THINKING OUTSIDE THE PIPE: THE ROLE OF PARTICIPATORY WATER ETHICS AND

WATERSHED EDUCATION COMMUNITY ACTION NETWORKS (WE CANs)

IN THE CREATION OF A NEW URBAN WATER NARRATIVE

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According to the United Nations, two-thirds of the world's population, approximately 4 billion people, experiences water scarcity at least one month per year. To avoid the water quantity crisis experienced in many regions of the world and the United States, a path to sustainability must be forged. My research aims to identify and critique the salient features of the narrative that drives contemporary urban water decisions and practices and to provide a meta-narrative about the role of narratives as invisible lenses through which individuals see, interpret, and interact with the world often without realizing the existence of those frames. The purpose of this problem-oriented dissertation is twofold: to provide a philosophical policy analysis of contemporary water issues in the United States generally and North Central Texas in particular, and to offer a pragmatic and interdisciplinary approach to discovering a sustainable relationship to water. The intent of my research is not to produce a new metaphysical understanding of water, but to provide a pragmatic application of ideas that can be utilized in the field; ideas that can invoke a new narrative, vision, and direction for urban water issues in North Central Texas and in areas far beyond the Lone Star State.

I begin my dissertation with an overview of the nature of the problems involved in managing our global and national water problems. To fully understand urban water issues requires more than just scientific knowledge, it also demands a philosophical orientation and grounding. Chapter 2 lays the philosophical foundation of my research by braiding the philosophical streams of thought inherent in Aldo Leopold's concepts of the land ethic and ecological conscience, Alfred North Whitehead and Maurice Merleau-Ponty's emphasis on relationship, Paulo Freire's pedagogy of critical consciousness, John Dewey's philosophy of experience and his perceived importance of the public and the "Great Community," and Hannah Arendt's theory of action. I argue that these tributaries of philosophical thought provide the foundation for creating a new urban water narrative. In Chapter 3, I provide an indepth description of the water policy problem by delineating the historical context of water policy, supply, and management, exploring the rise of disciplinarity that resulted from the divergence of the humanities and science, explicating the partnership and dominator models of civilization, and investigating the impact of the cultural narrative on the decision-making process. Chapter 4 consists of my analysis of the current water policy problem through the lens of a case study of water issues in North Central Texas. I describe the key trends that have driven water practices in the region, examine the factors that have fostered those trends, and project what is likely to happen if the status quo approach to water is maintained. Chapter 5 presents my proposed alternative for resolving the current water quantity problem in North Central Texas. I philosophically evaluate the potential of my proposed alternative, a new urban water narrative, for ameliorating the problem and achieving the goal of a sustainable relationship to water. I elucidate the ways in which a new cultural narrative can surface and precipitate a new way of being in relationship with water. The last chapter recaps the previous chapters, acknowledges limitations of my research, and provides recommendations for future philosophical research endeavors into water policy, supply, and management that is relevant on a local, national, and global scale.

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Whatever is hard to be traversed, whatever is hard to be acquired, whatever is hard to be visited, whatever is hard to be performed, all this may be accomplished by true devotion; for the difficulty of devotion is the greatest of all.

—The Laws of Manu

As the Laws of Manu quote above stipulates, true devotion is difficult especially amid never-ending struggles. Writing a dissertation requires two types of devotion: the devotion of the doctoral candidate to the project and the devoted support of friends, family, and colleagues. I would like to express my gratitude to the following entities for their support and assistance! To my dissertation committee members: Thank you for guiding and shaping this project so that in the end it exceeded what I thought I was capable of on my own. To Michele Birmingham, Dustan Compton, and Stephanie Zavala: Thank you for sharing your insights into water supply and management issues based on your experience as water professionals in North Central Texas and for your collaboration on designing the engagement survey. To Brian Kessler & Sharon Wieland: Your proofreading and editing skills rooted out many errors that I never would have found on my own. To my fellow colleague, Jamie Lobstein: You gave me the strength and courage to plod on in my philosophical journey because I was not alone. To my husband, Lane: I want to express my heartfelt thanks for all the assistance with the graphics. To my son, Mitchell, and my daughter-in-law, Courtney: Your enthusiastic support of me achieving my goal of completing my dissertation was restoring. To Trooper, Maya, & Lady: Thank you for being my devoted dissertation taskmasters and beloved pet companions who made the daily work in my study less isolating! *Dulcius ex asperi!*¹

¹ Latin motto meaning "sweeter after difficulties."

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CHAPTER 1

THE LAY OF THE LAND

In an age when man has forgotten his origins and is blind even to his most essential needs for survival, water along with other resources has become the victim of his indifference.

-Rachel Carson

Overview

My dissertation is different from a conventional philosophical dissertation due to my eclectic experiential and educational background. Whereas a conventional philosophical dissertation focuses on the analysis of an argument or theory, my problem-oriented dissertation analyzes a contemporary societal issue from a perspective gleaned from my multidisciplinary training in psychology, biology, education, environmental science, and philosophy. My dissertation committee also is composed of members representing a diversity of disciplines and interests: an environmental field philosopher specializing in the intersection of ethics and policy with science and technology; an environmental philosopher concerned with the conservation of the Texas Big Thicket, Texas land ethics, and the philosophy of science; and an environmental scientist and aquatic ecologist involved with international and interdisciplinary biocultural conservation. My research aims to identify and critique the salient features of the narrative that drives contemporary urban water decisions and practices and to provide a meta-narrative about the role of narratives as invisible lenses through which individuals see, interpret, and interact with the world often without realizing the existence of those frames.

The intent of my research is not to produce a new metaphysical understanding of water, but to provide a pragmatic application of ideas that can be utilized in the field; ideas that can invoke a new narrative, vision, and direction for urban water issues in North Central Texas and in areas far beyond the Lone Star State. Towards this end, I will analyze the current narrative that drives urban water policy, supply, and management decisions. The dominant present-day urban water narrative is still entrenched in a 20th century engineering mindset that searches for water supply and management solutions in better technology, new infrastructure, and increased funding rather than in changing the water mindset or the way water is viewed by society. I define narrative as the cultural "story" or collection of fundamental assumptions that configure knowledge. In the context of my research, I equate the concept of "mindset" with Foucault's notion of episteme: "In any given culture and at any given moment, there is always only one *episteme* that defines the conditions of possibility of all knowledge, whether expressed in a theory or silently invested in a practice" (Foucault 1994, 168). The mindset of an individual member of society or an institutional entity is based on the cultural narrative or episteme. The deeply ingrained fundamental assumptions of the cultural narrative from which a mindset is derived are experientially "invisible" and operate below the consciousness of all entities comprising a society and give rise to an epistemological unconsciousness. These "invisible" fundamental assumptions demarcate the boundaries of thought and thus prefigure what conceptual possibilities are foregrounded or backgrounded in any particular time, place, and domain. Although Gaston Bachelard specifically referred to these unconscious assumptions in the realm of science as "epistemological obstacles" (Bachelard 2002, 24), Foucault extended this concept to include other nonscientific domains. "Epistemological break or rupture" is the

term introduced by Bachelard to describe the process of tearing down or deconstructing these systems of thought (Bachelard 2002). My research aims to identify methods of invoking "epistemological rupture" to facilitate the emergence of a new mindset to guide water supply and management.

