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NAVIGATING ROADBLOCKS IN UTAH'S PATH TOWARDS
CURBING GREENHOUSE GAS EMISSIONS

by

Emily K. Fletcher

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Environment and Society

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ABSTRACT

Navigating roadblocks in Utah's paths towards curbing greenhouse gas emissions

by

Emily K. Fletcher, Master of Science

Utah State University, 2023

Major Professor: Dr. Sarah Klain
Department: Environment and Society

The impacts of climate change are and have been disproportionately felt by marginalized communities across the world. For example, marginalized communities on the west side of Utah's Salt Lake Valley stand to be more impacted by reduced air quality from its drying lake more than those in other parts of the valley and are more likely to feel the economic impacts of mitigating the drying lake and climate change. In Utah, where climate change has become highly politicized and polarized, civic groups have led initiatives to try to advance climate policy by focusing on less charged issues such as improving air quality. This research focuses on the signatories of the Utah Climate and Clean Air Compact, which aims to connect political parties in a conservative state to improve air quality in Utah amid exponential population growth, warming temperatures, and prolonged drought conditions. Despite prominent leaders publicly signing onto this Compact, progress towards improved air quality and in turn, climate change, has been slow within the state of Utah. It is also unclear if these leaders are considering the disproportionate impacts marginalized communities may face. Despite the lack of urgency, there have been efforts created and implemented since the Compact's initial

publication and signing that suggest it has seen minor successes in the state. I used semi structured interviews of community, business and other leaders who publicly signed this compact alongside document analysis of interviews and opinion pieces focusing on or written by the signatories of the Compact to assess perceived barriers to climate action and ways to address them. The first study, guided by two frameworks that look at issues using transformative social change and understanding environmental policy lenses, suggests that population growth and political disagreements are the most prevalent barriers for leaders in Utah. According to these leaders, the paths towards air quality and climate solutions, despite a lack of major success thus far, consist mainly of working together across party lines to address these issues. The second study, guided by the definition of procedural justice and how the concept fits into other parts of environmental justice, found that although most leaders are concerned about adverse effects of a drying lake, they are concerned about the valley as a whole and often do not consider that some residents are more vulnerable to direct effects and mitigation efforts, and therefore have different needs. These leaders have also largely not reflected on ways to ensure that these more vulnerable communities are involved in decision-making processes regarding water use and air quality policies.

(123 pages)

PUBLIC ABSTRACT

Navigating roadblocks in Utah's paths towards curbing greenhouse gas emissions

Emily K. Fletcher

In places where discussions about climate change have become highly political and divided, community groups have attempted to connect rival political parties by focusing on improving air quality. This topic is often less politically charged. The effects of climate change have been disproportionately felt by marginalized communities around the world. In the west side of the Salt Lake Valley, many communities are more likely to experience the negative consequences of a drying lake, a problem that Utah and other regions are currently facing, compared to others in the valley. This research focuses on the individuals who have signed the Utah Climate and Clean Air Compact, a public attempt to bring together political parties in a conservative state to address air quality issues in Utah. The state is facing challenges such as rapid population growth, rising temperatures, and prolonged drought conditions. Despite some prominent leaders publicly endorsing this Compact, progress towards improving air quality and addressing climate change has been slow in Utah. It is also unclear if these leaders are considering the unequal impacts that marginalized communities may face. However, there have been some efforts made since the Compact's publication and signing that indicate minor successes in the state. To understand the perceived obstacles to taking action on climate change and potential solutions, I conducted semi-structured interviews with community leaders, business representatives, and other individuals who signed the Compact. I also

analyzed documents such as interviews and opinion pieces focusing on or written by the signatories of the Compact. The first study revealed that population growth and political disagreements are the most common barriers reported by leaders in Utah. According to these leaders, the key to addressing air quality and climate issues lies in working together across party lines, even though significant progress has not been made so far. The second study found that although most leaders express concern about the negative effects of the drying Great Salt Lake, they tend to focus on the entire valley rather than prioritizing the needs of the most vulnerable residents. They also do not ensure that these communities have a say in decisions related to water use and air quality policies, signaling that major changes to include these communities must be made in the planning and mitigation process for these issues.

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Emily K. Fletcher

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CHAPTER 1 INTRODUCTION

Utah and Climate Change

Climate scientists have come to a consensus that climate change is occurring and is largely due to anthropogenic use of fossil fuels (Cook, et al. 2013, US EPA 2021, IPCC 2022). Recent research has shown that developed countries, although they emit less carbon as a whole, emit more carbon per capita than developing countries (Wei, Wu and Chen 2021). The United States (US) has been cited as the second highest producer of greenhouse gasses (GHGs) in recent years, particularly carbon dioxide, and ranks in the top 15 per capita in producers of CO₂ (Global Carbon Atlas, accessed 27 Jan 2022). Emissions from transportation and electricity production are the worst offenders, producing the bulk of GHGs in the US with 29 and 25% of gasses respectively in 2019 (US EPA 2021). Utah provides electricity to neighboring states and, in 2020, 61% of electricity produced in the state is from burning coal (US Energy Information Administration, accessed 19 Jan. 2022). Utah is also one of the fastest growing states in the US (US Census Bureau, accessed 16 May 2022), seeing an additional 56,291 people from April 1, 2020, to July 1, 2021, a 1.7% increase. This is surpassed only by neighboring Idaho, which saw a 2.9% increase. Larger populations mean larger demands for energy. If current energy policies are not improved to include caps on fossil fuels and increases in renewable energy, this will also mean increases in fossil fuel usage, exacerbating the problem of climate change.

While some states have committed to being fully run by renewable and green energies (e.g.: California, Nevada, and New York), as of 2022, 42 states have made no such commitments (Sierra Club, accessed 27 Jan. 2022). Despite increasingly urgent

recommendations to dramatically reduce GHG emissions (Allen, et al. 2018), the US federal government has only recently passed policies intended to result in overall emission reductions on a national scale. President Biden has, as of August 2022, signed the Inflation Reduction Act (IRA) that includes a target of 40% reduction of greenhouse gasses by 2030 (Tankersley 2022).

Scientists are uncertain that the planet will stay below the 2 degrees Celsius global temperature increase (when compared to pre-industrial levels) outlined by the Paris Climate Agreement in 2015. This 2-degree threshold is considered important because 37% of the Earth's population will be exposed to extreme heat waves at least once every five years if global warming reaches that point. Even at 1.5 degrees Celsius, an estimated 14% of the population will suffer through extreme heat waves often (Buis 2019).

In response to the climate crisis, various efforts to reduce emissions have focused on regional, state, and local scales due to national gridlock, prior to the passing of the Inflation Reduction Act in 2022, in the US on this issue (National Research Council 2011). Additionally, IRA modeling efforts have shown that national policies alone are not enough to create lasting change, meaning that regional, state, and local initiatives are still very much necessary. The Utah Climate and Clean Air Compact in 2020 provides an example of one such effort. The Compact asked signatories from non-profits, businesses, education institutions, and state and municipal political leaders to pledge to adopt the mileposts laid out in the Utah Roadmap. The roadmap, created by the Kem C. Gardener Policy Institute, uses data and models to provide an outline of actions that would have the most impact on reducing GHG emissions and improving air quality in the state of Utah.

The compact focuses on improving air quality, energy efficiency, environmental improvements that do not hinder the state's economy, adopting renewable energy sources, just transitions for rural areas throughout energy transitions, and being strong leaders of the country's green transition with collaborative solutions to climate and air quality issues. While some cities and entities have shown substantial progress towards adopting these goals, others have shown little to no progress. For example, Park City has pledged to have all city operations running on renewable electricity and be net-zero carbon by the end of 2022 and community wide by 2030 (Park City, accessed 19 Jan. 2022). In contrast, Provo, UT has only committed to at least 50% of their electricity coming from reduced carbon and/or renewable resources by 2030 (Provo, accessed 2 Feb. 2022).

A recent EPA report found that Black, Hispanic, and Latino communities within the US are much more likely to be negatively affected by climate change (US EPA 2021). Salt Lake City residents, alongside a large portion of Utah's population on the Wasatch Front, are feeling the effects of climate change with the drying of the Great Salt Lake (Flavelle 2022) and the consequences that marginalized communities in this region, a large portion of which are Hispanic and Latino (Collins and Grineski 2019), are facing are only beginning to be researched.

This thesis focuses on the viewpoints of a subset of the signatories related to successes and barriers in climate policy work within the state of Utah and provides insights to impactful changes.

Climate Change and a Drying Great Salt Lake

Climate change has been identified as one of the major reasons that the Great Salt

Lake (GSL) hit multiple record lows in the years 2021 and 2022 with negative economic and health consequences. Anthropogenic usage has been identified as the main consumption source of the state's water. Climate change has been found to exacerbate natural disasters (Klinenberg, Araos and Koslov 2020), such as the drought that the Intermountain West has been experiencing since the turn of the century. The state stands to lose major economic contributors, such as the brine shrimp and mineral harvesting industries, which bring in \$1.32 billion annually. Losing these industries would also mean losing nearly 8,000 jobs (Utah Department of Natural Resources, accessed 27 Sept. 2022). The main factors that have caused the desiccation of GSL include anthropogenic overuse of the lake's three tributaries (the Jordan, Bear, and Weber rivers) for agriculture and municipal water use for growing populations in the northern part of the state. A secondary driver is climatic changes such as earlier snowmelt and smaller snowpacks which are part of a positive, or reinforcing, feedback loop that leads to exacerbation of these climatic changes, creating the potential to drastically decrease the amount of snow that falls in the mountains over the winter, reducing the snow's albedo (reflectance of sun), resulting in land absorbing more of the sun's heat, which can compound the effects of the already existent drought.

While the current effects of a drying lake on the public health in the region are not clear, examples such as Owen's Lake in California, Lake Urmia in Iran, and the Aral Sea in Central Asia foreshadow what is likely to happen in Salt Lake Valley, Utah's most populous region and home to over 1.1 million people in 2022 (US Census Bureau, accessed 16 May 2022). These lakes dried up for similar reasons and became large sources of dust and other airborne particles, or PM10. Increased exposure to this

particulate matter has been linked to increased rates of asthma, heart disease, and earlier deaths (Stieb and Liu 2013). The Aral Sea specifically is cited as having a drastic increase in infant mortality rate in the world linked to air quality problems (Crighton, et al. 2010). Researchers have linked this and other increased health problems with the contamination of the Aral Sea, which was used as a dumping ground for factory and agricultural drainage for the 30 or so years before it dried up (Ataniyazova 1995). GSL has also been found to have high levels of various heavy metals such as arsenic and copper. These chemicals are currently trapped under a hard crust, but as the crust is worn away by wind and cracked by people walking, driving, and riding bikes along its surface, they have the potential to become airborne and breathed in by residents of Salt Lake City (SLC), the largest city in the state with a population of just about 200,000, and surrounding areas (Flavelle 2022).

The Need for Environmental Justice in the Salt Lake Valley

Research has shown that marginalized communities are disproportionately affected by climate catastrophes such as this (Benevolenza and DeRigne 2018, Wildcat 2013, Kolzenburg 2022), and certain communities within SLC are currently positioned to be drastically impacted by the increase in dust.

Jones (2021) documented that mortgage redlining in SLC has segregated the city along race and class lines, making it difficult for members of marginalized communities to move to less polluted areas. This practice took place in many cities across the US during the 1940s and 50s (Nardone, Chiang and Corburn 2020), and its impacts have persisted ever since. In the 1800s, Mexican immigrants came to Utah to work on expanding railroads. These first immigrants were pushed into neighborhoods that were

affordable and close to the railroad, which all happened to be focused on the west side of the city. Later, those neighborhoods were redlined, dictating where Latinx immigrants, as well as other communities of color that moved in later, could or could not buy property and who was allowed to receive a home loan. Today, these neighborhoods have become even more divided from the rest of the city by I-15 and have repeatedly been neglected, resulting in repeated issues with industrial and septic pollution that further negatively impact their quality of life. Furthermore, the city has a history of upgrading or building sewer systems and paved roads in these areas last, after other parts of the city have been prioritized (Jones 2021). Now, the desiccation of the Great Salt Lake is putting these communities at a higher risk for air pollution exposure (Collins and Grineski 2019).

In the interest of pursuing more just climate pathways, a focus of President Biden's Inflation Reduction Act, the environmental justice literature points towards inclusion of affected populations in decision making processes as a way to reach more just outcomes. The Compact cites support of rural areas throughout energy transitions and improving air quality as two of its main tenets but does not acknowledge the marginalized communities that stand to be most impacted. This research fills a gap in the literature by reviewing the views of a subset of leaders in Utah and the extent to which these people who have significant power in the state, are considering the historically marginalized groups that stand to be the most impacted by a climate disaster because of their socioeconomic status and their location relative to the lake.

Thesis Purpose

By utilizing the literature on creating lasting, transformative change, this thesis research first creates a profile of the most prevalent barriers that leaders in Utah are

currently facing in relation to climate (or clean air) action as well as identifies potential directions for policy to aid climate mitigation in the state. Using data from 14 interviews with signatories of the Utah Climate and Clean Air Compact and document analysis, my first study characterizes issues connected to climate and air that are most prevalent to leaders in a conservative state. I also offer analysis on potential solutions that arose during discussions, and possible reasons for public pushback on some solutions. This information can serve as a guide to policy pathways in other conservative states.

The second study focuses on marginalized communities in the Salt Lake Valley, and whether leaders are considering the impacts on them when thinking about policy and the drying of the Great Salt Lake. These communities have been historically underserved, e.g., lower infrastructure investment relative to other areas of the city (Jones 2021), and could greatly benefit from increased support, especially in the face of poorer air quality as more lakebed is exposed in a continued drought. This study uses the four pillars of procedural justice as defined by the Justice Collaboratory (The Justice Collaboratory, accessed 29 July 2022) as focal topics for additional interview questions posited to those signatories that work or live in the Salt Lake Valley. I interviewed 11 signatories about these issues. This study offers an analysis of leaders' responses when questioned about the marginalized communities likely to be disproportionately impacted and the extent to which they have or have not thought about them. It also argues that there may be potential for leaders who are in higher places of political power to feel pressure to prioritize larger groups rather than the smaller, more likely to be negatively impacted groups. Characterizing these responses can better inform areas where funding or support is needed.

Research Questions

Empirical Study 1 addresses the following questions:

1. How can respondent insights, cross compared with Naito et al's (2021) integrative framework for transformative social change, clarify realistic policy directions for climate action in Utah?
2. What barriers can be identified using respondent insights to implementing climate change solutions?

Empirical Study 2 seeks to answer the following questions:

1. To what extent do leaders in the Salt Lake Valley consider marginalized groups within their local community and how the shrinking GSL is affecting them?
2. Are leaders concerned with involving marginalized groups in the decision making or climate change mitigation process? To what extent?

Theory

Three theoretical frameworks are employed in this research to inform interview protocols and guide analysis of responses, as well as synthesizing results. Naito et al's (2021) Integrative Framework for Transformative Social Change alongside Cohen's (2014) Framework for Understanding the Environmental Policy Issue were applied during the writing of the interview questions. I also used them in the analysis of responses to assess which barriers were most prevalent among Utah leaders and perceived solutions. Additional solutions became apparent during analysis. The four pillars of procedural justice (The Justice Collaboratory, accessed 29 July 2022), applied to an environmental justice issue guided the formation of a second interview protocol and

the analysis of responses to assess the extent to which marginalized communities in Salt Lake Valley are being included in structural intervention and transformational process discussions among leaders in Utah. This thesis does not test these theories, but rather applies them to guide analysis of two case studies and provide and frame results in a beneficial way for larger audiences. It is my hope that these insights and the application of these theories will help other areas that are also largely conservative or that have marginalized communities that are suffering from other environmental problems can use this method to identify and assess their specific problems and follow a similar approach to diagnose potential solutions. Each theory and their relevance to this research is described in depth in chapters 2 and 3.

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CHAPTER 2 STATE LEVEL PUBLIC COMMITMENTS TO CLEAN AIR AND
CLIMATE SHOWS PARTIAL SUCCESS IN A CONSERVATIVE STATE

KEY WORDS: water policy, climate policy, desiccation, climate change, air quality

Abstract

In places where climate change has become highly politicized and polarized, such as the state of Utah in the United States, civic groups have led initiatives to try to advance climate policy by focusing on improving air quality, a topic that tends to be far less politically charged. This research focuses on one such effort: the Utah Climate and Clean Air Compact, which aims to connect political parties in a conservative state to improve air quality in Utah amid exponential population growth, warming temperatures, and prolonged drought conditions. Despite prominent leaders publicly signing onto this Compact, progress towards improved air quality and in turn, climate change, has been slow within this state. Despite the lack of urgency, there have been some efforts created and implemented since the Compact's initial publication and signing that suggest it has contributed to some minor successes. I used semi structured interviews of community, business and other leaders who publicly signed this compact alongside document analysis of interviews and opinion pieces focusing on or written by the signatories of the Compact to assess perceived barriers to climate action in Utah and their solutions. Interviews and subsequent analysis were guided by two frameworks: a broad framework for transformative social change, and a second, more specific framework for better understanding environmental policy. My analysis shows that population growth and political disagreements are the most prevalent barriers impeding air quality improvement and greenhouse gas abatement in Utah according to compact signatories. According to

these leaders, the most cited paths towards air quality and climate solutions, despite a lack of major success thus far, is working together across party lines to address these issues.

