity. The county was finally depicted as drought-free in September 2014.

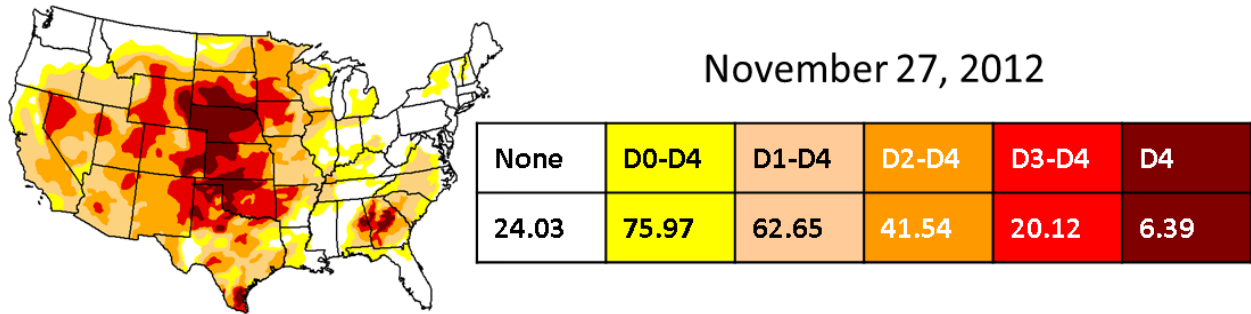


Figure 10: US Drought Monitor at the peak spatial extent of the 2012-2014 drought.
Source: NDMC, 2016.

Part IV: McCook Community Capitals in the 2012 Drought

Droughts are a different type of hazard and disaster than sudden-onset events like tornadoes, floods, earthquakes, and hurricanes. Sudden-onset events have an identifiable beginning and end, but as demonstrated in the previous section, the beginning and ending of a drought is more subtle and nuanced. Likewise, impacts of a drought on community capitals also have distinctions. For example, droughts most directly damage natural capital whereas sudden-onset events are most likely to damage built capital. Moreover, the ways in which community capitals are used in response to and recovery from drought have unique features. For example, instead of focusing on restoring damaged lifelines inherent in built capital, the focus during a drought is on limiting the damage to natural capital such as farm and ranch land, wildlife, and sources of water. This section describes impacts of the 2012 drought on McCook's community capitals and how the capitals were used in response to and recovery from the drought.

Although the 2012 drought was extensive, it would not be classified as a “disaster” from a social science perspective. The hazard event did not overwhelm local resources and place undue stress on the majority of the population. Instead, the accumulated cultural capital with respect to a history of dealing with drought and heat wave hazards combined with strong social, human, and political capital came into play during the prolonged response. A word cloud based on the interview and focus group notes and transcripts shows that *drought* is a commonly appearing term (Figure 11), along with *water*, *information*, and *people*. The frequency of these terms suggests that the social capital is high when it comes to water conservation. This section describes impacts of the 2012 drought on McCook’s community capitals and how the capitals were used in response to and recovery from the drought.



Figure 12. Word cloud based on the interview and focus group notes.

As the drought became evident in the summer of 2012, McCook responded with an “all-hands-on-deck” approach among various community leaders and organizations. In the words of the fire chief, community leaders were “eager to work together” and there was “no sense of territory or turf warring.” Individual leadership from YMCA officials, school administrators, public health department workers, the office of economic development, city council members, and others responded in directing relief efforts to various segments of the community.

Natural capital in western Nebraska was not immune to the devastating effects of the summer heat that blanketed the western United States in 2012. Reports showed that impacts were being felt across all sectors, but particularly in agriculture (Fuchs et al. 2013). Agricultural producers noted that the turn of conditions during the summer of 2012 came on quickly for their crops. Corn plants “curled” their leaves within a matter of a single day. Curling, or rolling, happens when the leaves begin to turn inward as heat stress affects their ability to hold enough water to maintain proper osmotic pressure (Nielson 1996). Leaf rolling is a natural response mechanism, allowing plants to take a defensive posture against moisture deficits. It is common to see this response for shorter periods of time, but once it reaches more than 12 hours in a day, there can be problems with reduced grain yield (Nielson 1996). In a May 2016 focus group farmers in McCook were left somewhat helpless to respond in a way that would recover their crop viability, noting that once the plants reached a certain level of heat stress, it was impossible to bring them back.

