Policy Designs to Address Water Allocations During Societal Transitions: The Southern Nevada Water Authority's Groundwater Development Project

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POLICY DESIGNS TO ADDRESS WATER ALLOCATIONS DURING SOCIETAL TRANSITIONS: THE SOUTHERN NEVADA WATER AUTHORITY’S GROUNDWATER DEVELOPMENT PROJECT

by

Lisa W. Welsh

A dissertation submitted in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY in Human Dimensions of Ecosystem Science and Management

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2014
Policy Designs to Address Water Allocations During Societal Transitions: The Southern Nevada Water Authority’s Groundwater Development Project

by

Lisa W. Welsh, Doctor of Philosophy

Utah State University, 2014

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The Southern Nevada Water Authority (SNWA) has had plans since the late 1980s to build a pipeline to transfer groundwater from five rural basins in northeastern Nevada 300 miles south to the Las Vegas metropolitan area in Southern Nevada. SNWA has asked the Nevada State Engineer to approve its water right applications to develop and use groundwater from these rural basins. One of the basins, Snake Valley, straddles the border between Nevada and Utah. An interstate agreement allocating the groundwater between the two states is required before the Nevada State Engineer will approve water rights that would divert water from Snake Valley’s transboundary groundwater basin for use in Nevada.

Water allocation is one of the most significant and contentious issues facing the western United States. As cities and population continue to grow in water-scarce environments, people are forced to confront tradeoffs in trying to balance efficiency, equity, and effectiveness of water allocation practices. This dissertation investigates how
water policy designs handle the challenges of meeting urban and rural as well as human and ecological water needs when allocating scarce water supplies.

This research uses a case study approach to conduct policy analysis, relying on a variety of data-gathering strategies, primarily key-informant interviews and document analysis. We found that policy debates and people’s rationales for how water should be allocated revolved around disagreements over beneficial use. This research also shows that water agreements need to be designed not only to apportion water fairly, but the risks from hydrologic uncertainties and impacts from other users need to be apportioned clearly and fairly as well. Policy designs are purposefully crafted and have enormous impact, yet analysis of the actual contents of policies and their societal impacts has not received adequate attention within the policy sciences. The significance of this research is that it focuses on the foundational principles and rules for the allocation of scarce water resources that must necessarily balance urban and rural interests as well as human and environmental needs.

(152 pages)
PUBLIC ABSTRACT

Policy Designs to Address Water Allocations During Societal Transitions: The Southern Nevada Water Authority’s Groundwater Development Project

Lisa W. Welsh

Although water is considered a renewable resource, there is only a fixed amount of water available. No additional water can be made, and we cannot easily control how fast water is recycled or in what form it will appear and where. With expected growth in the world’s population and economy, the same amount of water must supply more needs. Taking into account climate change projections and water-related environmental stresses, even less water might be available for human uses. People will need to decide how to serve a multitude of water needs. This dissertation uses the Southern Nevada Water Authority’s (SNWA) Groundwater Development Project to investigate how water policy designs handle the challenges of meeting urban and rural as well as human and ecological water needs when allocating scarce water supplies.

The Southern Nevada Water Authority (SNWA) plans to build a pipeline to transfer groundwater from five rural basins in northeastern Nevada 300 miles south to the Las Vegas metropolitan area in Southern Nevada. SNWA has asked the Nevada State Engineer to approve its water right applications to develop and use groundwater from these rural basins. One of the basins, Snake Valley, straddles the border between Nevada and Utah. An interstate agreement allocating the groundwater between the two states is required before the State Engineer can approve water rights that would be diverted from Snake Valley.
We found that policy debates and people’s rationales for how water should be allocated revolved around disagreements over beneficial use. In addition, water agreements need to be designed so that the risks from hydrologic uncertainties and impacts from other users are also apportioned clearly and equitably. Policy designs are purposefully crafted and have enormous impact, yet analysis of the actual contents of policies and their societal impacts has not received adequate attention within the policy sciences. The significance of this research is that it focuses on the foundational principles and rules for the allocation of scarce water resources that must necessarily balance urban and rural interests as well as human and environmental needs.
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I need to recognize and thank a number of individuals for their help and support throughout the dissertation process. I am indebted to my major professor, Dr. Joanna Endter-Wada. Working with Joanna has been an extremely rewarding experience, and she remains one of my biggest inspirations. I would also like to thank my committee members, Drs. Paul Johnson, Zhao Ma, Bethany Neilson, and Charles Romesburg, for their never-ending support and confidence in me throughout this project. Thanks are also owed to Drs. Mark Brunson and Chris Leucke for their support as I finished this dissertation. I also thank Tracy Jones for her thorough review of the dissertation.

I wish to acknowledge the many people who participated in this research by providing information and insights and agreeing to be interviewed. I would like to thank them for their time and interest in this project. Getting the chance to talk with them was invaluable.

I extend my gratitude to the Quinney Foundation, the NSF DDIG Law and Social Sciences Program, the National Water Research Institute, Utah State University Office of Research and Graduate Studies, and the Drought Management Project by the USDA CSREES, for providing funding for this research and for my studies.

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# CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>POLICY DEBATES OVER THE SOUTHERN NEVADA WATER AUTHORITY GROUNDWATER DEVELOPMENT PROJECT: BENEFICIAL USES OF WATER IN A DESERT</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>ALLOCATING INTERSTATE GROUNDWATER: THE SNAKE VALLEY AGREEMENT AS A FAILED POLICY OUTCOME</td>
<td>60</td>
</tr>
<tr>
<td>4.</td>
<td>MANAGING MULTIPLE RISKS OVER TIME: UNCERTAINTIES OVER THE SOUTHERN NEVADA WATER AUTHORITY’S GROUNDWATER DEVELOPMENT PROJECT</td>
<td>96</td>
</tr>
<tr>
<td>5.</td>
<td>CONCLUSIONS</td>
<td>126</td>
</tr>
</tbody>
</table>

APPENDICES ........................................................................................................ 130

A. KEY-INFORMANT INTERVIEW PROTOCOL ................................................................. 131

B. INFORMED CONSENT AGREEMENT ........................................................................ 136

CURRICULUM VITAE .................................................................................................. 139
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Division of Snake Valley groundwater proposed by the Snake Valley Agreement.</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>2-1</td>
<td>Social constructions and political power of target populations</td>
</tr>
<tr>
<td>2-2</td>
<td>Benefits and burdens assigned to target populations</td>
</tr>
<tr>
<td>2-3</td>
<td>Map of study area</td>
</tr>
<tr>
<td>3-1</td>
<td>Map of study area</td>
</tr>
<tr>
<td>4-1</td>
<td>Map of study area</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

Overview

The western United States faces many water challenges with increased droughts, pollution problems, and growing human demands. These challenges are even more complicated, due to nearly fully allocated water supplies. Water law has deep historical roots and its precedents and procedures are firmly entrenched in administrative institutions charged with overseeing water management. This is particularly true for the western United States’ prior appropriation doctrine, which contains the well-known rules of “first in time, first in right” and “use it or lose it” for allocating water.

Climate change predictions indicate future droughts are expected to be even more severe, prolonged, and unpredictable (United States Global Climate Change Research Program 2014). Finding flexibility within existing water laws and institutions to adapt to changing water supplies and demands is critical. The policy framework within which water use changes and allocations occur needs to be carefully analyzed, particularly as growing cities and sectors of the economy in the arid U.S. West continue to seek new water supplies. In particular, we need to better understand how equity concerns can be incorporated in policy designs in order to produce water institutions that can effectively respond to climatic and societal changes affecting water resources.

This dissertation uses a case study to illustrate how societal transitions are making people confront the rules by which we allocate water. The Southern Nevada Water Authority (SNWA) has had plans since the 1980s to pump groundwater in five, rural
basins in northeastern Nevada and transfer it 300 miles south to Southern Nevada.

SNWA’s pipeline plans were delayed when, in 2006, the Nevada Supreme Court ruled that a new public comment period had to be reopened on SNWA’s water applications, which were decades old. A new hearing was held in 2011, and the Nevada State Engineer published his ruling in March 2012, granting SNWA the majority of the water rights they applied for. The protestants appealed the State Engineer’s ruling in June 2013. In December 2013, the 7th Judicial District Judge released his decision, remanding the water rights back to the State Engineer for further study. This situation provided an opportunity to research how people in Nevada and Utah are debating the rules for allocating and managing rural groundwater.

One of the basins targeted by SNWA is Snake Valley, a basin that straddles the border between Nevada and Utah. SNWA’s water right applications in Snake Valley were not included in the water right hearings, because federal legislation dictates that Nevada and Utah must have an interstate agreement allocating Snake Valley water before the State Engineer can approve rights to use water that would be diverted from Snake Valley. In 2009, after four years of negotiation, Nevada and Utah released a final draft of an interstate agreement. However, in 2013, Utah Governor Herbert decided not to sign the agreement. In this dissertation, we analyze why the agreement ultimately failed.

**Dissertation Objectives**

The overarching objective of this dissertation is to understand how policies for dealing with water allocation challenges can be designed to work within the context of
existing water institutions to meet the parameters of efficiency, equity, and effectiveness.

The primary research objectives are to:

- document the various rationales embedded in policies used to allocate and reallocate water;

- contribute to a better understanding of how water policy designs can integrate the technical and social aspects of water management;

- investigate what factors lead to growth of municipalities in arid places and how the water needs of a large number of people in Southern Nevada can be balanced with the much smaller number of ranchers and the ecological needs of the rural areas from which water would be diverted.

The significance of this research is that it focuses on the foundational principles and rules for the allocation of scarce water resources that must necessarily balance public and private interests as well as human and environmental needs. Deliberately revisiting the rationale and worth of current rules when conflicts arise is an important element of policy design and implementation. The public trust doctrine is one example of a policy that has been revisited to understand the rationale behind it as the contexts to which it has been applied have evolved. In 1983, the California Supreme Court made a precedent-setting decision when it expanded the public trust doctrine from its original purposes to protect navigation, fishing, and commerce to also include protections for ecological values. The California Supreme Court ruled that all water allocations might have to be “reconsidered in the light of changing conceptions of the trust” (Hart 1996, p. 102). The public trust doctrine was revived in the 1970s with Joseph Sax’s seminal paper where he
argued that the courts could use the doctrine more broadly in an attempt to democratize natural resource management decisions (Sax 1970). Trigger events like the 1969 Santa Barbara oil spill and the 1969 fire on the Cuyahoga River led to public outcry over environmental conditions, and environmental policies were crafted in response (Smith 2004). Within a changing societal context, the public trust doctrine gained ground as a set of rules that could be used to solve environmental problems.

This dissertation focuses on understanding the design of water policies and rules by examining the values and rationales behind them in a specific western U.S. case study context. The usefulness of this research lies in its examination of tradeoffs that societies confront in trying to balance equity, uncertainty, and effectiveness of water allocation practices. Its unique contribution is in seeking a better understanding of how to design water policies to integrate the technical and social aspects of water management.

**Research Approach**

This dissertation uses a case study approach to conduct a policy analysis. A case study approach is appropriate in this research, because analyzing policy designs responding to societal transitions requires geographic and temporal contextualization. Case studies address qualitative variables, individual actors, decision-making processes, historical and social contexts, and path dependencies (George and Bennett 2005), which are all essential elements in understanding how water policy works in reality. Water is allocated and people are provided access to it using many different distributional rules, and the specific rules that particular locations choose depend partly on precedents that
can be generalized but partly on their appropriateness in unique and specific situations (Honadle 1999).

Data Sources

A variety of data-gathering strategies were used, namely key-informant interviews, document analysis, and observational data. Interviewees included people on both sides of the issue: SNWA water managers, Las Vegas citizens, board members of the Great Basin Water Network (an organization devoted to keeping water in rural Nevada), and rural Nevada landowners and business owners. Interviewees were chosen based on their expertise and involvement in the issue. I asked 26 open-ended questions to understand people’s perceptions and opinions on how and why rural Nevada water should be allocated (Appendix A). I also asked more general questions to gauge people’s thoughts on how they believed water could be effectively allocated and their opinions on what fair water allocation entails. The interviews ranged from 60 to 120 minutes in length and were tape recorded and professionally transcribed. I received informed consent prior to each interview, and all interviewees opted to remain identifiable (see Appendix B for informed consent agreement).

I used primary, archival documents to reconstruct the policy process in the SNWA case study by studying information produced by the legislative process, including the procedural history of the SNWA Groundwater Development Project and the transcripts from the 2011 water right hearings. The transcripts from the water right hearings were obtained and purchased from the court reporting firm that prepared and certified the transcripts. I also studied the March 2012 Nevada State Engineer’s ruling, as
well as the December 2013 7th Judicial Court’s ruling from the hearing that appealed the State Engineer’s decision. I also examined the Snake Valley Agreement, crafted by Nevada and Utah to allocate water in the interstate groundwater basin. I read through submitted public comments on SNWA’s water right application and public comments on the proposed Snake Valley Agreement. I also examined secondary, contemporary public accounts by searching for newspaper and other media accounts of the case as it unfolded over time. These public accounts are important because they help situate issues and define contexts within which policymakers operate (George and Bennett 2005).

Observational data included observing discussions and debates in online discussion groups and observing comment discussion threads on newspapers articles about the SNWA’s Groundwater Development Project. I also observed meetings of the Great Basin Water Network, an organization devoted to keeping water in rural Nevada, as members discussed strategies and rationales to build their case against SNWA in the water right hearings and subsequent appeal. Observation allows researchers to view phenomena in their natural settings and is generally noninterventionist. Observational methods is are adaptable and flexible and are often used as evidence to verify other data from other sources. In addition, researchers often discover new, interesting angles to pursue during observation. Information gained from observation might lead to more specific questions related to answering “how?” or “why?” certain social phenomena occur like they do (Adler and Adler 1994).
Data Analysis

Interviews were transcribed and analyzed. I coded the interview transcripts for categories of information when I initially read them. As I went through the material, I refined and added to the coding categories to include “what am I seeing instances of, what I am learning about, and what questions the material raises” (Weiss 1995, p. 155). I contextualized interviewee’s comments in terms of where that interviewee fell on the issue. In analyzing interview data, I integrated pieces from each interview to synthesize a conceptual understanding of the case studies. I found some consistency among interviewees and identified statements of fact and perspectives and interpretations of fact (Neuman 2011). I used similar coding and integration techniques when analyzing primary and secondary documents. As I analyzed the content of written documents, I assessed the meaning of what is being communicated and considered what purposes the documents were designed to serve. I also situated documents I analyzed in relation to other documents and communications (George and Bennett 2005).

I found consistency across analysis of interviews, observation, and document analysis, using a triangulation of measure approach (Neuman 2011). Triangulation is the idea that “looking at something from multiple points of view improves accuracy” and allows social researchers to learn more from multiple perspectives (Neuman 2011, p. 164). In the following three research chapters, I present the data and information from my data sources integrated with the interpretation. Schlager and Blomquist (2008) argue that the politics of watershed management must be embraced, because watershed decisions are all essentially political. In each chapter, I examined the politics involved in making various arguments on why water should be allocated to particular uses using certain
strategies or methods. I examined what the debates are about, who is engaged in the debates, and how various interests are being served. While these political components are important for understanding why particular decisions are made, I also looked through a more philosophical lens to determine what the SNWA case study reveals about how and why different allocation rules and rationales are utilized and balanced.

Dissertation Structure

This dissertation has been prepared in a multiple paper format: three research chapters, one introductory chapter, and one conclusion chapter. The research chapters are co-authored with my major professor. This introductory chapter provides some background information for the remainder of the dissertation and expands on the research methods and approach. The second chapter focuses on the water hearings over SNWA’s water right applications in the groundwater basins of rural Nevada. We examine the policy debates and people’s rationales on how they think water should be allocated. The third chapter evaluates the interstate agreement that was designed to allocate Snake Valley water between Nevada and Utah. We seek to explain why the crafted agreement ultimately was not signed by Utah. The fourth chapter traces the policy choices that have led to SNWA’s quest for rural Nevada groundwater. We analyze how different people perceive risk and uncertainty when allocating a scarce water resource. The final conclusion chapter summarizes the findings from the three research chapters and provides a reflective perspective on the implications of the research. Each of the chapters includes the necessary background information to stand alone, but the chapters do refer to each other for additional information as needed.
References


CHAPTER 2

POLICY DEBATES OVER THE SOUTHERN NEVADA WATER AUTHORITY

GROUNDWATER DEVELOPMENT PROJECT: BENEFICIAL USES OF WATER IN A DESERT

ABSTRACT

In March 2012, Nevada's State Engineer released water right rulings for four valleys in eastern Nevada. The Southern Nevada Water Authority (SNWA) was awarded the majority of the water they applied for from Spring Valley, Cave Valley, Dry Lake Valley, and Delamar Valley. The SNWA plans to pump the groundwater and pipe it south to the Las Vegas metropolitan area. The State Engineer's decision followed a six-week water hearing and the submission of more than 23,000 public comments. In December 2013, Senior District Judge Robert Estes ruled that the State Engineer’s decision was “arbitrary and capricious” and remanded the water rights back to the State Engineer for further action. Allocating scarce supplies is one of the most significant and contentious water issues currently facing the western United States. Using semi-structured key-informant interviews and document analysis of the water hearing transcripts, submitted public comments, and hearing rulings, we examine the water policy debates in this highly controversial case of water allocation and transfer. In analyzing water policy, it is important to determine what the debates are about, who is engaged in the debates, and how various interests are affected. This case study emphasizes the need to more closely examine the prior appropriation tenet of “beneficial use.” As water

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1 Co-Author: Joanna Endter-Wada. Written following *Weather, Climate, and Society* journal specifications.
becomes scarcer and conflicts between multiple and competing needs more common, it becomes necessary to more carefully deliberate why we allocate water the way we do.

**Introduction**

Many people have speculated that rather than oil, water is the resource that will dominate natural resource politics and conflict in the 21st century (Barlow and Clarke 2005). Societies around the world are faced with water challenges from increased droughts, pollution problems, and growing human demands. An abundant supply of clean water to meet all of the multiple and competing needs, both human and ecological, is no longer available. The western United States continues to be the fastest growing region in the United States, while also being the most arid. As cities and populations continue to grow in water-scarce environments, people are forced to confront tradeoffs in trying to balance efficiency, equity, and effectiveness of water allocation practices. In the U.S. West, these water allocation challenges are made even more difficult as people try to increase the flexibility of a water system deeply entrenched in American history.

The Colorado River is one of the most important landmarks of the western United States. Marc Reisner tells the story of Colorado River development and shows how the history of the West has been shaped by its hydrology and the quest to control that hydrology (1993). The wild Colorado River of John Wesley Powell’s time has been transformed into one of the most carefully controlled rivers in the world. The River’s path is marked by reservoirs, dams, and diversions to store and send water across the arid U.S. West and produce power. These projects, managed by the U.S. Bureau of Reclamation, have allowed development of the West we see today (Reisner 1993). Nearly
40 million people in seven states, including major U.S. cities and agricultural systems, depend on the supply and delivery of Colorado River water. Lake Mead and Lake Powell are the two main reservoirs on the Colorado River. Water flows from Lake Powell at the Arizona-Utah border down through the Grand Canyon and into Lake Mead in Nevada, the source of Las Vegas’ water supply.

The Colorado River has not only been altered physically, but institutional structures, in place since adoption of the Colorado River Compact in 1922, have also worked to carefully utilize and distribute as much water from the system as possible. These institutional structures are collectively known as the “Law of the River.” Unfortunately, the Colorado River’s carefully planned water system is in danger and has been for some time. The U.S. Bureau of Reclamation released their “Colorado River Basin Water Supply and Demand Study” in December 2012. This study projects that the Colorado River may not be able to meet all of the demands on it by 2060. In August 2013, the Bureau of Reclamation announced its plan to curtail water releases from Lake Powell in 2014 to the lowest release since the reservoir was filled in the 1960s.

The 1922 Colorado River Compact attempted to plan for future needs by dividing the seven Colorado River states into an Upper and Lower Basin so that development could proceed in California, part of the Lower Basin, without depleting the River before Upper Basin states had the opportunity to use their share in the future. However, the Compact negotiators did not envision all of the issues facing the Colorado River today. Over allocation of the River, multiple competing needs, prolonged drought, population growth, and climate change have stressed the system, and current water policies may not contain the tools to equitably solve the emerging water conflicts. As the Colorado River
basin states realize that water will become more scarce and limited, water managers have been brainstorming alternative solutions to survive in this new reality (USBR 2012). Nevada, in particular, is one state where water managers are insistent on developing new sources of water to use in conjunction with their Colorado River water. Nevada receives only 0.3% of the total water allocated from the Colorado River and depends on the Colorado River for over 90% of Southern Nevada’s water supply.