Introduction

The term climate change has become highly politicized and increasingly polarizing in recent decades (Chinn, Hart and Soroka 2020). As of 2017, an estimated 52% of conservative (Republican) voters in the US think that climate change is happening, as compared to 92% of Democrat (liberal) voters (Mildenberger, et al. 2017). As of 2020, 78% of Democrats in the US think that climate change should be a top priority, while only 21% of Republicans agree (Kennedy and Johnson 2020). Utah offers a case study of an effort to enact changes in climate policy in a conservative state with a recent initiative, the Utah Climate and Clean Air Compact. Utah's history of poor air quality paired with a historic drought that was exacerbated by climate change (Smirnov, et al. 2016), mismanagement and overuse of available water sources (primarily for agriculture) (Bedford 2010), and exponential population growth (Smirnov, et al. 2016) has motivated scientists, non-profit organizations and others to lobby the state legislature for changing water and air policy. The non-profit organization Utah Clean Energy created and published the Utah Climate and Clean Air Compact in 2020. Leaders across the state from varied careers and political backgrounds signed it to signify their support for "legislative policy making to improve air quality and address causes and impacts of a changing climate" (Kem C. Gardner Policy Institute 2020). The Compact aimed to bring Democrats and Republicans together over the problem of air quality, rather than the politicized and polarized issue of climate change. Interviews with signatories from each

group of leaders (government, education, NGOs/non-profits, business, religious, and a few influential individuals), show a snapshot of barriers leaders and policy makers face during climate change mitigation attempts. This type of compact as well as the themes I used in my semi-structured interviews and the results I obtained could inform possible strategies in other conservative regions towards reducing emissions and improving air quality. Given the politicization of the topic, this case study provides a snapshot of what other conservative states may face, should various groups concerned about climate and air quality attempt to enact similar changes.

In this chapter, I briefly review the history of Utah's air quality problems and political climate as well as the politicization and polarization of the term "climate change". Using a case study approach with the Compact signatories, I utilized two frameworks to analyze the signatories' responses. Naito et al.'s (2022) Integrative Framework for Transformative Social Change informed larger scale analysis, while Cohen's (2014) Framework for Understanding the Environmental Policy Issue provided guidance to narrow down specific facets of issues that signatories discussed.

Study Area

Utah's Air Quality

The most populous areas of Utah, Salt Lake Valley extending up to Cache Valley, have had consistent air quality issues historically due to the state's topographic features and heavy industrialization, which have been exacerbated by population growth in recent years (Mitchell and Zajchowski 2022). These two factors combined have caused acute air pollution events (Mitchell and Zajchowski 2022). This was most recently exemplified during the fire season of 2021 when Salt Lake City had a PM_{2.5} level of greater than 100

mg m-3, well over the federal standard and a level that temporarily earned the area the title of “worst air quality in the world”.

Studying the effects of climate change in Utah is particularly pertinent now, since climate change is one of the major drivers of the Great Salt Lake (GSL) hitting multiple record lows in the years 2021 and 2022 with negative economic and health consequences. The most recent broken record was July 3, 2022, while other record lows have historically been hit later in the year, such as the two in October of 2021 (Utah Department of Natural Resources 2023). This shift in how early the records were hit in a year is concerning because it means that the water sources are running low or dry sooner than before. The state’s economy derives \$1.32 billion annually from lake-dependent industries such as the brine shrimp and mineral harvesting industries. Additionally, these industries provide nearly 8,000 jobs to Utahns (Utah Department of Natural Resources 2023). Contributing factors to the desiccation of GSL include water diversions from the lake’s three tributaries (the Jordan, Bear, and Weber rivers) for agriculture and to provide growing populations in the northern part of the state with municipal water, and climatic changes such as earlier snowmelt, higher evaporation rates, and smaller snowpacks.

Utah is also one of the fastest growing states in the US (US Census Bureau, accessed 16 May 2022, United States Census Bureau 2022), seeing an additional 56,291 people from April 1, 2020, to July 1, 2021, a 1.7% increase. This is surpassed only by neighboring Idaho, which saw a 2.9% increase. Larger populations mean larger demands for energy and resources such as water. If current energy and resource policies are not improved to include caps on fossil fuels and increases in renewable energy, as well as improved regulations on water usage, population alone will likely drive increases in fossil

fuel usage and a decreased water supply, exacerbating the problems of drought and climate change (Smirnov, et al. 2016).

While the current effects of a drying lake on the area's health are not clear, examples such as Owen's Lake in California, Lake Urmia in Iran, and the Aral Sea in Central Asia foreshadow what is likely to happen in Salt Lake Valley, Utah's most populous region home to over 1.1 million people in 2022 (United States Census Bureau 2022). These lakes dried up for similar reasons and became large sources of dust and other airborne particles, or PM10. Increased exposure to this particulate matter has been linked to increased rates of asthma, heart disease, and earlier deaths (Stieb and Liu 2013). The Aral Sea specifically is cited as having the worst infant mortality rate linked to air quality problems. Researchers have linked this and other exacerbated health problems with the contamination of the Aral Sea, which was used as a dumping ground for factory and agricultural drainage for the 30 or so years before it dried up (Ataniyazova 1995). GSL has also been found to have high levels of various heavy metals such as arsenic, selenium, and copper (Adams, et al. 2015). These chemicals are currently trapped under a hard crust, but as the crust is worn away by wind and cracked by people walking, driving, and riding bikes along its surface, they have the potential to become airborne and breathed in by residents of Salt Lake City (the largest city in the state with a population of just about 200,000) and surrounding areas (Flavelle 2022), exacerbating the area's existing air quality problems.

[A Brief History of the Term "Climate Change" and Its Politicization](#)

In 1938, British engineer Guy Callendar used records from weather stations around the world to prove that the global average temperature had been increasing over

the last century. He also showed that CO₂ concentrations had increased and implied that that was the cause of the temperature increase, echoing Eunice Newton Foote's 1856 hypothesis about the connection between CO₂ and increases in atmospheric temperature. Other models were created to simulate how the global temperatures would change if the CO₂ concentration was doubled and dispelled theories such as the ocean absorbing all excess CO₂. In 1965, US President Lyndon B. Johnson's advisory committee warned that climate change, then known as the "greenhouse effect" was a "real concern", the first time that climate change was outright acknowledged by the federal executive branch in the US. The term "global warming" was first used in a scientific paper in 1975 (Broecker 1975, Conway 2008). In the 1980s, when renewable energy technology was first being implemented, there was not much attention paid to how the public perceived renewable energies, and it was not seen as an issue because the first public surveys about these technologies showed high levels of support (Black 2013). However, those surveys did not assess whether support for renewables was conditional.

The media's tendency towards dramatic coverage of climate science for the past 30 years has contributed to the hyper politicization and polarization of the term "climate change" and related ideas such as the "greenhouse effect" in the US (Chinn, Hart and Soroka 2020). Additionally, misinformation campaigns have caused a decrease in trust of scientists and experts on the consequences of, for example, tobacco and fossil fuel use (Oreskes and Conway 2022, Oreskes and Conway 2010). Dramatic media coverage and misinformation campaigns combined with the short-term costs of climate action and lobbying by fossil fuel companies (Newell 2021) have led to confusion among many US citizens and a lack of climate action, contributing to the failure to stay below the target

global temperature increase of 1.5°C that the Intergovernmental Panel on Climate Change (IPCC) assessment set forth in 2015 (Cointe and Guillemot 2023). Despite multiple attempts to adopt greenhouse gas emissions reductions goals set by the United Nations Framework Convention on Climate Change in 1992, the Kyoto Protocol in 1995, and the Paris Agreement in 2015, global CO₂ emissions are now 60% higher than 1990 levels (Stoddard, et al. 2021).

The Utah Climate and Clean Air Compact described in the next section aims to circumvent the politicization of climate change and build political momentum for climate and air policy change in Utah.

Utah Climate and Clean Air Compact

The Utah Climate and Clean Air Compact, which was launched in 2020, provides an example of a coordinated municipal and state-level effort to reduce emissions. Writers of the Compact intended for the Compact to be a “directive encouraging broad support and productive conversations and action on climate and clean air solutions” (Utah Clean Energy, accessed 25 June 2023). Various non-profits, businesses, and state and community political leaders launched this compact asking signatories to pledge to adopt the mileposts laid out in the Utah Roadmap. The roadmap outlines actions to reduce GHG emissions and improve air quality in the state of Utah. The compact focuses on air quality, energy efficiency, making environmental improvements that benefit the economy, adopting clean energy sources, support of rural areas transitioning away from fossil fuels and towards cleaner energy systems, and being strong leaders with collaborative solutions to climate and air quality issues (Utah Clean Energy, accessed 25 June 2023). The signatories of this compact consist of educational, business, political,

and religious leaders, influential individuals from the state of Utah, as well as some who lead corporations based within the state or who have major investments in Utah businesses.

Those directly involved with the creation of the compact cited increasing public awareness of environmental issues in Utah and attempting to bring together Republicans and Democrats on the issue of air quality rather than the hyper politicized issue of climate change as the main reasons for writing and publishing the compact. Those that sign the compact are not held to any specific standards in relation to the goals put forth and there are no repercussions if they fail to meet any of the goals outlined in the compact and the closely related Utah Roadmap.

Although most of the signatories are leaders, the Compact also calls on “all Utahns” to adopt these mileposts in their personal lives (Utah Clean Energy, accessed 25 June 2023). As demonstrated in Naito et al’s (2022) Integrative Framework for Transformative Social Change and Cohen’s (2014) Framework for Understanding the Environmental Policy Issue, connecting these two groups (leaders and citizens) and evaluating the individual pieces of the problems is imperative to enacting lasting social change.

Theories Relevant to Climate Change Mitigation

[Integrative Framework for Transformative Social Change](#)

For large-scale change to occur, it is imperative that people in power work alongside citizens, rather than only utilizing top-down methods, to create policy that can be implemented and enable progress towards solutions (Tuladhar, et al. 2009). In most contexts, individual behaviors (private, social-signaling, and system-changing) and

collective action for structural reform must be integrated to enact lasting, transformative change (Naito, Zhao and Chan 2022). In this context, private actions are defined as “behaviors that people privately conduct to reduce their own environmental impacts”, social-signaling as “behaviors... conduct[ed] to publicly share and signal... pro-environmental values, attitudes, identities, and opinions”, and system-changing as behaviors “that people collectively engage in with the intent of changing laws, policies, corporate actions, institutions, and infrastructure” (Naito, Zhao and Chan 2022). Naito et al. (2022) argue that traditional reductionist approaches, while able to identify specific factors that drive human behavior, often lead to failed interventions because the “real world” does not operate in a controlled environment and human behavior is not always predictable. Thus, this prevents large-scale social changes from occurring and having a lasting effect.

Additionally, they claim that approaches that focus on the larger picture, such as holistic or social structural approaches, overlook the differences in people at the small scale, taking away their “individual agency” and rarely provide causal evidence for why or how social change occurs (Naito, Zhao and Chan 2022). As a result of these shortcomings, Naito et al. (2022) as shown in Figure 2.1 propose the use of a “multi-directional causal framework” to explain how individual behaviors and social structures interact with one another. This framework is meant to be used by “change agents” to identify key intervention points and strategies, which could make it very useful for groups or individuals that have pledged to reduce their environmental impact, such as those that have signed the Utah Climate and Clean Air Compact. My research aims to inform “change agents.” I applied this framework to identify leverage points towards

improving air quality and reducing GHG emissions based on my interviews with compact signatories. I chose to use this framework as the background of my study because social scientists contend that top-down and bottom-up methods are not generally successful independent of each other, and because the compact aims to enact lasting change.

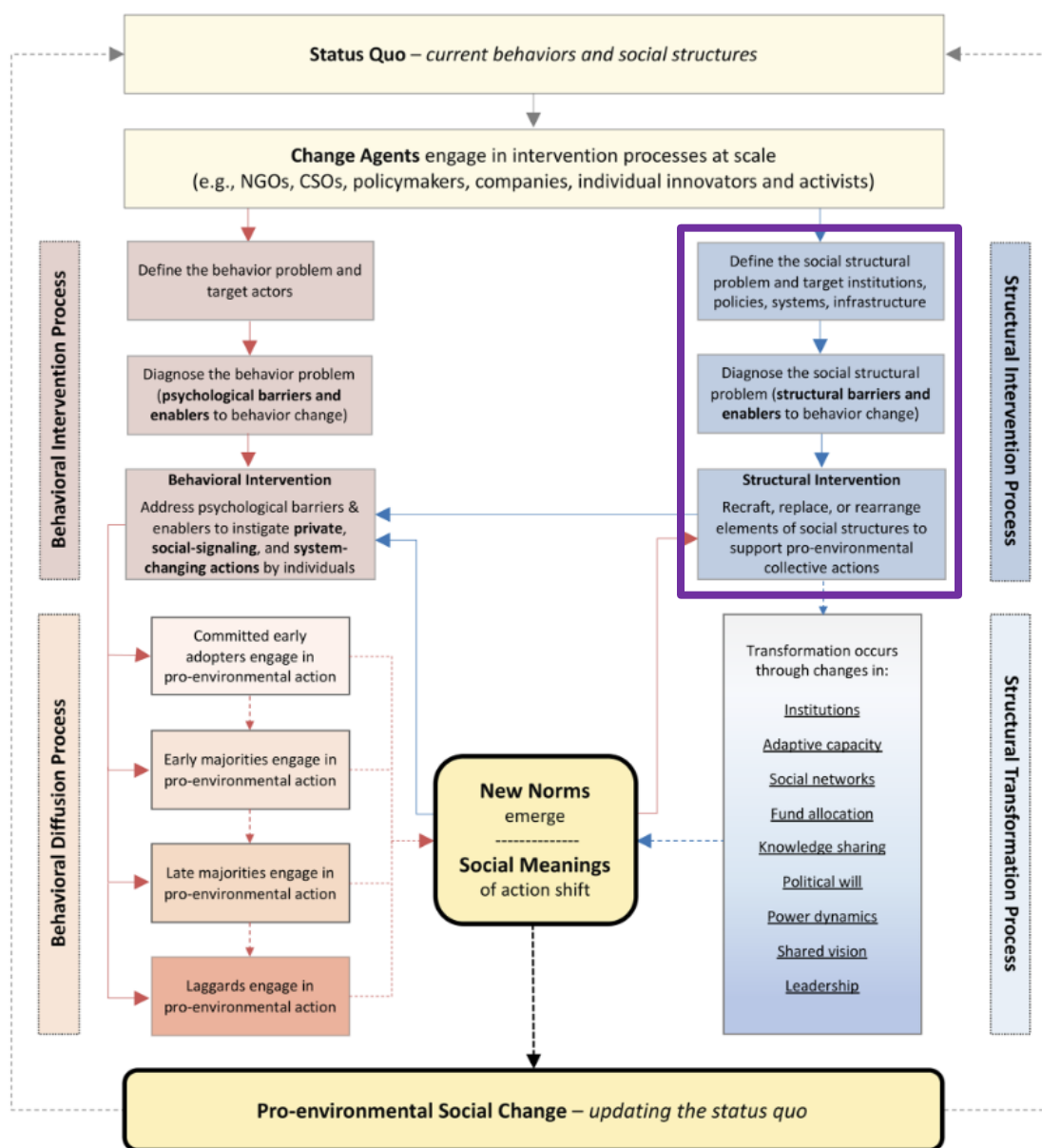


Figure 2.1 Integrative framework for pro-environmental social change (Naito et al., 2021). Solid line arrows represent directions of influence, and dotted line arrows represent potential (desired) outcomes. Red arrows indicate individual behavioral change and behavioral diffusion processes and influences, whereas blue arrows represent structural processes and influences. Red boxes show the portions of the behavioral (or individual) change process while blue boxes show the portions of the structural (or institutional) change process. The section outlined in purple shows the portion of the framework that guided this study.

Naito et al. (2022) elaborate that in their case study, top-down and bottom-up strategies have both been attempted, to no avail, because they fail to integrate the processes to incite lasting, transformative change. Top-down approaches are often disconnected from individuals and as such, rarely gain enough traction to make a difference or change individual behaviors. Conversely, bottom-up approaches can lack the amount of pull necessary to change social structural elements such as governmental policies. In the case study in Naito et al. (2022) they looked at the wildlife trade and found that top-down approaches ignored the fact that the trade was the only income source for many marginalized communities and bottom-up approaches had failed because many consumers are largely unaware of the legal status and negative impacts of purchasing exotic pets. They utilized their integrative framework to suggest a solution that allows the wildlife trade to continue to exist, and thus support the livelihoods of those involved, while still regulating the trade of species that may be endangered or have a large impact on the ecosystem.