Drought has been shown to have detrimental effects on rangelands and grazing areas. With decreased moisture levels, forage production suffers as plants struggle to produce mass. Soil moisture and humidity can be drivers for storms themselves. For example, with dryland corn production, it is possible to see the effects of heat and water loss all in one day, making it necessary to quickly adjust. In a May 2016 focus group, farmers in McCook referred to this phenomenon as “reacting to what you know today.” Once a drought begins, it can have a self-worsening effect on livestock as increasing evapotranspiration concentrates salts in soils and plant forage, making livestock even thirstier (USDA 2016). In rangelands around Red Willow County, the effects were numerous. Participants noted the following effects on natural assets:

- Liquidation of livestock, with an estimated 25-40 percent of animals sent to market;
- Increased demand for soil nitrate testing as an indicator for cornstalk health;
- Pigweed and kochia weed emergence;
- Increased commodity prices due to reliance on crop insurance;
- Moving cattle from areas where grazing was failing to areas where there was more forage, from within the state and from other states in the West, including Texas;
- Reduction of young pheasant populations because of a lack of dew, while quail numbers increased; and
- Air quality issues—there was “always dirt or smoke in the air.”

While there were numerous effects on the surrounding rural and agricultural areas, conditions were closer to normal in the municipal area. As one city official remarked, “it was just another hot, dry typical summer.” However, McCook enacted voluntary water restrictions at the beginning of summer as the level of the Republican River dropped. Once the extreme heat and low humidity set in and water usage increased, the restriction was elevated to mandatory

between the hours of 10 a.m. and 6 p.m. in order to reserve water supplies for firefighting efforts, should the need arise (City of McCook Civic Alert 2012).

One producer noted that drought had a high magnitude in 2012, but many were still suffering from 2002-2003. In his words, 2012 had very high water usage, and there had not been any recovery of water by 2016. This created a vulnerability in political capital in terms of future water management as surface and ground water irrigators could potentially be pitted against one another. Some of this could be attributed to drought, or attributed to other factors already present, such as the Republican River Compact agreement. Overall, 2002-2003 had a larger, worse impact on this producer as it seemed hotter and lasted longer, which caused several years of water management issues.

Hydrological issues have also been problematic for producers since 2012. Also noted as potential obstacles were the high land values, singly and in combination with severe drought conditions, which producers noted can have effects on financial capital for both the producer and various agribusinesses in the community.

In discussing future resiliency, it was noted that more research on plant genetics and drought conditions will help guide crop selection. A sense of “You’re either going to make it or you’re not” was expressed. And as “a farmer you are supposed to be an optimist.” It was also noted that it is wise to “keep to a small range (density of crops) and see what happens, [as] usually good stewards will keep with it and work with various resources such as research and extension specialists.”

Built capital in the McCook community was relatively unaffected by the 2012 drought. Some strain was placed on the municipal water infrastructure, but other major lifeline infrastructures were relatively unaffected. Drought can strain the water delivery infrastructure, but McCook’s utilities director reported that the city’s single 24” pipe proved capable of handling the daily volume requirements. However, during the 2012 drought, demand increased during peak hours (4 a.m. to 10 a.m.). As a result, the pressures increased to nearly 100 psi. Completion a new 16” supplemental pipe relieved the strain on the main line. With both the 24-inch and 16-inch pipes in place, the risk of failure became much lower, as pressure is kept within the 90 psi range during peak demand. The consistent pressure keeps pumping costs under control. This consistency from the utilities department contributes to built capital and drought resilience in keeping prices steady and supply infrastructure backed up, lowering the risk of failure.

Although there was a slight increase in heat-related emergency medical incidents, community medical services easily handled these cases. As the mayor noted, during a drought, “a fire could be disastrous” because fires spread more rapidly under hot conditions. However, there were no major fires in 2012 and the nine full-time firefighters and twenty-four volunteers were able to provide the manpower to meet the city’s needs. Public service announcements and in-person safety education by fire department personnel contributed to a high level of community awareness of fire danger, particularly pertaining to using fireworks during the unusually dry Fourth of July. Fire departmental personnel also made regular visits to firework vendors to hand out fire safety information.