In this paper, we examine the water conflict between the Las Vegas metropolitan area and the rural communities in east-central Nevada and Utah. In 1989, the Las Vegas Valley Water District, now part of the Southern Nevada Water Authority (SNWA), applied for water right permits to transfer groundwater from rural east-central Nevada 300 miles south to Las Vegas and the surrounding metropolitan area for their Groundwater Development Project. The project would “likely be the largest interbasin transfer of water in U.S. history” (White Pine County et al. v. King 2013). J. C. Davis, spokesman for the SNWA, explained the essence of the conflict when he said, “I think it was impossible from the beginning to find any real common ground, because it’s a philosophical argument” (J. C. Davis, personal communication, May 4, 2011). We use this case study to examine the water policy arguments involved in a rapidly growing urban area seeking water from distant rural sources. This paper relies heavily on the social construction and policy design framework (Schneider and Ingram 1997) to explain how the policy debates over the SNWA pipeline project have been framed. The significance of this case study is that it focuses on the foundational principles of water allocation that need to be reexamined as the world attempts to better balance multiple needs in water scarce environments.
Framework for Understanding the Debates

Much of the policy literature focuses on analyzing the policy process (Dye 2002; Sabatier 2007) or studying the effectiveness of various institutional structures (Blomquist 1992; Ostrom 1992; Sabatier et al. 2005). Applied to water, this literature helps us to understand why particular institutional arrangements and policies have or have not been deemed successful. Unfortunately, as Schlager and Blomquist (2008) point out, various explanations and justifications for specific types of institutional arrangements often do not apply to the complex political reality that governs most watersheds. Consequently, this literature is limited for helping us understand how the United States’ foundational water policies can respond to emerging water challenges.

Schneider and Ingram argue that the content of policy has not received adequate attention within the policy sciences. In their social construction framework, they argue that policy designs must be examined in order to create improved policies (1997). While policy processes that lead to policy designs may be chaotic and changes in policy abrupt (Sabatier 2007), the actual content of various policies is purposefully crafted to “serve particular values, purposes, and interests” (Schneider and Ingram 1997, p. 3). Understanding the context behind policy designs is also very important, because policies are created in response to particular contexts and situations (Honadle 1999; Schneider and Ingram 1997). Although the context may change and evolve, the policy design will most likely remain the same, because underlying foundations of policy designs are known for continuity, not for fundamental shifts (Ingram and Fraser 2006; Pierson 2004; Schlager and Blomquist 2008). Policy designs socially construct target populations in
positive and negative terms and distribute burdens and benefits that reflect and perpetuate these constructions. Over time, policy designs based on these social constructions can affect the distribution of resources within society (Schneider and Ingram 1997). Therefore, it is essential that the values underlying these policies and the messages they send to different segments of society are carefully considered.

Schneider and Ingram (1997) describe social constructions of target populations along two continuums: one that shows the value placed on the social group from deserving to undeserving and the other that shows the political influence of the group from weak to strong (Fig. 2-1).

From these two continuums, Schneider and Ingram (1997) identify and label four types of target populations. Advantaged groups are politically powerful and are positively constructed as deserving of benefits distributed through policy designs. Contenders are also politically powerful, but these groups are viewed negatively as undeserving of policy benefits and more likely to receive policy burdens. Dependents hold little political influence but are positively constructed as groups that need assistance or policy benefits. Deviants are politically weak but also negatively constructed and are the groups most likely to have policy burdens directed at them. Schneider and Ingram further explain that a group’s position in a target population is not fixed but can change depending on the perspective of who is viewing the group (1997). Often target populations are identified and then burdens or benefits are applied to those populations, depending on whether or not those actions provide political risks or opportunities to public officials (Fig. 2-2; Schneider and Ingram 1997).
Schneider and Ingram (1997) give examples of where certain target populations could fall on the diagram, depending on who is viewing the target population. Adapted from Schneider and Ingram 1997, Policy Design for Democracy, p. 109.
Fig. 2-2. Benefits and burdens assigned to target populations. Schneider and Ingram show which target populations policy makers tend to assign benefits and burdens, depending on whether or not the action would provide political opportunities or political risks. Adapted from Schneider and Ingram 1997, Policy Design for Democracy, p. 113.
Applied to water policy, Schneider and Ingram’s (1997) social constructions framework helps to explain how some groups are better able to receive benefits that they would not be entitled to in otherwise strictly applied water allocation processes. For example, municipalities are often considered to be deserving of water allocation preferences since municipal water use is perceived to be for household purposes such as drinking and bathing, while farmers’ use of water is often viewed negatively because of perceived inefficiencies in its application. As a result, municipalities are generally powerful in water politics and can influence the policy process in their favor. The ability of Los Angeles to take water from the Owens Valley in 1913 was partly due to the advantaged social construction of Los Angeles as deserving of water because of its growing population and industrial economy and the disadvantaged perception of the Owens Valley as small, rural, and agrarian (Kahrl 1982; Reisner 1993).

However, contexts and circumstances can change and, with them, the social construction of a group can also shift. As the 100-year anniversary of the Los Angeles Aqueduct was marked in November 2013, the long-lasting consequences of the project are still being felt. Perhaps the most notable consequence is the drying up of Owens Lake and the resulting air pollution problems in Owens Valley. The Los Angeles Department of Water and Power is still trying to mitigate the social and environmental effects that their pumping had on Owens Lake and the surrounding valley. As Los Angeles continued to pump water from Owens Valley and dealt individually with ranchers and other irrigators in ways that divided them, many people began to view Los Angeles as a contender, very powerful but undeserving of Owens Valley water (Kahrl 1982). Recognition is growing that water to fuel growth and development is not the only
legitimate meaning of water (Blatter et al. 2001). As other meanings of water become more accepted and the social constructions of what uses and users deserve water change, water policies are often modified to accommodate these new social constructions.

In all water allocations, but particularly in cases like allowing Los Angeles to divert Owens Valley water, value judgments about fairness in distributing scarce resources are embedded in the decisions made. Pradhan and Meinzen-Dick (2010) explain that in order to gain access to limited resources such as water, people have to legitimate their claims with a rationale that is socially accepted. Sometimes claims have to be negotiated when different people hold different values. Over time, certain values become the norm, and rules in the form of laws often develop to grant people legal rights based on those values. The concept of water rights actually refers to bundles of rights that vary according to the context in which they were formed, and these bundles all serve to condition the primary allocation principle (Endter-Wada et al. 2012). These conditions are necessary if the policy is going to serve multiple goals (Schneider and Ingram 1997). The context under which water is currently allocated has changed into one in which water is scarce and there are multiple needs and wants for that water. The policy debates surrounding SNWA’s water right applications in rural Nevada emphasize the different rationales people hold for allocating water under conditions where it is scarce.

Methods

This paper uses a qualitative, case study method approach appropriate for conducting policy analysis. The case study approach gave us the opportunity to examine the uniqueness of this specific case while also finding attributes that are common to many
water allocation debates (Ragin 1987). Case studies address qualitative variables, individual actors, decision-making processes, historical and social contexts, and path dependencies, which are all essential elements in understanding how water policy works in reality (George and Bennett 2005). Many rules have been used to allocate water, and the specific rules that particular locations choose depend partly on precedents that can be generalized but partly on unique and specific situations (Honadle 1999; Pierson 2004). We used a variety of data-gathering and analysis strategies, primarily relying on key-informant interviews and secondary document analysis (Box-Steffensmeier et al. 2008; Cresswell 2009; Johnson and Reynolds 2011).

We conducted 16 in-depth key-informant interviews. Interviewees included people on both sides of the issue: SNWA water managers, Las Vegas citizens, board members of the Great Basin Water Network (an organization devoted to keeping water in rural Nevada), and rural Nevada landowners and business owners. Interviewees were chosen based on their expertise and involvement in the issue. We asked 26 open-ended questions to understand people’s perceptions and opinions on how and why rural Nevada water should be allocated (Appendix A). We also asked more general questions to gauge people’s thoughts on how they believed water could be effectively allocated and their opinions on what fair water allocation entails. The interviews ranged from 60 to 120 minutes in length and were tape recorded and professionally transcribed. We received informed consent prior to each interview, and all interviewees opted to remain identifiable (see Appendix B for informed consent agreement).

We used primary, archival documents to reconstruct the policy process in the SNWA case study by studying information produced by the legislative process, including
the procedural history of the SNWA Groundwater Development Project and the transcripts from the water right hearings. The transcripts from the water right hearings were obtained and purchased from the court reporting firm that prepared and certified the transcripts. We also examined secondary, contemporary public accounts by searching for newspaper and other media accounts of the case as it unfolded over time. These public accounts are important because they help situate issues and define contexts within which policymakers operate (George and Bennett 2005). We integrated the data from the interviews, hearings, and news sources and used content analysis to identify the main arguments and rationales behind how the rural groundwater should be allocated (Krippendorf 2004). We also used the process-tracing method to trace the historical events and decisions that led to arguments and outcomes over the SNWA water applications (George and Bennett 2005; Pierson 2004).

Case Study Background

The Southern Nevada Water Authority (SNWA) was created in 1991 by joining the seven agencies responsible for water resources in Southern Nevada. The seven member agencies include Big Bend Water District, Boulder City, Clark County Water Reclamation, City of Henderson, City of Las Vegas, Las Vegas Valley Water District, and North Las Vegas. SNWA’s mission is to manage Southern Nevada’s water resources and provide for residents’ and businesses’ present and future water needs (SNWA 2012). The impetus for joining together came in the late 1980s when each of the individual water agencies realized that it would be difficult to meet the water demands of Southern Nevada’s rapidly growing population on their own. In creating the SNWA, each agency
set aside their priority rights and entered into a shared shortage arrangement to address water issues on a regional basis. The shared shortage arrangement is the underpinning of the extensive conservation measures that have been implemented by the SNWA (SNWA 2012). Without that arrangement, the seven individual water agencies had no incentive to conserve, because they were each competing with one another for scarce water supplies. By joining together, Southern Nevada formed a stronger, more unified voice in water negotiations and also had the capability to manage and develop large water projects (DWR Applications 53987 through 53992 Vol. 1 2011).

The water right applications to groundwater in the rural Nevada basins date back to 1989 when the Las Vegas Valley Water District made an unprecedented filing on 800,000 acre-feet of water from 30 groundwater basins across four counties. This filing was for half of the unallocated water in Nevada (Green 2008). In a 2011 interview, J. C. Davis explained that the Las Vegas Valley Water District applied for these water rights to protect against water speculation and to reserve the water for Southern Nevada municipal uses. SNWA took over the applications shortly after it was formed. Reporters following the project at the time believe that the water right applications were used as bargaining chips for SNWA to receive more Colorado River water to meet the needs of rapid growth occurring at that time, rather than implement the controversial groundwater importation plan (Christensen 1994; Green 2008). In response to the 1989 applications, more than 4,000 legal protests were submitted (Jenkins 2009). Hearings for the water right applications were not pursued, and SNWA dropped the project to pursue other strategies, such as negotiating with other Colorado River basin states to allow SNWA use of their
allocation of Virgin River water after it had already flowed to Lake Mead and had become part of the Colorado River system (Christensen 1994).

However, in 2002, the Colorado River was in the midst of a major drought that altered the perceptions of water security in Southern Nevada. As Davis explained, “we realized that this lake [Lake Mead] that everybody thought was drought-proof might in fact be susceptible to drought” (J. C. Davis, personal communication, May 4, 2011). In 2004, SNWA requested that the State Engineer rule on their 1989 water right applications for five of the basins: Spring Valley, Delamar Valley, Dry Lake Valley, Cave Valley, and Snake Valley (Fig. 2-3). SNWA also applied to the U.S. Bureau of Land Management for a right-of-way to build a pipeline from the groundwater basins to Las Vegas. Shortly afterwards, the Lincoln County Conservation Recreation Development Act (LCCRDA) was passed, sponsored by Senator Harry Reid of Nevada. The LCCRDA sets aside a corridor of land through Lincoln County, Nevada, where a pipeline to convey water is authorized (Fig. 2-3).

One of the groundwater basins targeted by SNWA is Snake Valley, a basin that straddles the Nevada-Utah border. Before the LCCRDA was passed, Senator Bob Bennett of Utah inserted a clause that no water from a shared groundwater basin could be diverted until an agreement was reached between Nevada and Utah (Styler 2011). Applications for water in Snake Valley were not included in the water right hearings, pending an agreement between the two states.

In 2006, water right hearings were held for the remaining four basins (Spring Valley, Delamar Valley, Dry Lake Valley, and Cave Valley), and rights to use 79,000 acre-feet of water a year were granted by the State Engineer.
Fig. 2-3. Map of study area. Map of Eastern Nevada showing the five ground water basins (Snake Valley, Spring Valley, Cave Valley, Dry Lake Valley, and Delamar Valley) targeted in SNWA’s water right application for their proposed Groundwater Development Project. The Lincoln County, Conservation, Recreation, and Development Act (LCCRDA) establishes corridors in Lincoln County for water conveyance structures.
However, the Nevada Supreme Court overturned the State Engineer’s ruling, because the State Engineer had violated his duty to act on the applications within one year, denying protestants to the applications due process. In 2010, the Nevada Supreme Court ruled that the only equitable remedy would be to rennotice the applications and reopen the protest period. The applications were rennoticed and new water right hearings took place in fall 2011. The State Engineer published his ruling in March 2012, granting SNWA the majority of the water rights they applied for. The protestants appealed the State Engineer’s ruling in a two-day hearing in June 2013. In December 2013, the 7th Judicial District Judge released his decision, remanding the water rights back to the State Engineer.

**Nevada Water Law**

Water transfers in the western United States have a reputation for being contentious. However, Jason King, Nevada’s State Engineer, explained that in making these kinds of difficult water right decisions, “We [the State Engineer’s Office] do what the State tells us to do, what the law tells us to do” (personal communication, March 24, 2011). Like most of the western United States, Nevada water law follows the doctrine of prior appropriation. Prior appropriation originates from 19th century mining law developed during the California Gold Rush (Cech 2009; Getches 2008; Thompson et al. 2012). The prior appropriation doctrine allows water users to divert water to use on nonriparian lands. The amount of water allocated is limited to the amount needed to fulfill a particular beneficial use. Each water right is assigned a priority date, based on the concept of “first in time, first in right.” Nonuse of a water right can result in forfeiture, a
concept which is known by the phrase “use it or lose it” (Cech 2009; Getches 2008; Thompson et al. 2012). Nevada water law is found in Title 48 of the Nevada Revised Statutes (NRS). NRS 533.370 states the conditions under which the State Engineer shall approve water right applications: if beneficial use is proven; if proposed use does not conflict with existing rights; and, if applicants prove reasonable diligence and have financial ability and reasonable expectation to construct the work and apply water to the intended beneficial use.

Groundwater law in the United States has always operated differently from surface water, mostly because groundwater is hidden and it is often not known exactly how groundwater flows through a region (Cech 2009; Getches 2008). In most states, including Nevada, domestic wells are not monitored and do not require a permit through the State Engineer. Nevada has been more proactive than other U.S. states by requiring that the groundwater rights issued in a basin should be less than or equal to the perennial yield. The perennial yield is the amount of water that can be drawn from a groundwater basin without exceeding the recharge of the basin. In 45 out of 256 groundwater basins in Nevada, water is over-appropriated. Some groundwater basins became over-appropriated when new data revealed the perennial yield of a basin to be lower than what it was thought to be at the time water was allocated (Nevada Department of Conservation and Natural Resources 2013). Because many states do not have all of the data to completely characterize and quantify water in groundwater basins, allocating groundwater can be difficult.

Jason King explained that interbasin transfers of water are particularly controversial with lengthy hearing processes (personal communication, March 24, 2011).
Nevada Revised Statute 533-370(3) is specific to interbasin transfers and addresses the criteria that need to be addressed in any interbasin water transfer decision. In determining an application for an interbasin transfer of groundwater, this statute specifies that the State Engineer shall consider:

(a) Whether the applicant has justified the need to import the water from another basin; (b) If the State Engineer determines that a plan for conservation of water is advisable for the basin into which the water is to be imported, whether the applicant has demonstrated that such a plan has been adopted and is being effectively carried out; (c) Whether the proposed action is environmentally sound as it relates to the basin from which the water is exported; (d) Whether the proposed action is an appropriate long-term use which will not unduly limit the future growth and development in the basin from which the water is exported; and (e) Any other factor the State Engineer determines to be relevant.

King feels that this statute is “arguably the most important section of [Nevada’s] water law, because it tells [the State Engineer’s office] how [it] should look at these applications” (personal communication, March 24, 2011). He admits that there are grey areas in the law and, in those cases, it is up to both the applicants and protestants to provide as much evidence as they can to support their positions. One example of the law’s obscurities is the criterion of “environmentally sound.” The concept of “environmental soundness” is not defined in the law, and applicants and protestants must “put [their] best foot forward and help [the State Engineer] help [their] case” and “put whatever experts [they] have…on the stand and get them to tell [the State Engineer] why or why not this is environmentally sound” (J. King, personal communication, March 24, 2011). The water right hearings provide an important forum for applicants and protestants to state their arguments and question their opponents’ reasoning. While the State Engineer’s decision is guided by water law, decisions about allocating scarce water are also based on the rationales and values presented in the hearings.
Water Policy Debates

The water hearings took place over a six-week period, starting in late September 2011. SNWA was the applicant for the water rights. The protestants included the Great Basin Water Network, the Confederated Tribes of the Goshute Reservation, Duckwater Shoshone Tribe, Ely Shoshone Tribe, EskDale Center, Corporation of the Presiding Bishop of the Church of Latter-Day Saints, the Long Now Foundation, and various counties in Utah and Nevada. These protestant groups consist of individuals, citizen groups, environmental organizations, rural businesses, and other entities located in or adjacent to one of the four targeted basins. SNWA and the protestants presented numerous witnesses to make their respective cases. Witnesses included physical scientists, policy makers, social scientists, and citizens.

SNWA Rationales

The hearings began by calling on attorneys representing SNWA to present their case. SNWA presented witnesses to confirm that SNWA “absolutely needs” the water from Nevada’s groundwater basins and has a “good-faith intent and reasonable expectation to construct the groundwater project and put this water to beneficial use” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 239). SNWA’s foundational rationale for the project is the “need to secure additional water supplies” and the “need to diversify [their water] portfolio” (J. Entsminger, personal communication, May 5, 2011). Witnesses to SNWA outlined the history of water management in southern Nevada that eventually led to the groundwater pipeline project. In his testimony, John Entsminger, then senior deputy manager of SNWA (and newly appointed SNWA general manager in
February 2014), described the politics behind southern Nevada’s water supply. Because Nevada only receives 300,000 acre-feet of water per year from the Colorado River, SNWA has had to be strategic to meet water demands.

SNWA has understood the importance of having a seat at the table when it comes to Colorado River negotiations. Shortly after becoming SNWA’s general manager, Pat Mulroy lobbied the Nevada governor and legislature to appoint SNWA staff on the Colorado River Commission of Nevada, an executive agency of the State of Nevada that is responsible for acquiring and managing Nevada’s share of Colorado River water (Green 2008). Now, three of the seven commissioners on Nevada’s Colorado River Commission are appointed by and are members of the Board of Directors of SNWA. SNWA’s positions on the Commission have enabled them to be successful in arranging temporary water supplies, meant to bridge the gap in water resources, while they develop additional permanent water supplies. One such temporary supply is the Arizona Water Bank, where SNWA pays the Central Arizona Water Conservancy District to bank their unused allocation of Colorado River water in an underground aquifer. In return, SNWA receives storage credits and can withdraw a portion of Arizona’s Colorado River allotment from Lake Mead.

While the initial 1989 water right applications were filed in response to the exponential growth of southern Nevada, SNWA felt comfortable with their water portfolio and the temporary water supplies that they had secured, because Lake Mead was close to full at the time. However, in 2002, the Colorado River experienced its lowest runoff since 1906, when records first started to be kept on the river. The shortages in the Colorado River system acted as a political trigger event for SNWA. They were a “wake
up call in Southern Nevada, how quickly the lake went down” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 233). The Groundwater Development Project, initially created to provide additional water supplies to meet future growth, became a project essential for diversifying SNWA’s water supply to reduce dependence on the Colorado River. Entsminger explained, “As a water manager with two million people to supply water to every day [and] with a peak demand of 900 million gallons a day for seven out of every ten Nevadans, we know that we can’t rely upon the Colorado River” (DWR Applications 53987 through 53992 Vol. 2 2011, p. 63). Entsminger was also careful to point out that while other technologies, such as desalination, may become more developed and useful in the future, currently these technologies do not work without having the proper exchanges through the Colorado River system (personal communication, May 5, 2011). Mulroy also pointed out that other states, particularly in the Upper Basin, have not fully developed their Colorado River allocations, enabling Lake Mead to sit at a higher elevation (DWR Applications 53987 through 53992 Vol. 1 2011). Mulroy further explained, “We will not be able to meet the needs of that community [southern Nevada] if there is no ability to bring water in from outside the Colorado River watershed that is not dependent on Colorado River supplies” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 89).