Building the political will to address climate change and improve air quality requires a holistic perspective on interlinked individual and systemic changes. This framework is a useful way of organizing a complex array of factors that can influence outcomes. According to Naito et al. (2022), “the world’s ecosystems depend not only on the practice of one group but also of every individual and organization that has vested interests in sustainable way of life.” The signatories of the Utah Climate and Clean Air Compact have obviously shown an interest in Utah’s future and the future of children in Utah and “around the globe” (Utah Clean Energy, accessed 25 June 2023). A large part of that endeavor includes creating more sustainable policies with regards to water and

other resource utilization given the state's growth and drought conditions, it stands to reason that this framework could be a vital tool for them to achieve their climate goals. In the case of many of the Compact's signatories, it would likely be beneficial to coordinate bottom-up and top-down approaches to enact lasting change to reduce GHG emissions and improve air quality. While recognizing the wider scope of factors influencing "pro-environmental social change" depicted in Figure 1, this study narrows in on the "Structural Intervention Process" section of the framework (the right half of the processes in Figure 2.1) to guide the interview questions with a goal of working towards identifying potential ways to intervene for structural transformation. This framework focuses on bigger picture topics, rather than zeroing in on specific facets of environmental and social hurdles. Therefore, a second framework is used in tandem to more closely identify specific facets of the perceived barriers and solutions that presented themselves during the interviews. This framework is detailed in the next section.

[Creating a Framework for Understanding the Environmental Policy Issue](#)

Effective policy to address climate change and improve air quality requires expertise in political science, economics, organizational management, and other related fields (Cohen 2014, Sovacool 2011). As Naito et al. (2022) confirms, addressing one part of these multifaceted problems is usually unsuccessful, or only successful in the short term. An approach that assesses the issue, its causes and a broader context is more likely to enact lasting change. To holistically assess environmental issues and policies to address them, Cohen (2014) argues that five facets of environmental issues need to be understood in order to work towards feasible policy solutions. These five facets are: 1) values; 2) politics; 3) technology and science; 4) policy design and economics, and 5)

organizational management. Within this expansive set of issue and policy dimensions, I focus on perceptions of the policy design and economics, politics, and organizational management. Cohen (2014) defines policy design and economic issues as related to the presence and/or absence of needed public policies meant to reduce environmental damage, and economic factors that have caused environmental damage. Within the framework, these issues also relate to incentives and disincentives, and whether they are effective. Political issues relate to political processes that maintain environmental quality and political dimensions of environmental problems. Management issues relate to the effectiveness of existing administrative and organizational arrangements and whether there is the organizational capacity to solve an environmental problem (Cohen 2014).

While Cohen (2014) focuses on understanding environmental policy specifically, it stands to reason that the categories of issues put forth by Cohen could also be applied to the problems that Utah Climate and Clean Air Compact signatories face when attempting to make progress towards their sustainability goals. This framework was utilized alongside Naito et al.'s (2022) framework to assess the perceived barriers and solutions signatories cited.

Methods

I used a qualitative approach to guide the creation of and analyze semi-structured interviews with signatories of the Compact. This approach allowed me to assess perceived barriers and solutions to climate change mitigation while allowing room for other topics to arise.

Beginning in December 2022 and ending in May 2023, I conducted in-depth semi-structured interviews with 14 Utah Climate and Clean Air Compact signatories (see

interview protocol in Appendix C). The interview participants consisted of six political/governmental, two educational, three non-profit/NGO, and three business leaders. I used publicly available email addresses to contact potential participants and a total of 43 potential participants were contacted.

Despite giving the option for in person interviews, all participants elected to be interviewed by video call (Zoom) or phone. I conducted 13 interviews on Zoom and one via phone. Participants were informed at the beginning that all their responses would remain anonymous to foster a low-pressure environment and garner more genuine responses. Participants were asked questions including “Why did you choose to sign the compact?” and “Have you experienced any barriers to adopting solutions to reach these goals?”, as well as questions about broader topics like “do you think there are bigger societal or cultural barriers impeding progress towards the IPCC’s goal of limiting warming to two degrees Celsius or less?” These questions and responses were discussed in a conversational style. During the interviews, time was given for other questions about topics that may have arisen. I employed “snowball sampling” (Biernacki and Waldorf 1981) in that many participants recommended other signatories for me to interview, and every attempt was made to contact those recommendations.

All interviews were recorded and then transcribed using Otter.ai, a software that transcribes audio files and differentiates speakers. The transcripts were manually cleaned and then transferred into NVivo, a software that is for qualitative analysis. Once cleaned, the manuscripts were sent to each interviewee to review and request modifications if necessary.

Using NVivo, I coded each interview for select themes from the Integrative

Framework for Transformative Social Change (Naito, Zhao and Chan 2022) and the Framework for Understanding the Environmental Policy Issue (Cohen 2014), as well as themes that emerged during the interviews such as growth and societal norms.

I also conducted a document analysis to supplement my interview data. In contrast to the low response rate to my interview invitations, I found several interviews and articles about the opinions of many of the compact signatories who were unable to participate in an interview. Using name and keyword searches on Google Search, I found 16 interviews, articles, and public statements regarding the topics of my interview questions. I downloaded a pdf of each document, input each into NVivo and coded them using the same themes as the interview analysis.

Results and Discussion

Interviewees frequently discussed how climate and air quality issues lacked an air of urgency from the current state level administration. The most salient barriers included differences in political opinions, lack of political support, time constraints/supply chain issues, as well as managing exponential growth and the added strain on state resources like electricity and water. The most often cited solutions were more/improved education efforts, incentivizing desired actions, smart growth (referring to the urban development definition of the term, which includes improved public transit), and working together towards improved climate policies. I explain how the Compact's main goal of building political will across party lines over improving air quality instead of the larger scale and politicized issue of climate change seems unsuccessful to many interviewees but may have aided progress, albeit slowly, towards the Compact's goals. Using the selected parts of the Naito et al (2022) and Cohen (2014) frameworks, visualized in Figure 2.2, I

categorize each perceived issue/barrier and characterize a set of potential ways forward based on the experiences of the compact signatories. Using the categories from Cohen (2014) allowed me to dive deeper into parts of the Naito et al. (2022) framework to better conceptualize and more thoroughly investigate solutions, such as working together across political parties toward a common goal and smart growth implementation, that would result in replacement, recrafting, and rearrangement of already existing institutions in Utah. The intention is for these results from a conservative state to help guide leaders in this state and other regions towards more effective and publicly beneficial climate and air quality policies.

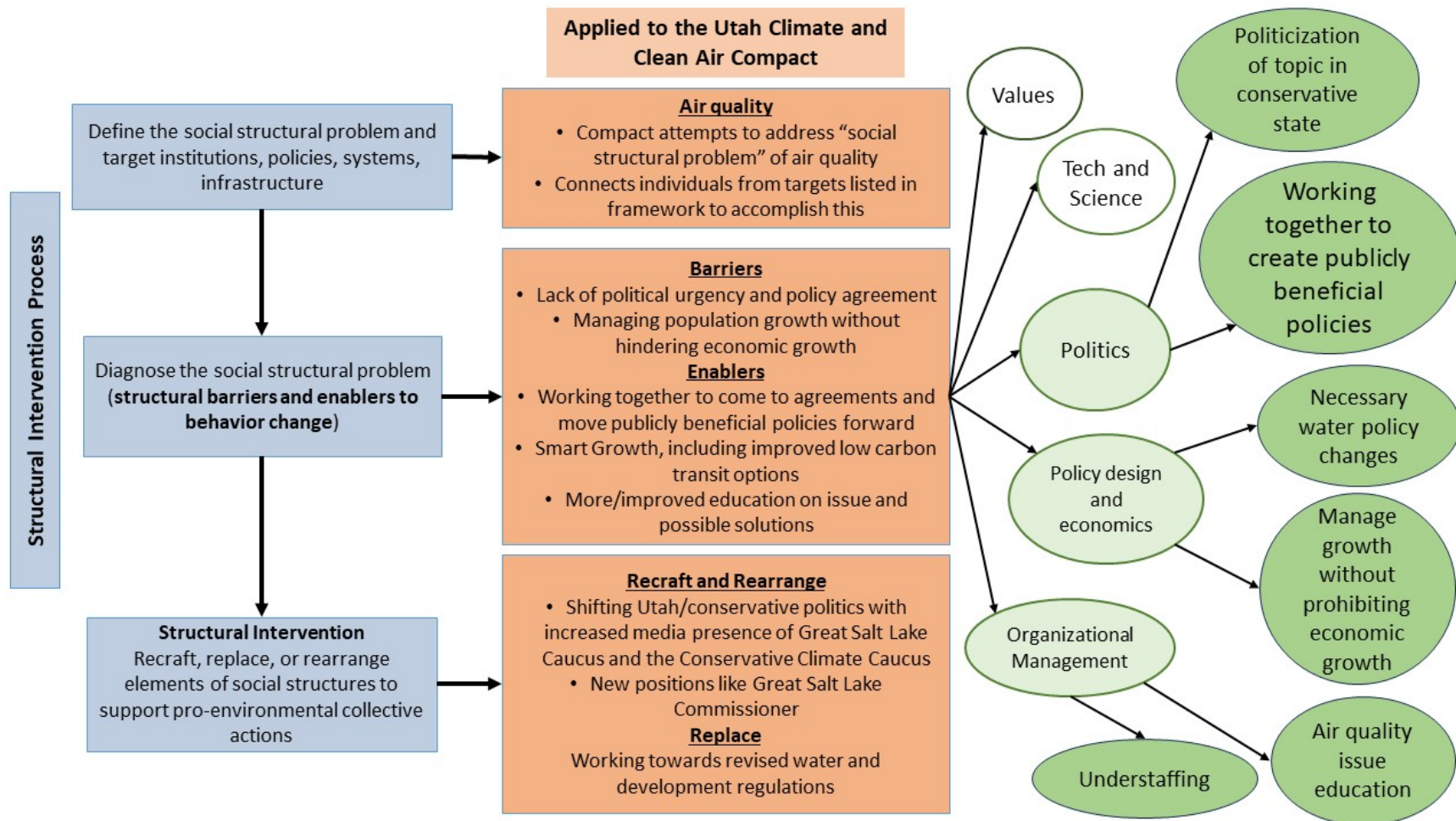


Figure 2.2 Connecting Environmental Policy Frameworks to Guide Climate Action in a Conservative State. Portions of Naito et al. (2022) and Cohen (2014) frameworks were used to assess the state of air quality and climate policy in Utah and perceived barriers and solutions from leaders in the state. Blue boxes show the parts of the Naito et al. (2022) framework that was used as guidance. Orange boxes detail each step of the framework as it pertains to the situation that the Utah Climate and Clean Air Compact addresses. Light green circles show the portions of the Cohen framework that were applicable, white parts that were not applicable, and dark green circles show the aspects of the Utah-specific problems that fell into each category.

Politicization of Climate Change

Climate change has become highly politicized and polarized in the United States (Chinn, Hart and Soroka 2020). Utah is no exception to this. The Utah Climate and Clean Air Compact was created with the goal of uniting Democrats and Republicans and garnering public support in the state of Utah over the issue of poor air quality and the need for a resilient renewable energy industry (Roberts 2020), which is exacerbated by impacts of drought and climate change. Over the course of the interviews, it became clear that many of the participants (6/14) felt that progress was not happening nearly as quickly as the Compact had intended. Some interviewees seemed to blame this lack of urgency on the state's desire to preserve existing systems, a trait that is considered a "core feature" of conservatives (Proch, Elad-Strenger and Kessler 2018). A few participants discussed how they feel that the state continues to prop up the fossil fuel industry, despite transitioning to green energy being one of the core Compact recommendations:

"there's a lot of interest in protecting existing industries and not innovating, not, ... creating the energy system of the future. Which I think is a pretty big barrier, when we're trying to radically change ...our energy system."

(Participant 5, NGO/Non-profit)

"I think climate change has become a trigger word almost, if you will, for partisan thinking. And I think that's unfortunate... I think there's important work to be done as stewards of this planet, And regardless of what you call it, I think we have an obligation. And I think as elected officials, we have that obligation." (Participant 6, government)

In addition to the politicization of this topic, transitioning to cleaner energy has been hampered by donations to political campaigns and lobbying pressure from the fossil fuel industry (Oreskes and Conway 2010). This cash flow, as well as the state economy's reliance on fossil fuels, adds another dimension of difficulty to the switch that the Compact is attempting to catalyze.

“So I know that we need to start with small steps here in Utah [towards a renewable energy market], because of our political climate that is feeling like coal and gas are being attacked.” (Participant 8, government)

Despite this consensus that political differences between the majority (Republican) and minority (Democrat) parties in the state are still blocking progress towards the goals that the Compact set forth, even within the group of political leaders that were interviewed, many interviewees maintain that working together to transform Utah's energy economy and resource policy is the main solution to Utah's air quality problems. As Participant 1 (government) stated and others echoed, “we all can add value to these discussions.” Others agreed with Participant 1:

“But I think it's so important that we are involved with our colleagues across the aisle in some important discussions.” (Participant 8, government)

Participant 8 said this directly after discussing the importance of attending task force meetings and being present for conversations about topics they were not well informed on. Similar to most legislators, they did not come to the table with a background in science and cited the necessity of being as informed as possible on the environmental issues Utah is facing so that they could be a better advocate for their

constituents and facilitate more productive conversations with their “colleagues across the aisle”. A participant from the business sphere also commented on this topic:

“The idea and the word climate change has become politicized. And so in my view, why talk about it? Why argue about it? It doesn't... do anything, but everyone agrees that we should have cleaner air, everyone agrees that we should conserve water, everyone agrees that we should protect our environment for our children in the future. And so that's what you have to focus on.” (Participant 10, business)

This participant cited having adequate support within their business and did not have many other barriers that they could think of. For them, the biggest challenge was navigating the political blocks to climate policy changes rather than their own personal contributions to the national carbon budget. They went on to talk about Congressman John Curtis (Utah Republican) and how they saw success when he established the Conservative Climate Caucus, which includes conservative politicians from across the US, not just Utah. Other leaders from different sectors also commented on this initiative:

“I think there are some partisan roadblocks, they're real. But I also appreciate that there's some good collaborative work taking place [in reference to John Curtis' work with the Conservative Climate Caucus] to try to protect the Earth. And I'm proud of what's happening here in the state of Utah, I really think that we've got good work happening.” (Participant 6, government)

The Conservative Climate Caucus states on their website that they believe “the climate is changing” and they acknowledge that the “decades of a global industrial era

that has brought prosperity to the world has also contributed to that change”

(Conservative Climate Caucus, accessed 10 July 2023). This is a significant shift from earlier Republican administrations, who went to great lengths to hide the scientific consensus about global warming because of political funding and pressure from fossil fuel companies (Oreskes and Conway 2010). The establishment of a group like this, among other groups and positions that are focusing solely on the preservation of the Great Salt Lake, such as the Great Salt Lake Caucus and the Great Salt Lake Commissioner position (a position recently created by Governor Cox), could be signs that change is in fact occurring, but it may not be as quickly as some leaders think it should be, or as quickly as the Compact states is necessary (within 10 years of the signing, or by year 2030 (Utah Clean Energy, accessed 25 June 2023))

Many participants also commented on Utahns as a whole and their perceptions regarding the state’s policy successes:

“I think that Utahns in general are a scrappy bunch. And they're going to try to figure out how to do their best with what they've got.” (Participant 4, business)

Participant 4 stated this after having a long discussion about their financial troubles as a business owner. They cited financial support from the government as a main reason that they were able to get off the ground, but also discussed the difficulties and hoops they had to jump through to obtain some of that funding, or even just to open their business due to a lack of uniform rules during their pre-opening inspections. In their experience, things that were previously acceptable from a regulatory perspective could change very quickly and unexpectedly. Some of these changes had the potential to shut

their business down before it even opened. While regulatory issues aren't necessarily attributable to political differences within the state, they did continue to connect it to another facet of Utah politics: the influence of the Church of Latter-day Saints. Members of this church make up the majority of the population in Utah, and according to past studies, they are much more likely to be Republicans than other Americans (Cragun and Philips 2008). Given that this group has also held a supermajority in the state's government since the 1950s, they also directly influence the state's policy trajectory (Davidson 2021). Another interviewee commented on this influence early on in their interview:

“Utah's a red [conservative] state, and there are a lot of red states, you know, there are 28 Republican governors or Republican legislators. ... but we're different than the other 27 because we live in a theocracy. And the LDS church has enormous influence on all things policy throughout the state. ..., when 68% of the state identifies as a strong LDS and that faith is the most important thing to them, but 97% of the legislature and the governor's office and executive positions are LDS it's, it's outweighed, and the LDS church, you know, basically controls everything because they all vote Republican [conservatively]. And that's why we have super majorities in the House in the legislature that's unlike any other red state where a single religion has that much power and that much devotion and that much blocked voting.”

(Participant 12, business)

After being forced to leave multiple states, the LDS members ended up settling in Utah and made the desert “rejoice, and blossom as the rose” (Smith 1830), otherwise known as introducing irrigation to the Salt Lake Valley. This story may have helped

justify lush, green lawn and growing thousands of acres of alfalfa, a highly water intensive crop, in the state's top five commodity crops. Resulting from the recent megadrought that began in 2000, this idea of limitless water consumption has come under fire, and younger LDS members may be changing their tune. As BYU student Addison Graham puts it:

“Somewhere along the way, Mormon culture devolved from embracing stewardship of the land to accepting nearly unfettered development.”