The Heritage Senior Center building was a source of resilience as it provided a cooling facility for residents in the town, and particularly elderly individuals who did not have air conditioning facilities in their homes. The YMCA served a similar purpose in providing a space for the active residents to recreate when it was too hot to be outside.

The 2012 drought exposed vulnerabilities in McCook's housing stock. Houses constructed before 1960 and mobile homes are less likely to have efficient air conditioning, if any at all. The heat wave that often accompanies drought has greater adverse impacts on occupants of these dwellings, a significant number of whom are elderly or members of other vulnerable groups.

Financial capital was adversely affected by the 2012 drought as agricultural production decreased, sending a downward rippling effect on McCook's local and regional economy. However, the overall impact was not considered severe because of the conservative financial approach engrained in the area's cultural capital and the short duration of the drought. Financial institutions worked with producers to restructure debt, which was enhanced by the strong local representation on boards of directors for most financial institutions. In addition, there is a trust in and reliance on government-funded crop insurance and other recovery programs that insure livelihoods during dry years.

"Farmers and ranchers get addicted to the game of chance, and the gamble that comes with it. Drought is a part of it. They play that game and they love it. Although they won't admit they love it. They won't admit it but they are playing this game."

Local landowners recognize risks inherent in dryland farming—that precipitation can be sparse in some years, making it difficult to predict how crops will fare from one year to the next. A local producer remarked, "I prepare for drought every year. I start by looking at subsoil moisture in making plans regarding potential drought." Successful producers are making financial investments in equipment and technologies that maximize irrigation efficiency, and they tend to have a diverse portfolio of land irrigated by surface water and groundwater, as well as a livestock component. As a local banker observed, "Over time the ag producers have become good business managers and marginal operators have all disappeared. Today's producers are savvy and manage around issues."

Social capital impacts were largely positive. Residents of Nebraska as a whole recognize the importance of rain on rural livelihoods, and many community members are attuned to moods following rain events (McCook Gazette 2015). The noted effects on moods were that there were "hot tempers" when games were held too early during the hot parts of the day. Some other social impacts included:

- The swimming pool water was not as clear because of the use of blending and backwashing water conserving techniques
- It was too hot to comfortably go motorcycle riding In town, the lawns were suffering, and around town the pastures were brown
- Reservoir levels for recreation were reduced because of increased irrigation
- Community access to wildlife became limited, in terms of loss to hunting opportunities

- People began to act “owly” and spend time inside because of the risk of heat stroke

These impacts were met with a resounding “can-do” attitude, and a willingness to recognize the detrimental immediate effects of the drought. In addition to a positive attitude, the residents also responded with logical measures. It was noted that a sense of connectedness between people and groups helped to implement these measures.

There are many opportunities for individuals to connect with each other in semi-organized formats, such as “Coffee with a Cop,” where law enforcement meets in an open, casual forum with community members. In non-drought years, these meetings provide an alternative venue for voicing concerns about things like the installation and operation of traffic lights (Baker 2016). However, these events can be harnessed as support venues to voice concerns when there is an extended dry period. When used in this way, these settings can serve as opportunities for individual concerns to be paired with the community organizations that can enact change.

There was evidence that organizations did respond to individual drought-related concerns during the summer of 2012. Some voluntary organizations, such as the American Legion, responded by accommodating the need for cooling during extended periods of outdoor exposure. For example, during the state baseball tournaments, the organizers recognized that the umpire staff, clad almost entirely in dark safety gear, were especially susceptible to heat stress, and responded with additional breaks between innings and games, as well as providing additional drinking and spritzing water. Pitchers and players were also provided extra breaks in order to drink water and stay cool.

Summer programs in the city were designed to keep children engaged in activities where they were kept cool. Additional response mechanisms included:

- The YMCA shut the sprinklers off, as well as the water at night.
- The times were turned back on the water-saving devices placed on the shower heads in the locker rooms (this affected women more than men due to longer shampoo times).
- Schools had to start the year late or dismiss the days early in order to compensate for not cooling the buildings sufficiently. Also, “heat days” became a reason to not hold classes.
- Schools had restrictions on recess and football practice.