The purpose of this problem-oriented dissertation is twofold: to provide a philosophical policy analysis of contemporary water issues in the United States generally and North Central Texas in particular, and to offer a pragmatic and interdisciplinary approach to discovering a sustainable relationship to water. I contend that it is possible to reconceptualize the human-water relationship through the creation of a new urban water narrative and mindset. The inspiration for my argument primarily was found in the works of Aldo Leopold, Alfred North Whitehead, Maurice Merleau-Ponty, Paulo Freire, John Dewey, and Hannah Arendt. In this preliminary chapter, I describe the methodological approach used, provide a brief problem analysis of water issues occurring globally, nationally, and locally, and outline the contents of the remaining chapters of this dissertation.

Methodology

My approach seeks to foreground a new narrative and water mindset through the means of a "radical" interdisciplinary approach. Radical is used here in the sense of advocating a practical and theoretical change that has far-reaching implications for political and social reform. The word *radical* stems from the Latin word *radix* which means root. I believe that a change in water mindset is the base or root of transforming the water problems currently

plaguing society. Although interdisciplinary research is certainly nothing new, my dissertation involves a reconsideration of what constitutes interdisciplinary research and intends to deepen thought and action regarding urban water supply and management.

I address the contemporary issues of urban water problems through a philosophical lens, yet I use an applied interdisciplinary field philosophy approach to envision and model a new mindset for addressing water issues. The term "field philosophy" was first coined by Robert Frodeman (2010). Field philosophy is the practice of philosophers leaving the realm of academic offices and entering the "field of the community" to facilitate the identification of the philosophic dimensions of social problems by community stakeholders. Field philosophy adopts a bottom-up rather than a top-down approach to solving community problems. The work of field philosophy is pragmatically driven by the needs of the stakeholders rather than theoretical philosophical constructs. As such, field philosophy moves beyond the boundaries of the silos of academic disciplines and builds interdisciplinary bridges to address real-world social problems holistically and collaboratively in the community. A field philosophy approach is characterized by "sauntering." Sauntering is indispensable to the practice of field philosophy because "field philosophers wander around questioning" (Briggle 2015, 2) stakeholders in a community, satisfying the "Socratic imperative to philosophize out in the world" (Frodeman 2010).

In *Walking*, Thoreau touts the art of "sauntering" as a means of not mere physical exercise, but a spiritual endeavor to reconnect us to our essential wildness (1994). Sauntering is an embodied experience that reminds humans that they are an "inhabitant, or a part and parcel of Nature, rather than a member of society" (Thoreau 1994, 71). A methodological approach characterized by sauntering should not be equated with aimless or mindless wandering. As

Thoreau notes, "the saunterer, in the good sense, is no more vagrant than the meandering river, which is all the while sedulously seeking the shortest course to the sea" (1994, 72). Etymologically, the word *sedulous* stems from the Latin word *sedulo* which means diligent. A sauntering approach to urban water issues incorporates thought and action that intentionally and diligently seeks a course that identifies barriers, dissolves boundaries, and builds bridges to facilitate the emergence of a new human-water relationship. This is all in keeping with field philosophy, which operates by non-disciplinary standards of rigor and is best assessed by alternative metrics, including impacts on policy processes (Brister and Frodeman 2020).

Sauntering in the context of solving environmental issues is inherently valuable in interdisciplinary research. As Alfred North Whitehead stated in *Science and the Modern World*, professionalized knowledge "produces minds in a groove" (1925, 197). Thus, progress remains linearly entrenched in disciplinary ruts and effectively prohibits the intermingling of disciplinary boundaries. Understanding and addressing the complexity of urban water issues warrants contemplation of not merely disciplinary abstractions, but real-world facts from multiple realms of knowledge and experience. Urban water issues cannot be treated superficially and reductively from the categorical lens of just one discipline.

My dissertation research adopts a holistic and interdisciplinary approach to understanding water issues in North Central Texas by addressing the complex environmental and societal factors embedded in the challenges of urban water supply and management through the utilization of a methodology of *problem* orientation rather than of *solution* orientation (Clark 2002, 85). This orientation entails a focused analysis to fully understand the problem before developing proposed solutions. Unfortunately, water resource problems

conventionally have been tackled from a solution orientation, leading people "to make assumptions about people's goals, pay too little attention to what has happened in the past and what might happen in the future, and focus uncritically on possible solutions" (Clark 2002, 85). As such, solution orientations are often band-aid or quick-fix approaches to problems marked by short-term thinking. A problem orientation, on the other hand, is more pragmatic and effective because it realistically analyzes the scope of the problem and identifies the underlying complexities. Urban water issues are multifaceted as they comprise social, political, economic, and cultural dynamics that are intertwined with the domains of technology, hydrology, and ecology (Klaver 2016, 5). As opposed to solution orientations, problem orientations address problems strategically and consider long-term goals and side effects.

To avoid the water quantity and quality crisis experienced in many regions of the world and the United States, a path to sustainability must be forged. As a microcosm of the nation, it is not surprising that North Central Texas is experiencing the water issues facing the nation as a whole.² To explore and better understand the community education and outreach aspect of these local water challenges, I collaborated with three water resource professionals to construct an online survey to identify how water resource professionals and invested non-

² According to the projections of the 2021 Region C Water Plan, the urban population in North Central Texas will experience a 93% increase between 2020 and 2070, from 7.6 million to 14.7 million people. Based on currently connected water supplies, Region C has projected that North Central Texas water demand will increase by 81% by 2070 requiring an additional 1.3 million acre-feet/year of water supply. To access the Main Report of the 2021 Region C Water Plan, see http://www.twdb.texas.gov/waterplanning/rwp/plans/2021. A 2018 investigation by the Dallas CBS11-I Team discovered that there is a 25% chance that the drinking water in North Texas cities is either unsafe to drink or has not been properly tested. Twenty of the seventy-six largest water utilities in North Texas were in violation of the Federal Safe Drinking Water Act. These 20 water utilities provide drinking water for more than 1.7 million people. See New, Brian. April 26, 2018. "North Texas Cities Fail to Test Safety of Drinking Water." https://dfw.cbslocal.com/2018/04/26/north-texas-cities-fail-to-test-safety-of-drinking-water.

professionals (i.e., individuals voluntarily engaged in environmental organizations) in North Central Texas define and assess "community engagement." The results of this survey are discussed in Chapter 4. In addition, through a series of synchronous and serendipitous events early in my dissertation writing stage, I was invited to play an active role in making a sustainable watershed development on Lake Arlington in Fort Worth, Texas a reality. The Living Waters Park project is a direct application of my dissertation research and is further discussed in the fifth chapter of this dissertation. Although my dissertation research focuses primarily on water issues in North Central Texas, it is imperative to first understand water issues on a broader scale. After all, water participates in hydrological cycles that cross all manner of boundaries worldwide. The problem analysis in my fourth chapter delineates water quantity issues that are occurring locally in North Central Texas.

Summary of Problem Analysis

Before summarizing the problem analysis detailed in Chapter 4, I would like to illustrate real-world water quality and quantity issues that are afflicting urban areas nationally and internationally by providing two vignettes, one from the United States and one from South Africa. These "little vines" intertwine to tell a larger narrative that reveals the cultural "story" or collection of fundamental assumptions that configured knowledge of water supply and management in the 20th century and that still continues to shape the contemporary water mindset.