(Graham 2023)

Graham goes on to detail other parts of LDS scripture that seem to have fallen by the wayside, such as the part that states that meat should be eaten sparingly. He connects this negligence to growing thousands of acres of water intensive alfalfa, which ranks among Utah's top five commodity crops (Graham 2023). Commentaries such as these, as well as continued scientific guidance on how to prevent the desiccation of the Great Salt Lake, have led to some changes within the state. In March 2023 the church promised to donate “over 5700 water shares” to the lake from agricultural uses and is said to have paved “the way for future partnerships and will include new measurement infrastructure” (Utah Department of Natural Resources 2023).

Before Participant 4 referred to Utahns as a “scrappy bunch” they had discussed this movement of young LDS members back to the roots of their religion:

“Mormonism has an interesting reputation rooted in a lot of principles that sadly, they've sort of put on the backburner for a long time, but I'm finding that younger Mormons are really dredging up these early principles... And they're going to try to figure out how to do their best with what they've got.

And I think that it has been a compatible environment in which to start something like this [referring to the Compact and its goals].”

Compact signatories identified ongoing political divisions within Utah over air quality and climate policies, despite the efforts of the Compact and its authors and signatories. Although most participants agreed that working together towards publicly beneficial policies was still a viable solution to Utah’s air quality problems, they also agreed that a lack of political support for such policies, political differences between parties within the state, and the differences in opinion between leaders (who make up the supermajority in the state legislature) that are members of the LDS church and Utahns that are not, were the biggest barriers that the state is facing. Given that the main goal of this Compact was to unite political parties over the issue of air quality, it does not appear to have been totally successful. Based on comments about the prevalent religion influencing policy and voting within the state, I speculate that religious leaders may have the largest role in shifting how residents and legislators think about and respond to these issues.

Growth

The second most prevalent barrier to effective state policies to improve air quality and more broadly, climate policy, that participants discussed was population growth within the state. This overarching topic tended to branch off into other barriers, such as supply chain restrictions, understaffing, time constraints, infrastructure limits, as well as increased negative air quality impacts related to vehicle usage, industrial activities, and increased water usage. Since this topic is so multifaceted, using the selected portion of the Naito et al. (2022) framework alone to analyze the problem did not provide an easily

communicable result. Therefore, the different parts of the issue have been broken down using the 3 chosen sections of the Cohen framework: Politics, Policy Design and Economics, and Organizational Management.

Politics

As discussed in the last section, the issue of climate change has been politicized, partially because the state's administration has historically and continues to receive funding from sources such as the fossil fuel lobby. The current administration is also perceived to have prioritized the growth of the state's economy over environmental conservation:

“the state legislature happens to be pro-development, and they spend a lot of our tax dollars encouraging people to move to Utah, we'd love to see that change.” (Participant 2, government)

This idea that growth is occurring at the detriment of the state's natural environment was present in 5 of the 14 interviews, and many of the participants acknowledged that while the development is necessary to provide housing for the state's population, it usually isn't preventable without some sort of policy blocking it:

“Because cities don't build housing, we don't build commercial but... the land owners in our community are in full build mode, and they can't get homes built fast enough people have them bought before they're even built still.” (Participant 6, government)

“not understanding how this [open space initiatives] works is always an interesting component. People want it to stop. Well, it can't stop. A landowner that's got 100 acres can sell that to a developer or not. And a developer can

develop it based on what the zoning is. And if a plan is presented to the city that meets all the zoning and code requirements. Legally, I can't deny that, it's not possible, it's not legal.” (Participant 2, government)

These issues are part of the bigger social structural problem of rapid growth that relies on fossil fuel energy. Participants had a few suggestions as to how to handle the issue. Some of the political leaders discussed the option of Open Space Bonds (usually an initiative that creates a public fund to be used by municipalities to buy development rights for a piece of land, thus blocking any future buyers from developing the land differently) and similar initiatives. Bonds like this encourage revitalizing already existing structures instead of expanding a city’s sprawl, since it takes away development rights to open areas. Additionally, preserving areas of green space directly impact the mental and physical health of citizens who utilize them (Dadvand and Mieuwenhuijsen 2018) as well as improving air quality and reducing urban heat (Heidt and Neef 2008).

As Participant 2 stated (see above), cities legally cannot stop development if a proposed development meets all requirements, it cannot be denied simply because the city does not want to allow more growth. However, participants felt that if the development rights were owned by the city or county, they could block such developments. There seems to be some miscommunication about what an open space bond would mean. During discussions about the recent open space bond in Logan, Utah, even county council members weren’t sure about how the money would be used: “Proposition 1 is full of good intentions and has a worthy goal. However, it doesn’t have any substance behind it. There aren’t any details on how your hard-earned money, \$20 million in total, will be spent. ... Remember, the devil is in the details.” (Cache County

Council Member Paul Borup, as quoted by the Herald Journal). Despite many citizens calling for a halt to development, many were opposed to an initiative like this, with 45.9% voting against Cache County's open space initiative in the fall of 2022 (Marchant 2022). While this could be considered a "Policy" issue in regard to the Cohen (2014) framework, because so many citizens pushed back politically and because so many local politicians had voiced opinions on the matter, I classified it as a "Political" issue.

Participant 6, a political leader, who had cited growth as their biggest barrier to mitigating poor air quality and climate change, claimed that their community elected them because of their support of an open bond initiative. They firmly believe that open space initiatives are one of the very few ways that development that results in urban sprawl can be curbed. Many of the interviews that discussed Open Space Bonds segway into discussions about smart growth, which I cover in the Organizational Management section.

Policy Design and Economics

Another solution for managing population growth that came up in the interviews was to drastically change how water is used and the rules regarding water use within Utah. As Participant 10, a business leader, put it:

"70 to 75% of the water ...[in] Utah [is] consumed by agriculture, agriculture represents about 2% of the state's GDP. So, the question is how can we free up some of that water that has been used for irrigation and allow more of it to flow to Great Salt Lake? What can you put in the soil in terms of bacteria that will enrich the soil and increase output but at the same time, take less water? ... how can you irrigate with less evaporation... I think there's a lot of things that we can do from a technology point of view, and how

water is used in agriculture that hopefully will free up a lot the water the problem is, is that if you free it up, you gotta let it flow to Great Salt Lake and not capture it and use it to build more houses.”

Participant 10 went on to discuss how this may mean using less water in certain sectors such as agriculture or building less but did not elaborate on how they thought those changes should be implemented. Other participants had ideas:

“we’re still growing alfalfa and raising cows and things like that up here. So there is a way that that water could be better used... that could benefit the environment on a lot of levels.” (Participant 2, government)

Other participants thought that Utahns significantly underpay for the water they use:

“I do think that we should be actually like paying the full cost of some of the things that we use, like water ... if we really charged people what water costs, I think people's behavior would change.” (Participant 11, government)

Many of the interviews discussed changing existing water policy within the state to reflect the current state of the environment, after two decades of a megadrought. Utahns reportedly use more water than any other state, with 75% of the water going to agriculture and only 10% being used by municipal users (The Center for Growth and Opportunity 2023). Many of the participants did not think that enough was being done within the policy sphere to control and reduce water usage within a state. This may have been different if all interviews were conducted after the legislative session in March. In response to record low GSL lake levels, a new Agricultural Water Optimization Task Force was created during the 2023 legislative session, and the same bill that created this

task force also appropriated \$200 million to be used to optimize agriculture, including its water usage. This is only one such initiative but paired with the sentiment that interviewees shared of the necessity for reform in water policy, it could be a sign that the Compact is beginning to accomplish its goals and that the Compact is part of a larger, growing effort to improve water policy which is increasingly inextricably linked to air quality around GSL..

Organizational Management

Utah is the second fastest growing state in the US and consequently growth and how to manage it was a common topic brought up by interviewees. Some were concerned about congested roads, and in turn, more emissions and decreased air quality:

“And the further you have to get over and [the more] lanes the more congestion you create, which makes it counterproductive.” (Participant 1, government)

This participant discusses public transit and emphasizes making it as accessible as possible. Expanding the valley’s transit system was a main solution across many interviews, as well as subsidizing and electrifying it so that utilizing the system would not place additional financial strain or emit more carbon in already carbon heavy areas like downtown Salt Lake City. Given that almost half of Salt Lake City’s population commutes to or from another county for work (Department of Workforce Services 2023), an improved and expanded transit system could be incredibly beneficial and create a large decrease in emissions from personal vehicles.

Others were concerned with how to supply a larger population with water or electricity:

“So we are down significantly, and the baseload power, we thought we had, you know, even three or four years ago, and our city is growing, we have more demand on our power.” (Participant 3, government)

“We're more mindful than we've ever been... experiencing this record drought and the significant impact ... the risk of losing the Great Salt Lake the concerns about having the water to be able to provide for the growth that is coming.” (Participant 6, government)

Regarding the Open Space Bond idea discussed earlier in this chapter, participants are very worried that the state will not be able to support a growing population. Some communities are concerned about providing power, given that multiple renewable sources have either gone offline due to lack of water (the Colorado River Storage Project) or been delayed, some indefinitely, by supply chain issues that have persisted since COVID began (Red Mesa Tapaha Solar Farm). Other concerns are that many new developments are electrifying most appliances, which in theory is good for the climate issue since these improvements will prevent direct usage of natural gas and other fossil fuels in the home but could be unsustainable for some communities that are already struggling to provide electricity for their current baseloads.

Many participants also cited getting ahead of the problem, or focusing on planning more efficiently and carefully for the inevitable population growth:

“Or we can be really deliberate about how we plan and steer and direct the growth so that it is a benefit and we don't lose ... and ruin what we have and ... the climate and the environment and the mountains and everything that we have here. If we just let growth happen, that's what will

happen. ... but being deliberate about it, we can manage growth in such a way that it is a benefit... economically it's a benefit even for quality of life... We can put in better transportation systems.” (Participant 6, government)

“So there are these like combinations of city design, road design, transit, that are huge opportunities, when you think about kind of the bigger picture of planning a more climate focused future.” (Participant 11, government)

Many participants described qualities of smart growth without directly naming the concept. Within this study, the term “smart growth” refers to the urban development definition that is guided by the following measures: 1) street network connectivity, 2) housing density, 3) land use mix, 4) accessibility, and 5) pedestrian walkability (Song 2005). Another political leader, Participant 3, had a different take on how to curb development growth. Revitalization, a vital component of smart growth, was their solution. They “focused on downtown revitalization”. This mind frame, of taking what already exists and altering it to better fit a community’s needs, seemed to be prominent across many of the interviews. Participant 3 also discussed improving parks and trails to provide more opportunities for active transport options, and to reduce vehicle traffic. Participant 6 also touched on improving public transport options alongside active transport options:

“And if people want to hop off the tracks line with their bikes and just go, that's what we want to create ... [name of area removed to protect identity] has been built as a very walkable community. So building our community and planning it in, in stations and communities that are transit

oriented communities is also a benefit. Definitely, if you can create spaces where people can live, work and play, and they don't have to drive their car get there. Of course, we know that that matters.”

All of the participants acknowledged that this population growth that the state is seeing is inevitable and there is little that they can do to stop it. Rather than focusing on the negatives of the situation with little to no mention of paths forward, which is common in climate science communications and has played a role in eroding the public’s trust of climate scientists and their willingness to act (Bissell 2011), they have addressed the issue of population growth and begun addressing it with solutions. While many of these solutions are still in their infancy, such as increasing access to public transit and transitioning this system to cleaner energy sources as well as implementing open space bonds to preserve public access to natural spaces, others are well on their way to being completed and influencing others in the state, such as the Daybreak community in South Jordan. This community has been touted as a “master-planned” community and while it still has some flaws, such as being the terminus of the light rail line and having a fairly high home price (just under \$600k in May 2023, almost \$100k more than the average for the state), it serves as a guide for what can be possible for communities in Utah and provides guidance on how to improve in future communities.

Limitations and Implications for Further Research

Due to a lack of responses to interview requests, no religious leaders were interviewed. Thus, a key perspective is missing in the results. Further research may benefit from including this group’s perspectives even if they are not likely to have expertise on specific ways that air quality and climate change could be addressed.

Additionally, because these interviews took place from December 2022-May 2023, some interviews may have been skewed by Utah's record-breaking winter snowfall. This falls under the category of "present bias" (Takeuchi 2011). Many of the later interviewees focused on this weather anomaly but earlier interviews were more influenced by a news article claiming that the Great Salt Lake may have less than 5 years before it was completely dried up (Larson 2023), if drastic action was not taken in the coming months.

Another event that occurred during the midst of the interviews was the 2023 Utah Legislative session. A few of the interviews took place before the session and did not discuss any of the bills that were set to be voted on. Other interviews took place during the session and some participants followed it more closely than others, which may have caused a larger focus on policy in some of the interviews.

Future researchers can build on the results of this study by gathering data from the groups that were unresponsive to my requests. Additionally, comparing these opinions to the laws and bills that are or are not passed during legislative sessions could create a wider snapshot of the political climate in Utah. This theoretical approach can also be used to assess and improve other environmental policy issues and in other areas of the world, but especially in other conservative states in the US. The other sections of the Naito et al. (2022) framework should also be used to guide future research, specifically the behavioral change portions of the framework. While this research focused on institutional change, it has been cited by social scientists that top-down approaches are not viable alone, they must also include bottom-up to have a lasting impact.

Implications for Policy

Based on the last decade, transformative policy change is unlikely particularly in the context of a state government dominated by conservatives who tend to resist expanding the role of government. However, given the influence of the LDS church on governance in Utah, legislators could do more to invoke the history of collective action in Utah when settlers came together for a common cause, namely, to build irrigation infrastructure. The infrastructure required now, as identified by the leaders who I interviewed, includes management of population growth including high density housing, cleaner transportation systems, efficient municipal water systems, effective changes to the current “water rights” system, and efficient management of agricultural water usage. Such a transition would generate jobs and could ultimately improve the quality of life for over a million people in the GSL region.

Based on the relationships between political parties in the state, small, incremental changes may have been the only way forward up to this point. The state of Utah is currently being sued by environmental groups because its past policy has failed to prevent the impending collapse of the lake and its ecosystem. If this lawsuit is successful, it will require the state to maintain a “healthy” lake level of 4,198 feet and the state will have to provide injunctive relief, which requires the state to prevent further depletion of the lake. The policy recommendations made above would serve both purposes. Additionally, should this lawsuit come to fruition, it could also make these changes happen at a much faster pace than before.

Conclusions

This research uses a novel approach in combining a framework for transformative

social change and a framework for understanding environmental policy to assess barriers to and solutions for climate mitigation in Utah. This case study explores barriers that political/governmental, educational, non-profit/NGO, and business leaders throughout the state have experienced when attempting to adopt the pillars of the Utah Climate and Clean Air Compact. By assessing perceived issues alongside perceived solutions, this research suggests that more work still needs to be done to connect the prevalent political parties within the state over more facets of the issue of poor air quality, but progress has been made in some sectors. Many signatories claim that change is not happening quickly enough and attribute it to differences in politics but maintain that working together is still the best option for transformative change. The main goal of the Utah Climate and Clean Air Compact was to connect leaders from “both sides of the aisle” (conservatives and liberals) over the less politicized issue of poor air quality, rather than climate change, to help facilitate necessary policy changes in a timelier manner. While some changes have begun to happen, such as the formation of groups like the Conservative Climate Caucus, a group that is made up of US Conservatives who acknowledge that climate change is happening and that it has become politicized, and some policies, such as the one discussed earlier that appropriated \$200 million and created a task force for optimizing agricultural water usage, most of the participants still thought that these changes were happening at a much slower pace than was necessary and was recommended by the Compact, and in turn the Utah Roadmap.

This case study also focuses on a circumstance unique to Utah: exponential population growth in the face of a potential climate catastrophe. Utah is currently the second fastest growing state in the US and most of the state’s population is to the east of

the Great Salt Lake, which is at risk of drying up. Because of local wind patterns, a large portion of the population is downwind from the lake, putting them at risk of exposure to toxic lake dust. Many leaders were concerned about how to supply this growing population with adequate living conditions and resources, while also protecting Utah's agricultural and public lands. Smart growth was a commonly perceived solution, although most leaders did not refer to it in this way. They instead focused on specific aspects of smart growth like active transport and public transport support, diversifying housing options, urban revitalization, implementing open space bonds, and getting ahead of the population curve to prepare and provide for the influx of people in ways that support the new populations without sacrificing air quality (i.e., looking for resources that provide electricity without relying on fossil fuels).

These perceptions could be beneficial when assessing how to move forward with state legislation or for other communities to utilize when deciding how best to approach potential climate issues in the future. This study only focuses on the structural intervention process of Naito et al.'s (2022) framework but touches on the importance of public support and changes in social norms, which are vital components of other parts of the framework for larger, lasting societal changes.