One of the challenges communities face during drought response is abiding by water conservation measures. However, these voluntary restrictions did not seem to place a social burden on the population. According to a long-time city employee, the community responded well, in terms of being cooperative about water restrictions. He said, “We are largely a farming community, and I think people understood the issues.” This sense of working together allowed the community to prioritize water for consumptive and emergency management uses, while cutting back on watering lawns. Eventually, as the drought eased, the social resilience boosted the community through the dry spell. It may have taken several years to fully recognize this recovery, but farmers have begun to recognize the “million-dollar rain” events that have lifted southwest Nebraska from drought (*McCook Gazette* 2015).

Human capital was an important component of McCook's response to the 2012 drought, but as one McCook resident noted, "There is nobody really there to 'help' by making it rain." Instead, leadership is key to McCook's community vitality and human capital. The community administrator was noted as being a strong leader in the community during drought (because of needing to supply the community with an adequate amount of water), along with the fire chief and Red Willow sheriff's office, as many wildfires were of concern. NU Extension also played a leadership role in the agriculture sector by providing drought information to the *McCook Gazette* and local radio stations. Teachers and their students are fully aware of the impacts of the drought, and discussions with both groups have taken place through various leadership programs such as 4-H and Future Farmers of America. Other trusted sources of information included the work of and communications from the local Natural Resources District and Southwest Nebraska Public Health Department.

There is a local emergency operation plan, and various leaders in the McCook area are responsible for providing damage and other information related to various natural hazards (mostly flooding and tornados) to the Nebraska Emergency Management Agency. Drought would also be reported if the impacts were severe, especially if there is structural damage or deaths because of wildfires during drought.

In 2012, the responsibilities of the health department included counting mosquitoes for West Nile virus in two counties in the health district (which includes McCook). They were also tasked by the state to do these surveillance activities. They also assisted in monitoring illnesses within hospitals and schools on a weekly basis. School nurses have been concerned about the increasing numbers in asthma in children, which has been an ongoing concern for decades. The health department receives reports from the state on the quality of public water systems, and they might also get reports related to lake water quality because of blue green algae concerns. Overall, the health department is a strong leader in monitoring and reporting health impacts due to drought over a very large 15-county region. Therefore, they are seen as a "hub" for emergency preparedness related to health. In 2012, they responded to vulnerable populations and the intense heat by giving away fans to those that needed them. There were recollections of more mental health problems due to financial stress, but this is very hard to determine because there is no formal system for tracking these issues. More financial and human resources are needed to adequately address prolonged periods of drought in the future.

Political capital was instrumental during the 2012 drought. Many of the measures that contributed to resilience were lessons learned from the 2002 drought. High levels of political capital and a strong history of collaboration between city council leaders made it possible to learn from the 2002 drought and prepare for the dryness and heat of 2012. Just as in 2002, new policies and procedures emerged out of the 2012 drought. For example, while providing interim cooling stations during the 2012 drought was important, city leaders considered the possibility of establishing cooling shelters on a more permanent basis. Requirements for shelters are different from those for stations, and as a result, a cooling shelter plan was developed by the city of McCook.

Another policy emerged out of concern for the fire risk posed by fireworks. While there was no official ban on fireworks in 2012, guidelines were developed for the fire chief and city

council to ban fireworks in a given year should the need arise. There is evidence that McCook learned from surrounding townships. In 2012, fire chiefs in many surrounding communities also called for a ban on fireworks, but found that without an official policy, there was no enforcement. For future drought events, a firework ban will be within the City's governance purview.

Political cooperation between surrounding professional fire safety organizations also emerged. As part of interagency agreements, McCook sent firefighters to assist rural volunteer fire departments in responding to wildfires throughout the county. This facilitated cooperation with the rural fire departments and fostered a confidence of being able to help each other in times of need. In the words of the chief, "We are much more prepared for the next [drought] than we were for the last one. Should a drought-related disaster require outside resources and intervention, the Fire Department is prepared to assist."

Additional response mechanisms during 2012 may not have been needed because there were no major fire events. During the summer, the relationship between governing bodies and residents remained relatively stable. City council members and managers noted there were no substantial increases in public attendance at the city council meetings, nor did the tax levy base change. "We did well," but a drought of longer duration would have made things worse.

The utilities department mentioned that having policies in place to address drought will make it possible to endure longer dry, hot periods. While the 2012 events were severe, they were not prolonged enough to strain political capital to the point of a breakdown in governance systems. The rains that came in 2013 were seen as a big relief, and when reporting on the follow-up effects after the drought ended, the utilities department and city council worked closely together to oversee a rate increase that they recognized could place fixed income and elderly vulnerable populations at risk. They also noted that a longer-lasting drought in the future could strain infrastructure and existing policies, to the point of needing to update usage legislation and rationing procedures.