When asked if the project was still necessary if no further growth occurred in Southern Nevada, Mulroy responded, “If not one more person moves to southern Nevada, if there is no more development in southern Nevada, this project is still critically important to the residents of southern Nevada” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 93). Furthermore, Kay Brothers, long-time employee and now consultant
to SNWA, explained, “When we were negotiating an agreement for the Arizona bank, they were very concerned that we would develop a dependency, a permanent dependency on this water” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 234). Entsminger also pointed out that other signatory states to the Colorado River Compact have “conditioned their cooperation [to help provide SNWA with temporary supplies] on the fact that we will have permanent supplies to replace those temporary supplies” (DWR Applications 53987 through 53992 Vol. 2 2011, p. 11).

In many ways, SNWA has been innovative in how they have supplied water with high demand and a small allocation from the Colorado River. In the hearing, SNWA illustrates how they have stretched limited water supplies through their conservation work. SNWA considers conservation as one of their main permanent supplies, as they strive to continually decrease southern Nevadans’ water use (DWR Applications 53987 through 53992 Vol. 2 2011). Southern Nevada is also one of the few communities in the United States that reuses 100% of their wastewater. It is treated and either used on golf courses and parks or returned to the Colorado River (DWR Applications 53987 through 53992 Vol. 1 2011). SNWA is able to take an additional acre-foot of water for every acre-foot that they return to the Colorado River as treated waste water. When Lake Mead began to drop in the early 2000s, SNWA enacted extraordinary water conservation measures. Davis explained, “We were able to adopt, arguably, the most stringent and comprehensive set of conservation measures in the United States” (personal communication, May 4, 2011). Perhaps SNWA’s most well-known conservation incentive is their Water Smart Landscapes Program, where they pay people to remove lawn or grass and replace it with water-efficient landscaping.
In 1990, southern Nevada used 347 gallons per capita per day (GPCD). In 2004, SNWA was able to exceed their conservation goal of 291 GPCD by 2010 with a water use of 274 GPCD. SNWA is striving towards a new conservation goal of 199 GPCD by 2035. In response to criticisms that Southern Nevada’s current GPCD is higher than some other cities in the Southwestern United States, SNWA explains that while GPCDs are useful measures to use within an agency to measure progress over time, GPCDs are not useful comparison measures across locations, particularly those with different climates and altitudes (DWR Applications 53987 through 53992 Vol. 4 2011). There is no industry standard for calculating GPCD and, unlike many other cities, SNWA includes tourist water use with permanent residents’ use in calculating GPCD, driving GPCD totals higher. Douglas Bennett, SNWA’s conservation manager, explained, “If we were to include those people [tourists] as functional population equivalents, it would reduce our GPCD by as much as 40 gallons per capita per day” (DWR Applications 53987 through 53992 Vol. 4 2011, p. 206).

SNWA also encourages indoor water conservation, even though indoor water use is a non-consumptive use, since all water used indoors is recovered for reuse in the community through recycling. One such indoor initiative is their free indoor water audits and retrofit kits. Bennett explains that SNWA supports non-consumptive use initiatives because they are dedicated to developing “a stronger ethic in the community” (DWR Applications 53987 through 53992 Vol. 4 2011, p. 136). They call this outreach campaign “the ethic campaign, that’s specifically targeted at...sending a message that water is a valuable resource and should be protected” (DWR Applications 53987 through 53992 Vol. 4 2011, p. 136). SNWA explained that while they continue to make forward
strides in conservation efforts, conservation cannot negate the need for the groundwater pipeline project, because it still would not diversify their water portfolio.

You can’t conserve your way out of the droughts that we’ve seen in the hydrologic record of the Colorado River…putting all your eggs in one basket and hoping for the best is not how we engage in water management (J. Entsminger, personal communication, May 5, 2011).

When justifying its need for the groundwater rights, SNWA ultimately presents the project as essential to its mission of supplying “a safe and reliable water supply for two million people” and consequently, to all of Nevada, since Southern Nevada provides the majority of the revenue for the entire state (J. Entsminger, personal communication, May 5, 2011). SNWA claims that the groundwater pipeline project is vital to Nevada’s economy because all investments in Las Vegas depend on water availability. Pat Mulroy explained, “What investor is going to lend money…and/or enter into any economic activity in Southern Nevada if their investment is at risk from a major drought?” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 95). SNWA showed that Southern Nevada accounts for 72.3% of the state’s population and is responsible for $91.7 billion, or 73.3%, of Nevada’s entire gross output. SNWA analyzed how an interruption to their water supply would impact the economy and determined that GDP and employment could be decreased by 1.7% - 10.5% (DWR Applications 53987 through 53992 Vol. 15 2011). “In the event that an interruption to normal economic activity results, because there is uncertainty in the water supply, [that] can have very, very far-reaching effects on an economy and fiscal system,” explained Jeremy Aguero, economic consultant to SNWA (DWR Applications 53987 through 53992 Vol. 15 2011, p. 179). The tourism industry, the largest industry in Nevada, is “particularly dependent on the availability of
When asked about the possibility that the groundwater pipeline project could harm the future economic growth in the basins of origin, Richard Holmes, SNWA’s deputy general manager for engineering, stated,

> In my opinion, the public interest would be best served by providing that water to the Southern Nevada Water Authority for economic development and uses in Southern Nevada which could benefit the state, I believe, in a far greater way than would be the case of additional agriculture in the basins of origins (DWR Applications 53987 through 53992 Vol. 15 2011, p. 162).

Knowing how important water is to Southern Nevada’s livelihood also plays into SNWA’s financial analysis of the project. SNWA’s analyses show that the groundwater pipeline project will be able to be funded, because SNWA provides an essential service and is an attractive, low-risk investment to investors in the project.

SNWA also used the hearings to present many scientific witnesses to explain that the pumping will be done in a responsible manner in order to reduce any impacts to senior water users and the environment. SNWA explained that they have collected more data in the groundwater basins than any other entity. They also pointed out that the project will be highly scrutinized by several federal agencies and the State Engineer to provide further protections to the basins. They have entered into stipulated agreements over the project with the Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), U.S. Fish and Wildlife Service (USFWS), and the National Park Service (NPS). As part of those agreements, they have developed monitoring and mitigation protocols that are supervised by technical panels from members of each agency. In the 2012 WaterSmart Innovations Conference, Mulroy said,
We have forged enough of a partnership with U.S. Fish and Wildlife, we have managed habitat, we are protecting the species, and we have proven that groundwater can safely be developed and not jeopardize and kill off old, prehistoric species – it can be done (Circle of Blue 2012).

Protestant Rationales

In making their case against the SNWA applications, the protestants presented witnesses to show that the groundwater pipeline project does not meet Nevada’s water law, particularly NRS 533-370(3), the statute specific to interbasin transfers. Addressing the first point of the statute, the protestants do not agree that SNWA has “justified the need to import water from another basin” (NRS 533-370(3)). Peter Gleick, president of the Pacific Institute, testified that SNWA has the potential to enact more stringent conservation measures to make more water available for their use (DWR Applications 53987 through 53992 Vol. 23 2011). In addition, the protestants show that SNWA’s water rates are substantially lower than other cities in the Western United States, and SNWA’s own conservation director admits that water rate increases can decrease water demand (DWR Applications 53987 through 53992 Vol. 4 2011). The protestants believe that more stringent conservation measures with increased water rates will be enough to cover the shortages that would result in a severe drought along the Colorado River, using the water delivery reductions that would be applied according to the 2007 Colorado River Interim Guidelines (Great Basin Water Network 2011). The protestants also presented several experts in economics and infrastructure investment to refute SNWA’s claim that they have the financial ability to construct the project and put the water to beneficial use. Sharlene Leurig, an expert in water project financing, testified that SNWA’s ability to
finance the construction of the project is “tenuous,” partly because SNWA’s revenue is directly related to water demand (DWR Applications 53987 through 53992 Vol. 22 2011 p. 75). Leurig explained that “further increasing rates could have the effect of further decreasing demand, and that creates very significant difficulties in their ability to assure a given revenue stream over time” (DWR Applications 53987 through 53992 Vol. 22 2011, p. 35).

The protestants also pointed out that although SNWA now explains that their water right applications are primarily intended for drought protection against the Colorado River, initially the applications were filed to support growth in Southern Nevada, and growth is still a factor in SNWA’s justification for the project. However, the protestants do not believe that SNWA’s growth projections are reasonable, because they are based on numbers calculated before the 2007 economic downturn. Luance Rake, communications director of the Progressive Leadership Alliance of Nevada, explains, “The Water Authority’s [SNWA] conservation plan still calls for a five, six, seven percent annual growth, even though that hasn’t happened for years and isn’t likely to begin happening anytime soon” (personal communication, May 5, 2011). Some protestants go even farther and believe that growth should not be a planning goal in Southern Nevada. Rick Spilsbury, a Western Shoshone Indian living in the rural basins, explained, “They don’t really need the water at this point…If they grow by taking what’s out here in rural Nevada, at some point the water will run out and then they will be desperately in need of [more] water” (personal communication, March 17, 2011).
In fact, protestant witnesses testified that the rural basins are experiencing growth and having SNWA’s water right applications pending since 1989 has restricted growth in those areas. Gary Perea, White Pine County Commissioner, explained that traditional economic sectors, including agriculture and mining, are increasing in production and are being supplemented by growth in tourism, outdoor recreation, new commercial and industrial growth, and energy developments (DWR Applications 53987 through 53992 Vol. 21 2011, p. 98).

Protestants do not believe that the water wants of Las Vegas should trump the well-being of their rural communities. Even though SNWA believes that Nevada’s public interest would be better served by allocating the water for development in Southern Nevada, the protestants do not agree. James Garza, the director of community and economic development for White Pine County, explained, “The vitality of rural America is critical to ensuring the strength of our economy. The affordability of our food, the independence of our energy supply, and the vibrancy of small communities” (DWR Applications 53987 through 53992 Vol. 21 2011, p. 121). One protestant asked, “why is it okay to destroy one community to save another?” (DWR Applications 53987 through 53992 Vol. 10 2011, p. 41). Perea said, “It’s hard for me to imagine us being able to stay here in business and be able to live here with that kind of volume of water leaving the valley” (personal communication, May 27, 2011).

The protestants also explained that while monitoring and mitigation plans could help ensure that the project does not impact existing users, the plans as written do not provide that protection. The plans do not contain any quantified goals or thresholds to trigger mitigation measures. James Deacon, an expert in desert ecology, explained that
monitoring, mitigation, and management plans (MMM plans) often do not work in practice. He stated,

I believe all of the several that I’ve been involved with have, in spite of the best efforts of really competent people, over time resulted in decline or disappearance of some of the species or some of the habitats that [they] were attempting to prevent damage to (DWR Applications 53987 through 53992 Vol. 19 2011, p. 76).

Rob Mrowka, ecologist with the Center of Biological Diversity, explained that the Nevada water law that requires groundwater rights to be less than or equal to the perennial yield of the basin does not protect against drying up the vegetation. SNWA would be allowed to convert the evapotranspiration of vegetation into “urban water by pumping,” causing the natural vegetation to dry up (personal communication, May 6, 2011). Mrowka explained that the massive pumping SNWA proposes has the potential to affect the entire ecosystem of the basins, leading to the loss of game species and other wildlife species (personal communication, May 6, 2011).

Like SNWA, the protestants presented many scientific experts. These scientific witnesses for the protestants emphasized the large amounts of uncertainty in knowing the details of the groundwater system in the rural basins. Scientists disagree on the perennial yield and the amount of recharge in the basins. Hugh Hurlow, geologist with the Utah Geological Survey, said, “I don’t believe, personally and scientifically, that they [SNWA] could get away with developing all of it [the amount of water SNWA has applied for] without having really severe environmental impacts” (personal communication, June 2, 2011). There are also many disagreements on the amount of interbasin flow that occurs throughout the system. Scientists also pointed out that effects of a project of this magnitude often take a long time to unfold. John Bredehoeft, expert in geology,
hydrology, and ground water monitoring, explained, “This idea that you can sit there and allow the system to recover and then we’ll start pumping again, if you really look at that, it doesn’t work” (DWR Applications 53987 through 53992 Vol. 24 2011, p. 64).

Ranchers and other irrigators in the basins have firsthand experience of how pumping affects the springs, and they recognize that groundwater levels have decreased from their own, much smaller-scaled actions. Dean Baker said, “We dried up springs around our land. We’ve killed plants and things. So, yes. We know it [his ranch’s pumping] is drawing it down,” (DWR Applications 53987 through 53992 Vol. 24 2011, p. 273). The protesters pointed out that it is clear that there is great uncertainty about the amount of flow and that the system is not well understood. In such a situation, the only responsible and rational approach to take is a conservative one that errs on the side of protecting the long-term viability of the resource (Great Basin Water Network, 2011, p. 17).

The protesters also presented compelling testimony from witnesses who live in the rural basins of origin. These witnesses emphasized that the groundwater in the rural basins supports their livelihood, and they do not have other options for water. Steve Carter, rancher and president of the Preston Irrigation Company in Nevada, explained, “Our limiting resource is water. Any removal of this water will limit our ability to make a living on the land. If you take any of this water away from Eastern Nevada, you’ll be taking it from our family and our communities. There is no excess water,” (DWR Applications 53987 through 53992 Vol. 21 2011, p. 190). The Confederated Tribes of the Goshute Reservation, Duckwater Shoshone Tribe, and Ely Shoshone Tribe testified that water is essential to the culture of the Tribes. Witnesses representing the Tribes explained that if the hydrological models SNWA is relying on are incorrect, then they will lose their
reservation and their way of life. Testimony from protestant witnesses make clear that the
stakes of the project are much higher for the communities in the rural basins. SNWA’s
groundwater project is part of a larger water picture for Southern Nevada. When asked
what SNWA would do if the groundwater project was not approved or could not be
implemented, Holmes stated,

I’m thoroughly convinced that we will see increase in the demands in the future
and we will need additional resources to meet those demands. Your question is
hypothetically if the water is not there what will we do? We will find water for
Southern Nevada (DWR Applications 53987 through 53992 Vol. 2 2011, p. 133).

Unlike SNWA, the people and the ecosystem in these rural basins do not have another
source of water nor do they have the resources to find other sources of water. Many of the
rural residents within the basins are fourth and fifth generation residents. One protestant
explained that it is his “lifelong home” (DWR Applications 53987 through 53992 Vol. 21
2011, p. 176). Diane Murphy from the Confederated Tribes of the Goshute Reservation
explained the stakes for people living on the reservation. “People that live on the
reservation, that’s all we have…[Other] people can move wherever they want. We can’t.
We have to live within our means, and if we don’t have that, then we cease to exist”
(DWR Applications 53987 through 53992 Vol. 10 2011, p. 224).

The Ruling

The State Engineer released his rulings on SNWA’s water right applications on
March 22, 2012, four months after the six-week long water hearings ended. Of the
104,856 acre-feet annually that SNWA requested, King granted 83,988 acre-feet annually
from the four north-eastern Nevada groundwater basins: 5,235 acre-feet in Cave Valley,
11,584 acre-feet in Dry Lake Valley, 6,042 acre-feet in Delamar Valley, and 61,127 acre-feet in Spring Valley. The total amount permitted in Spring Valley is dependent on staged pumping. Stage one allows 38,000 acre-feet for the first eight years of pumping. Then depending on biological and hydrological data, an additional 12,000 acre-feet for another eight years will be granted for stage two. Following monitoring for stage two, SNWA will be allowed to develop the entire 61,127 acre-feet granted by the State Engineer. All water right applications are subject to existing rights, a minimum of two years of biological and hydrological data collection prior to exportation, and a monitoring, mitigation and management program.

In his ruling, the State Engineer explained that his decision is made within the current Nevada water law and that the law recognizes the importance of “protecting existing water rights, supporting water conservation, and acknowledging the role of water planning” (Office of Nevada State Engineer 2012, p. 28). First, the State Engineer ruled that SNWA’s water applications would be put to beneficial use and that

Southern Nevada needs a water resource that is independent of the Colorado River and that it would not be advisable for the Applicant to continue to rely upon the Colorado River for 90% of Southern Nevada’s water (Office of Nevada State Engineer 2012, p. 37).

The State Engineer also ruled that SNWA has a “good faith intention” and the financial ability to “construct the works necessary to put this water to beneficial use” (Office of Nevada State Engineer 2012, p. 45).

In the rulings, the State Engineer had to determine how much unappropriated water was available and if the groundwater pipeline project could be done in a responsible manner. The law encourages the State Engineer to use the “best available
science” when making decisions. Because there is much uncertainty about how groundwater flows throughout the groundwater basins and exactly how much water is available, the State Engineer “consider[ed] and weigh[ed] the science submitted by all parties” (Office of Nevada State Engineer 2012, p. 162). After determining the existing water rights in the basins and the estimated perennial yield of the basins, the State Engineer also reserved an additional 4,150 acre-feet of water for future growth and development of the basins of origin, collectively. This amount was guided by testimony that predicted the nature of possible future growth in the basins.

SNWA submitted a monitoring, management, and mitigation (MMM) plan to the State Engineer’s office prior to the water rights hearing. The State Engineer ruled that the plan is comprehensive and “scientifically sound” (Office of Nevada State Engineer 2012, p. 119). Even though the protestants argued that the mitigation plans do not include specific, objective standards that will force mitigation activities, “the State Engineer finds that it is premature to attempt to set quantitative standards or triggers for mitigation actions in the Management Plan at this time” (Office of Nevada State Engineer 2012, p. 118). In the end, the State Engineer concluded that with the MMM plans in place and by reserving water for the basins of origin that “there is no reason to reject the Applications under NRS 533.370(2),” the Nevada statute that stipulates when water applications must be denied.

The Appeal

SNWA was satisfied with the State Engineer’s ruling. Entsminger stated, “We think the State Engineer has grounded his decision in science and the law” (Brean 2012).
Mrowka, protestant representing the Center for Biological Diversity, disagreed and said, “The winner in today’s ruling is mindless Las Vegas growth, while biodiversity, rural residents, and future generations are the clear losers” (Brean 2012). The protestants appealed the rulings to Nevada’s 7th Judicial District Court, where two days of testimony in June 2013 were heard by Judge Robert Estes. Judge Estes listened to arguments to determine whether the State Engineer’s groundwater rulings met Nevada’s water law criteria authorizing interbasin transfers of water. In particular, the protestants objected that the State Engineer’s rulings were “neither environmentally sound nor in the public interest” (White Pine County et al. v. King 2013, p. 7).

In December 2013, Judge Estes published his decision and remanded SNWA’s approved water rights back to the State Engineer for further action. Judge Estes ordered the State Engineer to recalculate the amounts of SNWA’s water right awards, because as the water rights stand now, the aquifer may not reach equilibrium even after 200 years, leading to groundwater mining. Judge Estes ruled that losing this water from the aquifer is “unfair to following generations of Nevadans and is not in the public interest” (White Pine County et al. v. King 2013, p. 13). Judge Estes also disagreed with the State Engineer’s ruling that it is acceptable to award water rights if impacts to existing users do not occur within hundreds of years. Estes explained that water applications need to be rejected if there will ever be impacts to existing users, because it is irresponsible to “defer serious water problems and conflict to later generations” (White Pine County et al. v. King 2013, p. 20).

Judge Estes agreed with the protestants that the MMM plans are useless without “objective standards to determine when mitigation will be required and implemented”
(White Pine County et al. v. King 2013, p. 15). Without these standards, Judge Estes explained that the State Engineer’s ruling is “arbitrary and capricious” and “cede[s] the monitoring responsibilities to SNWA” (White Pine County et al. v. King 2013, p. 18). Estes explained that if the State Engineer does not have enough scientific data to establish triggers and thresholds in the MMM plans, then “it is premature to grant water rights” (White Pine County et al. v. King 2013, p. 23). Judge Estes ordered the State Engineer to establish objective standards for mitigation and to include the adjacent Snake Valley, Utah in the MMM plans.

**Discussion**

SNWA’s proposed Groundwater Development Project illustrates how public water institutions have tried to manage water in changing societal and climatic contexts without deviating from their original mission of providing a reliable and safe water supply to meet the current and future demands of their constituents. Because institutions, such as SNWA, manage water to serve the specific needs of municipal use, they tend to focus solely on their mission, regardless of impacts to the users and uses related to other values of water (Lach et al. 2005). In addition, many water managers seek to serve their constituents through the engineering approach to water management (Huitema and Meijerink 2010). However, with more recent recognition of environmental needs and the importance of water to sense of place and community sustainability, competing uses and values of water have increasingly been at odds with water managers’ mission and vision of water as a product (Blatter et al. 2001; Whiteley et al. 2008). This case study has shown that when people debate water allocation decisions, they are currently focused on
what happens to the water after it is allocated. While prior appropriation requires applicants to specify for what purpose they will use the water, generally after a water right has been granted, it is considered as personal property of the applicant (J. King, personal communication, March 24, 2011). Traditionally, little attention had been focused on how the water is actually used after it was granted (Tarlock 1991). However, now that the amount of unallocated water is increasingly scarce, people are more interested in understanding how water will be used and are making value judgments on whether they consider particular uses as beneficial from a societal perspective.