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CHAPTER 3 COMING UP SHORT IN THE FACE OF COMPOUNDING AIR
QUALITY, WATER SCARCITY AND CLIMATE CRISES: ENVIRONMENTAL
JUSTICE CONCERNS IN THE GREAT SALT LAKE REGION OF UTAH

KEY WORDS: environmental justice, air quality, marginalized communities, Great Salt
Lake

Abstract

The impacts of climate change are and have been disproportionately felt by marginalized communities across the world. Such communities on the west side of the Salt Lake Valley in Utah stand to feel the consequences of a drying lake more than those in other parts of the valley. Signatories of a recent climate initiative have signaled that they see a need to address the ongoing poor air quality, but it is unclear if these leaders are considering the disproportionate impacts the west side may face. This study relied on expert interviews (n= 11) and analysis of media (17 news articles) analyzed according to a definition of procedural justice and its four pillars. I assess the extent to which a subset of business, community, and non-profit leaders in Utah, who have publicly signed a commitment to reduce air pollution and GHG emissions, consider these communities and their needs and concerns related to air quality, GHG emissions and water policy. This study found that although most leaders are highly concerned about adverse effects of a drying lake, they are concerned about the valley as a whole and often do not have the needs of the most vulnerable residents at the forefront of their minds, nor do they ensure that they are involved in the decision-making process regarding water use and air quality policies. I conclude with recommendations for improving equity and procedural justice when it comes to addressing interlinked air quality, water scarcity and climate issues. My

research suggests that moving forward, leaders should provide more opportunities for the communities closest to the lake to voice their concerns, and leaders should take specific concerns of those most vulnerable into consideration when making policy decisions regarding the lake and the impacts of its desiccation.

Introduction

“Everyday inequalities—around race, gender, age, neighborhoods, and nations, among others—determine who lives, who dies, or who suffers disproportionately” (Klinenberg, Araos, & Koslov, 2020). For many years, social scientists have shown that natural disasters are not that natural, rather they are almost always influenced by human actions and have become more and more unpredictable (Klinenberg, Araos, & Koslov, 2020). Climate change has made these disasters more frequent with increasingly negative impacts (Banholzer, Kossin, & Donner, 2014). A key concern in climate change mitigation is community resilience, since climate change has been found to create “compounding and cumulative disasters” (Klinenberg, Araos, & Koslov, 2020). In this research, I focus on a relatively wealthy, politically conservative region of the world that nonetheless is arguably on the brink of compounding and cumulative disasters. Using the four pillars of procedural justice to guide interview questions and analysis of responses from a subset of leaders in this region, as well as analysis of publicly available documents, my research suggests that while leaders are thinking about marginalized communities on the poorer west side of the Great Salt Lake (hereafter referred to as GSL), they are usually not involved in policy discussions and their needs/concerns are largely overlooked in discussions about lake desiccation mitigation. Instead, leaders are mainly concerned with impacts on the state as a whole.

Despite decades of warnings from scientists about the risks of a shrinking Great Salt Lake (Wurtsbaugh & Sima, 2022; Endter-Wada, Kurtzman, Keenan, Kjelgren, & Neale, 2008), the scale of response as of 2023 to these linked climate, air quality and water scarcity challenges has been insufficient in relation to the scale of the problems. Challenges remain to better regulate and reduce anthropogenic water use and reduce greenhouse gas emissions to address a reinforcing feedback cycle linking hotter temperatures, reduced snowpack, and a shrinking terminal saline lake (Baxter & Butler, 2020; Abbott, et al., 2023). As demonstrated repeatedly in the literature, poor communities and communities of color are likely to bear the brunt of consequences from the local impacts (in this case toxic dust from exposed lakebed) (Wildcat, 2013; Kolzenburg, 2022; Benevolenza & DeRigne, 2018) hastened by climate change and excessive human appropriation of resources (in this case water).

In this study, I review Utah's history of racial injustices and how it connects to current environmental justice issues. Using the definition of procedural justice as guidance, I investigate the extent to which leaders are considering the needs and concerns of the communities that are likely to be most impacted by a natural hazard that has been and will likely continue to be exacerbated by climate change. In the case of this study, procedural justice is defined by identifying strategies for injustice remediation while providing effected communities with a voice and including their insight in decision making processes (The Justice Collaboratory, accessed 29 July 2022), and whether a procedure treats those that it is applied to justly (Miller, 2021). The results of this analysis suggest a way forward to increasing adaptative capacity, reducing vulnerability and expanding inclusion in decision processes as related to climate action among leaders

in Utah who have signed onto a public climate initiative. In this case, adaptive capacity refers to the ability of these communities to adapt to their local environments. Reducing vulnerability refers to a reduction of how drastically a natural hazard would impact the community. Through semi-structured interviews, I develop a more holistic understanding of how these Salt Lake Valley-based leaders perceive the needs of the most vulnerable communities in their area. I evaluate the extent to which these signatories have considered procedural aspects of social equity (defined below) as related to achieving the milestones established in the Compact.

Disproportionate Impacts of Climate Change on Marginalized Communities

The locally and regionally catastrophic impacts of climate change are becoming increasingly common and severe (IPCC, 2022). Climate change disproportionately affects those in marginalized communities around the world (Shonkoff, Morello-Frosch, Pastor, & Sadd, 2011). Shonkoff et al (2011) discusses how poor communities often do not have access to the resources needed to not only live through but also be resilient to major weather events such as heat waves, drought, and hurricanes, among many other severe weather phenomena. Social scientists have recognized that climate change is a moral issue because those who contributed least to emitting greenhouse gas emissions bear the brunt of suffering from the consequences of these emissions (Islam & Winkel, 2017). Recent research has shown that affiliation with a locally dominant religion, in this case study the Church of Latter-Day Saints (LDS), known informally as the Mormon Church, “shapes neighborhood patterns of environmental inequality”. This religion is prevalent in the Salt Lake Valley area. Several communities along the western edge of the city are comprised of marginalized groups, as seen in Figures 3.1. Many of these

groups are not majority LDS, while the richest and whitest communities, which are also largely LDS, are concentrated in the eastern side, placing them farther away from one of the main sources of SLC's poor air quality, the drying Great Salt Lake (Collins & Grineski, 2019).

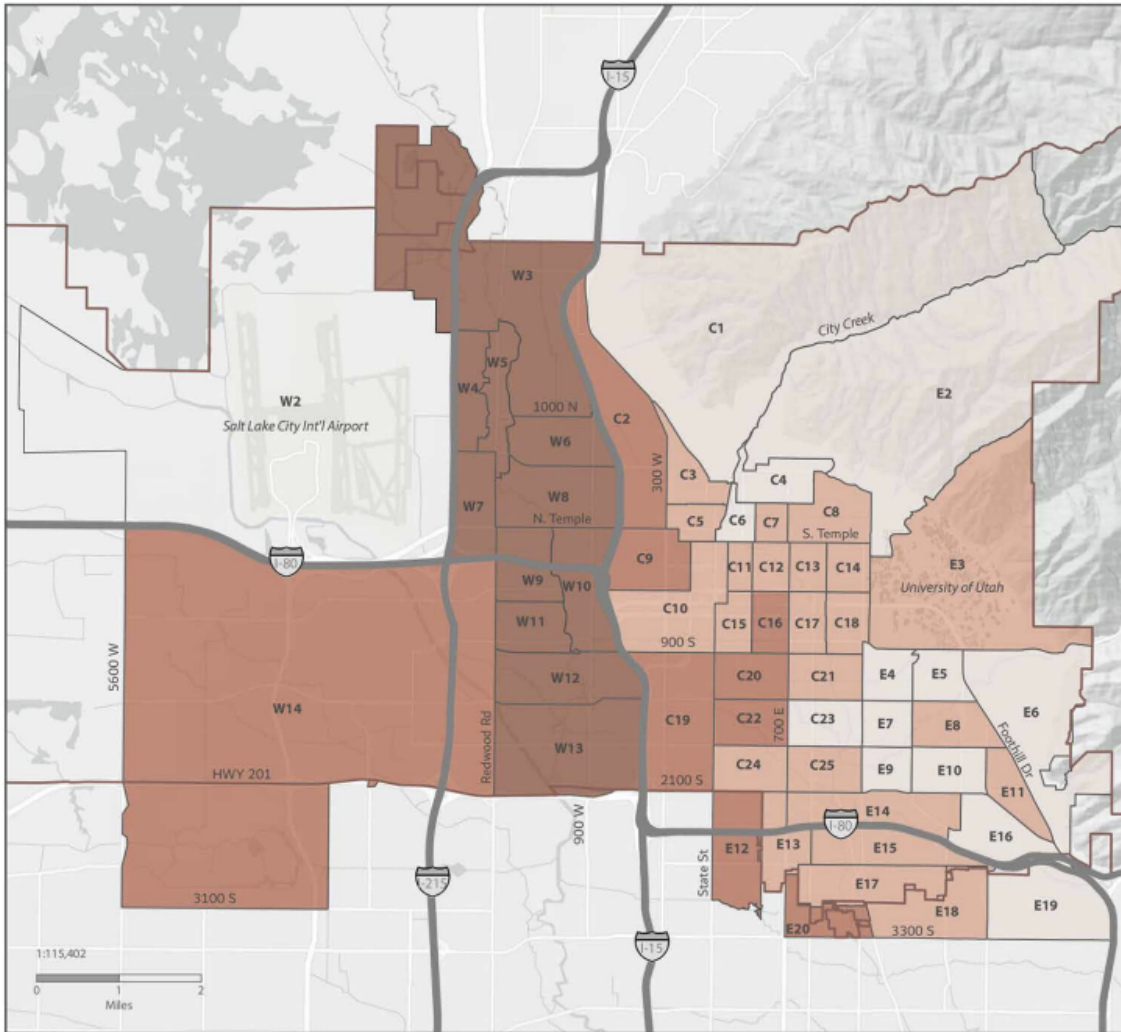
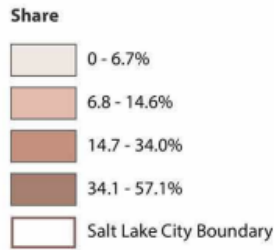


Figure 3.1 Concentrations of Hispanic populations in Salt Lake City as of 2018 by council districts and census tracts. Darker colors signify higher concentrations. The Great Salt Lake is to the west, or the left of the map (Kem C. Gardner Policy Institute, 2020). Areas closer to the lake, and subsequently more exposed to the dust, have a much higher proportion of the city's Hispanic populations.

Environmental Justice

The term environmental justice is defined as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies” (EPA, 2022). Environmental justice first became a national concern for the US in the 1980s, when civil rights activists fought the state of North Carolina, when legislators came close to allowing 120 million pounds of contaminated soil to be deposited in Warren County, which had the highest concentration of Black citizens in any county in the state (Mohai, Pellow, & Roberts, 2009). This movement highlighted an aspect of environmentalism that White environmentalists had overlooked and one that has been proven time and again over recent decades: people of color are often disproportionately impacted by pollution (Islam & Winkel, 2017). Since the 1980s, environmental justice has continued to be studied and gained attention in the policy arena (Mohai, Pellow, & Roberts, 2009).

Procedural justice, also known as procedural fairness, is defined as “having the political power to shape decisions in the policy process”. Procedural equity is defined as “the ability for actors to have meaningful participation in decision making processes which will affect them”. Interactions are considered “procedurally just” when the individual was 1) given a voice and 2) treated with dignity and respect. These encounters must also have 3) a decision-maker who is neutral and transparent and 4) who has conveyed trustworthy motives (The Justice Collaboratory, accessed 29 July 2022). These four tenets guide the interviews and analysis detailed later in this chapter. According to The Justice Collaboratory, procedural justice can restore strained community

relationships by improving legitimacy. Additionally, scholars have found that the decision-making process regarding environmental contaminants and what levels are “acceptable” is generally conducted without considering marginalized communities. If these communities are given adequate support (i.e., given the communication skills and education on the topic that are necessary to make an argument), they can often push for more strenuous policies that protect them more (Skinner-Thompson, 2022).

Environmental Justice concerns, including procedural justice dimensions, have been incorporated explicitly into the largest suite of US federal climate policies: the Inflation Reduction Act. It includes \$47.5 billion in direct benefits for “disadvantaged communities” (Perls, 2022). Given how Salt Lake City has multiple marginalized communities living in close proximity to a probable health hazard (Collins & Grineski, 2019), applying insights from the environmental justice field means that the needs of these communities related to worsening air quality and probable health impacts ought to be assessed. In May of 2023, the Environmental Protection Agency (EPA) announced that Salt Lake City would receive up to \$1 million from the Climate Pollution Reduction Act grant program. This is the first round of multiple grant opportunities. This \$1 million is meant to be used to plan and develop strategies to reduce emissions, protect communities from pollution, and advance environmental justice (EPA, 2023). Additionally, the city has conducted an equity study regarding access to public transit in the west side neighborhoods, which is a big step in the right direction but does not acknowledge the impacts of the nearby drying lake (Salt Lake City, accessed 2 July 2023).

Many scholars state that for injustice to be mitigated, as visualized in Figure 3.2

below, the injustice must first be identified, outcomes considered in light of what constitutes a fair distribution of costs and benefits (distributional justice), the affected parties and their human dignity and the differences between them and the dominant society recognized (recognitional justice), and only then should strategies for remediation be identified (Jenkins, McCauley, Heffron, Stephan, & Rehner, 2016). Jenkins et al. (2016) also posits that procedural justice is “more than simply inclusion. It also involves the mobilization of local knowledge.” In the context of my research, the concern is the drying of the Great Salt Lake, and the affected parties are marginalized communities who, for historical and economic reasons detailed in the next section, live in areas that are most likely to be affected more by the resulting increase in toxic dust than wealthier communities at higher elevations and greater distance from the lakebed. While it is still unclear to what extent these communities are being impacted, most studies agree that they should be the primary concern during policy conversations (Christian, Delgado, Summers, & Magana, 2023; Jones, 2021; Andrews & Smirnov, 2020). It is also unclear if these communities have been consulted when researching possible solutions to this looming public health crisis connected to water over-use, drought, and air quality that acutely threatens the area.

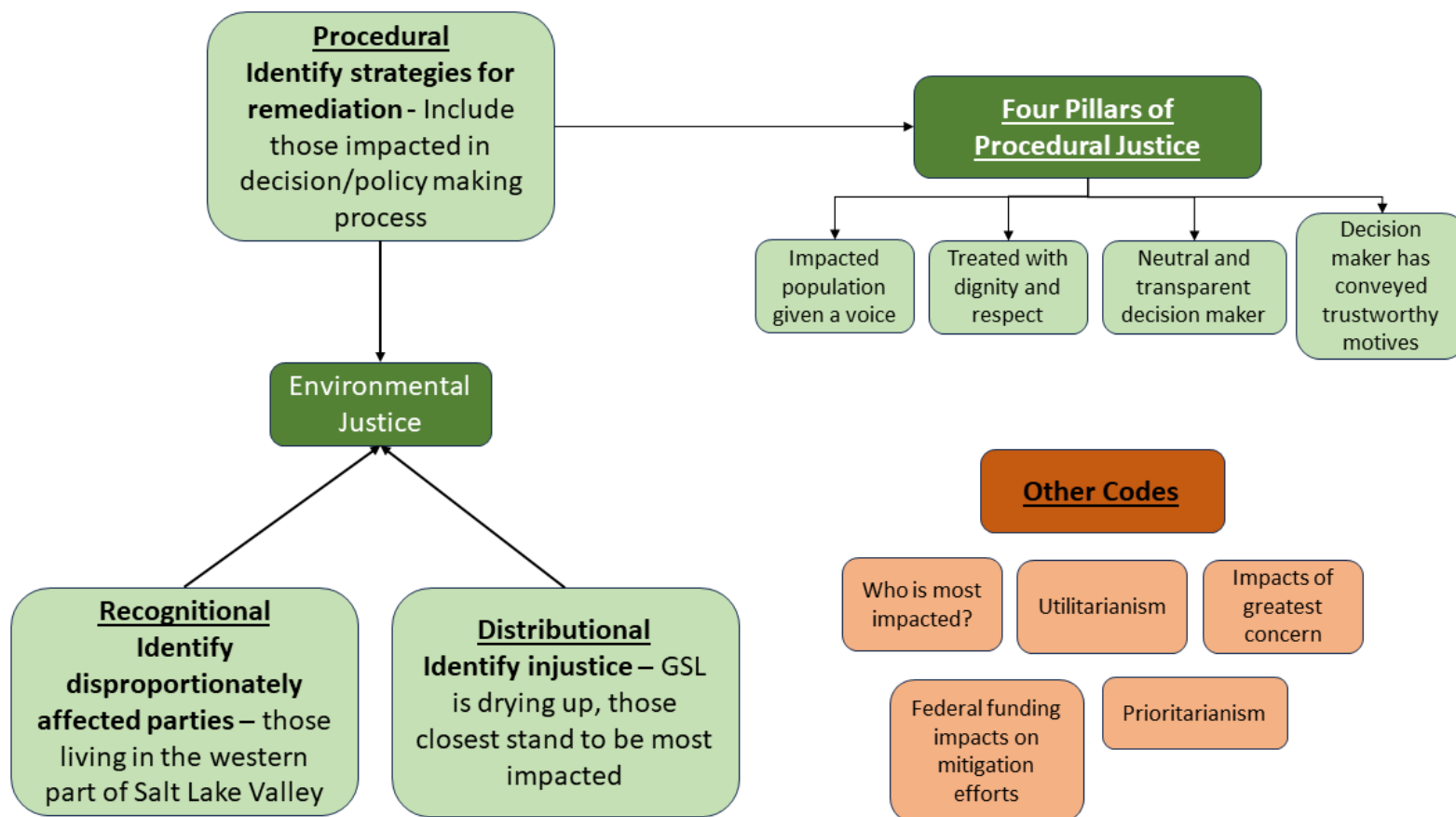


Figure 3.2 This study focuses on Environmental Justice and more specifically, the procedural aspects of justice. Procedural Justice is commonly thought to have four main pillars (The Justice Collaboratory, accessed 29 July 2022). These pillars, shown in green in the top right corner of the graphic, along with other pertinent codes, shown in orange in the bottom right corner, were used to analyze the interviews from this study. For this study, “utilitarianism” refers to the biggest benefit for the largest amount of people and “prioritarianism” refers to prioritizing the populations that require the most assistance.