Vignettes: Flint, Michigan and Cape Town, South Africa

Recent municipal water crises have raised concerns about the ability of the United States to maintain its high quality of drinking water. As exemplified in Flint, Michigan, the trust that most Americans place in their drinking water can be quickly shattered. The New York Times (Duhigg 2009) reported that the tap water of more than 49 million Americans contains illegal concentrations of chemicals and bacteria resulting from violations of provisions of the Safe Drinking Water Act by more than 20% of the nation's water treatment systems. Despite the seriousness of these infractions, fewer than 6% of the water treatment plants received fines or punishment from state or federal regulatory officials. The recent water crises in Flint, Michigan and in many other American cities³ have raised the specter of systemic political corruption and the prioritization of economic and industrial interests over the provision of safe drinking water to the public. The Flint water crisis may represent a "canary in the mine" in the world of water supply and management. This sentiment is eerily echoed in the words of Dr. Mona Hanna-Attisha, the pediatrician involved in exposing the lead-poisoning of Flint citizens, "As our aging water infrastructures continue to decay, and as communities across the nation struggle with finances and water supply sources, the situation in Flint may be a harbinger for future safe drinking water" (Campbell 2016, 2). River systems supplying municipal needs for drinking water,

³ For a recent discussion on how widespread the problem of unsafe drinking water is in the United States see Langin, Katie. 2018. "Millions of Americans Drink Potentially Unsafe Tap Water. How Does Your County Stack Up?" http://www.sciencemag.org/news/2018/02/millions-americans-drink-potentially-unsafe-tap-water-how-doesyour-county-stack. During the 2015 Flint water crisis, Langin reports that the tap water of approximately 21 million Americans, nearly 6%, violated the national health standards of drinking water. For a discussion of how the Flint drinking water crisis may be happening again in California, see Kukura, Joe. February 9, 2017. "Drinking Water Crisis Brewing in California." http://www.sfweekly.com/news/drinking-water-crisis-brewing-in-california. Note however, that although lead contamination is present in some California cities (i.e., Oakland), current contamination problems in California predominantly stem from arsenic and nitrate contamination.

sanitation processes, and energy production are unable to meet the rising demand due to population increases and regional drought conditions. In August 2021, the United States federal government declared cuts in water consumption for Southwestern States receiving water supply from the Colorado River.⁴ Lake Mead and Lake Powell, the largest and second largest reservoirs in the United States, are fed by the Colorado river and were only 35% and 32% full.⁵ Data from the 2020 Census released by United States Census Bureau recently revealed that Arizona's Maricopa County grew by almost 87,000 people representing more growth than any other county in the United States.⁶ In addition, the greater Phoenix area, located in Maricopa County, is the fastest growing metropolitan area in the United States, growing by 106,000 to 5.1 million people from July 2018 to July 2019.⁷ Forty percent of Phoenix's water supply comes from Lake Mead.⁸

According to the United Nations,⁹ 68% of the world's population will live in urban areas by 2050, a projected 6.7 billion urban residents (2018). Given this population trend, it is not surprising that the United States Government Accountability Office reports that 40 of 50 state

⁴ For more information, see news article written by CNN reporter Rachel Ramirez published on August 17, 2021. "First-ever Water Cut Declared for Colorado River in Historic Drought." https://www.cnn.com/2021/08/16/us/ lake-mead-colorado-river-water-shortage/index.html. Accessed August 17, 2021. ⁵ Ibid.

⁶ For more information, see the 12 News article published on May 12, 2021. "Maricopa County is the Fastest-Growing County in the US, Report Says." https://www.12news.com/article/news/local/valley/maricopa-county-the-fastest-growing-county-in-the-us-report-says/75-5e414a43-ffcb-4aa6-9092-906108f74a5e. Accessed August 17, 2021.

⁷ Ibid.

⁸ For more information, see news article written by ABC 15 reporter Mark Phillips. "As Water Level Drops at Lake Mead, Phoenix Works to Reduce its Dependence on Colorado River Water." https://www.abc15.com/weather/ impact-earth/as-water-levels-drop-at-lake-mead-phoenix-works-to-reduce-its-dependence-on-colorado-riverwater. Accessed August 17, 2021.

⁹ The 2018 Revision of World Urbanization Prospects published by the United Nations Department of Economic and Social Affairs stipulates that future increases in the world's urban population is expected to occur in high concentrations in India, China, and Nigeria. These three countries are projected to account for 35% of the projected world's population growth between 2018 and 2050. This report can be accessed at https://esa.un.org/unpd/wup.

water managers anticipate freshwater shortages in some portion of their states in the next 10 years (USGAO 2014). Many large urban cities have recently reported water shortages (e.g., Atlanta, GA in 2007; Dallas-Fort Worth, TX in 2010-2015; and San Francisco, CA in 2012-2016). These water shortages reflect deep concerns about the impacts of climate change, population growth, and environmental regulation on urban water supplies. Historically water supply and management focused on water delivery and infrastructure to move water from one area to another. Movement of water, made possible by technological and engineering innovations, facilitated further economic expansion and growth. Ironically, continued urban economic growth is threatening to surpass the capacity of cities to meet rising water demand in the 21st century.

Cape Town, South Africa, experienced one of the world's most dire and dramatic urban water crises. In January 2018, South African leaders warned four million residents that they were likely to experience "Day Zero" on April 12, 2018, the day when water would be shut off to residences and businesses due to critically low reservoir levels as a consequence of record drought and population growth (Welch, 2018). Fortunately, the city of Cape Town escaped becoming the first major city in the world to run out of water by ramping up conservation and efficiency via drought-awareness campaign measures. In addition, for the first time in four years, the region experienced average rainfall in June 2018. Although the "Day Zero" water crisis was averted, Cape Town's water supply remains tenuous since reservoir levels are still below pre-drought years and daily water use has continued to rise post "Day Zero" (Alexander 2019).

Description of Problem

While the amount of freshwater on our planet has remained relatively constant over time, the human population has exploded, placing increased demands on the supply of clean, safe drinking water. Although approximately 71% of the planet is covered by water, only 2.5% is freshwater, and more than two-thirds of this amount is unavailable for human use. Ultimately, less than 1% of the water on the planet is available for use by almost eight billion people. Due to differences in geography, climate, technology, and pollution, access to water is not equitable. A 2007 UN-Water and Food and Agriculture Organization report projected that by the year 2025, an estimated 1.8 billion people would live in regions experiencing water scarcity and two-thirds of the world's population would live in water-stressed regions (10). A more recent report by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) projects even more grim water scarcity statistics: "At present, an estimated 3.6 billion (nearly half the global population) live in areas that are potentially water-scarce at least one month per year, and this population could increase to some 4.8-5.7 billion by 2050" (2018, 15).

Scarcity of water concerns were highlighted on December 7, 2020, when water, joining gold and oil, began to be traded as a commodity on Wall Street (Bloomberg 2020). Not surprisingly, the announcement of these water contracts was made as the West Coast of the United States was being devoured by heat and wildfires and California's eight-year drought was abating. According to CME Group, an American global markets company responsible for pooling the contracts, the trading of water in the futures market will permit better management of risk associated with water scarcity and regulation of water supply and demand. As will be discussed in the next section, numerous social and environmental trends (i.e., population growth, water pollution, global climate change, droughts, etc.) will exacerbate water scarcity issues, which ultimately will increase the price of water. Trading water futures on Wall Street may be a way to protect large water consumers (e.g., agriculture and electrical utilities) against high prices, but since the scarcity of water is due to excessive exploitation by the primary sector, industry, and human consumption, I do not view water futures as a viable way to solve water quality and quantity issues.