Cultural capital was evident during the 2012 drought. Nebraskans, as a whole, are proud of their self-reliance. This spirit of individual competence is evident in McCook, as its residents are quick to help others in need, but perhaps slower to ask for help from others, including from higher levels of government (*Daily Gazette* 2006). This tendency was put aside, to some extent, once the devastating impacts of drought in the 2000s reached new levels. Senator Ben Nelson named the 2002 drought "Drought David" as part of an effort to call attention to its severity and account for the economic losses incurred (*Daily Gazette* 2006). In 2012, the warmest July ever recorded drew attention back to the devastating effects of drought. During that summer, the USDA declared natural disaster areas from drought in over half of the country (Nelson 2012). While it may have been difficult to singularly categorize or gauge the entire cultural milieu of the region, the local perceptions were well captured by the town's newspaper. The *Gazette* staff conducted interviews with local leadership in a timely manner, along with the radio stations in town that regularly host community groups and businesses. Monthly radio reports were designed concerning drought and how to manage its effects on the farm.

McCook also has multiple faith-based organizations that serve as information sources. For those who are not affiliated with these groups, city leaders mentioned that local cafes, restaurants, and a well-loved bakery are common meeting spots where information is exchanged.

One possible barrier with regard to using cultural capital most effectively could have been the self-called “conservative political culture” that calls for individual autonomy and a mindset that advocates for small government and sometimes espouses the view “stay out of my business.” This was brought up in the context of a focused discussion on interconnections between those in leadership roles for government bodies, business organizations, educational facilities, nonprofits, and other groups. The general goal, as one extension officer saw it, was to build on the self-reliant culture while maintaining transparency in decision making in order to boost public trust. A good example of a coordinating space for this to happen is the Natural Resource District, which is a trusted entity to link science and monitoring with practical guidance. An example of this type of work would be the collaborative relationship with the National Drought Mitigation Center at the University of Nebraska.

Interview and focus group transcripts were coded for programmatic response. This was done using an auto-coding feature to search for any mention of programs. This search returned 36 mentions (Figure 12). After the initial query, the results were subjectively grouped and mapped according to type. This analysis reveals elements that currently exist, as well as one future need. The four main existing areas of relief programs are recreation, farmer education, conservation, and monitoring. When water rates are increased, residents would like a city-led effort to provide assistance for municipal users to pay their bills. According to the city council, the relief programs for water payments are currently led by faith-based and poverty reduction groups.

The thematic program areas in place cover a range of capitals. First, efforts surrounding monitoring are directed at soil quality, which is a topic that the NRD, extension, and industry co-op liaisons mentioned in their focus group. This soil quality monitoring provides a valuable service to producers who seek guidance on crop viability based on current conditions.

Second, conservation-based drought relief programs involve preventive prescribed burns, as well as alternative income programs to allow private landowners to seek income from hunters wishing to access areas on their land. Recreation is an important and related component, with a skate park mentioned by the economic development board as a space where youth can engage in activities that do not require access to water-based activities in reservoirs, streams, or pool facilities. Finally, farmer education programs around drought were mentioned by the producer-oriented focus group as an important component of water conservation. This initial attempt at mapping assets was used as a stand-in with the available data from the transcripts. It is meant to inform future work that would involve community members to interactively map their programs and response mechanisms. Other small cities with a city management governance structure may find this policy approach¹ useful as a realistic way to map assets for rapid assessment processes.

¹ The city’s drought plan is posted on the NDMC’s online repository of drought planning materials as an example of proactive, evidence-based drought policy.