Study Area

Utah's History of Poor Air Quality and Racial Inequality

Utah has a history of poor air quality (Mitchell & Zajchowski, 2022) and racial inequality (Jones, 2021). The US federal government utilized guidelines created by the federal Home Owners Loan Corporation and redlined cities across the nation, including Salt Lake City, UT, after the Great Depression (1940s). Redlining was officially banned in the US in 1968 (Faber, 2020), however effects persist to this day. The communities that were redlined in Salt Lake City currently stand to be more impacted than others downwind from the drying Great Salt Lake due to their proximity (Tussupova, Anchita, Hjorth, & Moravej, 2020; Christian, Delgado, Summers, & Magana, 2023). Historically these communities have been neglected, e.g. saved until last for vital infrastructure upgrades and forced into less desirable areas of the city (Jones, 2021) and stand to be disproportionately impacted by a potential climate and water catastrophe that is already negatively impacting air quality in the northeastern part of the state (Christian, Delgado, Summers, & Magana, 2023). Based on environmental justice literature in conjunction with the GSL's current trajectory (Abbott, et al., 2023), these communities and the potential impacts they may encounter soon ought to be evaluated and planned for in order to make progress towards more just outcomes.

Parts of the valley west of the train tracks and I-15 (see Figure 3.3) have a reputation as a "rough town" and are statistically shown to have larger numbers of non-white residents who suffer from higher rates of poverty and health problems (Cabrera, 2021). Their location of residence must be considered with historical context. Mortgage redlining in SLC segregated the city along race and class lines, making it difficult for

members of non-white and poorer communities to move to less polluted areas (Jones, 2021). This is not a problem unique to SLC, but rather a problem that plagues many cities across US and that has been tied to increased rates of cancer, asthma, poor mental health, and a lack of health insurance among citizens (Nardone, Chiang, & Corburn, 2020), and has been happening for decades. While these issues are more likely caused by the generational poverty that has come with redlining, they will be exacerbated by increased pollution levels, such as the addition of dust from newly exposed lakebed. As Jones (2021) summarizes, Mexican immigrants came to Utah in the late 1800s to work on expanding railroads. Those first immigrants settled in neighborhoods on the west side of SLC because of the proximity to the railroads and affordable housing. Later, those neighborhoods were redlined, dictating where Latinx immigrants could or could not buy property. Today, these neighborhoods are further divided from the rest of the city by a highway, I-15, and have a long history of industrial and septic pollution, negatively impacting the quality of life there. Furthermore, the city has a history of leaving the neighborhoods until last for vital upgrades like the addition of sewer systems and paved roads (Jones, 2021). According to research in 2019, these communities are at a higher risk for air pollution exposure (Collins & Grineski, 2019).

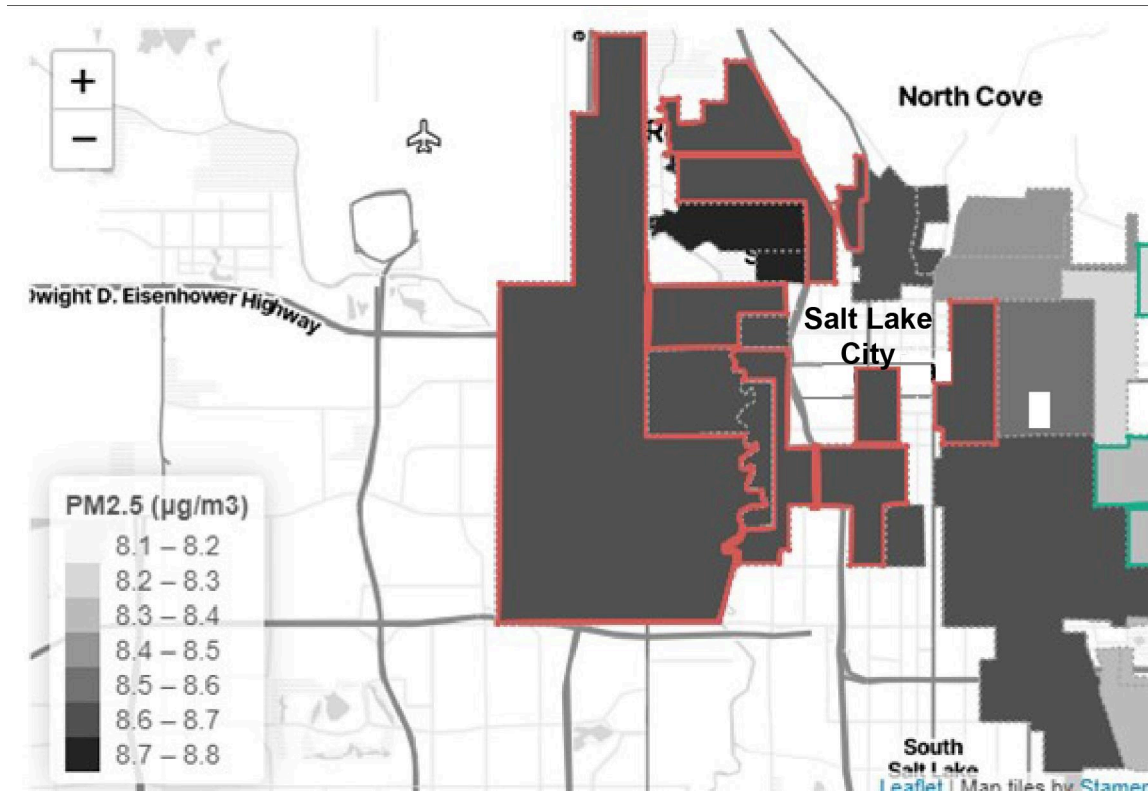


Figure 3.3 The map shows which areas of Salt Lake City were redlined, outlined in red, and the level of particulate matter (PM_{2.5} measured in µg/m³) that was in the air in 2021 (Madrigano, et al., 2022). Areas that were redlined have very high levels of PM_{2.5}.

If drought conditions persist past 2023, despite the record-breaking amount of water the state received in the winter of 2022-23, these communities may soon be exposed to ever greater amounts of toxic dust from the drying GSL (Carling & Adams, 2022). They continue to be a larger part of the state's growing population (rising from ~1% in 1950 to nearly 27% in 2022 (World Population Review, 2022)) but have still been neglected, as is evident in their high rates of poverty, health issues, and reduced infrastructure investment (Jones, 2021). The effects of a drying lake on their populations have been understudied and they are being disproportionately affected by the negative changes associated with the drying of the lake making it imperative that they are involved in the decision-making processes revolving around this looming climate catastrophe.

To work towards more just climate pathways from a procedural justice perspective, a focus of the largest federal climate policy package to date, the 2022 Inflation Reduction Act, the creators and signatories of the Utah Climate and Clean Air Compact should consider these voices in decision making processes. The Compact asks leaders and citizens of Utah to take action to improve climate and air quality issues in the state. The Utah Climate and Clean Air Compact cites support of rural areas throughout energy transitions but makes no mention of the communities in Salt Lake County that have lower socioeconomic status and are more exposed to poor air quality (Christian, Delgado, Summers, & Magana, 2023). It also cites improving air quality as one of its main tenets, but again, does not mention anything about the communities that are likely to be disproportionately affected by the looming air quality, water scarcity and climate catastrophe that the Salt Lake area is facing. This research seeks to assess the extent to which a subset of the signatories are considering marginalized communities and the

impacts of living closer to a drying lake that these groups may experience. Given that the injustices and the affected communities have already been identified by the literature, this study focuses on the procedural aspects of this situation.

Methods

Beginning in December 2022 and ending in May 2023, I conducted 11 in-depth semi-structured interviews (see interview protocol in Appendix C) with 3 political/governmental, 2 educational, 3 non-profit/NGO, and 3 business leaders, selected from the list of Utah Climate and Clean Air Compact signatories. These interviews pertained to the Great Salt Lake and its potential negative impacts on communities from the west side of the Salt Lake Valley, as well as if support for these communities existed or were being discussed. I searched for publicly available email addresses and used them to contact 43 potential participants. Follow-up emails were sent to those who did not respond within a month. Despite giving the option for in-person interviews, all participants elected to be interviewed by Zoom or phone. A total of 10 interviews were conducted on zoom and 1 was conducted via phone.

Participants were asked questions such as “Who do you think will be most impacted by the drying of the lake?”, “Are you aware of any marginalized communities within the Salt Lake Valley?”, and “In your opinion, do these communities receive an adequate amount of support, whether that be financial, material, etc.?” These questions and responses were discussed in a conversational style, and participants were informed at the beginning that all their responses would remain anonymous to allow more candid discussions. The interview script and scheduled time allowed for other questions about topics that may have arisen during the interview. Many participants recommended other

signatories that might be good to talk to during their interview or suggested articles and public interviews that may be beneficial to read.

All interviews were recorded in zoom and then transcribed using Otter.ai. This software automatically transcribes audio files using artificial intelligence that allows it to transcribe and differentiate speakers. The transcripts still needed to be manually cleaned and were then transferred into NVivo, a software that allows for qualitative analysis coding. Once cleaned, the transcripts were sent back to participants for review before analysis to provide an opportunity for modification if needed.

Using NVivo, I coded each interview using the four pillars of procedural justice as it relates to paths towards achieving the milestones identified in the Compact, as well as themes that emerged during the interviews such as who is most impacted, what impacts are of the greatest concern, and how available federal funding may impact the state's mitigation efforts. An emergent theme was other understandings of justice, e.g. utilitarianism or providing the greatest good for the greatest number of people rather than prioritarianism, or prioritizing the poorest in the community.

Since the response rate for this study was low, and because there were quite a few interviews and articles about the opinions of many of the signatories and the west side of the Salt Lake Valley, I also conducted a document analysis. While searching for emails, I found 17 interviews, articles, and public statements regarding the topics of the interview questions. I downloaded each document and coded them using the same themes and NVivo software as the interview analysis.

Results and Discussion

Over the course of the interviews, it became apparent that while signatories were

aware of the shrinking GSL and possible consequences, many of them were not very concerned about the communities that may be disproportionately affected by those impacts. Responses about who would be the most affected ranged from the entire state of Utah to those in the Salt Lake Valley to those closest to the lake. There was not a consensus on who will be the most impacted, and some responses suggest that there may be a political factor contributing to this lack of agreement and willingness to acknowledge the area's marginalized communities. Most signatories agreed, however, that the impacts to the state's economy and the dust coming from newly exposed lakebed that has a high likelihood of being toxic were the biggest concerns. I assess to what extent leaders are considering environmental justice concerns related to the lake and if they are acting justly, as detailed by the four pillars of procedural justice, a crucial part of environmental justice. Using these pillars and the definition of environmental justice to analyze responses, I present a summary of concerns (and lack thereof) regarding a drying lake, and suggestions for just ways forward.

Fuzzy Boundaries Around Communities of Top Concern

When asked who would be the most impacted by the issues surrounding a drying lake, the responses varied widely. Responses ranged from the area closest to the lake to the entire state. One participant discussed how they felt the next generation would be the most impacted:

“If things hadn't changed this year, and we didn't have the record water year... if we continued on the trajectory that we were on last year and previous? I don't know how much my immediate life would have changed”

(Participant 6, government)

Others thought about the issue on a broader scale, citing the west side of the valley or the entire state as the most impacted:

“I think every Utahn would be impacted.” (Participant 14, NGO/Non-profit)

While this statement is likely true, every Utahn is likely to feel the impacts of a drying lake, it disregards any communities that may be more impacted.

Seven of the eleven (64%) participants mentioned marginalized communities (including mentioning the communities on the west side/closest to the lake) in some capacity without being prompted:

“Just like COVID, people with preexisting health conditions, or other environmental impacts stacking on top of the [situation related to the] Great Salt Lake. ... ultimately, if it comes down to... needing to avoid the impacts, ... people with means have the ability to move and people without don't.”

(Participant 13, NGP/Non-profit)

Participant 13 brought up the point that this issue could compound other issues that these communities may be facing. This quote also touches on the financial barrier that many living on the west side may be facing, one of the issues that this climate disaster is compounding. Other participants were also concerned about those that fell into the lower income bracket:

“Because right now... the lower income folks, the lowest income places to live, where a lot of minorities are... are closer to bigger polluting sources.”

(Participant 5, NGO/Non-profit)

This participant explained Salt Lake City’s history of redlining and poor air

quality. They discussed that the redlining in this city was based, in part, on where the worst air pollution was at the time, closer to the refineries and roads. They stated that this pattern persists today, and that although air quality has improved due to various regulations related to vehicle emissions and industrial practices, these communities are still most commonly close to polluting sources.

“If there's areas that would be negatively impacted, it would certainly be as the wind blows, but also the negative impacts [related] to economic change are ... felt more readily in lower socio-economic groups. And so those historically have been identified in ... Western pieces of Salt Lake County”

(Participant 1, government)

Most of the participants tended to evade a specific answer when it came to defining the areas on the West Side as “marginalized”. Many initial responses were similar to Participant 1’s, and only mentioned aspects of being marginalized, such as being lower income, or just generally that the communities on the West Side would be most impacted. It is unclear whether participants could have meant marginalized communities indirectly when citing those areas, since the West Side has a reputation for being “rougher” (Cabrera, 2021) and the majority of participants are from Salt Lake City and may be familiar with the neighborhoods and their characteristics.

Two participants bluntly answered the question of who would be the most impacted:

“Marginalized communities and communities of color that dominate the west side are at the greatest risk.” (Participant 12, business)

“You can see when it's wind coming across the lake, or if it's inversion setting in really, ... not all the time, but very frequently, the highest density of the worst air quality is in the same spots, right ... Basically, the I-15 corridor is the cutoff, right? And it's ... really concentrated on the west side of Salt Lake City, into West Valley out to Magna like we think about this kind of area that's most directly up close to the lake on the west side of the valley, and then stretching all the way down.” (Participant 11, business)

Participant 12 was not shy about their concerns regarding the lake's desiccation and did not need prodding to discuss which communities were marginalized and why. Responses like this fell into the prioritarianism category. While Participant 4, another business leader, responded similarly, the other business leader that was interviewed, Participant 10, was less responsive and believed that the whole valley would be impacted about the same:

“I think that the whole valley is going to be impacted about the same. So I don't think if you live in Rose Park, you're going to be impacted more than if you live up in Federal Heights. You know, the wind blows in and it all blows in the community.” (Participant 10, business)

While this participant was willing to discuss marginalized communities, they did not think that those communities would be impacted more or less than other communities. I attempted to probe by briefly reviewing the research that found that disadvantaged communities and communities of color were statistically more likely to be disproportionately impacted by situations like that regarding the lake (Andrews & Smirnov, 2020) but this probing did not lead to additional comments on the topic.

What is most telling may be the reluctance that some leaders had to discuss the marginalized communities within the state. Two participants, including Participant 10, discussed directly above, who are still heavily involved in local and statewide politics and who publicly identify as moderate or right leaning on the political spectrum were reluctant to discuss the probable disproportionate impacts that these marginalized communities may be facing in the near future:

“[We] will all be impacted by what happens... I don't think that's an issue. I don't think there's any evidence that would show that a marginalized community will be impacted any more than well, a majority community.”

(Participant 10, business)

When probed to cite a marginalized community within the Salt Lake Valley, participant 7 (an education leader) was reluctant to define any such area:

“Marginalized communities? Well, there's so many ways to define that right. But I would ... look at socio economically disadvantaged communities. ... It can be everything from income and poverty data to life expectancy, to educational attainment to health disparities. So, I feel quite familiar with the socio economic, health disparities in our state. ... for me to identify specific areas, it's... everywhere, right. It's urban, rural... it's different neighborhoods, there's disparities, but there's disparities within a street. I think it's really difficult to label the disparities, but rather to recognize that they're ubiquitous everywhere.”

Participant 7's response after further probing showed continued reluctance to define any one community:

“I’m not sure what the question is trying to get at, but are there racial and ethnic and socio-economic disparities? Yes. Is there a geographic component to it? Yes. Generally, are there communities in the western portion of Salt Lake Valley that are socioeconomically disadvantaged? Yes ... But I think that oversimplifies it.”