Although it is not possible to create more global water,¹⁰ it certainly is feasible to manage it better. Despite the expenditure of greater amounts of money and increasingly sophisticated engineering, we have failed to solve the world's water problems because we keep trying to meet insatiable demands by continuously expanding a supply that has limits (Postel 1997, 183). Thus, the challenge we face today is how effectively to conserve, manage, and distribute the water we have. One of the chief contentions of this dissertation is that water needs to be managed better. Current water supply and management practices are problematic because they are primarily based on supply-side and utility concerns. These management concerns stem from a mindset of increased production through feats of engineering to promote continued economic growth. This mindset, however, is short-sighted and anthropocentric in

¹⁰ Although desalination is being developed and encouraged in geographic areas close to oceans but lacking in surface freshwater supplies, there are many disadvantages of desalination technology that render it less than an optimum solution. Currently, the process of desalination is expensive, energy-intensive, involves large-scale facilities which can displace people, uses pre-treatment and cleaning chemicals, and produces brine as a by-product. Waste disposal of the chemicals and brine pose a problem for plankton and phytoplankton which form the base of the marine food chain. In addition, desalination technology has not been perfected and desalinated water can pose multiple health risks to humans. See Cooley, Heather, Peter H. Gleick, and Gary Wolff. 2006. *Desalination, with a Grain of Salt: A California Perspective*. Oakland: Pacific Institute. I also seriously question if desalination is a viable long-term solution given the trends of global climate change, increasing population, acidification and plastic pollution of oceans.

that it does not consider either long-term consequences or the interests and well-being of nonhuman constituents of the environmental community.

Identification of Trends, Conditions, and Projections

Problem analysis entails not only the identification of past and current environmental and social trends but also the conditioning factors that explain how and why the trends occur (Clark 2002, 90-92). The status of environmental variables is apprised through environmental trends and social perspectives that are elucidated by social trends (Clark 2002, 90). Chapter 4 contains a discussion of the trends and conditioning factors identified here that also pertain to North Central Texas.

A major social trend prevalent on all geographic scales is the disconnect between people and the environment that the philosopher Martin Heidegger associates with industrialization and technology (1977, 5) and the political theorist Hannah Arendt attributes to the age of modern science (1998, 254). Thus, industrialization, technology, and modern science are primary conditioning factors that have contributed to the disengagement of people from the natural world. Specifically, Arendt contends that "earth alienation" (1998, 264-265) was a consequence of the modern scientific worldview made possible by Galileo's telescope and Newton's new mathematics. As a result, "man realized his newly won freedom from the shackles of earth-bound experience; instead of observing natural phenomena as they were given to him, he placed nature under the conditions of his own mind, that is, under conditions won from a universal, astrophysical viewpoint, a cosmic standpoint outside of nature itself" (1998, 265). The modern scientific worldview predominantly has been constituted by a technological and utilitarian mindset of mastering the environment and viewing natural

resources solely as means to ends and the earth as the work of *homo faber*, man as "toolmaker and producer of things" (1998, 229-230). In addition to alienating humans from the Earth, industrialization and technology are also conditioning factors for another social trend that Karl Marx referred to as alienation from self (Kamenka 1983, 177-178), an isolation of an individual from his/her social nature. According to Arendt, this self-alienation is the result of the collapse of the public political arena and results in the loss of collective political power. I discuss this loss of political agency in detail in Chapter 5 and propose actions that will facilitate the development of participatory water ethics and the empowerment of community-based solutions to urban water issues.

Related to the trend of environmental disconnection is the trend of lack of water awareness and appreciation amongst the public. This trend represents a combination of both earth and self-alienation: it is the manifestation of a lack of relationship with water. People are not aware of the risks associated with the problems of water scarcity and water quality. Consequently, the behavior of people does not correspond to the nature and magnitude of the urban water crisis. According to a 2007 national water use study conducted by Hoekstra and Chapagain, the United States has the largest average water footprint of 2,480 m³/cap/yr and China has one of the lowest average water footprints of 700m³/cap/yr (39). Despite the water scarcity challenges of many areas in the United States, people are consuming 3.5 times the amount of water as people in China. Simply raising water rates may reduce consumption by some individuals, but it introduces a social justice issue in the differential ability of citizens to afford to pay increased water rates. Moreover, those individuals that have access to greater financial resources feel they have no reason to reduce their consumption of water. Also disconcerting is a recent survey which revealed that 79% of American millennials do not know where their water comes from (Erbentraut 2016) – whether a stream, river, lake, wetland, or aquifer. Similarly, as revealed by the 2004 and 2014 Texas Statewide Water Conservation Survey, only 28% of respondents in each survey year reported knowing the source of their drinking water; whereas, 29% in 2004 and 30% in 2014 reported that they thought they knew the source of their drinking water (Texas Water Foundation 2014). Despite ten years of elapsed time and increased community education and outreach efforts, there was essentially no change in the percentage of respondents reporting knowledge of their drinking water source.

If people do not know where their drinking water comes from or where their wastewater goes, they lack a vital understanding of the connection of their individual actions on water quality and water quantity. In *Walden; or, Life in the Woods*, Thoreau details his relationship with nature including Walden Pond in the mid 1800's. Not only does Thoreau devote a lot of attention to describing the source and the purity of Walden Pond, but also lucidly and candidly expresses his relationship with Walden Pond characterized by reciprocity and intimacy. The description of his experiences on Walden Pond captures his sense of respect, appreciation, gratitude, wonder, and awe for Walden Pond as such and as his source of drinking water.

Perhaps on that spring morning when Adam and Eve were driven out of Eden Walden Pond was already in existence, and even then breaking up in a gentle spring rain accompanied with mist and a southerly wind, and covered with myriads of ducks and geese, which had not heard of the fall, when still such pure lakes sufficed them. Even then it had commenced to rise and fall, and had clarified its waters and colored them of the hue they now wear, and obtained a patent of heaven to be the only Walden Pond in the world and distiller of celestial dews. Who knows in how many unremembered nations' literatures this has been the Castalian Fountain? or what nymphs presided over it in the Golden Age? It is a gem of the first water which Concord wears in her coronet. (1995, 116-17)

Thoreau's relationship with Walden Pond is derived from a deep lived experience that embraces the historical context of the human and other-than-human Walden Pond community.

His reflections on Walden Pond exemplify an interweaving of a spiritual, moral, and scientific knowledge and are simultaneously marked by erudition and prophecy. He perceptively comments on the influence of science, technology, global economy, and consumerism on the environment.

Now the trunks of trees on the bottom, and the old log canoe, and the dark surrounding woods, are gone, and the villagers, who scarcely know here [Walden Pond] lies, instead of going to the pond to bathe or drink, are thinking to bring its water, which should be as sacred as the Ganges at least, to the village in a pipe, to wash their dishes with! – to earn their Walden by the turning of a cock or drawing of a plug! (1995, 125)

Thoreau ardently laments the impending propensity to view the natural environment through an instrumental lens and consequently to ascribe value to the land community predominantly based on potential economic gain. The relationship of Thoreau to Walden Pond epitomizes what it means to be a watershed steward.