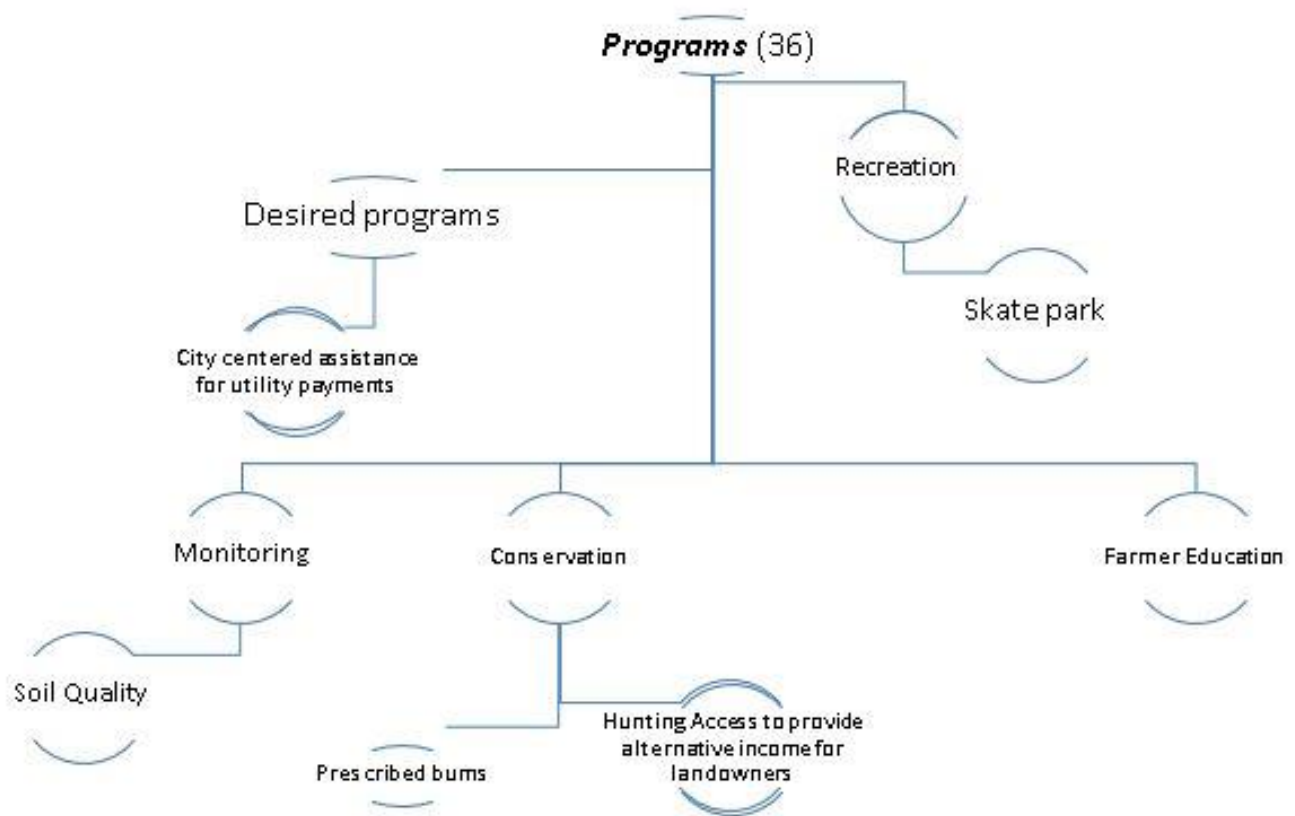


Figure 12. Analysis for programmatic response to drought.

Another tool the research team used to analyze impacts and response was to collaboratively populate a table that breaks out the capitals by type and lists the components of resilience and vulnerability for each. The impact and response, followed by longer-term recovery, provides a snapshot of specific examples.

Table 2. Resilience and Vulnerability in each of the capitals.

Capital	Resilience	Vulnerability	Impact, Response, and Recovery
Natural	<ul style="list-style-type: none"> - Soils, topography, & climate suitable for agriculture - Rivers, streams, lakes, reservoirs, & impoundments - Groundwater & aquifers - Abundant wildlife 	<ul style="list-style-type: none"> - Region is prone to low precipitation, water shortages, & drought - Heat waves - Risk of wildfires increases during drought & periods of low precipitation - Natural hazards—T-storms, hail, tornadoes, snowstorms, ice storms, blizzards, floods, etc. - Agricultural production at risk 	<ul style="list-style-type: none"> - increase in toxic blue-green algae in lakes and impoundments (response-monitoring and communication of risk) - Decrease in pheasants & other wildlife - Protect habitat & species during drought - “It got hot early in 2012, and the irrigation restrictions never were mandatory” (Utilities Manager interview)
Built	<ul style="list-style-type: none"> - Up-to-date water utility - Broadband communication infrastructure - Transportation—major highways, railroad, airport (recent service to DIA) - Farm-to-market road system - Public buildings - Emergency response equipment - Supporting documentation: Adequacy of roads - Investment in emergency management - Pressure problems were not an issue because of the supplementary water mainline 	<ul style="list-style-type: none"> - Potential damage to water & wastewater infrastructure - Supporting documentation: At-risk infrastructure building materials quality 	<ul style="list-style-type: none"> - Backfilling in YMCA pool; water conservation measures (shower timers) in the locker rooms - Trucked in additional salt for the injection well system at public utilities - The drinking water comes from the Republican River Basin; when the river is dry, the wells are slowed (mechanically speaking) - Drought can provide opportunities to repair/improve infrastructure - Public swimming pools stayed open (despite water quality) - Facilities converted to accommodate “cooling stations” - Recommend extending boat ramps - Air conditioning in schools - Pumping increased to 4500 gallons per minute: \$2 -\$4 million costs associated