By using Schneider and Ingram’s social construction framework, there are two arenas that have clear political opportunities: providing benefits to advantaged groups and burdens to deviant groups (1997). All other actions are risky for politicians, including providing benefits to contenders and burdens to dependents (Schneider and Ingram 1997). The protestants of SNWA’s groundwater pipeline project view SNWA as a “contender,” an entity that is powerful but undeserving of the benefits they seek through water law and policy. The protestants have very little trust in SNWA and recognize the large power imbalance between them. Luance Rake explained, “They’ve [SNWA] got the money and the power and they’re just going to do it,” (personal communication, May 5, 2011). In presenting their case, SNWA tries to shift people’s perspectives in ways that would put SNWA into the “advantaged” category, i.e., as a group not only powerful but seen as deserving of benefits in terms of water rights. Their arguments that SNWA provides water for 70% of Nevada’s population and is the economic engine of the state are aimed at influencing this reframing. As attorneys for SNWA explained in their summary and closing arguments, “If these applications are granted, 7 out of 10 people in
the State of Nevada will directly rely upon this water and the other 3 out of 10 will benefit either directly or indirectly” (SNWA 2011, p. 19). Furthermore, SNWA tries to show that burdens of the project will not fall on “dependent,” less powerful interests in the rural groundwater basins. SNWA highlights their MMM plans and insists that Nevada state law and federal law will protect the basins of origin. In her testimony, Mulroy explained, “What I can say is that Nevada law protects existing users. Federal law protects the environment. The State Engineer, the State Department of Natural Resources will be absolutely involved in protecting the existing users” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 128).

In the water right hearings, SNWA also tried to take the focus away from value judgments on their intended beneficial use of the rural groundwater. During the cross-examination of witnesses that live and own businesses in the rural basins, SNWA attorneys continually asked the witnesses if they believe that no new water rights should be developed within any of the four basins. The majority of witnesses admitted that they do not protest other water right applications where the beneficial use would remain within the basins. Rocky Hatch, a rancher, explained, “I think the water should be developed as far as for cows and for wildlife, stuff like that. I don’t know about developing it to take it to Las Vegas, no” (DWR Applications 53987 through 53992 Vol. 22 2011, p. 105). Steve Carter further clarified his position by saying that he did not protest SNWA water right applications for the ranches they had bought in the basins. “It was just the ones that left the valley,” (DWR Applications 53987 through 53992 Vol. 21 2011, p. 200). SNWA believes that the protestants are opposed to their water right applications based on the fundamental idea of exporting water to Las Vegas, a city whose
economy depends on casinos and the gambling industry. In his opening statement for SNWA, attorney Paul Taggart said, “the opposers and their experts are blinded by personal prejudice against SNWA and this project.” SNWA further argued that water allocation decisions cannot rely on value judgments of beneficial use. Taggart explained, “Here’s why the law supports SNWA: We filed for the water first, and Nevada’s water law is still founded on prior appropriation. Nevada water law prohibits SNWA from impacting existing water rights.” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 24). SNWA’s position is that as long as they fulfill Nevada’s water law that guides interbasin transfers, including minimizing impacts, that there is no legal reason why the applications should be denied.

However, Nevada water law is known to be one of the most comprehensive formulations of prior appropriation in the West, and there are provisions within the law that allow the State Engineer to apply values to beneficial uses. For example, the State Engineer has the ability to issue orders declaring preferred uses in designated basins in the interest of public welfare. In addition, Nevada Revised Statute 533.370(2) states the State Engineer will reject water right applications that “prove detrimental to the public interest.” However, the law does not specifically define criteria to establish what actions would be “detrimental to the public interest.” Great Basin Water Network found that in the past the State Engineer has had to use his own discretion in interpreting the law (Great Basin Water Network 2011). In a 1982 ruling, the State Engineer wrote,

It is not unusual that more than one public interest is determined or defined. Some interests may ultimately outweigh others….The State Engineer in many cases is simply faced with weighing one public interest against another in reaching a decision especially when competitive beneficial uses are at issue (Great Basin Water Network 2011, p. 1).
In King’s rulings on the SNWA water right applications, he explained that his analysis of the public interest is guided by the Nevada State Legislature, because the concept of the public interest “is a dynamic concept changing over time” (Office of Nevada State Engineer 2012, p. 163). Current Nevada policy has established the “important role of water resource planning and that such planning must be based upon identifying current and future needs for water” (Office of Nevada State Engineer 2012, p. 28). With that guidance, the State Engineer ruled that SNWA’s water right applications fulfill a beneficial use and, furthermore, that “it would not be advisable for the Applicant to continue to rely upon the Colorado River for 90% of Southern Nevada’s water,” (Office of Nevada State Engineer 2012, p. 37). In Judge Estes’ ruling on the appeal, he agreed with the State Engineer’s findings of SNWA’s need for and financial ability to develop the groundwater. However, Judge Estes ruled that the amount of water the State Engineer granted to SNWA was excessive and did not meet the public’s interest. Judge Estes wrote in his ruling,

This Court finds that the Engineer’s own calculations and findings, show that equilibrium, with SNWA’s present award, will never be reached and that after two hundred years, SNWA will likely capture but 84% of the ET [evapotranspiration]. Further this Court finds that losing 9,780 acre-feet annually from the basin, over and above ET after 200 years is unfair to following generations of Nevadans, and is not in the public interest. In violating the Engineer’s own standards, the award of 61,127 acre-feet annually [from Spring Valley] is arbitrary and capricious. (White Pine County et al. v. King 2013, pp.12-13).

Judge Estes ruled that “while the State Engineer’s interpretation of the law is persuasive, and the court should give it great deference when it’s within the language of the applicable statutory provisions, it is not controlling” (White Pine County et al. v. King 2013, p. 6). Judge Estes’ ruling makes a greater attempt at balancing multiple beneficial
uses. While he agreed that SNWA does prove a beneficial use of rural Nevada groundwater, he interpreted the “public interest” statute of Nevada water law to include future generations and the future sustainability of rural Nevada. As such, Judge Estes ruled that the State Engineer must recalculate the water granted to SNWA to incorporate a longer view of the consequences of the groundwater pipeline project.

The State Engineer also applied burdens to SNWA with the staged pumping and MMM protocol. However, Judge Estes ruled that the MMM plans are not really a burden to SNWA, because the MMM plans would be under SNWA’s direction and “there are no objective standards to determine when mitigation will be required and implemented” (White Pine County et al. v. King 2013, p. 15). While Judge Estes agreed that the MMM plan has good intentions, he ruled that the vague guidelines in the plans give no guarantee that existing users will be protected. “Essentially, the State Engineer is saying, ‘we can’t define adverse impacts, but we will know it when we see it’” (White Pine County et al. v. King 2013, p. 18). Schneider and Ingram explain that it can be difficult to assign burdens to contender groups, because contender groups have the power to inflict political damage (1997). Therefore, many burdens assigned to contender groups tend to be “hollow and unenforceable” (Schneider and Ingram 1997, p. 119). In this case study, many protestants believed the State Engineer “want[s] to make a good decision” (G. Perea, personal communication, May 27, 2011) but they recognize the broader political implications of SNWA’s project with Senator Harry Reid’s influence in not only pushing the LCCRDA through but also encouraging federal agencies to sign stipulated agreements with SNWA to not protest SNWA’s water right applications (S. Lynn, personal communication, April 14, 2011). Mrowka explained,
The bottom line is that Southern Nevada Water Authority enjoys the support of developers and casino owners, who then influence heavily, with campaign donations, politicians who are supposed to be the watchdogs over SNWA, but are held at abeyance because of the money (personal communication, May 6, 2011).

This case study has shown that as water becomes more scarce with increasing droughts and over allocated river systems, it has become ever more important to carefully deliberate water policy designs to allocate water to meet a variety of competing needs. The policy debates over SNWA’s water right applications show that one central argument is over the beneficial uses of that water. Endter-Wada et al. explain that a foundational element of water law is determining fair ways to allocate water among users (2012). In his ruling, the State Engineer used the testimony provided to determine how much water was unappropriated in the basins and granted SNWA that amount, minus a small amount reserved for the basins of origin. However, Endter-Wada et al. emphasize that less attention is paid to fair ways to allocate water among beneficial uses (2012). The State Engineer was careful to point out that it is not his job to evaluate the political and economic decisions made by local government and there is nothing in Nevada water law instructing the State Engineer to control or distribute population or perform an alternative analysis (Office of Nevada State Engineer 2012, p. 158).

Even so, Judge Estes ruled that the State Engineer does have a responsibility to carefully consider how an assigned use will affect the collective, existing uses of that water in rural Nevada, including ecological uses. Judge Estes stated, “it is also unseemly to this court, that one transitory individual may simply defer serious water problems and conflict to later generations” (White Pine v. King 2013, p. 20). In addition, Judge Estes’ ruling showed that allocating water should require more thought than how the paper water is assigned. Instead, allocating water necessitates a holistic view of the hydrologic system.
and a true understanding of how water uses interact in the system. SNWA has admitted that it is unclear exactly how the aquifer will respond to pumping and will know more once pumping begins. However, Judge Estes wrote, “If there is insubstantial evidence and it is premature to set triggers and thresholds [in the MMM plans], it is premature to grant water rights” (White Pine County et al. v. King 2013, p. 23). Judge Estes’ ruling demonstrates that water allocation decisions can and should take the time needed to clearly understand and evaluate the impacts of a project.

Schneider and Ingram have shown that focusing on target populations, like water users, can send messages on which users are more deserving of water and can perpetuate or reinforce existing water allocation decisions (1997). This case study illustrates that there is a need to focus on the actual uses of the water so that society can begin to differentiate between water needs and water wants. The “public interest” statute that is found in many states’ water law is a step in the right direction to encourage decision makers to wrestle with these concepts. However, its use can be limited depending on how a decision maker chooses to interpret the statute, often depending on how comfortable the decision maker is at assigning benefits and burdens to particular applicants. The State of Nevada and SNWA has appealed Judge Estes’ decision that remanded SNWA’s water rights back to the State Engineer. It is possible Nevada’s Supreme Court can decide to overturn Judge Estes’ interpretation of whether and how water rights given to SNWA would best serve the public interest of Nevada.
Conclusions

Battles over water can be long-standing and arduous. One hundred years later, litigation still persists between Owens Valley residents and the Los Angeles Department of Water and Power. This case study over rural Nevada's groundwater is no exception, and protesters have been fighting the project for nearly 25 years. Simeon Herskovits, attorney for the Great Basin Water Network, explained the significance of Estes’ ruling, “[I]t could fundamentally change the way regulators review [SNWA’s] controversial pipeline” (Brean 2013). While the protesters are pleased with Judge Estes’ ruling, they realize the fight for rural Nevada water is far from over. The same newspaper article explains that SNWA is committed to the groundwater project and will continue to defend it. Herskovits expected the case would wind up in the Supreme Court and assumed that it would even before Estes released his ruling (Brean 2013).

While Judge Estes’ decision validated many of the arguments that the protesters made against SNWA’s project, the protesters are aware that Nevada water law is vague when it comes to recognizing environmental uses of water. Susan Lynn, then coordinator of the Great Basin Water Network explained, “We want him, [the State Engineer], to further define environmental soundness because he gives it lip service, but he has nothing in which to base his decision. There are no criteria for environmental soundness” (personal communication, April 14, 2011). Mrowka calls for “better foundational laws in place that provide for environmental protection” before large-scale water exportation projects begin (personal communication, May 6, 2011). If society can carefully deliberate why we allocate water the way we do and which beneficial uses it considers legitimate uses of scarce water in different contexts, then we will more likely be able to balance the
multiple water needs of cities, rural communities, and the environment. Finding the right forums in which these societal deliberations can occur, given the current political climate in the U.S., is the challenge.

**References**


CHAPTER 3

ALLOCATING INTERSTATE GROUNDWATER: THE SNAKE VALLEY AGREEMENT AS A FAILED POLICY OUTCOME²

ABSTRACT

The Southern Nevada Water Authority (SNWA) has been pursuing groundwater from five rural basins in northeastern Nevada to transfer 300 miles south to Southern Nevada for their Groundwater Development Project. One of the targeted groundwater basins is Snake Valley, a basin that straddles the border between Nevada and Utah. Before water can be allocated from Snake Valley, an agreement between Nevada and Utah that divides the water must be in place. Four years after a final draft agreement between the two states was completed, Utah’s Governor Herbert decided not to sign it. Relying on policy analysis and using a process tracing approach to reconstruct the agreement, this paper analyzes why the agreement ultimately failed. Many water experts thought the agreement provided an equitable, sustainable solution for groundwater management. However, opponents of the agreement could not separate the agreement’s division of water between the two states from the allocation of Snake Valley water for SNWA’s groundwater project. Opponents did not feel that the agreement adequately addressed the risks and uncertainties the rural residents of Snake Valley would experience from SNWA’s groundwater project. While many water experts regretted the fact that politics stopped the Snake Valley Agreement from being signed, politics is the means through which citizens debate differences between multiple values of water. If

² Co-Author: Joanna Endter-Wada. Written following Weather, Climate, and Society journal specifications.
negotiations can incorporate multiple ways of knowing and understanding risks and uncertainties in water allocation and development, a successful interstate agreement could be designed.

Introduction

Public policy attention on water challenges societies face has increased with droughts, pollution problems, and growing human demands. The Western United States, in particular, has been experiencing drought conditions for over a decade, in what could become a “megadrought,” a widespread drought that lasts for two decades or longer (Cook 2013). Water managers are increasingly concerned about having the necessary water supply to meet their constituents’ needs (Larson et al. 2009). The Colorado River, the source of water for 30 million people in the Western United States, is experiencing its worst 14-year drought in the last one hundred years.

Many areas of the United States are also experiencing groundwater depletion (Anderson and Woosley 2005). Groundwater is the source of drinking water for 90% of the rural population, particularly in the U.S. West (Anderson and Woosley 2005). However, compared to the extensive monitoring of surface water, groundwater is not systematically monitored on a national scale (Anderson and Woosley 2005).

Groundwater law has incompletely and slowly developed, with use and pumping of groundwater occurring faster than development of the law to manage it (Hesser 2011; Leshy 2004). While many interstate water compacts mention groundwater, currently there are no interstate compacts that solely allocate and manage groundwater resources (Hall and Cavataro 2013; Hesser 2011). Likewise, the United States Supreme Court has
never equitably apportioned groundwater between states (Hall and Cavataro 2013; Hesser 2011). As urban water managers continue to seek water from distant rural sources to avoid interruptions of water deliveries in rapidly growing western cities, the inadequacies of groundwater law to protect the sustainability of aquifers can lead to great conflict.

The Southern Nevada Water Authority (SNWA) has been pursuing groundwater from five basins in rural, northeastern Nevada to transfer 300 miles south to Southern Nevada for their Groundwater Development Project. SNWA believes the project is essential to reduce the risks from Colorado River shortages that could endanger the economy that has developed in Southern Nevada, fueled by the growth of Las Vegas, which has caused Nevada to be the nation’s fastest growing state for five straight decades (Mackun and Wilson 2011). SNWA’s proposed water importation project has been very contentious and arguments over the project have persisted for over two decades (see Chapter 2). Making the project even more complicated is the fact that one of the groundwater basins being targeted in the pipeline project, Snake Valley, straddles the border between Nevada and Utah. Before water can be allocated from Snake Valley, an agreement between Nevada and Utah that divides the water must be in place. A final draft agreement between the states was released in 2009 after four years of negotiation. Four years after the final draft was completed, Utah’s Governor Herbert decided not to sign it.

This paper explores why the Snake Valley Agreement ultimately failed, despite the fact that many water experts believed the agreement provided an equitable division of water and an extensive monitoring and management plan. Opponents of the agreement felt that the monitoring and management plan did not adequately reduce the risks that residents of Snake Valley would experience if SNWA is allowed to export water out of
the valley. For opponents, the risk of not having clear mitigation and management responses to adverse impacts of pumping outweighed the risks of not signing the agreement.

The Role of Interstate Water Compacts in Conflict and Cooperation over Water

Conflict and cooperation over water can change and evolve over time, depending on the particular legal, political, and institutional contexts under which water is allocated in different locations (Endter-Wada et al. 2009). In the case of transboundary water resources, working through conflicts and developing cooperation can be even more challenging (Odom and Wolf 2011; Sivakumar 2011). Green et al. (2013) explain the delicate balance in creating legal and institutional arrangements in managing and allocating water. Reducing uncertainty in a highly variable system has been the goal of water law and water infrastructure (Green et al. 2013; Whiteley et al. 2008). Water users seek assurances that they will always have the water they need. Admitting uncertainty of the system can cause difficulties in reaching transboundary agreements if those uncertainties cannot be alleviated (Green et al. 2013). However, not allowing for uncertainty can lead to legal and institutional rigidity that limit how water managers respond to changing social-ecological conditions (Garmestani et al. 2009). Finding flexibility within existing water laws and institutions to adapt to changing water supplies and demands is critical.

Interstate water resources in the United States can be allocated using three mechanisms: (1) interstate compacts or agreements, (2) equitable apportionment, the
water law doctrine that governs the U.S. Supreme Court’s allocation of interstate water, or (3) congressional apportionment. Many legal scholars suggest interstate compacts are the best way to allocate interstate water resources (Hall and Cavaturo 2013; Hesser 2011). Hesser (2011, p. 17) explains that relying on the U.S. Supreme Court to equitably apportion interstate waters is not conducive to sustainably managing groundwater aquifers, because a state must prove that another state’s pumping will cause a “real or substantial injury or damage” before the Supreme Court will agree to hear a case on equitable apportionment, often resulting in a reactive allocation plan. Judges rarely understand the complexity of issues involved in interstate water disputes, and the outcomes of equitable apportionment can be “uncertain and unreliable,” with the Supreme Court’s decision as binding (Hall and Cavaturo 2013, p. 50). Congressional apportionment of interstate water is rare, and Congress has generally avoided making interstate water allocation decisions to avoid conflict among their constituents (Christie 2013).

Christie (2013) points out that entering into interstate compacts rather than relying on equitable apportionment or congressional apportionment allows states to maintain more control over decisions related to their own waters. Negotiating parties in an interstate compact are deeply enmeshed in the details and context within which water conflicts arise. If all parties are dedicated to reaching an agreement, they can work together to develop better voluntary solutions than outside judges may impose (Thorson 2003). Interstate compacts are also ideal in the sense that negotiating them requires water managers to carefully consider the future management of aquifers or river systems by forcing the involved parties to think about how they want their shared water system to be
developed (Christie 2013; Hesser 2011). In order for transboundary water agreements to be successful in the long run, they need to encourage resilience by including provisions for extreme weather events, allowing flexible allocations to reflect possible changing water quantity, and incorporating mechanisms to resolve conflicts (Odom and Wolf 2011). The task force responsible for drafting the Snake Valley Agreement created a reserved category of water that could be apportioned to the states if studies show that amount of water is available. The agreement also allowed for further studies and data to refine both the amounts of water apportioned to the two states and the management of that water.

Effective water agreements must encourage coordination and cooperation among participating parties and must also integrate local knowledge and local stakeholders (Green et al. 2013). While interstate compacts are agreements between broader state entities, interstate water issues have local ramifications (Thorson 2003). Complex management issues cannot be dealt with without taking into account local stakeholders’ perspectives and information (Pahl-Wostl et al. 2007). Interstate agreements should establish a regulatory commission made up of members of all signatory states to ensure the agreement remains flexible and viable under changing conditions (Jeffers 2009). Pahl-Wostl et al. go farther by suggesting “multiparty collaboration processes” in water management (2007). Multiparty interactions give groups of stakeholders the ability to manage problems so that not only experts are involved in decision making. Allowing stakeholders more active involvement in decision making can lead to a “higher willingness to reach agreement and to more commitment to the outcome” (Pahl-Wostl et al. 2007). In addition, water experts and managers get the opportunity to learn from and
work with local stakeholders so that different ways of knowing are shared between groups, recognizing that local, experiential knowledge is just as important as generalizable, scientific knowledge (Endter-Wada et al. 2009; Pahl-Wostl et al. 2007; Schneider and Ingram 2007).

**Methods**

This paper uses a qualitative, case study method approach appropriate for conducting policy analysis. The case study approach gave us the opportunity to examine the uniqueness of this specific case while also finding attributes that are common to many water allocation debates (Ragin 1987). Case studies address qualitative variables, individual actors, decision-making processes, historical and social contexts, and path dependencies, which are all essential elements in understanding how water policy works in reality (George and Bennett 2005). We used a variety of data-gathering strategies, primarily key-informant interviews and document analysis (Box-Steffensmeier et al. 2008; Cresswell 2009; Johnson and Reynolds 2011).