All watershed stakeholders have a responsibility to protect the health of the land and water. In order to do so, people must know that their actions have consequences. Watershed stewardship is therefore of utmost importance. According to the *Texas Watershed Steward Handbook*, "Watershed stewardship means caring for the water, air and biodiversity in an entire watershed, while acknowledging that all resources are connected and all are affected by natural and human activities" (Peterson 2017, 2). Watersheds are intertwining and nested; thus, water quality and quantity upstream affects water quality and quantity downstream. Similarly, actions which affect the land have direct consequences for surface and ground water resources. Human life is dependent on access to clean water. When people need water today, they expect that safe water will run from their tap. In the past, when the population was smaller and dispersed across rural areas, people had to dig their own wells and build storage tanks to provide for their water needs. Moreover, in "The Cultural Basis for Our Environmental Crisis," Lewis Moncrief (1970) states, "One hundred years ago at almost any location in the United States, potable water was no further away than the closest brook or stream. Today [1970] there are hardly any streams in the United States...that can safely satisfy human thirst without treatment" (508). As population increased and became more urbanized, public watersupply systems became vitally important. Roughly 87% of Americans today rely on public water supply for their household needs (USGS 2018). Many Americans erroneously assume that the mere presence of a municipal water treatment plant is an adequate means of ensuring safe drinking water. They also fail to understand that the best way to protect the drinking water in a community is to protect the source itself from contamination (EPA 2018). This notion is reiterated by Peter H. Gleick, world renowned scientist and freshwater expert, in his discussion of the history of drinking water in *Bottled and Sold*: "...the simplest and cheapest approach to providing clean water is to take our water from pristine, unpolluted rivers, lakes, or aquifers and to protect those waters from contamination in the first place... if we protect natural sources, we have to do far less later on to provide safe water" (2010, 25). Unfortunately, there is still limited awareness of the nature of the threat stemming from water contamination.

In fact, not much has changed since 1962 when Rachel Carson wrote in *Silent Spring*:

This is an era of specialists, each of whom sees his own problem and is unaware of or intolerant of the larger frame into which it fits. It is also an era dominated by industry, in which the right to make a dollar at whatever cost is seldom challenged. When the public protests, confronted with some obvious evidence of damaging results of pesticide applications, it is fed little tranquilizing pills of half-truth. We urgently need an end to these false assurances, to the sugar coating of unpalatable facts. (13)

This quote reflects a third social trend of specialization, disciplinarity, and siloism. Carson's "era of specialists" is a consequence of the professionalized knowledge with which Whitehead was concerned due to its proclivity to produce "minds in a groove" which "lead to a celibacy of the intellect which is divorced from the concrete contemplation of the complete facts" (1925, 197). In "Forbidding Science" (2009), Leon Kass, a medical doctor and researcher engaged with ethical and philosophical issues inherent in biomedicine, contends that the deliberate exclusion of "public members" in an attempt to control "unwelcome intrusions of the noisy and contentious political process" (277) from the discussion of ethical considerations of biomedicine results in an unhealthy insulation. "As a consequence, scientists encounter no serious and thoughtful ethical challenges to their unexamined faith that all of their innovations are good for humanity. Worse, this attempt of government by so-called experts isolates the larger society from the opportunities and responsibilities of public decision making" (277). Kass argues the multiple views and values of the public not only should be heard, but also seriously considered in deliberations that encourage public involvement. Although Kass' comments in "Forbidding Science" are focused on the realm of bioethical issues, they are directly relevant and applicable to urban water issues. Understanding and addressing the complexity of urban water issues warrants contemplation of not merely disciplinary abstractions, but real-world facts from multiple realms of knowledge and experience. Disciplinary silos of knowledge thus need to be replaced by the adoption of a web of interactions honoring the transdisciplinary knowledge and experience of all stakeholders. The concurrent rise of disciplinarity and the divergence of humanities and science is discussed in Chapter 3. The emergence of transdisciplinarity and the reconvergence of the humanities and science is addressed in

Chapter 5. Not only is today's public "fed little tranquilizing pills of half-truth," we currently live in an era of "fake facts," thus underscoring the necessity for reasoning that is balanced. Moreover, the public insidiously continues to be asked to assume the risks calculated by the industry-government complex. Thus, as Vice President Al Gore declared in his introduction to Carson's *Silent Spring*, "Cleaning up politics is essential to cleaning up pollution" (1962, xv). To this end, citizens will need to play a pivotal role by taking the initiative in bridging the divide between the industry-government complex and the community. However, due to selfalienation and the loss of political agency, ordinary members of the community are not aware of how to become engaged either individually or collectively in determining sustainable water solutions. This is a skill that needs to be recovered through critical pedagogy, a philosophy of education first developed by Freire that combines education and critical theory.¹¹ Critical pedagogy is a means to enable people to gain power through knowledge and to take constructive action. This is a vital function of Watershed Education Community Action Networks (WE CANs) which I discuss in detail in Chapter 5.

Environmental trends in water supply and management are those of privatization, expropriation, dam building, and the diversion of water from rural areas to urbanized and industrialized areas. According to Food and Water Watch, various cities and towns across the United States have considered selling their water utilities to generate much needed revenue to meet budgetary shortfalls due to economic downturns and decreased federal funding (2010, iv). This movement to privatize water is mirrored internationally as well, although these

¹¹ For a full discussion of critical pedagogy see Freire, Paulo. 1995. *Pedagogy of the Oppressed*. New York: Continuum Publishing Company.

attempts have met with political backlash and the enactment of laws to ban the privatization of public water supply (Klaver 2012, 25). Expropriation through the use of eminent domain is commonly used to obtain private land for the construction of water supply reservoirs around the world. This practice recently has been mired in controversy in North Central Texas regarding the recently approved construction of Bois d'Arc reservoir in Fannin County and the proposed construction of Marvin Nichols Reservoir in Red River, Titus, and Franklin Counties and Ringgold Reservoir in Clay County. These reservoirs are examples of intersectoral competition as they divert water from rural to urban areas and necessitate the expropriation of tens of thousands of acres of family ranchland. Although construction rates have slowed due to a lack of viable locations for siting new reservoirs in Texas, the Texas Water Development Board's (TWDB) *Water for Texas: 2017 State Water Plan* recommends building 26 new major reservoirs to meet the increasing water needs of Texas (31-32). Globally, 50,000 large dams block 60% of the world's rivers and between 40 and 80 million people have been displaced from their homes (Akhmetshin and Kolvalenko 2019, 1).

Conditioning factors which have intensified the utilitarian mindset of water supply and management are increasing population, decreasing water supply, urban sprawl, national and state water policy and politics, and economic incentives. Although the *2021 Region C Water Plan* developed by the Region C Water Planning Group does include an increase in the reliance on water conservation and reuse, it still relies heavily on new water infrastructure projects (i.e., construction of new reservoirs and pipelines) to provide water to meet a projected increase in demand in North Central Texas (2020, ES.8). To continue to meet increasing water demand with increasing water supply is in essence a positive feedback system and a disincentive for

conservation. I argue that this model of constant growth needs to be eliminated. Without a change in the relationship of humans to water in North Central Texas, an increase in supply will only lead to an increase in demand; the resultant increase in demand will merely drive the need for more water supply. Thus, building new reservoirs is a short-term solution to a long-term problem. For better management of demands, humans need to re-imagine their relation to water. Past and current water plans for this region are drenched in a utilitarian mindset, one that perceives water only as a commodity. The current mindset is that if the water is there, it is ours for the taking. Decreased water quality and quantity are also environmental trends on a global, national, and local scale. There are a myriad number of conditioning factors for these trends in North Central Texas, but the primary factors are population growth, increased urbanization, floods and droughts, non-point source pollution, aging water infrastructure, and decreased federal funding (North Central Texas Council of Governments 2019).