Financial	<ul style="list-style-type: none"> - Agricultural-based economy - Service hub (educational, medical, governmental, social services, etc. - Recreation economic sector; <p>Document: Economic diversity Active economy Economic growth entrepreneurship</p>	<ul style="list-style-type: none"> - Loss of income & revenues - Agricultural producer losses create losses for ag businesses - Negative multiplier effect - Loss of recreational revenues - Reliance on natural resource sector 	<ul style="list-style-type: none"> - Draw on financial reserves; - Economic hardship - Unemployment - Tax shortfalls
Social	<ul style="list-style-type: none"> - High level of voluntary organizations - Voter participation rate - % owner-occupied housing - Religious organizations 	<ul style="list-style-type: none"> - Community erosion (FBI violent crime rate) - Marginalized groups 	<ul style="list-style-type: none"> -The centrally located North Cambridge Reservoir storage was affected—<i>low levels for boating was the first noted impact</i> - Most residents were understanding of the situation (sympathetic to agriculture & their need to restrict personal water use) -Most people realized it was hot and dry, so they voluntarily reduced usage
Human	<ul style="list-style-type: none"> - Strong & effective leadership - Trained emergency management personnel - Trained medical personnel - Trained social service providers - High level of education (% with BS or higher) - Life-expectancy 	<ul style="list-style-type: none"> - Vulnerable groups (% under 18, % over 65, % disabled; % without health insurance, & “linguistically isolated”) - Potential out-migration 	<ul style="list-style-type: none"> - Good decision-making in managing the 2012 drought - Elderly were particularly at risk to heat and special programs were implemented to assist them

Political	<ul style="list-style-type: none"> - Strong & effective leadership with mayor, city council, & city officials - Local ordinances in place to activate water use restrictions - Local Emergency Planning Committee - Inter-agency agreements (e.g., McCook fire dept. & rural volunteer fire depts.) 	<ul style="list-style-type: none"> - Lost tax revenues during economic downturn - Political fragmentation (number of jurisdictions) - Income inequality - Poverty rate - Governmental agreements regarding water sharing between NE & KS 	<ul style="list-style-type: none"> - Placed voluntary restrictions on water use by McCook residents - Wise investment of revenues (authorization for water infrastructure improvements)
Cultural	<ul style="list-style-type: none"> - “Can do” spirit - Community cohesion - Individualism - Strong sense of community attachment & pride 	<ul style="list-style-type: none"> - Individualism 	<ul style="list-style-type: none"> - Community pulled together - Caution during 4th of July fireworks celebration

Part V: Summary and Conclusions

McCook serves as the agricultural and economic hub of southwest Nebraska. It is located in the drought-prone part of the state and frequently experiences dry spells, along with other natural disasters. This rural community is vulnerable to the physical impacts of exposure to extreme natural events. It experienced an exceptional drought from August 2012 to September 2013. In the early part of 2012, the community noticed that it was hot in April, but it was not until late June/early July that the drought registered on the USDM. The combination of lack of precipitation and heat drove issues with drought in 2012. Increased evapotranspiration (ET) caused by early warm temperatures and more rapid growth in the spring along with warm temperatures during summer seemed to exacerbate the 2012 drought. During this time, precipitation was below baseline levels.