We conducted 16 in-depth key-informant interviews. Interviewees included people with different relationships to and perspectives on SNWA’s Groundwater Development Project: SNWA water managers, Las Vegas citizens, board members of the Great Basin Water Network (an organization devoted to keeping water in rural Nevada), and rural Nevada landowners and business owners. We asked 26 open-ended questions to understand people’s perceptions and opinions on how and why rural Nevada water should be allocated and on the pending Snake Valley agreement (Appendix A). We also asked more general questions to gauge people’s thoughts on how water could be effectively
allocated and their opinions on what fair water allocation entails. The interviews ranged from 60 to 120 minutes in length and were tape recorded and professionally transcribed. We received informed consent prior to each interview, and all interviewees opted to remain identifiable (see Appendix B for informed consent agreement).

We used primary, archival documents to reconstruct the policy process in the SNWA case study by analyzing information produced by the legislative process, including the procedural history of the SNWA pipeline project and the transcripts from the Nevada water right hearings. The transcripts from the water right hearings were obtained and purchased from the court reporting firm that prepared and certified the transcripts. We also obtained written public comments on the draft Snake Valley Agreement and other documents released by Nevada and Utah describing the process behind the agreement. We examined secondary, contemporary public accounts by searching for newspaper and other media explanations of the case as it unfolded over time. These public accounts are important because they help situate issues and define contexts within which policymakers operate (George and Bennett 2005). We integrated data from the interviews, hearings, and news sources and used content analysis to identify the main arguments and rationales behind people’s opinions about how the rural groundwater should be allocated (Krippendorf 2004). We also used the process-tracing method to trace the historical events and decisions that led to arguments and outcomes over the proposed Snake Valley Agreement (George and Bennett 2005; Pierson 2004)
Case Study Background

In 1989, the Las Vegas Valley Water District applied for 800,000 acre-feet of water from 30 groundwater basins across four rural counties. Shortly after, the Las Vegas Valley Water District, along with six other member water agencies in Southern Nevada, joined together to form the Southern Nevada Water Authority (SNWA). SNWA assumed responsibility for the water applications but did not pursue them amidst numerous protests. In 2004, in response to the major drought occurring in the Colorado River Basin, SNWA requested that the Nevada State Engineer rule on their 1989 water right applications for five of the basins: Spring Valley, Delamar Valley, Dry Lake Valley, Cave Valley, and Snake Valley (Fig. 3-1).

In 2006, the State Engineer conducted water right hearings for Spring Valley, Delamar Valley, Dry Lake Valley, and Cave Valley. He awarded SNWA 79,000 acre-feet of water annually. However, in 2010, the Nevada Supreme Court overturned the State Engineer’s ruling, because he neglected to act on SNWA’s applications within one year as required by Nevada statutes, which denied protestants the opportunity to submit current comments on the applications. The Nevada Supreme Court ruled that the only equitable remedy would be to renotice the applications and reopen the protest period. The applications were renoticed and new water right hearings took place in fall 2011. The State Engineer published his ruling in March 2012 and awarded SNWA 83,988 acre-feet annually, subject to a staged pumping plan and a monitoring, mitigation, and management plan. The protestants appealed the State Engineer’s ruling in a two-day hearing in June 2013. In December 2013, the 7th Judicial District Judge released his decision remanding the water rights back to the State Engineer for further study. The
Fig. 3-1. Map of study area. Map of Eastern Nevada showing the five ground water basins (Snake Valley, Spring Valley, Cave Valley, Dry Lake Valley, and Delamar Valley) targeted in SNWA’s water right application for their proposed Groundwater Development Project. The Lincoln County, Conservation, Recreation, and Development Act (LCCRDA) establishes corridors in Lincoln County for water conveyance structures.
state of Nevada and SNWA have appealed the judge’s decision to the Nevada Supreme Court.

SNWA’s water right applications to Snake Valley were not included in the 2006 and subsequent 2011 water right hearings. Snake Valley is a 500 square-mile area adjacent to Spring Valley (Fig. 3-1), straddling the border between Nevada and Utah. Although most of the land area is in Utah, 60% of the water originates in Nevada’s Snake and Deep Creek mountain ranges. Currently, the majority of already allocated Snake Valley water has been in Utah, used primarily by farmers and ranchers. Great Basin National Park in Nevada also lies within Snake Valley boundaries. Snake Valley groundwater was part of SNWA’s original 1989 water right applications in rural northeastern Nevada. However, Senator Bob Bennett of Utah inserted a clause in the Lincoln County Conservation, Recreation, and Development Act (LCCRDA) that required an agreement between Utah and Nevada before any water could be diverted from Snake Valley (Styler 2011).

The LCCRDA was introduced in 2004 by Senator John Ensign and Senator Harry Reid, both of Nevada. Lincoln County is just south of Snake Valley and covers 100,000 square miles. Delamar, Dry Lake, and parts of Cave and Spring Valley lie in Lincoln County. Before the LCCRDA was passed, nearly 98% of Lincoln County’s land base was held by the U.S. federal government, most of it managed by the Bureau of Land Management (BLM). The LCCRDA allows the sale of 90,000 acres of BLM land into private ownership. The LCCRDA also establishes two half-mile wide water conveyance corridors in Lincoln County for SNWA and the Lincoln County Water District (Fig. 3-1). The residents of Snake Valley were concerned that the right-of-way established by the
LCCRDA essentially gave Snake Valley water to SNWA. Senator Bob Bennett of Utah
inserted language into the bill to provide Utah residents of Snake Valley some protection
(Styler 2011). The inserted clause states,

(3) AGREEMENT- Prior to any transbasin diversion from ground-water basins
located within both the State of Nevada and the State of Utah, the State of Nevada
and the State of Utah shall reach an agreement regarding the division of water
resources of those interstate ground-water flow system(s) from which water will
be diverted and used by the project. The agreement shall allow for the maximum
sustainable beneficial use of the water resources and protect existing water rights.

Water right hearings for SNWA’s applications in Snake Valley are pending until
an agreement is established between Nevada and Utah. In 2005, representatives from
Nevada and Utah began preliminary discussions on an interstate agreement. On August
13, 2009, Nevada and Utah released to the public draft forms of the “Agreement for
Management of the Snake Valley Groundwater System” (referred to in this paper as the
“Snake Valley Agreement”) and the “Snake Valley Environmental Monitoring and
Management Agreement” addendum (referred to as EMMA in this paper). The public
submitted more than 200 written comments on the agreement. Both states reviewed the
comments and together submitted a document responding to the comments, along with
the final draft of the agreement. In 2010, Utah Governor Herbert was ready for Utah
Department of Natural Resources director, Mike Styler, to sign the agreement, but shortly
after, the Nevada Supreme Court overturned SNWA’s 2006 water rights from Snake
Valley’s neighboring groundwater basins. Utah decided to delay action on the Snake
Valley Agreement until SNWA’s other water right applications were settled. In April
2013, Governor Herbert finally decided not to sign the agreement.
The Snake Valley Agreement

While many legal scholars have pointed to the Snake Valley Agreement as an important mechanism to guide cooperation between Nevada and Utah in managing the shared groundwater resources of Snake Valley (Clyde et al. 2012; Hall and Cavataro 2013), it has been controversial. The Snake Valley Agreement apportions Snake Valley water between Nevada and Utah. The agreement created three categories of Snake Valley water: allocated, unallocated, and reserved. The allocated water category was meant to protect existing rights, with priority dates prior to October 17, 1989, which predate SNWA’s water right applications for use of Snake Valley water. The unallocated water category contains water right applications with priority dates on or after October 17, 1989 and include SNWA’s water right applications. Water in the reserved category can only be allocated if both Nevada and Utah’s state engineers agree. The Snake Valley Agreement apportions groundwater such that both states receive 66,000 acre-feet/year divided among the three categories as seen in Table 3-1.

TABLE 3-1. Division of Snake Valley groundwater proposed by the Snake Valley Agreement.

<table>
<thead>
<tr>
<th>Category</th>
<th>Nevada</th>
<th>Utah</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocated</td>
<td>12,000 acre-feet/yr</td>
<td>55,000 acre-feet/year</td>
</tr>
<tr>
<td>Unallocated</td>
<td>35,000 acre-feet/yr</td>
<td>6,000 acre-feet/year</td>
</tr>
<tr>
<td>Reserved</td>
<td>19,000 acre-feet/yr</td>
<td>5,000 acre-feet/year</td>
</tr>
</tbody>
</table>
Water managers who support the agreement tried to emphasize that the agreement itself does not allocate water to SNWA for their pipeline project (Clayton 2013; Styler 2011). Rather, the agreement is meant to divide Snake Valley groundwater between the two states and provides guidelines on how the states would monitor and manage the water. The agreement does not grant any water rights or authorize any pumping projects. Governor Herbert commissioned three well-known water lawyers in Utah to analyze the agreement. In their report, Clyde et al. explain “both States have the right to appropriate and develop this limited water supply, and that without the agreements, it would simply be a race to development” (2012, p. 4). The only feasible way Nevada can develop Snake Valley water is by diverting it away from the valley, which is prohibited by the LCCRDA without an interstate agreement. However, it is not clear what Nevada could do if Utah refuses to sign the agreement after participating in negotiations.

Nevertheless, many of the public comments opposing the agreement preferred no agreement at all and equated the agreement to allowing Snake Valley water to be exported to Las Vegas. Opponents of the agreement think it divvies up more water than is available in the aquifer, particularly if water leaves the Valley. Many opponents also think that the 50/50 division of water is unfair. They think Utah should receive more Snake Valley water, because most of Snake Valley’s arable land lies in Utah (Fahys 2013); this implies that many Snake Valley residents feel that using Snake Valley water within the Valley is more important than exporting the water to Southern Nevada (see Chapter 2). Some sample comments include the following. “Please stop the Agreement on the…Allocation of the Snake Valley Aquifer. Keep Utah’s water in Utah” (Snake Valley Aquifer Advisory Council 2009, p. 8). “Please stop the agreement being made
with Nevada to give [them] some of our underground water. Utah needs all the water it has” (Snake Valley Aquifer Advisory Council 2009, p. 9). “Las Vegas does not need Snake Valley water, and the Agreement is no solution for the problem” (Snake Valley Aquifer Advisory Council 2009, p. 13).

The State of Utah issued multiple public outreach publications to explain that Nevada is legally entitled to a portion of Snake Valley water and that the Snake Valley Agreement actually works to protect Utah’s interests (Utah Division of Water Rights 2009). However, opponents of the pipeline project countered that having an agreement in place allows SNWA to move one step closer to making the pipeline a reality. Terry Marasco explained that agreements like the Snake Valley Agreement are “written to placate the opponents at the time only to be broken in the future” (Maffly 2013). The agreement was mandated by the LCCRDA, which was passed to facilitate a SNWA water conveyance structure in rural Nevada after SNWA asked the State Engineer to rule on their pending water right applications. Even though, legally, many people understand that both Utah and Nevada have rights to Snake Valley groundwater, the political underpinnings of the agreement suggest that the agreement’s purpose is to give SNWA what they ultimately want – rural Nevada groundwater piped to Southern Nevada.

Hall and Cavatano (2013) explain that the agreement contains extensive protections for Snake Valley stakeholders and the environment. The agreement prohibits groundwater mining and used available studies to determine Snake Valley’s sustainable yield, the amount of groundwater that can be developed without depleting the aquifer (Alley and Leake 2004). In response to the LCCRDA, the U.S. Geological Survey, in cooperation with the Desert Research Institute and the Utah State Engineer’s Office,
conducted the Basin and Range Carbonate Aquifer System Study (BARCASS).

BARCASS estimated the sustainable yield of Snake Valley as 132,000 acre-feet/year. Other studies suggested lower numbers in the range of 105,000 to 111,000 acre-feet/year. To be on the conservative side, the agreement proposed 108,000 acre-feet/year as the sustainable yield, as reflected in the allocated and unallocated water categories. If further studies and data indicate more water in Snake Valley is available, the additional 24,000 acre-feet of water cited by the BARCASS study can be allocated (Table 3-1).

The agreement requires Nevada’s State Engineer to wait ten years to rule on SNWA’s water right applications in Snake Valley so that additional hydrological and biological data may be gathered and analyzed. The agreement also establishes an Environmental Monitoring and Management Agreement (EMMA) between Utah, Nevada, and SNWA. The EMMA establishes two objectives: one, to understand the baseline conditions of biology, hydrology, and air quality; and, two, to provide a plan of operation and a definitive, binding process for resolving disputes. The EMMA was meant to protect existing users by creating procedures to identify and mitigate adverse impacts from SNWA withdrawals and establishes an interstate panel to resolve disputes between existing users and SNWA. In the event SNWA is granted water rights in Snake Valley, SNWA is required to help fund a monitoring and mitigation account of $3 million that will be maintained as long as SNWA maintains groundwater development in Snake Valley.

Many legal experts thought that the EMMA and other protections included in the Snake Valley Agreement provided an ideal implementation of an adaptive management plan (Clayton 2013; Hall and Cavatario 2013; Styler 2011). Adaptive management is
based on the principle of learning by doing (Pahl-Wostl 2007; Stankey and Allan 2009). Management plans are purposely designed so that managers can learn the resource’s responses to management actions and can use this knowledge to inform future actions (Pahl-Wostl 2007; Stankey and Allan 2009). Adaptive management is considered to be essential in order to respond to the uncertainties of social and ecological responses to both natural changes and human manipulations of the system (Green and Garmestani 2012). The agreement states that more scientific data and studies can “further refin[e] the available groundwater supply of Snake Valley” and this additional information can be used to “revise estimates” (Snake Valley Agreement 2009, p. 4). The EMMA of the Snake Valley Agreement establishes a multidisciplinary Technical Working Group (TWG), composed of two representatives from SNWA, as a political subdivision of the State of Nevada, and three representatives from the State of Utah. The purpose of the TWG is to review and analyze data and make recommendations to the Management Committee, a committee composed of Utah and SNWA members.

However, opponents of the agreement do not think that the agreement outlines a comprehensive adaptive management strategy. Argent (2009) explains that a key for adaptive management success is to establish clear objectives for the management strategy, including the identification of impacts. Under the agreement, what constitutes an “adverse impact” is not clearly defined. The agreement lists a number of factors that will be considered when deciding if SNWA’s pumping is having an “adverse impact” on existing water rights, and the agreement does mandate that the Operation Plan will identify and define some “early warning indicators” (Snake Valley Agreement 2009, p. 19). However, the agreement does not provide details of the Operation Plan or specific
thresholds that will lead managers to identify an occurrence as an “adverse impact.” One of the public comments on the agreement’s draft stated, “The method of determining adverse impacts…is not adequately developed in the Agreement” (Snake Valley Aquifer Advisory Council 2009, p. 210). Another commenter wrote, “Some specific triggers need to be established that, if met, would stop the pumping while determinations are arrived at” (Snake Valley Aquifer Advisory Council 2009, p. 250).

Argent (2009) points out that while adaptive management is a way to help inform management decisions by presenting and evaluating possible options, it does not guide how the decisions are made. Opponents disagree with how the agreement determines management response actions to avoid, minimize, or mitigate pumping impacts. Under the agreement, if it is determined that SNWA’s pumping caused an adverse effect, SNWA would be obligated to “make an offer…to the owner of the Existing Permitted Use to mitigate the Adverse Impact” (Snake Valley Agreement 2009, p. 11). Although the agreement lists some possible management actions, including “reducing or ceasing groundwater withdrawals at specific points of diversion (11),” opponents believe that “at the best, we may expect some co-called mitigation, in the form of pay-offs, to Utah, on condition that the pumps remain on” (Snake Valley Aquifer Advisory Council 2009, p. 213). Because opponents believe that the end goal of the agreement is to give SNWA an avenue to pursue their water right applications in Snake Valley, opponents are skeptical that SNWA managers would be willing to choose management options that would cease pumping in Snake Valley. One commenter stated, “I do not believe…[SNWA will] stop pumping should the aquifer show stress” (Snake Valley Aquifer Advisory Council 2009, p. 153). Another commenter wrote, “This Agreement does NOT give automatic power to
Utah to stop pumping of groundwater by Nevada when impacts are detected” (Snake Valley Aquifer Advisory Council 2009, p. 196).

According to Stankey and Allan (2009), adaptive management admits that knowledge of a social-ecological system is incomplete, and it is impossible to understand in advance the full consequences of management options. Adaptive management accepts resource allocation, while learning from the changes that result from that allocation (Argent 2009). Many opponents of the agreement cannot accept the risks that come with groundwater pumping in Snake Valley and would rather evoke the precautionary principle. The precautionary principle delays certain actions by recognizing that decisions can cause serious consequences, even when the exact nature and timing of those consequences is unknown (Whiteside 2006). The agreement states, “The Parties acknowledge that not all effects caused by the development of groundwater in Snake Valley are unreasonable” (Snake Valley Agreement 2009, p. 2). Opponents are wary to sign off on that statement. Andrew Ferguson, superintendent of Snake Valley’s Great Basin National Park, had this to say about SNWA’s pumping in Snake Valley: “We’re not willing to take any risk. We will err on the side of caution” (personal communication, May 27, 2011).

The agreement also admits that Nevada allows for the “appropriation of groundwater that is naturally discharged as phreatophytic evapotranspiration” (Snake Valley Agreement 2009, p. 2). Opponents of the agreement are worried that Nevada’s water law will cause phreatophytic vegetation, plants with roots deep enough to reach the water table, to dry up. Rob Mrowka of the Center for Biological Diversity explained that without phreatophytic vegetation, dustbowls would be formed, with dust reaching as far
east as Salt Lake City (personal communication, May 6, 2011). Gustavson (2003) advises that the precautionary principle should be used over adaptive management when there is a high irreversibility of impacts, the type of impacts are highly uncertain, or if the size and likelihood of the impacts is high. The possibility of the loss of phreatophytic vegetation is one such impact that opponents believe deserves use of the precautionary principle. “Once they’re [phreatophytic vegetation] gone, they’re gone,” Ferguson said (personal communication, May 27, 2011).

**Utah Governor Herbert’s Decision Not to Sign**

Many of the water managers and other stakeholders involved in creation of the Snake Valley Agreement wanted the agreement to build cooperation between the two states. In an article of *High Country News*, Boyd Clayton, Utah’s deputy state engineer, said, “The purpose of the agreement is to build some kind of cooperative management of Snake Valley so we don’t have a pumping war in the West Desert” (Jenkins 2009). Instead, the agreement caused much strife and discord. In fact, members within the Great Basin Water Network (GBWN), the major group protesting the SNWA groundwater project, could not agree on whether or not the agreement should be signed, because it is not clear if SNWA could still obtain water rights in SNWA if the agreement is not signed. The majority of GBWN members felt very strongly that the agreement should not be signed, while the Baker family, a prominent ranching family in Snake Valley, felt the agreement provided the best chance to protect rural communities in Snake Valley. Susan Lynn, former executive director of GBWN, explained, “My sense is that it was an issue
that we agreed to disagree on within our group, because we weren’t ever going to resolve the differences” (personal communication, April 14, 2011).

After many discussions and debates, Utah Governor Herbert ultimately decided not to sign the proposed agreement. He explained that he could not sign it when the vast majority of Utah citizens who reside in Snake Valley are so adamantly against it (Smart et al. 2013). Shortly after, legislators and water experts on the Utah Water Development Commission sent the Governor a letter asking him to rethink his position and sign the agreement (Fahys 2013). The Commission members thought the agreement provided Utah with many protections by including provisions to protect existing water users and the ecology of Snake Valley (Maffly 2013). Warren Peterson, a member of the Utah Water Development Commission and one of the attorneys Governor Herbert consulted, disagreed with Herbert’s decision and said, “Public dialog was ill-founded and driven by the media” (O’Donoghue 2013). In Peterson’s opinion, the media distorted the facts of the agreement and helped mobilize intense opposition, making signing the agreement politically risky for Governor Herbert (Hall and Cavataro 2013; O’Donoghue 2013). Sentiment towards the Governor was negative because many people thought he was close to signing the agreement. Some comments on newspaper articles from that time include, “Lack of leadership. Lack of stewardship. Lack of vision. Lack of principle. New Governor please,” “Herbert has to go,” and “I wonder how big the check the Southern Water Nevada Authority wrote to Herbert was?” (Smart 2012).