The participants that were part of NGOs and non-profit organizations and the other participants in the education sector seemed more willing to discuss marginalized communities and the injustices that they have suffered. Participant 11, a leader from government, gave a possible reason for why those that are still prominent in politics may be reluctant to take a stance on this matter when they said “I’m also not in politics anymore. So I’ll say whatever I want.” Additionally, another signatory was cited in a Salt Lake Tribune article as being reluctant to comment on some topics that may be “too hot” for their business to handle (Canham, 2016). Based on these responses, leaders are thinking about these communities directly adjacent to the GSL in some capacity, but those that are in positions of greater political power may be feeling pressure to remain neutral or to prioritize larger groups to protect their position of power.

It is also possible that not all participants had the same definition of justice in mind when they answered these questions. The reluctance to cite one specific area or areas combined with the responses of who would be the most impacted suggest that some leaders may not be considering EJ as it is related to marginalized groups, but rather in a broader sense. It is also possible that their idea of EJ fell into the utilitarianism category, or they interpreted justice as the greatest good for the greatest number. Since “all” Utahns will be impacted it makes sense to them that “all” Utahns should be the priority, rather than prioritizing communities that would be more impacted (prioritarianism).

Concerns About the Drying of the Lake

The most often cited concerns about a drying lake were air quality issues, including health concerns, as well as economic impacts. Some of the participants mentioned marginalized communities while they were discussing these topics, but they seemed more concerned about the state as a whole:

“I think there's other reasons we don't want [it] to dry up, safety health reasons, but also economic reasons, the brine shrimp is the big industry for our state.” (Participant 6, government)

“And even if you didn't care much about the people... Utah's economy is going to suffer tremendously when people don't want to live here. So yeah, no one's getting away from this issue.” (Participant 13, NGO/Non-profit)

Concerns about health mostly stemmed from the contents of the lakebed and the probable impacts on Utah's weather and climate, as well as the scientific uncertainty that has surrounded the lake:

“Asbestos and arsenic line the bottom of the lake. And if the lake dries up, we'll have dust storms that are lethal... with arsenic floating around in the air. And it'll impact the snow levels...which will impact our skiing industry and our outdoor industry. So we just can't let it happen.” (Participant 10, business)

Participant 10 was familiar with the impacts that have been found and published in scientific literature, although there is not evidence in the literature of asbestos in the lakebed. They used information about toxic dust to back up their claim that the entire state would be greatly impacted by a drying lake. Their responses also showed that they

had read and trusted the scientific literature that has identified risks associated with a shrinking lake. All but one of the participants echoed this sentiment.

“There has been testing and I don't know that all of the ground under the Great Salt Lake is contaminated and poisonous, but I don't know that it isn't. There's been testing that said it's dangerous, there are some things we don't want getting leached into the air..., and so they want to make sure are covered.” (Participant 6, government)

Based on this response, Participant 6 appears to be less trusting of the published science than Participant 10, but they acknowledged that they are not an expert in this topic and still decided to err on the side of caution and continue on as though the scientists are correct about what lies in the lakes bed. Participants 12 and 7 showed similar concerns about the newly exposed lakebed:

“We're scared that it's going to be a toxic dust bowl.” (Participant 12, business)

“I think human health is easy to make the biggest one [problem] because of the dust and the danger to our lungs.” (Participant 7, education)

Only one participant mentioned the report published in January 2023 that stated that the lake was likely to dry up completely in the next 5 years if urgent action was not taken (Larson, 2023).

*“It was sensationalized and not a fair representation of the science”
(Participant 7, education)*

While this response does not necessarily negate the current science, it does

discount the need for urgency that climate scientists claim is necessary (Abbott, et al., 2023). Despite this response, participant 7 did think that human health impacts were of great concern, which is consistent with the current academic literature.

Given that all participants were concerned about issues related to a drying lake that are consistent with the scientific literature, I argue that these responses show science communication success within the state, despite only partial policy success having been achieved as of yet. Conservatives have historically disregarded scientific consensus not only on the causal linkages between smoking and cancer, but also on climate science and its anticipated impacts (Oreskes & Conway, 2022). Fortunately, in the case of the GSL, my interviews provide preliminary evidence that leaders in the region are accepting the scientific literature regarding risks posed by a drying GSL. The participants were a mix of conservatives, moderates, and liberals, either self-identified during the interview or noted as such in public interviews and articles.

The concern that the state is not moving fast enough or pushing more changes in water policy was also prevalent:

“We’re also horrified that the legislature isn’t moving fast enough to do anything about [updating water policy]. They wasted an entire session this year not doing anything about it, the solution is clear and right in front of everybody: pay the alfalfa farmers to not use their water. We’re going to pay for it one way or another.” (Participant 12, business)

Many of the participants that were interviewed after the legislative session had started in March 2023 had comments about water policy and what needed to happen to drastically change social norms and water usage at home in the interest of reducing

drought impacts:

“The biggest reason why the ... Great Salt Lake itself is drying is because of water utilization and ... water laws in the state.” (Participant 5, NGO/Non-profit)

“Water pricing would be my greatest concern. As an economist, I think we don't price water correctly in this state and it leads to overuse.” (Participant 7, education)

“What's happening is the alfalfa farmers that use 70% of the incoming water to the Great Salt Lake, they grow alfalfa, pack it up, compact it and then ship it to the Pacific Rim. So in essence, we are exporting our water. So ... buy the water rights from the alfalfa farmers, pay them not to do it. We're going to pay for reparations in some way ... buy the water rights from the alfalfa farmers and let the water flow into the Great Salt Lake.” (Participant 12, business)

Given that there were many more quotes regarding health and economic concerns statewide, it is possible that this issue of water policy is so large and has potentially been sensationalized by news outlets that leaders are having a tough time focusing on the communities that stand to be disproportionately impacted as confirmed by a recent study (Christian, Delgado, Summers, & Magana, 2023). The Christian et al. (2023) study found that a decreasing lake level is associated with an increase in intensity of dust events and those events would particularly impact of Tooele County and the west side of Salt Lake City.

Uncertainty Surrounding Marginalized Communities' Involvement in Policy

The Inflation Reduction Act (IRA) was passed in late 2021 and includes \$47.5 billion in direct benefits for “disadvantaged communities”, although this term is not explicitly defined within the IRA (Perls, 2022). During my interviews and document analysis, I assessed whether the marginalized communities in the Salt Lake Valley were being considered in decision-making processes. I also asked interviewees if this funding would be utilized in the state of Utah to assist those communities in just transitions. My interviews included questions about the participants’ knowledge on the IRA and if they knew of any efforts to include these communities. The International Labour Organization defines a “just transition” that is related to climate mitigation as “greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind” (United Nations Development Programme, 2022). Other sources define “just transitions” as a “long-term technological and socio-economic process of structural shift that... causes rearrangements” at all levels of society (Wang & Lo, 2021) and that a “lower carbon future are underpinned by attention to issues of equity and justice” (Newell & Mulvaney, 2013). Most participants did not have an answer to either of those questions.

Many of the participants were aware of the IRA, but many did not know what the funding was for or that the act had a focus on just transitions for disadvantaged communities. Only one interview mentioned this:

“I know that [a just transition has] been a significant priority of this administration. I heard the President say it himself. I've heard them speak to it. And when Speaker Pelosi was the Speaker, I heard her speak to it as well.”

And so I know that providing resources to marginalized communities is a high priority of the Biden administration.” (Participant 6, government)

After learning about the IRA and what it provided funding for, the participants were hopeful that the state would take advantage of the funding. Many mentioned that they would be shocked if the state did not use this opportunity, but most were unsure if this would happen. Most of them did not know specifics on how the state would have to go about obtaining the funding or they stipulated that they thought the state would only take advantage if it was easy for the state to utilize.

Participant 12 (business) mentioned an effort at West Side news reporting (increased efforts to report on issues that the West Side are experiencing) that they were aware of, but they did not know much else besides that it existed. When I searched for this effort during the document analysis, very few results came up that were related to air quality and climate change. One result was from Salt Lake City’s webpage, an initiative to assess access to public transit on the West Side. The summary of this study acknowledged that previous investment and improvement efforts had been unsuccessful because they lacked collaboration with the groups that they were attempting to help (Salt Lake City, accessed 2 July 2023). This initiative shows a step in the right direction towards procedurally just transitions but is indirectly related to the topic that this study focused on. While public transit access could help reduce transportation emissions and potentially improve the local air quality, it is not directly tied to the impacts that a drying lake may have on these populations.

Other news stories focused on just transitions within parts of the state more economically reliant on fossil fuel extraction, specifically coal country, primarily in

Carbon County, UT. Most of the news related to just transitions in Utah, as well as the initiatives that many of the signatories cited in interviews, revolved around the Coal Country Strike Team and efforts from the Citizens Climate Lobby. The Coal Country Strike Team focuses their efforts on transitioning communities in Utah that are reliant on the coal industry for their local economies. The Citizens Climate Lobby is a volunteer organization that focuses on national level policy to address the national and global climate crisis. While these reports showed significant support, including monetary funding, for transitioning communities that have historically relied on coal production as their primary source of income, they do not mention anything about communities within Salt Lake Valley or mitigating lake desiccation impacts. Again, these efforts are a step in the right direction, as they reduce the emissions in the state from the coal industry and encourage a transition to renewable energies, as well as provide a just transition for some communities, but they continue to ignore the communities closest to the lake.

After my last interview was completed, the EPA announced that Salt Lake City was one of more than 70 cities to receive a grant of up to \$1 million to develop a climate action plan. The uses of this funding are not yet apparent, but SLC Mayor Mendenhall stated that it was important to identify “strategies to reduce pollution and improve the health of... residents” while being inclusive. It was not clear what was meant by “inclusive” in this instance, but based on the emphasis that was placed on “low-income and disadvantaged communities” throughout the article it is reasonable to assume that Mayor Mendenhall may have meant those communities as well (EPA, 2023).

The insights from signatories and the document analysis provide preliminary evidence of shifts in how leaders are understanding and responding to the risks of a

drying GSL, but the communities that stand to be most impacted by the lake's desiccation may still be overlooked. While coal industry reliant communities are being given opportunities to move away from fossil fuels, the communities nearest to the lake have received little to no dedicated funding and rarely been directly involved in policy and planning efforts.

Limitations and Implications for Further Research

No religious leaders responded to the requests for an interview. Future research should endeavor to include this viewpoint, especially because of how large a role the Church of Latter-Day Saints plays in the state's politics.

Additionally, because these interviews took place from December 2022-May 2023, some interviews may have been skewed by Utah's record-breaking winter snowfall. Many of the later interviewees focused on this above average precipitation. My earlier interviewees were more influenced by an article that claimed that the Great Salt Lake may have less than 5 years before it was completely dried up if drastic action was not taken in the coming months (Larson, 2023). The Environmental Protection Agency also announced in May of 2023 (after the interviews had concluded) that Salt Lake City had received funds from the Inflation Reduction Act. Since this occurred after the interview timeframe, this aspect is only included in the results and discussion through the document analysis and not within any interview responses.

Finally, studies regarding environmental justice should involve the impacted communities. Since this study was part of a master's thesis, there was not adequate time to establish a relationship with those communities. Future research about this particular situation should also include members of these communities to adequately assess their

specific concerns and desired policy outcomes.

Conclusions

This research used semi structured interviews guided by the four pillars of procedural justice to assess the extent to which leaders in Salt Lake Valley, Utah are considering poorer, largely non-white communities in close proximity to the drying GSL. Using the pillars as a guide for the analysis, it is apparent that although many leaders are thinking about these marginalized communities, they are often not involving them in procedurally just initiatives related to lake impact mitigation. This case study explores the topics of highest concern among these leaders who have publicly signed onto a clean air and climate compact in the context of a Great Salt Lake that may disappear, which would have detrimental health and environmental impacts.

Marginalized communities are on the minds of these leaders but not at the forefront. For most of them, the issue is much larger than the west side of the valley being impacted. Most signatories that were interviewed discussed these communities without prompting, but quickly moved on to discuss the larger issues of poor air quality, water shortages, and toxic lakebeds. For two of the eleven (18%) interviews, it was apparent that some who are in higher places of political power may feel pressured by their place in state politics to generalize the issue as something that is impacting most Utahns, rather than focusing on the communities that stand to lose the most if the lake continues to dry.

This information shows that these communities should receive significantly more support to manage the impacts that they will face should the lake continue to desiccate, and their local air quality continue to suffer. Many of the West Side residents do not have

adequate access to health care and most do not have the means to leave should the environmental conditions continue to worsen and worst case scenario, become unlivable. Given that coal country communities have been provided with significant support from various sources, including the state Legislature (Anderson, 2019), to transition away from coal, it stands to reason that the west side of Salt Lake Valley could also be provided with funding to some extent to mitigate these problems. While helping these communities move away from fossil fuel-based economies can indirectly improve the conditions for the lake by reducing their carbon emissions, these efforts do not necessarily improve living conditions for the West Side communities. My evidence points to the need for Utah leaders to take greater initiative to directly involve these communities in policy creation regarding the GSL and water usage in the state for progress to be made in working towards procedural, recognition and distributional justice. Additionally, these communities should be provided with greater access to adequate health care and support to purchase things such as air purifiers and masks to wear during bad air events, as well as greater education on the impacts of poor air quality on their health.

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CHAPTER 4 Conclusions

Synthesis of Research Findings

Theoretical Background

The International Panel on Climate Change has recommend that we need to significantly reduce the amount of greenhouse gases (GHGs) that are emitted in order to prevent further increase of the Earth's global average temperature, otherwise 37% of the planet's population will be exposed to extreme heatwaves more frequently (IPCC 2022). Furthermore, climate change also exacerbates natural disasters, making them more frequent and less predictable, i.e., less manageable (Banholzer, Kossin and Donner 2014). One such case of this is the drought that the Intermountain West has been experiencing since the early 2000s. This drought, paired with anthropogenic water diversions from the Great Salt Lake's three tributaries, has led to multiple historic lows for the lake and many are concerned that the lake may not recover if drastic actions are not taken (Endter-Wada, et al. 2008, Wurtsbaugh and Sima 2022).

The populations that are likely to be the most impacted in regards to health and environment (Christian, et al. 2023), and disproportionately so when we consider how many GHGs they emit through their lifestyles compared to that of other groups, are people of color and people who live below the poverty line. In other words, marginalized communities (US EPA 2021). In the case of the Great Salt Lake, the Salt Lake Valley's west side, which is majority people of color and people who live in poverty, stands to be the most impacted by a drying lake (Christian, et al. 2023). While various efforts to mitigate these emissions and the probable impacts, the politicization and polarization of the term "climate change" (Chinn, Hart and Soroka 2020) has led to difficulties when

enacting these changes.

In order to mitigate these and other environmental challenges, various frameworks and theories have been created. This study utilized two of these frameworks. First, Naito et al.'s (2021) Framework for Transformative Change, which aims to connect top-down and bottom-up approaches to create policies that support progress towards solutions. In the case of this study, solutions referred to climate action and reducing air pollution in Utah. The framework argues that individual behaviors need to be altered alongside larger, societal changes in order to create the lasting, large-scale change that is necessary to mitigate the climate crisis. I argued that utilizing this larger scale framework alongside Cohen's (2014) more specific Framework for Understanding the Environmental Policy Issue provided a snapshot of the perceived barriers and solutions that leaders in Utah have.

Cohen's (2014) framework focuses on aspects of policy problems including politics, values, policy design and economics, organizational management, and technology/science. Cohen argues that categorizing a problem using these facets as a guide can lead to more effective policy and allow for holistic assessment of the issue. Using the two frameworks together to assess the air and water policy field in Utah allowed me to synthesize the opinions of policy actors and assess possible paths forward to more effective climate policy.

When considering how best to proceed with these policies, it is important to include the voices of those who will be the most impacted by the physical outcomes. Since the communities that live closest to one of the main sources of air pollution in the state, the drying of the Great Salt Lake is an environmental justice issue, rather than just

an environmental issue. Therefore, from a procedural justice perspective, the communities on the west side should be more included in the decision-making process. The concept of procedural justice provides a guide for how to include them in a just manner. First, the communities must be given a voice in the policy arena, and they must be treated with dignity and respect. Decision makers in this situation must also be neutral and transparent and have trustworthy motives.

Research Area and Methods

Using a qualitative case study approach, this thesis first explored the perceived barriers and solutions to climate change mitigation of a subset of Utah leaders. This group was chosen from the list of signatories of the Utah Climate and Clean Air Compact, a statewide climate initiative that brought together leaders from business, education, non-profits, religion, and political sectors. This document had the goal of uniting leaders from a variety of sectors (i.e., business, government, religion, education, NGO) over the issue of poor air quality, something that has plagued Utah for decades and that has been worsened by climate change and a drying lake. The state of Utah is majority conservative and Church of Jesus Christ of Latter-Day Saints (LDS). Some of the interview participants cited this portion of the demographic as resistant to climate action. The Compact attempted to navigate this landscape.