Global climate change (GCC) is a pervasive environmental trend that creates a diversity of water management problems due to changes in the hydrological cycle. Destabilization of the climate alters the amount, distribution, timing, and quality of available water and these changes, in turn, directly or indirectly affect all water users (i.e., residences, municipalities, industries, ecosystems, etc.). Worldwide climate change phenomena such as glacial melting, sea level rise, and increased storm frequency and intensity can potentially affect millions of people. Shifts in precipitation patterns are projected to make wet areas wetter and dry areas drier. Increased precipitation and runoff are expected to lead to increased flooding. This in turn will place more stress on over-burdened urban water stormwater systems, many of which lack the appropriate infrastructure to deal with the increased volume of water: not to speak of the

funding to construct new systems. Decreased precipitation will lead to more severe droughts which increase the aridity of already normally dry areas, placing further stress on water supplies. According to the Union of Concerned Scientists, projections for the United States call for wetter conditions in the Northeast and the Midwest and drier conditions in the Southwest.¹²

Another change in precipitation patterns includes a change in the type of precipitation, specifically, less snow and more rain. Although mountains, often referred to as natural "water towers," are major contributors to the world's freshwater supply due to snowpack and glacial meltwater, scientists disagree on how to quantify the percentage of freshwater provided by mountains on a global scale (Viviroli et al., 2007, 1). What is not contested, however, is that warmer temperatures are causing snowpack and glaciers to melt at unprecedented rates. A recent study in *Nature* revealed that glaciers are losing 369 billion tons of snow and ice each year and are shrinking 18% faster than previously calculated by an international panel of scientists in 2013 (Zemp 2019). As a result, areas dependent on gradual snow melt to supply surface water in summer will experience lower flows and greater water stress. A study also published in *Nature* in 2005 reports that "one-sixth of the world's population rely on glaciers and seasonal snowpacks for their water supply" and, consequentially, less precipitation falling

¹² For a discussion on water and climate change, see Union of Concerned Scientists. "Water and Climate Change." https://www.ucsusa.org/global-warming/science-and-impacts/impacts/water-and-climate-change.html. Accessed 7-11-2019. To access a detailed report on climate change including future climate changes, risks, and impacts, see Intergovernmental Panel on Climate Change. 2014. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Edited by Core Writing Team, R.K. Pachauri and L.A. Meyer. IPCC: Geneva, Switzerland. https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf.

as snow and early spring snowpack melting pose a severe threat to future water availability (Barnett, 303).

Global climate change impacts sea level in two ways; rising sea level as oceans warm and glacial melting. Sea-level rise poses a threat to the infrastructure, economy, and ecosystems of coastal communities and to freshwater supplies as a result of saltwater intrusion. Saltwater intrusion would necessitate the treatment of water designated for drinking and irrigation. Desalination, as noted earlier, is an expensive and energy intensive process.

Aside from being an environmental trend, global climate change also represents a social trend of environmental injustice. Since climate destabilization was set in motion by the industrialization of Western countries, Shiva argues in *Water Wars* (2016) that GCC produces climate and water injustice: "The main victims of climate disasters are those who have had the smallest role in creating climate destabilization [*sic*] – coastal communities, small islanders, peasants, and pastoral communities" (42). The burden of the consequences of global climate change not only disproportionately affects those who least contributed to the problem but also those who are less able to mitigate and adapt to the changes wrought.¹³

Based on the trends and conditions discussed above, I project that contemporary water policy, supply, and management will continue to be dominated by a 20th century mindset of expertise focused on engineering feats of moving water from one place to another. This movement of water includes the process of damming rivers and building reservoirs in one area and piping the water to another area, as well as constructing infrastructure to move

¹³ See Pope Francis. 2015. *Encyclical on Climate Change and Inequality: On Care for Our Common Home*. Brooklyn, NY: Melville House.

stormwater out of the urban environment as quickly as possible. This mindset evolved parallel to the divergence of the humanities and science, the consequent disciplinary framing of societal problems, and the rise of the "story of science" or scientism.¹⁴ Scientific reductionism, reducing complex interactions/entities to the sum of their constituent parts, has contributed to a mechanistic understanding of urban water issues and to a centralized model of water supply and management. In turn, centralized urban water systems have resulted in a disconnect between humans and water arising from a disembodied utilitarian experience of water. Rather than being perceived as sacred and thus revered as it was in antiquity, water in modern society becomes viewed as a commodity needing to be controlled, manipulated, subdued, and conquered. How water as a resource is perceived has direct implications on global, national, regional, and local water policy, supply, and management. The historical context of the global human-water relationship is provided in Chapter 3 and a contemporary case study of water policy, supply, and management in North Central Texas is explored in Chapter 4. Because the aforementioned social and environmental trends and conditions are likely to persist unchanged with no intervention, and the future water quality and quantity would be unacceptable to meet the needs of North Central Texas, something must be done. Thus, the task of problem-solving is required to be undertaken and an alternative solution needs to be invented and recommended

¹⁴ My use of the term *scientism* refers to the excessive and sometimes exclusive application of the ideology or narrative of science to environmental problems. From the perspective of the philosophy of science, many environmental problems are dogmatically subjected to analysis through the lens of scientific methodology which leads to the reduction of a complex problem in terms of only what can be measured and empirically verified. For environmental problems this is problematic since the problems involve social, political, economic, and cultural factors that are beyond the scope of scientific inquiry. For a discussion on the invalidity and impossibility of applying scientific methodology to the social sciences see F.A. Hayek. 1979. *The Counter Revolution of Science: Studies on the Abuse of Reason*. Indiana: Liberty Press. I also use the term scientism to connote the exclusionary view that science is the only discipline that yields reliable knowledge. For further discussion of this view see Thomas Sorrell. 1994. *Scientism: Philosophy and the Infatuation with Science*. New York: Routledge.

(Clark, 95). My alternative strategy for solving this problem is the creation of a new urban water narrative facilitated by the use of participatory water ethics and Watershed Education Community Action Networks (WE CANs). I briefly summarize my recommended alternative for resolving the water quality and quantity issues of North Central Texas below, but Chapter 5 elucidates my proposed solution in detail.

Recommended Resolution of Problem

To better manage water there is an urgent need for a different mindset to guide thought and actions related to water issues. A new mindset, which I term water consciousness, could emerge from the developing field of participatory water ethics. Ethics are an essential element of any water policy, decision, or practice. Thus, to fully comprehend water resource management necessitates an understanding of the ethics being acted out in water policies (Groenfeldt 2013). Indeed, Briggle asserts in *A Field Philosopher's Guide to Fracking* that "policy questions are often philosophical questions in disguise" (2015, 12). However, he contends that society often has little patience for philosophical discussion because of a fundamental assumption that societal problems are the domain of science and technology (2015, 12).