Schneider and Ingram (1997) show that it is politically risky for decision-makers to assign benefits to contender groups, and this could have influenced Governor Herbert’s decision to not sign the Snake Valley Agreement. In their social constructions framework
for analyzing public policy making, Schneider and Ingram (1997) discuss how the perception of target populations of policies can affect the distribution of burdens and benefits in a policy’s design. Schneider and Ingram (1997) identify and label four types of target populations. “Advantaged” groups are politically powerful and are positively constructed as deserving of benefits distributed through policy designs. “Contenders” are also politically powerful, but these groups are viewed negatively as undeserving of policy benefits and more likely to receive policy burdens. “Dependents” hold little political influence but are positively constructed as groups that need assistance or policy benefits. “Deviants” are politically weak but also negatively constructed and are the groups most likely to have policy burdens directed at them. Opponents of the Snake Valley Agreement thought that the agreement gave benefits to SNWA by allowing SNWA’s pipeline project to proceed in a smoother fashion. Many of them consider SNWA as a contender, because they are politically powerful but are viewed negatively and as undeserving of benefits (see Chapter 2).

In addition, many opponents do not see the Utah Water Development Commission as an impartial legislative committee that is solely interested in the well-being of Snake Valley. Ron Thompson, member of the Commission, is the General Manager of the Washington County Water Conservancy District. The Washington County Water Conservancy District is currently proposing to construct a 139-mile pipeline from Lake Powell to the southeastern portion of Utah to supply the growing cities of St. George and Kanab. Water in Lake Powell is from the Colorado River, and the pipeline would need the cooperation and approval of other Colorado River Basin states to proceed. Thompson thinks “it’s hypocritical for us [Utah] to tell Nevada not to develop a
water project“ and believes that Nevada will now be unwilling to support Utah’s proposed Lake Powell pipeline (Maffly 2013).

The political context behind the Utah Water Development Commission’s recommendation has led to a lack of trust from opponents of the Snake Valley Agreement. Opponents understand that because SNWA has the political power to inflict damage on Utah’s water plans, the Utah Water Development Commission has an incentive to provide and support water policies beneficial to SNWA. One commenter on the agreement wrote,

I have to wonder if it isn’t possible that within the hierarchy of state government, there isn’t a little deal being made that simply goes like this: we won’t oppose your water project, your pipeline, if you don’t oppose our pipeline [from Lake Powell] (Snake Valley Aquifer Advisory Council 2009, p. 335).

Another commenter wrote, “Is Utah trying to make amends with Nevada so they can pipe Lake Powell [water] to St. George and not have Nevada dispute that project?” (Snake Valley Aquifer Advisory Council 2009, p. 379).

**Discussion**

Hall and Cavaturo (2013) argue the Snake Valley Agreement should serve as a good example for other transboundary groundwater disputes. The Snake Valley Agreement incorporated flexibility in water allocation with the reserved water category and established environmental protections with conflict resolution strategies outlined through an interstate panel. They speculate that under equitable apportionment, Nevada and Utah would likely each be apportioned half of the water in Snake Valley, enough water for SNWA to proceed with their pipeline project, but without the extensive
protections that the agreement tried to implement. However, Hesser (2011) explains that a successful compact should minimize controversy, and it is clear that the proposed Snake Valley Agreement was not able to do that. Negotiations between Nevada, SNWA, and Utah were held privately and many opponents of the agreement suggested that the negotiations should have been held publicly to “alleviate the great mistrust the [Snake Valley] residents have about SNWA and the true intentions of the parties involved” (Snake Valley Aquifer Advisory Council 2009, p. 593).

While conflict often helps drive the negotiations in forming a water compact, there can be a fine line between negotiations and the threat of litigation (Hesser 2011; Thorson 2003). Thorson explains that often the threat of litigation is needed to drive cooperation between negotiating parties (2003). However, moving towards litigation can take attention away from the negotiation process. Currently, it is unclear how Nevada and Utah will proceed with management of Snake Valley water. Without an agreement, many water managers are worried that the Snake Valley aquifer will be irrevocably harmed through Nevada and Utah pursuing separate state management strategies that each attempt to use as much of the aquifer as possible in a development race. After Utah officially rejected the agreement, the director of the Nevada Department of Conservation and Natural Resources noted that Nevada was disappointed and would evaluate all of their options in light of Utah’s actions (O’Donoghue 2013). While it is possible that a lawsuit will lead to intervention by the U.S. Supreme Court in an equitable apportionment action between Nevada and Utah, many water experts think that it would be more valuable to return to negotiations (Gehrke 2013; Hall and Cavaturo 2013). In an interview after his decision, Governor Herbert said, “I always hope there is an
opportunity for us [Utah and Nevada] to push the reset button and have dialogue and understanding. It’s better than conflict” (Gehrke 2013). Thorson explains that even when agreements are not ultimately signed, the process of negotiation keeps information flowing between parties and can create a social learning process through which opposing parties can share differing perspectives and seek mutual understanding (2003). This sharing of information and experiences makes it important to continue to engage in the negotiation process.

In his work on conflict and cooperation over transboundary waters, Wolf finds that negotiations move from rights-based to needs-based when people eventually realize that everyone, even enemies, requires water for life (2007). Often negotiating parties will agree to allocate water on needs-based metrics, like population or irrigable land to ensure that all parties feel their minimum requirements are being met (Odom and Wolf 2011). In fact, opponents of the Snake Valley Agreement felt that Utah was entitled to more water due to the larger amount of irrigable land in Snake Valley on its side of the border, proving to them that Utah needs a greater amount of Snake Valley water. However, putting water to beneficial use in agricultural production is not why SNWA is pursuing Snake Valley water. Opponents of the agreement do not agree with SNWA’s planned beneficial use of the water, and they do not want to allocate any Snake Valley groundwater for a distant, growing, urban city in the desert (see Chapter 2). Hesser suggests that states should begin negotiations first on how to manage shared groundwater resources before deciding how to allocate the water between states (2011). Hesser has found that compacts that first focus on management of an aquifer will better ensure the water is used in a sustainable, future-oriented way (2011).
The EMMA of the Snake Valley Agreement elaborates on how the states will respond to water pumping in Snake Valley to protect existing users and the hydrologic and biologic resources of the valley. Focusing negotiations on refining the EMMA so that it is acceptable to both parties could encourage bi-state cooperation on how to manage water development in Snake Valley. Opponents of the agreement thought that the EMMA was incomplete and needed to better define adverse impacts and warning indicators of environmental impacts. Opponents wanted assurance that financial mitigation would not be the only remedy for negative pumping effects and that it would be possible to decrease or stop pumping water. Many opponents also wanted protection for phreatophytic vegetation. While the designers of the agreement planned to use an adaptive management approach, the details of the Management Response and Operation Plans were not completed in the agreement. The most critical step in an adaptive management design is the “design and implementation of ecosystem monitoring and the iterative process of feeding that information back into management actions” (Green et al. 2013, p. 1).

Opponents of the agreement wanted the details of the Operation Plan to be thoroughly discussed. When dealing with complex social-ecological systems, it is also important to understand the risks and levels of uncertainty that are considered “acceptable.” The precautionary principle places the responsibility on SNWA to ensure that unacceptable impacts will not take place before moving forward.

While adaptive management and the precautionary principle can seem like contradictory approaches, they both recognize uncertainty in environmental management and help guide decision-making. In fact, some scholars view the adaptive management approach as a way to implement precaution (Benidickson et al. 2005). The precautionary
principle encourages decision makers to consider the possible harmful effects of an action on the environment before it occurs. The adaptive management approach tries to create a management plan that can respond to unpredictable changes so that serious harmful effects do not occur. Many criticisms of adaptive management stem from the absence of clear rules and procedures in management plans (Benidickson et al. 2005). Without clearly defined and enforceable plans, some opponents fear that management of Snake Valley water will not be subject to appropriate accountability and could compromise sustainability of the social-ecological system. In addition, Ingram has found that adaptive management plans are often disconnected from the politics of the situation so that when issues arise, the local politics take over and the planned arrangements fall apart (2011).

Water has multidimensional values, from the traditional economics, law, and engineering perspectives to newer recognition of place-based values linked to community, culture, and identity (Blatter and Ingram 2001). Cooperation in transboundary water management requires an understanding and discussion of each of these perspectives on water. There are always winners and losers in any water allocation decision. Water transfers, in particular, lead to a loss of some type of value, such as the certainty that there will be enough water to sustain the environmental resources and the rural lifestyle in Snake Valley. While many water experts regretted the fact that politics stopped the Snake Valley Agreement from being signed, politics is the means through which citizens debate differences and prioritize multiple values of water (Ingram 2011). More stakeholder involvement in the agreement design process will not be sufficient by itself when there is great economic and social inequity (Ingram 2011). Water resources and political power are intertwined, with powerful interests like SNWA having greater
influence and access to the decision-making and design of the Snake Valley Agreement. It was essential that politics entered into the discussion over the agreement, because that is how other values and meanings of water were recognized and how the risks and uncertainties were assessed. The mobilization of many protest groups in response to the agreement elevated the values of water that had been overshadowed by SNWA’s economic value of water and forced recognition of Snake Valley’s place-based values associated with access to water. While the people who mobilized against the agreement opposed decisions made in a private, nontransparent way, it is possible that they would support an openly designed agreement that equitably apportioned the risks and recognized that the social and ecological communities of Snake Valley where the water originates deserve to be protected above a project that would export that water away.

An interstate agreement over aquifer management should also provide mechanisms to address conflicts that are sure to arise between the two states (Odom and Wolf 2011; Thorson 2003). Such an agreement will not necessarily resolve all of the issues between SNWA and Snake Valley residents, but it would help set precedents for managing conflicts and facilitating cooperation in the future. After both states are satisfied with how they have chosen to manage Snake Valley, it might be less contentious to allocate the water to the various states. The states’ common experiences in managing the aquifer under an interstate agreement will have built a network that could make it possible for both states to trust that no matter how Snake Valley water is allocated in each state, the Valley will be protected by the EMMA agreement that will have been established.
To get to this level of trust, it is important that the drafters of the agreement encourage multiple perspectives and use numerous strategies to appeal to different values of water. The EMMA established a Management Committee to act as a regulatory commission to make decisions based on new data and changing conditions. It also created a Technical Working Group (TWG) to analyze data and make recommendations to the Management Committee. If the EMMA could also incorporate stakeholder groups that make recommendations to the TWG and Management Committee, the agreement could help bridge different ways of knowing and understanding Snake Valley and its water so that greater cooperation and transparency could be fostered.

Conclusion

This case study on the Snake Valley Agreement shows how the legal, political, and institutional contexts behind the complexities of interstate water disputes can extinguish what seems to be a thoughtful, equitable interstate agreement. Opponents had trouble accepting an agreement that would allow SNWA to receive an allocation of water that will be exported out of Snake Valley before verifying it would be sustainable and not have local impacts. SNWA’s political power and mission to take water away from the Valley does not engender cooperation with Snake Valley stakeholders. Politics over water cannot be ignored, and political considerations over water are necessary to create water governance arrangements that can work. Ingram is careful to note that there are no universal prescriptions to manage water resources (2011). Instead, the consideration of multiple values of water lead to contextualized solutions. Conflict and cooperation over water is constantly evolving. No interstate agreement will be able to completely resolve
conflict over water, but interstate agreements can force opposing parties to come together and accumulate shared experience and knowledge as an avenue to move toward cooperation. If the negotiating process is serious about incorporating multiple ways of knowing and valuing Snake Valley water, eventually a successful agreement between Nevada and Utah could be designed. Nevada and Utah are the first and second most arid U.S. states, respectively. Because water in the face of climate change is such a gamble in these states, then aside from apportioning the water, an interstate agreement needs to also apportion the risks.

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CHAPTER 4

MANAGING MULTIPLE RISKS OVER TIME: UNCERTAINTIES OVER THE SOUTHERN NEVADA WATER AUTHORITY’S GROUNDWATER DEVELOPMENT PROJECT

ABSTRACT

The Southern Nevada Water Authority (SNWA) plans to build a pipeline to transfer groundwater from five rural basins in northeastern Nevada 300 miles south to the Las Vegas metropolitan area in Southern Nevada. Relying on the path dependence literature, we trace the policy choices that have led to Southern Nevada’s growing need for water and their proposed pipeline project. We find that policy decisions over time, often initiated by water policy entrepreneurs, have fueled Southern Nevada’s development. Using semi-structured key-informant interviews and document analysis of water right hearing transcripts, public comments, and hearing rulings, we examine the risks and uncertainties involved in the groundwater pipeline project. SNWA and the opponents of the pipeline project experience different aspects of risk and uncertainty. SNWA believes the groundwater pipeline project is essential to reduce the risks from Colorado River shortages that could endanger Southern Nevada’s survival. Opponents believe the uncertainty of SNWA’s mitigation and management plans are inadequate to protect rural basins from risks associated with SNWA’s pumping and export of groundwater from their areas. Balancing scientific uncertainties with political uncertainties are essential to equitably manage water.

3Co-Author: Joanna Endter-Wada. Written following Weather, Climate, and Society journal specifications.
Introduction

In a report by the Natural Resources Defense Council, the authors show that many U.S. western water managers have established two opposing strategies in order to meet their mission of supplying water to their constituents (Fort and Nelson 2012). One water management strategy consists of proposals to use the water they have more efficiently, using conservation strategies, tiered rate structures, water recycling, and water markets. The other strategy has water managers seeking to increase their water supplies through long-distance water pipeline structures (Fort and Nelson 2012). The Southern Nevada Water Authority (SNWA) is an example of a municipal water supplier that is attacking their water supply concerns with both of the above strategies. Through outdoor water conservation initiatives begun in 2003, Southern Nevada was able to decrease their overall water consumption, even while the population grew by 500,000 people (J. C. Davis, personal communication, May 4, 2011). However, Southern Nevada has realized their high vulnerability to water shortages. Nearly 90% of their water supply comes from one source, the Colorado River, and the Colorado River has been experiencing its worst 14-year drought in the last one hundred years. To respond both to drought in the Colorado River basin and to Southern Nevada’s long booming population, SNWA has pursued development of groundwater rights they filed for in the late 1980s in five rural groundwater basins 300 miles away in northeastern Nevada.

Traditionally, large water conveyance projects have helped municipalities establish reliability in their water supplies. However, many water scholars have pointed out that water policy is in a time of transition (Brooks et al. 2009). Many regions have seen great water challenges resulting from climate change, increased droughts, and
population growth. These challenges are complicated in water systems, such as those in the western United States, where water supplies are either fully allocated or nearly so (Contor 2010). With these added stresses to existing water systems, new water projects often are not as reliable as past projects and, in fact, could increase water supply vulnerability as communities begin to rely on unreliable sources of water (Fort and Nelson 2012).

In this paper, we examine the risks and uncertainties involved in SNWA’s proposed groundwater pipeline project. SNWA thinks the groundwater pipeline project is essential to reduce vulnerabilities to Colorado River shortages that pose risks to Southern Nevada’s survival. While the groundwater pipeline project would provide SNWA with another source of water separate from the Colorado River, large-scale water projects are not without their own set of risks. People living in rural Nevada recognize that water is essential to their livelihoods and believe that the environmental and social risks from such a large water exportation project are too great to bear. Water policy is often characterized by stability and the concept of path dependence, which refers to the importance of the sequencing of events (Ingram and Fraser 2006; Pierson 2004). A variety of policy decisions over time have facilitated Las Vegas’ growth and the further fragmentation between land use and water availability. This study uses insights from the path dependency literature to trace the policy choices that have led SNWA’s decision to pursue the pipeline project. We also examine the multiple perspectives of risk and uncertainty that accompany water transfer projects and explain how imbalances between divergent risk assessments have made the project so highly controversial.
Path Dependence and Policy Entrepreneurs in Acquiring Municipal Water Policy

Pierson (2004) explains the importance of path dependence in understanding current public policies. Choices made in the past can constrain future decisions and reinforce the paradigms under which earlier choices were made. Changing or reversing a policy track can be very difficult and the costs can be high, causing policy alternatives to be less likely to be adopted (Ingram and Fraser 2006; Pierson 2004). To develop the U. S. West, the Colorado River was altered with dams, reservoirs, and aqueducts to store and transport water so that settlers could form communities and support them through agricultural production (Reisner 1993). Now, nearly 40 million people in seven states depend on the supply and delivery of Colorado River water. Major U.S. cities and agricultural areas rely on the existence of extensive water infrastructure systems and are dependent on them for continuing survival. Because of this reliance and the investments previously made in that infrastructure, strong incentives exist to find and transport more water from distant places to maintain both the use of existing infrastructure and the same uses of water, even when water supply quantities are threatened (Ingram and Fraser 2006).

Studies have shown that municipal water suppliers, in particular, often depend on water importation or supply augmentation to respond to water challenges (Fort and Nelson 2012; Lach et al. 2005; Larson et al. 2009). The mission of most municipal water managers is to supply water to their constituents, to avoid any interruptions in water service, and to maintain low water rates (Larson et al. 2009). Lach et al. (2005) explain that municipal water organizations tend to be timid at innovation and prefer incremental
changes in their policies. The natural hydrologic system is complex and water supplies can be uncertain, particularly in arid regions. However, most U.S. citizens expect water systems to be reliable and infallible, and water managers work to avoid criticism by “routinizing the uncertain” through the construction of infrastructure, agreements, and other organizational processes (Lach et al. 2005, p. 2031). Municipal water managers generally have been successful at reducing uncertainty in their water systems such that citizens often do not realize the scarcity of water in the western United States (Lach et al. 2005).

In Southern Nevada, Pat Mulroy, former general manager of SNWA, led many policy changes to reduce uncertainty in Nevada’s water supply so that Southern Nevada could maintain its high-rate of population and economic growth. Kingdon (1984, p. 214) describes policy entrepreneurs as people who “invest their resources in return for future policies they favor.” Policy entrepreneurs are motivated by a variety of different reasons and can be individuals both inside and outside the government (Huitema and Meijerink 2010). Pierson (2004, p. 136) describes policy entrepreneurs as “well-situated and creative actors.” While policy entrepreneurs can be important to stimulate policy change, that change may have been in progress over a longer period of time (Pierson 2004). In this paper, we recognize the role that policy entrepreneurs have played in Southern Nevada’s water development over time. We also discuss a growing shift in thinking about water in Southern Nevada through the actions of other policy entrepreneurs, who are concerned about the future sustainability of Southern Nevada and rural areas of the Great Basin.
Methods

This paper uses a qualitative, case study method approach appropriate for conducting policy analysis. This approach gave us the opportunity to examine the uniqueness of this specific case while also finding attributes that are common to many other water allocation challenges (Ragin 1987). Case studies address qualitative variables, individual actors, decision-making processes, historical and social contexts, and path dependencies, which are all essential elements in understanding how water policy works in reality (George and Bennett 2005). We used a variety of data-gathering strategies, primarily relying on key-informant interviews and document analysis (Box-Steffensmeier et al. 2008; Cresswell 2009; Johnson and Reynolds 2011).

We conducted 16 in-depth key-informant interviews. Interviewees included people on many sides of the pipeline issue: SNWA water managers, Las Vegas citizens, board members of the Great Basin Water Network (an organization devoted to keeping water in rural Nevada), and rural Nevada landowners, business owners, and tribal representatives. We asked 26 open-ended questions to understand people’s perceptions and opinions about how and why rural Nevada water should be allocated (Appendix A). We asked what people thought of the scientific investigations that have been conducted on the groundwater systems of rural eastern Nevada and western Utah. We also asked more general questions to gauge people’s thoughts on how they thought water could be effectively allocated and their opinions on what fair water allocation entails. The interviews ranged from 60 to 120 minutes in length and were tape recorded and professionally transcribed. We received informed consent prior to each interview, and all
interviewees opted to remain identifiable (see Appendix B for informed consent agreement).

We used primary, archival documents to reconstruct the policy process in the SNWA case study by analyzing information produced by the legislative process, including the procedural history of the SNWA pipeline project and the transcripts from hearings about SNWA’s water rights. The transcripts from the water right hearings were obtained and purchased from the court reporting firm that prepared and certified the transcripts. We examined secondary, contemporary public accounts by searching for newspaper and other media accounts of the case as it unfolded over time. These public accounts are important because they help situate issues and define contexts within which policymakers operate (George and Bennett 2005). We integrated the data from the interviews, hearings, and news sources and used content analysis to identify the main arguments and rationales behind how people think rural groundwater should be allocated (Krippendorf 2004). We also used the process-tracing method to trace the historical events and decisions that led to framing the arguments and influencing the outcomes over the proposed Snake Valley Agreement (George and Bennett 2005; Pierson 2004).

Las Vegas’ Path Towards Increased Dependence on Scarce Water

In 1922, the Colorado River Compact was negotiated by the seven Colorado River Basin states under federal oversight to allocate Colorado River water among those seven states. Nevada was given 300,000 acre-feet of water per year, only 0.3% of the total Colorado River water allocated in that compact. At the time of the negotiations, the
flowing groundwater springs beneath Las Vegas seemed like plenty of water to supply a small railroad town (Green 2008). However, during construction of the Hoover Dam in 1931-1935, Las Vegas developed with housing, bars, and casinos for construction workers. Eventually, the casino industry catalyzed further growth in the Las Vegas Valley. By the 1950s, the groundwater springs beneath Las Vegas began to be over-pumped, resulting in subsidence issues and Las Vegas’ switch to using Colorado River water (Green 2008). Eventually, it became clear that not even Nevada’s Colorado River allocation would be enough to support Las Vegas’ continuing growth.