The 2012 drought affected the community and the adjacent rural surroundings in many adverse ways. Among all community capitals, natural capital was most affected by the 2012 drought, mostly because of a shortage of water. Cascading impacts from an overall shortage of water affected other capital areas (such as financial). Some examples of this included a decrease in market price of hay, corn, and soybeans and a decrease in overall tractor sales. The drought also affected farming operations and transportation around McCook as the combination of high winds and ongoing drought conditions caused several dust storms, which reduced visibilities, altered air quality, and made driving hazardous. Wildfires spread rapidly because of the high winds and dry conditions. The fires destroyed buildings, machinery, and crops.

Many irrigators struggled during the drought period because of a shortage of surface water. High prices and scarce hay and water supplies led many ranchers to relocate, cull, or sell (at below-normal prices) their herds. The city lost revenues because of a decreased number of hunters. The number of recreational visitors to the city decreased because of reduced water levels in neighboring lakes and increased toxic blue green algae, and fishing also suffered from the drought. In essence, outdoor activities were reduced, and most water-based recreation came to a near halt. Wildlife also suffered.

The city's response to the drought was quick and effective in reducing the impacts of the event. Municipal supply authorities advised residents to use water as carefully as possible. The city asked its residents to refrain from outdoor irrigation, but never made this activity mandatory. The city helped the most vulnerable people, such as the poor, elderly, and children, to cope with the heat effects of the 2012 drought. It distributed fans to lower-income residents and opened shelters with cooling facilities for the elderly. School hours and days were adjusted due to extreme heat, and school buildings were equipped with cooling systems. The city helped low-income families cover utility bills; church organizations also helped individuals both psychologically and financially. Most residents voluntarily reduced water usage, and pumping increased, but pressure problems were not an issue.

The 2012 drought did not trigger significant detectable migration from McCook. The population size of the city decreased by about 50 in 2012 relative to the previous year. While this decrease was a part of the trend of population decrease since 2000, other measures show few effects of population reduction. For example, single-family new house construction building

permit volumes remained stable. The city issued five building permits each year for 2012 through 2014. In 2011, the city issued only three building permits. Similarly, the drought had little to no effect on unemployment and crime rates of McCook. The unemployment rate consistently decreased since 2010.

Crime rates, particularly robberies, assaults, burglaries, theft, and auto theft, either remained the same or slightly increased in 2012 relative to the previous year. Taken together, stability in these social and economic indicator response variables implies that the city adequately responded to the event. Going beyond the quantitative trends, the Community Capitals framework aided in further analysis of the community response in McCook. It helps explain the recovery from the 2012 drought impacts in shortest possible time, and made the community resilient for future drought and other natural disasters. Given the experience it gained from the 2012 drought, the city will effectively and efficiently cope with future drought events of any magnitude.

Like most other natural disasters, the 2012 drought in McCook provided opportunities to repair and improve infrastructure. For example, as a result of the 2012 drought, air conditioning was installed in the city's schools. In doing this and adopting other similar measures, the city has improved its resiliency and minimized the destructive and disruptive effects of future droughts.

It is worth mentioning that McCook had a drought plan before the 2012 event. This plan seems to have worked well in 2012. Thus the existing drought monitoring efforts need to be continued to identify drought early enough so that water managers and city authorities have more information sooner to help support decision making. The coordination among relevant city departments also worked well in 2012. Multiple and overlapping groups and organizations contributed to the success of McCook's response to drought. All entities of Community Capitals worked together and performed satisfactorily because of the dedicated human interactions involved. However, the drought plan needs to be updated. Bringing soil moisture monitoring to the forefront is essential for improving the climate and drought monitoring system. In fact, emphasis should be given to monitoring and forecasting because city authorities were not aware that the 2012 drought was coming. Public awareness and education campaigns can further improve individual response to future drought events. In addition to current ways of disseminating drought information, social media can be used for a much wider audience for future drought events. Mental health support should also be expanded.

Overall, the city has proper planning and proactive action plans which contributed a great deal to reducing the impacts of the 2012 drought and quick recovery from the event. This is consistent with the mission of the National Drought Mitigation Center, which has long promoted the idea that societies will deal with drought events better through preparedness and risk management rather than a crisis management approach. It is hoped that the lessons learned from the 2012 drought event, as outlined in this report, will increase knowledge of how to address the next drought event. It is hoped that this report will help decision makers understand exactly what happened during the 2012 drought and use this information to prepare for the next drought.

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