In "The Tragedy of the Commons," Garrett Hardin states that some social problems have no scientific or technological solutions. He defines a technical solution as one that "requires a change only in the techniques of the natural sciences, demanding little or nothing in the way of change in human values or ideas of morality" (1968, 1243). A similar viewpoint was espoused over a hundred years earlier by Thoreau in a review of J. A. Etzler's *The Paradise Within Reach of All Men, without Labor, by Powers of Nature and Machinery*. One of Thoreau's biographers, Laura Dassow Walls, notes that while living in New York Thoreau experienced first-hand the

growing attitude that every social problem has a technological solution (2017, 155). Like Hardin, Thoreau vehemently disagreed and argued that rather than focus on engineering solutions to societal problems, concentration should be placed on the inner moral transformation of humans: "Nothing can be effected but by one man.... In this matter of reforming the world, we have little faith in corporations; not thus was it first formed" (1973, 35, 42). Rather than relying on the world to reform the individual, Thoreau believed that only individuals could successfully reform the world. I likewise contend that contemporary water issues in large part can be classified as "no technical solution problems" and that contemporary water issues plaguing the world, the United States, and North Central Texas can be better addressed by incorporating moral and ecosocial-political means through community-based problem solving. Current water problems cannot be solved solely through technology. I suggest in this dissertation that these "political means" include public participation by those affected by a collective decision in authentic deliberative and discursive democracy.¹⁵ Science and technology are necessary but not sufficient to solve water issues. Effective solutions must consider how values, morals, worldviews (i.e., mindset), narratives, and actions affect and contribute to current water problems.

Conclusion of Problem Analysis

To avert the impending urban water crisis, the 20th century mindset of centralization dependent on feats of engineering needs to be replaced by a 21st century mindset that

¹⁵ See Dryzek, John S. 2000. *Deliberative Democracy and Beyond: Liberals, Critics, and Contestations*. Oxford: Oxford University Press. Dryzek states that authentic deliberation requires that "communication induce reflection upon preferences in non-coercive fashion" (2). He also argues that discursive democracy should be pluralistic, reflexive in terms of questioning established tradition, capable of extending across boundaries, open to communication with non-human nature, and receptive to changes in democratic constraints and opportunities (3).
embraces a pragmatic, community-based approach to decentralizing¹⁶ water policy, supply, and management decisions and reimagines the relationship between humans and water. This change in mindset can be catalyzed by the convergence of the humanities and science and the consequent transdisciplinary and holistic framing of urban water issues through the reintegration of the humanities and science in a new narrative of urban water. A 21st century mindset can emerge through the creation of a new urban water narrative derived from community-based decision-making and stewardship. The reuniting of the humanities with science would foster the reinfusion of the sense of water as sacred¹⁷ into the conception of water as a resource to be utilized. However, the utilization of water would incorporate the needs of the environment and all other living beings. Although the uncertainty of a changing climate and urban population growth necessitate a revolution in the management and design of urban water systems, a change in the cultural narrative is not likely to take place without a change in attitude of stakeholders toward the value of water and the way it functions in the real world.

¹⁶ Although water conservation has been a current solution for relieving the source and supply challenges of centralized water systems, another long-term solution may lie in the utilization of decentralized water systems to assist with providing sufficient water and appropriate sanitation to a growing population. Centralized systems are becoming increasingly expensive due to cuts in federal funding for these systems. Innovative small decentralized systems are challenging the wisdom of exclusive reliance on large centralized systems. The solution to source and supply challenges lies not in the choice of any one system over the other, but in selecting the most appropriate system or mix of systems that meets local needs. for See Sedlak, David. 2014. *Water 4.0: The Past, Present, and Future of the World's Most Vital Resource*. New Haven: Yale University Press.

¹⁷ Recovering the perception of water as sacred is vital to reimagining the human-water relationship. Interactions among religion, science and technology, politics, and economics evoke varying visions of water. The societal value and perception of water is manifested in a variety of ways, including myths, symbols, rituals, and language. Chapter 2 traces the historical development of the human perception of water and Chapter 4 explores ways to restore and recapture the sacredness of water in the post-industrial 21st century.

Public philosophy¹⁸ can facilitate such a change in attitude by posing a new set of philosophic questions to be answered through public dialogue. How does an urban city become a source and not merely a user of water? How can water be viewed as part of the experience of the urban area? How can a community be invited to have an embodied and experiential relationship with water and water infrastructure? Who should participate in water supply and management decisions? Although a new cultural imagination of water can be realized in many ways, I contend that a participatory water ethic can be facilitated through the creation of Watershed Education Community Action Networks, emergent sites of community engagement that facilitate a public-driven understanding of water issues within a local river watershed, as well as bridge the gap between all stakeholders through the creation of heterotopic¹⁹ (i.e., non-hegemonic) space manifested by participatory decision-making.

Watershed Education Community Action Networks (WE CANs) would function to reunite the public with politics in a local public space serving to resurrect the ancient Greek *agora*. WE CANs would be sites for the intertwining of boundaries between private and public, lifepolitics and Politics, "where private problems are translated into the language of public issues and public solutions are sought, negotiated and agreed for private troubles." (Bauman 2012, 39.) Current water management decisions in the majority of urban cities lack an emphasis on dialogue, community engagement, and participation of stakeholders. WE CANs would

¹⁸ Public philosophy is a critical civic activity characterized by open-ended dialogue and participatory decisionmaking that aims to create insight through the process of reciprocal elucidation of key societal issues. See James Tully. 2008. *Public Philosophy in a New Key. Volume 1: Democracy and Civic Freedom*. New York: Cambridge University Press.

¹⁹ Foucault's conceptualization of heterotopias and the use of the term in my research will be discussed in detail in another section of this dissertation. Foucault, Michel. 1984. "Of Other Spaces: Utopias and Heterotopias." *Architecture/Mouvment/Continuite* October:1-9. See also Johnson, Peter. 2013. "The Geographies of Heterotopia." *Geography Compass* 7(11):790-803.

encourage the abandonment of silos of specialized knowledge and the adoption of a web of interactions honoring the transdisciplinary knowledge and experience of all stakeholders. Understanding and addressing the complexity of urban water issues warrants contemplation not merely of disciplinary abstractions but of real-world facts from multiple realms of knowledge and experience. The development of a new cultural narrative of urban water must be rooted in participatory communication and action that focuses on the communal good to solve local water issues. A new decision-making framework that encourages new perspectives, practices, and frames of reference needs to be adopted and implemented. Such a framework would embrace genuine innovation in redefining urban water policy, supply, and management issues and seek to identify solutions that truly provide a long-term answer to the current mosaic of problems plaguing contemporary urban water systems. In short, as Arendt urges in her book The Human Condition, in terms of water management both regionally and globally, we need to "think what we are doing" (1998, 5). In so doing, it is possible to re-discover the inherent political nature of humans, realize the importance of plurality, and recognize the viability of community participation in water policy, supply, and management decisions. The creation of a heterotopic or non-hegemonic common space thus facilitates discourse and active political engagement which can affect radical changes in urban water policy and systems.

Outline of Chapters

The first chapter of this study has outlined the nature of the problems involved in managing our water problems. The second chapter will lay the philosophical foundation of my research. In Chapter 3, I provide an in-depth description of the water policy problem by delineating the historical context of water policy, supply, and management, exploring the rise of disciplinarity that resulted from the divergence of the humanities and science, explicating the partnership and dominator models of civilization, and investigating the impact of the cultural narrative on the decision-making process. The fourth chapter consists of my analysis of the current water policy problem through the lens of a case study of water issues in North Central Texas. I describe the key trends that have driven water practices in the region, examine the factors that have fostered those trends, and project what is likely to happen if the status quo approach to water is maintained. Chapter 5 presents my proposed alternative for resolving the current water quantity and quality problem in North Central Texas. I philosophically evaluate the potential of my proposed alternative, a new urban water narrative, for ameliorating the problem and achieving the goal of a sustainable relationship to water. I elucidate the ways in which a new cultural narrative can surface and precipitate a new way of being in relationship with water. The last chapter recaps the previous chapters, acknowledges limitations of my research, and provides recommendations for future philosophical research endeavors into water policy, supply, and management that is relevant on a local, national, and global scale.