Southern Nevada underwent rapid growth beginning in the 1980s. The individual water entities in the region (Big Bend Water District, Boulder City, Clark County Water Reclamation, City of Henderson, City of Las Vegas, Las Vegas Valley Water District, and North Las Vegas) realized that they would run out of Colorado River water by 1995, particularly when they looked at future demands and the number of water applications that they had each committed to serve (DWR Applications 53987 through 53992 Vol. 1 2011). In 1989, the Las Vegas Valley Water District (LVVWD) filed for half of the unallocated groundwater in Nevada, encompassing 30 groundwater basins in four counties (Green 2008). With Mulroy’s encouragement and promise to develop rural Nevada water, the seven water entities joined together to form the SNWA and pooled their water in a shared shortage arrangement to address water issues on a regional basis.

In the Cooperative Agreement between the seven agencies, one of the functions conferred to SNWA was

To acquire the rights of LVVWD under applications filed with the Nevada State Engineer to appropriate surface and groundwater in northern Clark, Lincoln, Nye,
and White Pine Counties…for the use of such water in Clark County [where Las Vegas is located] (SNWA 1995, p. 15).

SNWA was formed out of the necessity to help Southern Nevada decrease uncertainty in their water supply system, an example of an organizational process that many water organizations employ to make access to water more predictable (Lach et al. 2005).

In an interview, John Entsminger, recent appointee as general manager of SNWA, explained, “We [SNWA] are not a pro-growth or anti-growth agency. We don’t make land use decisions…Our job is to be prepared to supply water to whatever growth occurs or doesn’t occur.” SNWA maintains a rolling 50-year resource plan that is evaluated every year. In the plan, they review their existing water sources, project the water demand in 50 years, and compare their existing supplies to future demands (DWR Applications 53987 through 53992 Vol. 1 2011). However, in February 1991, the LVVWD, followed by the City of Henderson, stopped promising service to new developments, a bold action led by Pat Mulroy (Green 2008). For 18 months, the moratorium on water applications could have enabled SNWA to limit Las Vegas’ growth so it could be supported by its Colorado River allocation. Instead, Mulroy and SNWA used the example of new developments with no water guarantees as a way to prove that Nevada needed more water from the Colorado River (Green 2008). While Nevada’s allocation remains unchanged, Mulroy was able to reign in California’s excess use of Colorado River water and create other innovative strategies, such as trades with other states, to obtain more water (see Chapter 2).

Interestingly, Las Vegas’ growth is limited by the fact that the city is surrounded by public land managed by the Bureau of Land Management (BLM). In her
comprehensive series on the history of Las Vegas and water, Emily Green (2008) explains that Nevada was so arid that the state preferred to concentrate its land holdings in areas adjacent to water and welcomed the federal government’s management of the remaining 97% of land. However, as Las Vegas continued to grow, Nevada policy entrepreneurs worked to modify the federal land boundary around the city. The key policy entrepreneur in effecting this change is Senator Harry Reid from Nevada. He was instrumental in the creation and passage of the Southern Nevada Public Land Management Act (SNPLMA) in 1998. The SNPLMA allows the BLM to sell public land around Las Vegas. The profits from the land sales stay in Nevada to benefit schools, parks, and conservation efforts. The SNPLMA also directs 10% of the profits to SNWA, a clause inserted into the bill by Pat Mulroy (Green 2008). As of February 2014, more than 15,000 acres of land have been sold under the provisions of SNPLMA for a total of $3 billion (Tetreault 2014).

Releasing federal lands back into the state of Nevada’s ownership seemed like common sense to outside legislators in a context where devolving federal land to state control was gaining political traction (Green 2008). However, many people who are opposed to SNWA’s pipeline project think the federal land disposals have played a large part in Southern Nevada’s growing use and dependence on limited water (R. Mrowka, personal communication, May 6, 2011). In 1999, drought in the Colorado River Basin began, causing water levels in Lake Mead, Las Vegas’ primary source of water, to drastically drop 50 feet by 2002. The drought gave SNWA a wake-up call that “this lake that everybody thought was drought proof might in fact be susceptible to drought” (J. C. Davis, personal communication, May 4, 2011). The drought was a trigger event that led
to SNWA water policy changes to enact innovative and effective conservation measures. While SNWA worked hard to conserve water and dropped its per capita use of water from 347 gallon per capita per day (GPCD) in 1990 to 274 GPCD in 2004 (J. C. Davis, personal communication, May 4, 2011), federal land sales around Las Vegas continued with additional legislation passed to expand the disposal boundary in 2002 (R. Mrowka, personal communication, May 6, 2011). Rather than use the drought as a trigger event to limit but sustain Southern Nevada’s population, Southern Nevada continued to grow at a rapid rate. In 2004, SNWA requested that the State Engineer rule on their 1989 groundwater applications in five basins: Spring Valley, Delamar Valley, Dry Lake Valley, Cave Valley, and Snake Valley. This request lead to a lengthy water right hearing in 2011 (Fig. 4-1; see Chapter 2 for discussion and outcomes of the hearing).

Senator Harry Reid helped pass another act to help bring the proposed pipeline project closer to construction. He was responsible for introducing and facilitating passage of the Lincoln County Conservation Recreation Development Act (LCCRDA) (see chapters 2 and 3 for more information on the LCCRDA). The LCCRDA was passed by Congress in 2004 and sets aside corridors through public land managed by the Bureau of Land Management (BLM) for any facilities that support a water development project (Fig. 4-1). The LCCRDA states that the corridors are subject to review and analysis under the National Environmental Policy Act (NEPA). However, Penny Wood, BLM project manager, explained that her interpretation of the wording of LCCRDA suggest that the BLM cannot reject SNWA’s request for a right-of-way in the corridor area the LCCRDA specifies (personal communication, April 14, 2011). Instead, the BLM is restricted to using the NEPA process to ensure that the project is appropriately mitigated. The
Fig. 4-1. Map of study area. Map of Eastern Nevada showing the five ground water basins (Snake Valley, Spring Valley, Cave Valley, Dry Lake Valley, and Delamar Valley) targeted in SNWA’s water right application for their proposed Groundwater Development Project. The Lincoln County, Conservation, Recreation, and Development Act (LCCRDA) establishes corridors in Lincoln County for water conveyance structures.
LCCRDA helped streamline a very complex permitting process to allow SNWA to build a pipeline across BLM lands. Eight years after SNWA submitted a proposed action to obtain a right-of-way from the BLM, the BLM released its record of decision, approving SNWA’s pipeline project.

**Hydrologic Uncertainties in the Groundwater System**

Many uncertainties surround the hydrology of the groundwater system that connects the groundwater basins where SNWA has filings on water. How much water is available in the aquifer is not known with any high degree of confidence. The extent of groundwater flow through and between the basins is also unclear, and it has not been determined how a large-scale pumping project will affect those basins. Many studies have been conducted on this aquifer system. Directed by the LCCRDA, the U. S. Geological Survey in cooperation with the Desert Research Institute and the Utah State Engineer’s Office, conducted the Basin and Range Carbonate Aquifer System Study (BARCASS). BARCASS, completed in 2007, evaluated the groundwater systems of Lincoln and White Pine Counties in Nevada and adjacent areas in Utah. BARCASS did collect some new data, including evapotranspiration (ET) data, but BARCASS primarily reevaluated existing information to characterize the groundwater systems of the selected basins (DWR Applications 53987 through 53992 Vol. 3 2011, p. 119).

Much of the science that SNWA is using to underpin their Groundwater Development Project has been conducted by their own scientists. SNWA explains that they have collected more data in the groundwater basins than any other entity (J. C.
Davis, interview). SNWA has also used data and information from BARCASS, along with other studies that have been conducted in the basins. SNWA used existing and original data to derive a groundwater flow budget and groundwater flow system model. They calculated the total recharge in each basin as the sum of the groundwater discharge by ET, the outflow across the basin boundary, and the inflow to the basin. However, every model is based on a set of assumptions. Many scientists, testifying for opponents of the groundwater project, did not agree with many of SNWA’s scientists’ assumptions, including how they determined the groundwater discharge by ET. ET was directly measured only in one basin, Spring Valley, because the groundwater in the other basins was too deep to measure by their methods (DWR Applications 53987 through 53992 Vol. 3 2011, p. 186). Furthermore, the opponents believe the five years of ET data that the scientists collected cannot be assumed to be accurate for the remaining 200 years of the pipeline project (DWR Applications 53987 through 53992 Vol. 4 2011, p. 114). There are also many disagreements between SNWA and opponents on how much water flows through the basins. Scientists explain that it is “very complicated given the structural setting and the different lithographic contrasting permeabilities” (DWR Applications 53987 through 53992 Vol. 3 2011, p. 128). Dr. James Thomas, research professor of the Desert Research Institute, illustrated the interpretative nature of the data when he explained “the data can be used to evaluate whether a flow path is probable” (DWR Applications 53987 through 53992 Vol. 5 2011, p. 111). Dr. Hugh Hurlow of the Utah Geological Survey admitted that “our two [interpretations] are valid – different looks at the same problems,” when explaining why his conclusion of aquifer connectivity differed
from an SNWA’s scientist’s conclusion (DWR Applications 53987 through 53992 Vol. 16 2011, p. 71).

SNWA and the pipeline opponents consider these uncertainties in scientific knowledge of the groundwater basins differently. Sjoberg (2001) explains that scientific knowledge is always provisional. In the past, environmental concerns tended to be dismissed by scientific experts but later were found to be justified. Many experts tend to have an objective view of risk using statistical probabilities, while the public maintains a “multidimensional” perception that integrates qualitative factors (Sjoberg 2001, p. 5). However, experts’ perceptions can often correlate with their employers’ interests (Sjoberg 2001). In closing arguments, protestant attorney, Simeon Herskovits, said, “Many pieces of testimony…seemed pretty clearly keyed, and guided, and marshaled towards the realization of one thing, an overarching goal, which is the support of these [SNWA’s water right] applications” in rural Nevada basins (DWR Applications 53987 through 53992 Vol. 29 2011, p. 53).

Schneider and Ingram (1997) discuss how scientists and experts are often used to legitimize policy decisions. They found that science can promote, inhibit, or have no effect on policy. Science has the greatest influence when the policy has no particular public target group. Target groups are socially constructed in positive and negative terms, and policy designs distribute burdens and benefits that reflect and perpetuate these constructions (Schneider and Ingram 1997). When strong social constructions are present, science that contradicts these constructions are usually ignored, while science that reinforces the constructions is used as a rationale to support and continue the stereotypes. SNWA sees their use of rural groundwater as a deserving, beneficial use of the water (see
Chapter 2) and might be motivated to present the science that best promotes their policy plan to export that water to Southern Nevada’s metropolitan area.

Schneider and Ingram (1997) also find that at times science is used to “objectify” issues, resulting in ordinary citizens believing that there is one objective answer that only experts can find. This process can result in ordinary citizens feeling as if they do not have the skill or information to participate meaningfully in political decisions informed by science. However, according to Schneider and Ingram (1997), local citizen groups can often gain confidence due to their familiarity and experiential knowledge of the area. In these circumstances, these groups often will perceive the issue in question as an equity issue rather than a technical issue. In the case of the SNWA pipeline project, the opponents recognize the uncertainty in the known science and raise the technical issues in their protests. However, the next section shows that the main point of their protests focuses on how SNWA has chosen to manage the uncertainties entailed in their pipeline project.

**Multiple Perspective on Uncertainty And Risk**

*SNWA’s Risk Perspective: Water Security for Southern Nevada*

Many decisions made over time that were driven by water policy entrepreneurs have led to SNWA’s belief that the groundwater pipeline project is necessary to decrease the risk of catastrophe in Southern Nevada. The main rationale offered by SNWA for the groundwater development project is to mitigate risks from drought on the Colorado River
John Entsminger, now general manager of SNWA, explained: “[If] 90% of your water supply is imperiled, [and] your job is to provide a safe and reliable water supply for two million people, can you afford not to build the project?” (personal communication, May 5, 2011). As a municipal water system, SNWA is focused on their mission to provide water to their constituents. Lach et al. (2005) explain that water organizations are so intent on their clients’ needs that they limit their decision making scope only to their geographic jurisdiction. SNWA does not fully consider the effects of their proposed water transfer project on the rural communities, because those five groundwater basins are not within SNWA’s jurisdiction.

SNWA is most concerned with reducing the uncertainty of Southern Nevada’s water supply. As such, they are intent on creating a water system to respond to the worst case scenario, even if it may not occur (Lach et al. 2005). Many opponents state that SNWA does not need the groundwater from rural Nevada at this time, because Nevada’s growth has since slowed. SNWA asserts that “under-forecasting population could be potentially very serious for us…if we are under-forecasting, we may end up short of resources” (DWR Applications 53987 through 53992 Vol. 2 2011, p. 71). SNWA also maintains that it is important to undergo the complete permitting process for the project so that when Lake Mead levels drop below 1075 feet elevation (the level that triggers the first federal shortage declaration on the Colorado River), they can instantly begin construction on the project (J. C. Davis, personal communication, May 4, 2011). Mulroy explained that when Lake Mead hits 1075 feet, the elected officials of Southern Nevada will need to confront a risk assessment. “And it will be a question of how much risk are
you willing to expose this community to?” (DWR Applications 53987 through 53992 Vol. 1 2011, p. 97).

*Rural Nevadans’ Risk Perspective: Undefined Mitigation Plans*

The opponents of SNWA’s pipeline project are also concerned about risks to their communities, but the risks they face are from the implementation of SNWA’s proposed pipeline. People in these rural valleys of Nevada have been fighting to protect their rural communities for a long time. Many of the people in the Great Basin Water Network (GBWN), the major group protesting SNWA’s pipeline project, have been working together for over 30 years, dating back to protesting the MX Missile system proposed for sites in eastern Nevada and western Utah in the late 1970s to early 1980s. The MX Missile project, which has since been terminated, would have established a missile system throughout the Great Basin desert. Over time, rural residents have been forced to consider and protect their future in light of multiple outside interests proposing to make changes to the landscape and communities in the Great Basin. Steve Erickson, policy advocate for the GBWN, explained that SNWA’s pipeline project is “the third major project that we’ve had to fend off out there” (personal communication, January 12, 2011). Erickson said, “These people know how to stand up for themselves and be heard…I think [their past experiences have] been really a critical part of the overall battle” (personal communication, January 12, 2011).

Opponents protest SNWA’s pipeline project for many reasons and fear the project will destroy social and environmental resources in rural Nevada (see Chapter 2 for
opponent rationales against the project). They are working every possible angle to stop the project, because they are uncertain what SNWA will do if their pumping causes adverse impacts. In the mitigation and management plans for the project, SNWA does not include quantified thresholds or triggers that would force them to stop pumping.

Herskovits explained, “You [SNWA] must do necessary work upfront to establish objective quantified triggers and thresholds and goals, and you must have concrete measures that will be implemented in a certain way when those triggers are reached” (DWR Applications 53987 through 53992 Vol. 29 2011, p. 63). The opponents seek some kind of certainty that their rural values will be preserved. However, SNWA maintains that it is too early to establish thresholds and that more test wells and monitoring are needed to understand how the system works. SNWA says that stresses need to be applied to the system in order to better understand both the hydrology of the system and the effects of pumping (DWR Applications 53987 through 53992 Vol. 16 2011, p. 103). According to SNWA, they are using an adaptive management approach that allows them to learn about the aquifer system and use that knowledge to make management decisions (DWR Applications 53987 through 53992 Vol. 8 2011, p. 191; Pahl-Wostl 2007). SNWA contends that its groundwater flow models help pinpoint where monitoring should occur. They do not use the models to predict impacts from pumping, because the model would simply show more drawdown without taking into account the changes in pumping that SNWA would make; furthermore, SNWA is not explicit on what those changes will be (DWR Applications 53987 through 53992 Vol. 29 2011, p. 79).
SNWA is also not clear on what they consider to be adverse impacts. SNWA explained that it was impossible to define adverse impacts ahead of time, because each impact would need to be considered on a case-by-case basis (Utah Division of Water Rights 2009). In an interview, Pat Mulroy explained,

Cities cannot, rural communities cannot, ranchers cannot take water from a source without having some kind of impact. That impact range is very broad. Where on that continuum will it fall, and what are we willing to say is an acceptable impact and what is an unacceptable impact? (Brean 2014).

However, SNWA has not had that conversation with the opponents to determine what will be considered acceptable and unacceptable impacts. Instead, SNWA plans to use hydrologic data collection and other techniques so that a technical working group can decide if impacts are unreasonable and caused by SNWA pumping (Utah Division of Water Rights 2009).

However, determination of whether impacts should be considered unreasonable or not is not simply a science question. Failing et al. (2007) explain that it is important to include public involvement in controversial environmental decisions. Guston (2001) explains that there is not a clear dividing line between science and policy, because both science and policy contain elements of rationality and value judgments. Similarly, Schneider and Ingram (1997) show that increasing the role of scientists in policy-making does not cause policy to be more objective, because the scientific process itself is socially constructed. Guston (2001, p. 405) proposes the use of boundary organizations as an approach that combines the interests of science and policy while preventing the “ politicization of science” and the “scientization of politics.” A successful boundary organization is one that satisfies members on both sides of a boundary while remaining
stable by continually negotiating the interests of the opposing sides through a variety of boundary-spanning processes. Such an organization is not part of the development or operation of the SNWA pipeline project. The lack of a mechanism for continuing dialogue and conflict management creates serious political risks from the opponents’ perspective.

In 2012, the State Engineer released his rulings on SNWA’s water right applications and granted SNWA the majority of the water they asked for. However, the opponents appealed the decision to Nevada’s 7th Judicial District Court. In December 2013, Judge Estes remanded SNWA’s approved water rights back to the State Engineer for further study. Judge Estes agreed with the opponents that SNWA’s vague mitigation plans are unacceptable without “objective standards to determine when mitigation will be required and implemented” (White Pine County et al. v. King 2013, p. 15). Judge Estes also ruled that if there is not enough scientific information to establish thresholds, then “it is premature to grant water rights” (White Pine County et al. v. King 2013, p. 23). Herskovits explained that Judge Estes’ ruling was significant, because it could “fundamentally change the way regulators review [SNWA’s] controversial pipeline” (Brean 2013). Judge Estes’ ruling indicates that viable approaches for addressing uncertainties and managing risks emanating from SNWA’s pipeline project have yet to be identified.

**Discussion**

The SNWA pipeline project opponents can be considered water policy entrepreneurs, because they have mobilized an alternate approach on how to manage
large water importation projects (Huitema and Meijerink 2010). Resource managers are often under a “bureaucratic imperative” and cannot always wait for further studies to solve uncertainties before making decisions (Steel et al. 2004, p. 5). However, the opponents have advocated for slower and more thoughtful decision making so that the uncertainties can be more carefully considered and strategies for dealing with risks those uncertainties pose can be devised. Taking time works to the advantage of these pipeline opponents because the pressure to decide quickly is being driven by urban development. Once made, urban land and water development decisions take people down a certain path that is hard to reverse because it establishes, demonstrates, and reinforces a municipal demand for water.

Similarly, the state of Utah decided not to sign an interstate agreement allocating water in the shared Snake Valley basin between Utah and Nevada (see Chapter 3). While some people fear the possible consequences of Utah not signing the agreement, refusal to sign buys Utah more time before Nevada begins allocating Snake Valley water to SNWA. Water in the U.S. West is threatened by climate change. Yet both SNWA and the rural residents of the Great Basin want guarantees that they will continue to have water to support their values and ways of life. The way rural values are maintained with the pipeline project in place is through determinations of what negative impacts look like and assurances on how impacts will be mitigated and addressed. While SNWA is correct that we will never know exactly how the hydrology of the aquifer system in rural Nevada works, having political certainty that SNWA must stop pumping in defined situations could give opponents the certainty they need that SNWA’s water use will not interfere with their own. In essence, opponents are seeking the protection of non-interference
from other water users that forms the foundation of western prior appropriation water law and that underpins the principle of equitable apportionment between states. Given the many hydrologic uncertainties posed by groundwater and climate change, minimizing legal and political uncertainties that pose additional risks to their ability to access scarce water becomes their entrepreneurial imperative.