Utilizing data from 14 semi-structured interviews with leaders from businesses, politics, education, and non-profit organizations, I coded responses for themes related to the chosen portions of both frameworks including politics, management, economics, etc. My analysis for this portion of the thesis resulted in the main themes of politicization of climate change and growth. The second study of this thesis used data from additional

interviews with 11 of the participants from Study 1. These semi-structured interviews focused on what the interviewees knew about marginalized communities within the area and the potential negative impacts they may experience from a drying lake. I coded these responses using themes related to the pillars of procedural justice and other themes such as who is most impacted, what is the biggest concern, etc. This analysis resulted in the overarching themes of fuzzy boundaries around communities of top concern, concerns about the drying lake, and uncertainty surrounding marginalized communities' involvement in policy. For both studies, a document analysis was also conducted to supplement interview responses because many of the signatories had publicly available interviews or op-eds that they had published related to these topics.

Politicization of Climate Change

As stated earlier in this chapter, climate change has become increasingly politicized in the US and the interview responses confirm this is also the case in Utah. One of the main goals of the Compact was to bridge the gap and unite parties over another issue, air quality. Participants agreed that this endeavor was still the most important Compact priority, and it was the most cited solution across the interviews. It appeared that although they agreed that this was a valid and important solution, it may have impacted the urgency of change within the state.

The Compact also emphasized the urgency of action on air and climate, specifically change within the next 10 years or by 2030. While it did appear that conservatives in the state were more willing to discuss air quality and policy change that would improve this issue, many of which are also impacting GHG emissions, liberals maintained that these changes are encouraging but still happening too slowly. Participants

also felt that too many policy makers are still trying to prop up the fossil fuel industries to protect the state's economy and because of political donations the politicians may have received and may still be receiving. While it appears that the Compact has succeeded in one aspect, it is falling short in others.

Growth

The second most common barrier that participants cited was the population growth that the state has been experiencing and will likely continue to experience. The interviews covered many aspects of this issue including economic impacts, resource strain, and anticipating and planning for the additional needs of new citizens. Most interviews discussed the additional cars that would be on the road, which would continue to decrease air quality because of the additional greenhouse gas emissions. To mitigate this, expansion and improvement of public transit and active transport infrastructure was often cited as a vital component of the solution. Suggestions included electrifying current buses and trams, although supply chain problems seem to have delayed this in many areas, as well as making public transit free/subsidized so that all citizens could utilize it. Parts of the state already have robust transit systems, but others are severely lacking and there are few options for travel between cities or for longer distances.

Despite the boost that new residents provide to the economy, many residents do not want more people to move in because they are already losing a lot of their green spaces and cities are becoming more and more crowded. To mitigate part of this problem, some cities have passed Open Space Initiatives which provide funding via a tax to the county or city governments to purchase the developing rights from property owners. This can include farmland or open land that can be used by the public for recreation. While

these initiatives do not completely halt development, they do prevent development of green spaces and can encourage redevelopment of locations that may be run down or not currently utilized. Revitalizing already developed land is a critical component of smart growth and can help limit urban sprawl, which improves the sense of community and requires less vehicle travel since necessary places like grocery stores and schools are closer together.

Other recommendations from interviewees included changing water policy within the state. Many interviewees stated that water is not priced correctly and because of that many citizens use much more than they should during a drought. Four of the fourteen participants thought that water pricing should be reevaluated and changed according to the scarcity of this resource. Additionally, some communities are worried that they will not have enough water or electricity sources to continue to provide for growing populations. The solution for supplying more electricity was to diversify their energy portfolios and invest in renewable energies while continuing to keep some fossil fuel-based providers for situations when renewables do not provide enough.

Overall, the Compact appears to be a partial success, although it still has not led to measurable reductions in GHG emissions and air pollution abatement.

[Fuzzy Boundaries Around Communities of Top Concern](#)

The second study of this thesis focused on leaders in a specific part of the state: the Salt Lake Valley. This area will be one of the most impacted by the drying of the Great Salt Lake. The marginalized communities on the west side will likely be disproportionately impacted and may not be able to leave if it becomes necessary or be able to afford medical care should the dust from the lake impact their health. While the

literature shows that this is very likely to happen, it appeared from the interviews that most leaders do not have these communities at the forefront of their minds when they are thinking about the impacts of the lake. Rather, most of them were thinking about the state as a whole. While the entire state will be impacted to some degree, the communities on the west side will be more impacted than most (Christian, et al. 2023) and it is vital that leaders are thinking about them. Most of the interviews cited marginalized communities as being a concern, but not the biggest concern.

Some participants were even hesitant to identify any marginalized communities or to discuss the impacts they may be facing. It was not clear why but based on their affiliations and the places of power that these participants held, it was inferred that they may be feeling pressured to prioritize larger and more economically influential groups. Possible sources of this pressure could have been from their political party, a lack of knowledge about these communities and the hardships they face, or from a public appearance standpoint. NGO/Non-profit leaders were much more likely to 1) know about these communities and the impacts they may feel in the future and 2) state that these communities were not receiving adequate supports as well as discuss these topics in depth.

Concerns About the Drying Lake

All participants agreed that the main concerns about the lake drying were related to air quality and in turn health impacts. Most also agreed that economic impacts were of significant concern. What was most interesting about these responses was that all participants were aware of and, for the most part, agreed with the scientific research and consensus on risks posed by a drying GSL. This differs from previous findings about

conservatives and whether they believe the science around climate change (Oreskes and Conway 2022). Unfortunately, in the US it has become common for conservatives to actively reject scientific results in the context of climate change in favor of the opinions of public figures who may or may not be scientists (Oreskes and Conway 2022).

[Uncertainty Surrounding Marginalized Communities' Involvement in Policy](#)

The second study utilized the pillars of procedural justice as a guide for the analysis. Interactions are considered to be “procedurally just” when the individual was 1) given a voice and 2) treated with dignity and respect. These encounters must also have 3) a decision-maker who is neutral and transparent and 4) who has conveyed trustworthy motives (The Justice Collaboratory, accessed 29 July 2022). Two of the pillars include the involvement and consideration of marginalized voices in decision making processes. To assess this, participants were asked if they were aware of any efforts to include these communities in those processes within the state. Unfortunately, almost all of the participants did not know of any efforts. Only one mentioned a recent west side reporting effort that one of the news outlets was reporting.

For this topic, the document analysis was much more telling. I found four articles about funding and just transitions for coal country communities. They detailed multiple efforts since 2019 to transition these communities away from coal industry-based economies. Only one article discussed transitions for the communities on the west side. This article was not about air quality directly, but rather improving public transport on the west side. While this was not related to policy or decisions regarding the future of the lake, it did include a piece that stated that past attempts at improving this infrastructure had failed because they were not done while involving the communities they were meant

to serve and stated that future efforts must include them to be successful and beneficial. While this does not mean much for the topic of this study, it is promising that the city has acknowledged this vital facet of justice.

During the document analysis, an announcement about IRA funding for Salt Lake City also surfaced. It stated that the city had received \$1 million to begin planning for climate change mitigation efforts. The article also stipulated that this funding would help cities assist marginalized communities but did not specify how. Although little is currently known about how this funding will be used, it is promising that marginalized communities are a focus of the IRA and that they were mentioned in the announcement.

Recommendations for Future Study

Unfortunately, neither of the studies in this thesis include responses from religious leaders. Given the role that religion plays in Utah's politics, future research should strive to include points of view from the various churches and religions that are present in the state. Additionally, future work regarding the marginalized communities discussed in this research should strive to include their voices. Due to time constraints, this research was unable to accomplish this, and therefore, vital voices are missing from this narrative. This research also only focuses on the marginalized communities within Salt Lake Valley and does not include the tribes that see the lake as a sacred place. For these transitions to be truly just, their opinions also need to be taken into consideration, given their ancestral connection to the land.

My approach of using Naito et al.'s (2021) framework alongside Cohen's (2014) framework helps to elucidate air and climate issues and has shed some light on plausible ways forward in a conservative state by looking first at the larger picture with Naito et

al.'s (2021) framework, then zeroing into specifics about the issue using Cohen's (2014) framework. This approach could easily be applied to climate issues in other conservative areas.

Conclusions

My research provides a snapshot of climate opinions and mitigation efforts in the state of Utah. Through my analysis, it was clear that although the Utah Climate and Clean Air Compact has been successful in uniting leaders over air quality, a less politicized issue than climate change, it has only been a partial success, as all but two of the participants stated that they wish progress was moving at a faster pace. My second study demonstrates that the state of Utah may be slowly moving towards considering their most vulnerable populations but that they have a long way to go before a just transition is possible for those on the west side. This research will ideally inform policy makers within the state on how they should proceed when making policy decisions regarding water, air quality, and climate crisis mitigation within the state.

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APPENDICES

Appendix A. IRB Approval Letter

Greetings from the IRB,

Protocol #12965, *Navigating road blocks in Utah's paths towards curbing GHG emissions* (Initial), has been approved by the Utah State University Institutional Review Board. It was approved using the Exempt review process, and will expire on Saturday, November 20th 2027.

Just a few quick reminders about the life cycle of your protocol:

- The research team is required to [file an amendment](#) with the IRB prior to making any changes to the research.
- All deviations, problems, adverse events, and other occurrences should be [reported to the IRB](#) as soon as practicable.
- Renewal of Exemptions is not available beyond the five year approval period. Renewal of an Expedited protocol must be submitted no later than one week prior to the expiration date of the protocol. Protocols reviewed by the Convened IRB must submit renewal paperwork no later than one week prior to the [IRB meeting](#) that most immediately precedes the protocol's expiration date. As a reminder, your protocol is approved under the Exempt category of review.

Best of luck with your research!

Use this link to access your protocol: usu.kuali.co/protocols/protocols/63769f213bfeab0035559658

Appendix B. Interview Recruitment Letters**Letter for Non-Salt Lake based Participants**

Dear [Name]:

My name is Emily Fletcher. I am a graduate student at Utah State University in the department of Environment and Society. I am conducting a research study on perceptions of barriers to climate mitigation efforts experienced by Utah Climate and Clean Air Compact signatories as part of my thesis research. Additionally, I am researching the influence of a drying Great Salt Lake on motivating climate action. You have been identified as one of those signatories.

Participation will take 40 minutes approximately. If you are interested please respond to this email to set up either a virtual or in person appointment for an interview. If you choose to participate, all interview results will be confidential and any identifying information will be removed before any analysis or results are shared/published. If you have any questions about the study, please contact the study's PI, Dr. Sarah Klain at sarah.klain@usu.edu. There are no known risks involved in this research.

Emily Fletcher

Graduate Research and Teaching Assistant
Environment and Society
Quinney College of Natural Resources
Utah State University
Logan, UT

Letter for Salt Lake City Based Participants

Dear [Name]:

My name is Emily Fletcher. I am a graduate student at Utah State University in the department of Environment and Society. I am conducting a research study on perceptions of barriers to climate mitigation efforts experienced by Utah Climate and Clean Air Compact signatories as part of my thesis research. Additionally, I am researching the perceived impacts of a drying Great Salt Lake on marginalized communities with Salt Lake City as a case study of the Compact's goals.

Participation will take either an hour approximately, or an hour and a half if you work or live in the Salt Lake Valley. If you are interested please respond to this email to set up either a virtual or in person appointment for an interview. If you have any questions about the study, please contact the study's PI, Dr. Sarah Klain at sarah.klain@usu.edu. There are no known risks involved in this research.

Emily Fletcher

Graduate Research and Teaching Assistant
Environment and Society

Quinney College of Natural Resources
Utah State University
Logan, UT

Scheduling Email

Dear [Name]:

Thank you for agreeing to participate in our study! Here are few times that we are available for a zoom interview: *[list times based on date of response]*

If none of those times work for your schedule please respond with a few dates and times that you are available in the coming weeks. If we are unable to find a good time for a zoom interview, we will also be in Salt Lake City conducting in person interviews at XX location on XX days and times.

Additionally, before the interview we ask that you read and sign our informed consent form using the following link: https://usu.co1.qualtrics.com/jfe/form/SV_7QCHcB03XACQluu

Please contact me or Sarah Klain (sarah.klain@usu.edu) with any questions you have. We look forward to meeting with you!

Best,

Emily Fletcher

Graduate Research and Teaching Assistant
Environment and Society
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Appendix C: Interview Protocol

Interview Protocol for Study 1

- Interviewer introduces themselves
- Informed Consent Check
- Record interviewee name/affiliation
- Introduce project

Our group identified you as a signatory of the Utah Climate and Clean Air Compact. The information you provide will be anonymous. We have received Institutional Review Board authorization (TBD) from Utah State University and would be happy to provide a copy of our final report should you request it.

We would like to record this interview. We will transcribe the text verbatim, then share the transcript with you to ensure accuracy and to give you an opportunity to remove any text you would like us to exclude from our synthesis.

- 1) *Can you tell me about your/your affiliation's background regarding climate change?*
 - a) *Why did you choose to sign the compact?*
 - b) *What have you/your company done to achieve the principles and mileposts set forth by the compact and by extension, the Utah Roadmap? I know you signed this compact over 2 years ago, so to jog your memory, the compact is comprised of 6 principles that relate to the health and well-being of Utah, climate and air quality, the state's economy, re-energizing the state (or moving towards resilient, clean, and affordable energy sources), assisting rural areas in these transitions, and investing in challenging issues with collaborative solution.*
 - c) *Have you or your organization measured progress towards these goals? If so, how? Are you able to share any evaluation measures or data, such as a greenhouse gas inventory emissions report?*
- 2) *Have you experienced any barriers to adopting solutions to reach these goals?*
 - a) *From your organization?*
 - b) *From your clientele/community?*
 - c) *Are there other limitations that you've experienced? Any staffing issues, needed technology isn't available, funding is insufficient, or something else?*
- 3) *The compact asks for urgent action, specifically within the next 10 years. Does that timeline align with how you think about this issue?*
 - a) *Have you set a time constrained goal? For example, an emissions reductions goal, an infrastructure investment strategy, etc.*
 - b) *If yes, how feasible do you think reaching the goal is? Why/why not?*
 - c) *Do you think others in your organization agree with your opinion on feasibility in the last question, or are you in the minority?*
- 4) *What would you say has had the largest effect on your organization's overall emissions over time?*
 - a) *Are there any others that contribute equally or almost as much?*

- b) *How?*
- c) *What has been the biggest roadblock?*
- 5) *When deciding the best way to move forward with clean air and emissions reduction goals, was a cost-benefit analysis conducted in any capacity?*
 - a) *If yes, what were the findings, given that you can share them?*
 - b) *How did they influence the decision-making process?*
- 6) *Are any incentives or resources available that aided you in the process of attaining your GHG emissions goals?*
 - a) *If yes, what were they? How were they helpful?*
 - b) *If no, are there any incentives that you would have benefitted from?*
 - c) *In the same vein, are there any policies, newly created or already existing, that aided your process?*
 - d) *Again, if yes, what were they and how were they helpful?*
 - e) *And again, if no, are there any that you would like to push forward, or that you believe would help?*
- 7) *Looking back, is there anything you would have done differently?*
 - a) *Similarly, looking forward, do you anticipate any changes in you or your affiliation's actions pertaining to reaching your GHG emissions reduction goals?*
- 8) *Now, stepping outside of the compact's goals and thinking more generally, do you think there are bigger societal or cultural barriers impeding progress towards the IPCC's goal of limiting warming to 2 degrees Celsius or less?*

Extended Interview Protocol for Study 2

- Only participants who live, work or are involved in politics and/or mitigation efforts in/near Salt Lake City will be asked the remaining questions.
- Time will be given for a short break if needed.
- Introduce second study.

Thank you for being willing to stay for an extended interview. Again, this will be recorded and provide an opportunity to revise the transcript. Your responses to this interview will also remain anonymous.

- 1) *Are you aware of the concerns regarding the drying of the Great Salt Lake?*
 - a) *Do you have any specific concerns regarding this desiccation?*
- 2) *Who do you think will be most impacted by this?*
- 3) *(skip to 3b if they bring up marginalized communities in their response to 1, 1a, or 2) Are you aware of any marginalized communities within the Salt Lake Valley?*
 - a) *If yes, where/who?*
 - b) *In your opinion, do these communities receive an adequate amount of support, whether that be financial, material, etc.?*
 - c) *Have you been directly involved with any such initiative or community?*
 - d) *If no, provide respondent with some examples such as the Hispanic and Latino communities that have been red-lined into West Valley City or the*

Native American and Pacific Islander concentrations in the western half of the city. (Show maps from p. 6)

- 4) *Studies have shown that people of color are much more likely to be affected by climate change. Given the current trajectory of the Great Salt Lake's desiccation, and the proximity of communities of color to the newly exposed lakebed, how do you think these communities will be impacted?*
 - a) *Are you aware of any efforts to discern these communities' specific concerns regarding the drying of the lake? If yes, what are their concerns?*
 - b) *Do you know of any efforts to mitigate the probable health effects of the decrease in air quality?*
- 5) *Are you aware of the specifics of President Biden's Inflation Reduction Act and its various supports for marginalized communities?*
 - a) *If no, provide with background info on the available funding.*
 - b) *If yes, do you foresee Utah utilizing the available funding and rebates to help these communities?*