SNWA has been so focused on reducing Southern Nevada’s risk to drought in the Colorado River Basin that they have neglected to consider the risks of becoming dependent on rural Nevada groundwater, particularly if that groundwater is depleted. The path Southern Nevada has followed has avoided limiting growth as a way to manage water scarcity. Because municipal utilities are entrenched on how they manage water, it can be difficult for water agencies to change their missions from supplying their constituents with water to managing constituent water demand. Water systems can be so complex that it takes a long time to know and understand the system. By the time new employees are familiar with how the system works, they are often indoctrinated with the agency’s mission (Lach et al. 2005). When Pat Mulroy retired as general manager of SNWA in early 2014, many people wanted SNWA to conduct a national search for her replacement. Instead, the board unanimously appointed John Entsminger, who served as Mulroy’s deputy general manager. Entsminger is an obvious choice as he has been instrumental in Colorado River negotiations and understands the complex relationships between SNWA and other entities. However, many people were disappointed at the loss of an opportunity to bring new perspective to SNWA.

Mulroy believes, “You can’t control growth through your utilities,” and furthermore, growth is not something that can reasonably be stopped (Brean 2014). In
many ways, Mulroy is right that it is not feasible to stop cities from growing. Tarlock (2005, p. 94) explains that cities will be able to obtain the water they need because they have “the political power, the resources, and the technical capacity to overcome most limitations on growth posed by uncertain supplies.” Furthermore, many public utilities are subject by law to “duties to serve” (Tarlock 2005, p. 81). Utilities are required to serve customers if the system can absorb the cost, and they have a duty to seek additional sources of water supplies when they are needed (Tarlock 2005).

Municipalities are also allowed to hold water applications for future growth and delay putting it to beneficial use, without the threat of losing the water right under normal forfeiture or abandonment provisions that apply to almost all other users. SNWA was allowed to hold its water right applications in rural, northeastern Nevada for almost 20 years before they asked the State Engineer to rule on them. In a newspaper article, a business woman in Baker, NV, said,

Holding on to these rights for 25 to 50 years without putting them to beneficial use not only flouts the prohibition against speculation in Nevada water law, but it unfairly inhibits opportunities for future growth and development in the affected basins in Lincoln and White Pine Counties (Brean 2012).

“Wet growth” is an emerging concept that recognizes the relationship between land use and water resources in planning, regulation, and development (Arnold 2005). Traditionally, land use planning and permitting has neglected to consider water quality and quantity issues. While “smart growth” planning is an attempt to develop land in a sustainable way by eliminating urban sprawl, concerns over water quality and quantity have received little attention in the smart growth literature. Many water scholars have recommended that water managers should have greater input into land use decisions
(Thompson 2005). Thompson (2005) suggests that before land can be developed, cities should ensure that a proper water supply is available for the new development. However, the Southern Nevada Public Lands Management Act (SNPLMA) does not require new urban development to have a guaranteed water supply before land can be acquired from the federal government. In fact, the SNPLMA gives 10% of the land sale profits to SNWA, perhaps encouraging the idea that water will always be supplied to and follow land development in Southern Nevada. Rob Mrowka, an ecologist with the Center of Biological Diversity, explained that if the federal government does not expand the disposal boundary past the current border, “Las Vegas can’t continue to grow” (personal communication, May 6, 2011).

**Conclusion**

As Pat Mulroy stepped down as SNWA general manager at the beginning of 2014, she reflected on what she believed the legacy of her leadership would be:

The team we brought together was able to keep this community with a reliable water resource and facilities. Nobody ever was slowed down, hampered or in any way obstructed from building wherever they wanted to build in the valley, and that was a Herculean effort. We kept this valley going during its most phenomenal growth spurt. I mean when I started, the valley had less than 600,000 people in it. Today it has 2 million. The change has been unbelievable in 25 years. And when people down the road look back, they’ll say that this team was able to keep that going. (Brean, 2014).

However, Steve Erickson wondered if we had to do it all over again, “would we grow cities in the desert?” (personal communication, January 12, 2011).

We cannot get rid of the cities that are already in water-scarce regions, but the challenge we will face is how we make sure that people in these cities have the water
they need without harming other communities and nature. Water transfer projects need to accurately portray the risks, and the project’s scientific and political uncertainties must be balanced so that water is managed fairly.

References


CHAPTER 5
CONCLUSION

This dissertation has used the Southern Nevada Water Authority’s (SNWA) groundwater pipeline project to examine the historical pathways and the current designs of water policy in the U.S. West. The prior appropriation doctrine followed by the Western United States originated and evolved to enable rapid settlement and development of the arid West and its natural resources by providing some predictability in people’s access to water in a region where it was scarce and highly variable (Bates et al. 1993; Reisner 1993). Currently, the U.S. West is in a time of transition, with the majority of westerners now living in urban instead of rural areas. Some of the fastest growing cities in the U.S. are in the West. Along with a growing population, prolonged drought has led to conflicts over water. Water law, in practice, has tended to favor cities ahead of rural communities and the environment since water for culinary and domestic use has always been prioritized. However, as many western cities outgrow their water supplies, citizens are demanding more equitable ways to allocate water among multiple and competing uses. It is often forgotten that the prior appropriation doctrine includes other rules besides “first in time, first in right” and “use it or lose it.” The doctrine also emphasizes beneficial use of water, and many states have public trust provisions in their water laws. However, it is not always clear how to use all of the tools available in water policy to encourage equitable water management.

Southern Nevada and the rural valleys in the Great Basin are areas undergoing particularly rapid transition. SNWA has employed numerous strategies to feed their need
for water that has outgrown Nevada’s small Colorado River allocation. However, 14 years of drought in the Colorado River Basin has led SNWA to seek to develop groundwater from five, rural basins in northeastern Nevada to transfer 300 miles south to the rapidly growing Las Vegas metropolitan area in Southern Nevada. This dissertation used this case study to understand the current debates and challenges in water policy characteristic of those occurring throughout the U.S. West. Three chapters prepared in the multiple-paper format explored different aspects of current water policy challenges.

Chapter 2 focused on the legal hearings over SNWA’s filings to use water from groundwater basins of rural Nevada. We found that the policy debates and people’s rationales for how water should be allocated revolved around disagreements over beneficial use. Applying Schneider and Ingram’s (1997) framework on social constructions of target populations, our analysis in chapter 2 showed that SNWA attempted to portray their use of groundwater as most deserving. However, District Judge Estes’ ruling that remanded the water rights back to the Nevada State Engineer for further study showed that less attention should be paid to the individual users of water. Instead, it is important to consider how water uses are allocated in a system, so that we can better balance the multiple water needs of cites, the environment, and rural communities.

Chapter 3 evaluated the interstate agreement crafted between Nevada and Utah to allocate the shared groundwater in the Snake Valley Basin. Although many water experts believed the agreement to be a fair division and management of water, the agreement ultimately failed when Utah’s governor refused to sign it. The interstate agreement was meant to provide assurances that both Nevada and Utah would receive fair water allocations from Snake Valley, while establishing joint management of the aquifer so that
both states could ensure the valley’s sustainability. While many water managers believed the agreement was rejected because of the controversial SNWA pipeline project, we found that the agreement did not adequately provide the protections that residents of Snake Valley needed and sought. Chapter 3 shows that an interstate groundwater agreement needs to be designed so that not only the water is apportioned equitably, but also the risks from hydrologic uncertainties and impacts from other users are apportioned clearly and equitably as well.

In chapter 4, we traced the policy choices that have led to Southern Nevada’s growing need for water. We also traced the multiple risks over time that both Southern Nevada and the rural residents of the Great Basin have been attempting to manage as water becomes scarcer and conflicts over water increase. Uncertainties in scientific knowledge are treated differently than uncertainties involved in working with other people to use and manage a shared resource, depending on the types of risks people are trying to mitigate. However, balancing and negotiating scientific uncertainties with political uncertainties are essential to equitably manage water.

This dissertation has emphasized that there is a need to carefully deliberate water policies, particularly in the face of climate change in the already arid West. Chapters in this dissertation have shown that, contrary to some water manager opinions, politics cannot be taken out of water policy designs. It is important to consider the politics of a situation so that contextualized solutions can be crafted in designing water governance arrangements that will work for that particular situation. SNWA’s water rights in rural Nevada were remanded back to the Nevada State Engineer, because the State Engineer did not fully consider the effects of SNWA development and diversion of groundwater in
the particular basins of origin. Likewise, the Snake Valley Agreement failed, because it
neglected to take into account the risks caused by uncertainties that residents in the rural
basins face in light of SNWA’s pipeline project. The conclusion of the unfolding story of
Southern Nevada’s quest to obtain rural water for the rapidly growing Las Vegas
metropolitan area is far from clear. SNWA has appealed the decision to remand their
water rights to the Nevada Supreme Court. It is also not clear what will happen between
Utah and Nevada in Snake Valley, without an interstate agreement in place. Policy
analysis requires that we observe how these situations are dealt with over time, because
water conflicts are never fully resolved. Instead, past experiences establish precedents for
managing future conflict and cooperation over water.

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APPENDIX A

KEY-INFORMANT INTERVIEW PROTOCOL
Policy Designs to Address Water Allocations During Societal Transitions: The Southern Nevada Water Authority’s Groundwater Development Project

Key-Informant Interview Protocol

Procedures

Key-informant interviews will be conducted on overarching dissertation research themes and for more specific detail in each of three related case studies. These interviews will supplement analysis of secondary documentation related to water law and policy. Interviewees will be selected based on geographic location, job position, reputation, specific knowledge or expertise, and relevance to research objectives. We will also use snowball sampling and build the initial interviewee list with recommendations from other key-informants and people in the water community.

The following list of questions is organized into two parts: Part A includes some overarching questions that will be included in nearly all of the interviews; Part B includes three different lists of questions, each one pertinent to one of the three case studies. The list of questions is also comprehensive. Based upon the position and background of the person being interviewed, a subset of questions will be selected from this larger list. Each individual key informant interview will include some, but not all, of these questions. With permission, we will record interviews using a digital sound recorder for later transcription and analysis.

PART A: Overarching Research Questions

1. What do you think about the rules (the laws and policies) by which water is allocated to various uses in the Western United States?

2. Do you think the current water allocation rules favor certain uses or users? If yes, which uses/users do you think are favored? Who and why do you think they are favored?

3. How do you think various uses of water should be prioritized in times of scarcity, such as during droughts?

4. Which uses of water do you think are most deserving? Why? Which users of water do you think are most deserving? Why?

5. What do you think would be the most fair way to allocate scarce water supplies?

6. In some areas, the available water is already fully allocated. How do you think water should be reallocated to meet new demands and changing needs?
PART B: Specific Questions Related to Case Studies

Case Study 1: Water technologies in the Bear River Basin of Utah, Idaho, and Wyoming

General Questions:

1. Tell me about the real-time water monitoring that provides data on water flow diversions in the Bear River Basin.

2. Describe how you have used this instrumentation and data in your irrigation practices.

3. How have your perceptions of neighboring irrigators been affected by the implementation of this monitoring system?

4. Have your irrigation practices changed since the implementation of the real-time monitoring system? If so, how?

5. Do you participate in the biweekly conference calls hosted by PacifiCorp during the irrigation season? If yes:
   a. What kinds of information do you gain from the conference calls?
   b. How have the conference calls affected your relationships with other irrigators?

6. I understand that the real-time data became available after the conference calls were established. How has the availability of the real-time data on the internet changed how you (and/or others) have interacted in the conference calls?

7. What improvements to the real-time monitoring would you like to see?

Questions for water managers in Bear River Basin:

8. Describe, if you will, the different kinds of technology used in the Bear River Basin.
   a. How are each of these technologies used in water allocation and delivery?

9. Which areas of the Bear River Basin are equipped with the real-time monitoring instruments?

10. Why were these areas of the Bear River Basin automated?

11. Can you tell me about any plans to expand the automation technologies throughout the Bear River Basin?

12. How have the real-time monitoring technologies affected water allocation rules and procedures in the Bear River Basin?

13. Describe, if you will, the process that led to the real-time monitoring.

14. What was the reasoning behind implementing real-time monitoring technologies?

15. How did the conference calls hosted by PacifiCorp come about?
16. How do you think the monitoring and metering technologies would be used if the real-time data were not accompanied by conference calls?

17. Conversely, what would be the impact of weekly conference calls without the technological data?

Case Study 2: Water banking policy in Cache County, Utah

1. How would a water banking policy work in Utah?
2. How does water banking fit into and affect current water allocation rules?
3. How is water banking by a governmental agency different from private water brokering?
4. How is the water banking policy being proposed to the Utah legislature different from what water conservancy districts do?
5. Why do you think a conservancy district has not been established in Cache County?
6. Is the proposed Utah water bank modeled after any particular water bank? If so: why was that specific water bank chosen as a model?
7. Is a water banking policy is needed in Utah? Why or why not?
8. What have been the obstacles to implementing a water banking policy in Utah?
9. What do think needs to be addressed in order to clear those obstacles?

Case Study 3: Proposed Las Vegas Transfer of Snake Valley Water

General Questions:

1. How would a pipeline from Snake Valley to Las Vegas affect you?
2. How would you like to see this water issue resolve? Why do you think this is the best way to resolve the issue?
3. Who do you think has the power in this issue? Why?
4. Can you compare and contrast the values related to water here (Las Vegas/Snake Valley) as compared to (Snake Valley/Las Vegas)?
5. What do you think about the argument that the economic benefits to the many in Las Vegas should outweigh the livelihoods of the few in Snake Valley?
6. What do you know and think about the agreement that was drafted between Utah and Nevada before the SNWA had to reopen their water right applications?
7. What do you know and think about the scientific work that has been done on the hydrology of Snake Valley?
   a. How has this scientific work influenced your thoughts on the Snake Valley pipeline?

8. I read an interview with Pat Mulroy of the SNWA where she states that she wants the ranchers of Snake Valley to participate in the management of Snake Valley. Can you describe how the opposing sides of this issue might work together?

9. Is there anything you think could be done differently to improve how the opposing sides have addressed their concerns to each other?

10. From media accounts that I have read, I know that this is a contentious and often emotional issue. Can you explain any trust issues that you might have with other people or entities involved in this issue?

11. What can other rural areas and municipalities learn from the Snake Valley issue?

12. What do you see for the future of Snake Valley?

13. What do you see for the future of Las Vegas?

*Additional questions for people opposed to pipeline:*

14. Please explain, if you will, how you see the significance of the Snake Valley?

15. What are your fears about the SNWA pipeline?

16. What could the SNWA offer that you would think is appropriate?
   a. Why do you think this offer would be appropriate?

*Additional questions for people supporting the pipeline:*

17. Why do you think some of the residents of Snake Valley are upset about the pipeline?

18. Do you think their complaints are legitimate? Why or why not?

*Additional questions for water managers and people involved in Snake Valley policy:*

19. Can you talk about the process that led to the initial proposed agreement between Nevada and Utah?

20. How might the agreement between Nevada and Utah change in light of the reopening of SNWA water right applications to a public review process and public comments?
APPENDIX B

INFORMED CONSENT AGREEMENT
INFORMED CONSENT LETTER
Policy Designs to Address Water Allocations During Societal Transitions: the Southern Nevada Water Authority’s Groundwater Development Project

Dr. Joanna Endter-Wada and her graduate student, Lisa Welsh, from the Department of Environment and Society at Utah State University are conducting research to understand how policy designs deal with the challenges related to distributing scarce water supplies in the US Intermountain West. This research uses three case studies to illustrate how societal transitions are making people confront the rules by which we allocate and reallocate water. The first case study analyzes technological changes and associated human behaviors that strive to increase efficiency of water use in the Bear River Basin. The second case study examines water banks, leasing, and transfers as tools for increasing institutional flexibility by providing ways to move water between different uses. The third case study examines the conflict over water in Snake Valley of Utah and Nevada. You have been asked to take part because of your knowledge and involvement in one of these water issues. Approximately 25 participants will be interviewed for each case study, with about 75 total participants included in this research project.

This policy research involves conducting in-depth interviews with water officials and water users and analyzing secondary documents and written records. If you agree to be in this research study, you will participate in one interview, approximately one to two hours long. The interviews are designed to obtain people’s perspectives and insights concerning water allocation policies. Interviewees have been selected to represent various sectors of societal water demands, including agriculture, conservancy districts, municipalities, landowners, industry, recreation, and the environment.

Your participation in this research is entirely voluntary. You may refuse to participate or withdraw at any time without consequence. If you decide you want to withdraw from the study after the interview has begun, any information obtained from you will be destroyed. There are minimal risks involved in this study. There may or may not be any direct benefit to you from this research. The investigators, however, may learn more about water allocation policies and strategies and the different rationales that are used to justify the use of particular water allocation rules. The Institutional Review Board (IRB) for protection of human subjects at Utah State University has reviewed and approved the procedures employed in this research. If you have questions or concerns about your rights as a research participant, you may contact the IRB Administrator at (435) 797-0567 or email irb@usu.edu.

Because this research strategy relies on in-depth interviews with key people, the validity of the findings rests, in part, on the reputations of the people who are interviewed and the information that they provide. We would like to ask your permission to record the interview and then to transcribe the recording. This is to ensure that we have correctly heard and understood the information that you provide. The audio files and transcriptions will be kept confidential, consistent with federal and state regulations. Only Dr. Endter-Wada and Lisa Welsh will have access to the data, which will be kept in a locked file.
cabinet and/or stored on a secured computer in a locked room. Personal, identifiable information (voice recordings and codes linking names to transcriptions) will be destroyed once the research work and publications have been completed.

If at any time during the interview, you indicate that certain information is “off the record,” we will keep those comments completely confidential and will delete them from the transcriptions of the interviews. If you would prefer that your participation in this study remain confidential, we will gladly honor that request as well and not include you on lists of people interviewed.

You have been given two copies of this Informed Consent. Please sign both copies and retain one copy for your files. We appreciate your time and want to thank you in advance for participating in this study. If you have any questions about the research, we would be more than happy to answer them. If after the interview you wish to contact us, we may be reached at the phone numbers and emails listed below.

**Interviewer Certification:** “We certify that the research study has been explained to the individual, by one or the other of us, and that the individual understands the nature and purpose, and the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered.”

_____________________________________
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_____________________________________
Lisa Welsh, Ph.D. Student
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**Interviewee Consent (Initial all that apply):**

_____ I agree to be interviewed and understand that my participation is voluntary

_____ I agree to have the interview taped and transcribed

_____ I prefer that my participation in this study remain confidential (my name will not be listed as one of the people interviewed)

_____________________________________
Name of Interviewee (printed)

_____________________________________
Signature of Interviewee Date

_____________________________________
Signature of Interviewer Date
CURRICULUM VITAE

LISA W. WELSH
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EDUCATION
Ph.D., Human Dimensions of Ecosystem Science and Management, Utah State University, Logan, UT, dissertation successfully defended in April 2014
M.S., Geology, Texas A&M University, College Station, TX, 2007
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PROFESSIONAL EXPERIENCE
Fall 2014 Instructor: Fundamentals of Natural Resource Policy
Department of Environment and Society, Utah State University, Logan, UT
Summer 2013 Instructor: Natural Disasters
Department of Geology, Utah State University, Logan, UT
Fall 2007-2013 Graduate Research Assistant: Quinney Research Fellow and Utah Drought Management Project, Utah State University, Logan, UT
Fall 2009 Graduate Teaching Assistant: Natural Resources Administration
Department of Environment and Society, Utah State University, Logan, UT
2005-2007 Graduate Teaching Assistant: Mineralogy and Petrology
Department of Geology and Geophysics, Texas A&M University, College Station, TX
2004-2005 Graduate Research Assistant: Resident Scientist in sixth grade science classes
GK-12 Program funded by National Science Foundation, Texas A&M University, College Station, TX
2004 Student Conservation Association Intern
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2002 Student Research Technician
Texas Agricultural Experimental Station, Texas A&M University, College Station, TX
Summer 2001 Undergraduate Research Assistant: REU Program, National Science Foundation
Geophysical Institute, University of Alaska, Fairbanks, AK
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Undergraduate Research Assistant: REU Program, National Science Foundation  
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*denotes maiden name

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**FELLOWSHIPS**

NWRI Fellowship, National Water Research Institute, 2010-2012 ($5000/year)
Quinney Fellowship, Utah State University, 2007-2011 ($20,000/year)
Mrs. Robert Berg Graduate Fellowship, Texas A&M University, 2006 ($5000)
Michel T. Halbouty Graduate Fellowship, Texas A&M University, 2005 ($4000)
Regent’s Fellowship, Texas A&M University, 2004 ($18,000)

**AWARDS**

Spring Runoff Conference, Utah State University. Poster presentation award, 2010
Intermountain Graduate Research Symposium, First place (Natural Resource Poster), 2010
Texas A&M University First Annual Geology and Geophysics Research Symposium, First place (Master’s Research), 2007
PROFESSIONAL ACTIVITIES AND AFFILIATIONS

American Water Resources Association, 2008-Present
International Association for Society and Natural Resources, 2013-Present
Xi Sigma Pi, 2009-Present
Fellow, Water Initiative, Utah State University, 2008-2010
Information Technology in Science (ITS) Center for Teaching and Learning at Texas A&M University, College Station, TX, earned Science Education Specialist Certificate, 2005-2006