CHAPTER 2

HEADWATERS OF PHILOSOPHICAL GROUNDING

Philosophers have hitherto only interpreted the world in various ways; the point, however, is to change it.

—Karl Marx

To fully understand urban water issues requires more than just scientific knowledge, it also demands a philosophical orientation and grounding. In this dissertation I will draw from the works of many different philosophers to elucidate the difference between a 20th century and that of a 21st century water mindset. In this chapter, my goal is to provide a broad philosophical framework to contextualize my research. I selected the Marx quote above because it fully captures the intent of my dissertation. The philosophical works of Aldo Leopold, Alfred North Whitehead, Maurice Merleau-Ponty, Paulo Freire, John Dewey, and Hannah Arendt provide some philosophical justification for community engagement in actions to transform the human-water relationship and in so doing to rediscover a sense of place and reclaim a public voice through political agency. In explaining Marx's thinking in the quote given above, Cornel West, in *The Ethical Dimensions of Marxist Thought*, contends that Marx wanted to situate philosophical thinking about social problems within a historical context:

...any talk about objectivity, necessity, or essentiality must be under-a-description, hence historically located, socially situated and "a product" of revisable, agreed-upon human conventions which reflect particular needs, social interests, and political powers at a specific moment in history. The task at hand then becomes a theoretic one, namely, providing a concrete social analysis which shows how these needs, interests, and powers shape and hold particular human conventions and in which ways these conventions can be transformed. (1991, 67)

Thus, for Marx, and for me, social change and the assemblage of actants²⁰ are fluid, always in process, and inevitably emergent. These concepts will be discussed in more detail throughout the remainder of my dissertation.

From Conqueror to Citizen: Leopold's Land Ethic

Aldo Leopold was a 20th century American forester, ecologist, conservationist, philosopher, and author. He is best known for his book *A Sand County Almanac*, originally published in 1949, which includes his land ethic essay calling for the development of an ethical relationship to the land. Ethics is a branch of philosophy concerned with morals and values and historically has been dominated by answering questions about ethical relations among people. The first ethics dealt with relations between individuals and then later evolved into ethics between individuals and society. Environmental ethics, on the other hand, inquire about the moral relationships between humans and the world around us. The extension of ethics to land, and to the plants and animals which grow upon it, is what Aldo Leopold (1887-1948), "the father of wildlife ecology,"²¹ believed to be not only possible, but also necessary. He contended that we need to expand "the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land"²² (Leopold 1966, 239). His land ethic was published

²⁰ Actant is a technical term Bruno Latour borrowed from the discipline of literature studies to use as a substitute for the term agent in his Actor-Network Theory (ANT). Since "agent" is derived from a subject-oriented language it fails to connote conceptual integrity with ANT, which simply put is the "sociology of associations." According to ANT, an actant can be human or non-human and is ultimately the source of action. The use of the term "actant" removes any anthropomorphic propensities because actants are acting agents or interveners. See Latour, Bruno. 2007. *Reassembling the Social: An Introduction to Actor-Network Theory. New York: Oxford University Press*, pp. 54-55. Latour, Bruno. 2004. Politics of Nature: How to Bring the Sciences into Democracy. Translated by Catherine Porter. Cambridge, MA: Harvard University Press, p. 75.

²¹ For more information on the historical background of Aldo Leopold, refer to The Aldo Leopold Foundation's website at https://www.aldoleopold.org/about/aldo-leopold.

²² In terms of Leopold's land ethic, "land" refers to the natural world.

posthumously in 1949, roughly a year after his death, in a collection of essays entitled *A Sand County Almanac*. In it he states, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise" (1966, 262). This land ethic continues to inform and inspire the efforts of environmental conservationists around the world to promote change in human perspective from being a "conqueror of the land community to plain member and citizen of it (1966, 240).²³

Unfortunately, the land in America and in our state of Texas has been shaped, and is still being shaped, by a "frontier mentality" (Gunter and Oelschlaegar 1997, ix). This mentality operates under two harmful myths: 1. the human role is to conquer and control nature and 2. nature's resources are unlimited. Leopold believed the conqueror role is misguided and "selfdefeating" (1966, 240). From the perspective of conqueror, humans possess a mechanical view of nature and, as such, erroneously believe they know what makes the natural "community

²³ Leopold's land ethic is ecocentric or based on the intrinsic value of all biotic and abiotic components and processes of an ecosystem. The concepts of Leopold's land ethic were built upon and developed by ethical theorists, like J. Baird Callicott. For Callicott's interpretation of Leopold's land ethic, see Callicott, J. Baird. 1989. In Defense of the Land Ethic: Essays in Environmental Philosophy. Albany: State University of New York Press. An ecocentric philosophy or ethic stands in direct opposition to an anthropocentric view that prioritizes humans and their interests over those of the rest of nature. Whereas an ecocentric worldview recognizes the inherent value of a natural entity in its own right, an anthropocentric belief bestows value on a natural entity based upon its utility to humanity. The field of environmental ethics was founded in 1970, and the ethical debate continues along the ecocentric-anthropocentric continuum. In addition to Callicott, other nonanthropocentric environmental philosophers include Rolston and Taylor. See Rolston, Holmes III. 1988. Environmental Ethics: Duties to and Values in the Natural World. Philadelphia: Temple University Press. See also Taylor, Paul W. 1986. Respect for Nature: A Theory of Environmental Ethics. Princeton: Princeton University Press. For versions of weak anthropocentric views, see Hargrove, Eugene. 1992. "Weak Anthropocentric Intrinsic Value." The Monist 75:183-207. See also Norton, Bryan G. 1984. "Environmental Ethics and Weak Anthropocentrism." Environmental Ethics 21:131-148. A movement that developed within environmental ethics is that of deep ecology. Deep ecologists share a disdain of the anthropocentric value system characteristic of the industrial culture of Western countries. Naess founded the deep ecology movement in reaction to 'shallow ecology' and its emphasis on developing solutions to ecological problems within existing societal institutions through reformation. Naess' 'deep ecology' calls for a radical shift in ecological worldview by questioning and transforming the assumptions that undergird current Western, industrial societies. See Naess, Arne. 1973. "The Shallow and the Deep, Long-Range Ecology Movement: A Summary." Inquiry: An Interdisciplinary Journal of Philosophy and the Social Sciences 16:95-100.

clock tick, and just what and who is valuable, and what and who is worthless, in community life" (Leopold 1966, 240). However, Leopold believed that humans know no such thing:

The last word in ignorance is the man who says of an animal or plant: 'What good is it?' If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering. (1966, 190)

Leopold's holistic view acknowledges and embraces the intertwining reciprocity and connectedness of all parts of an ecosystem.

Moreover, land use was, and currently still is (especially in the property-oriented state of Texas), viewed as the unquestioned right of the landowner. Consequently, land use practices remain to be largely dictated by the expectation of short-term economic returns (Shaw 1987, 470). As such, many members of the land community are not ascribed any economic value even if they are essential to the proper functioning of the ecosystem. This is yet another characteristic of the Cartesian, mechanistic mindset that assumes that the land community can continue to function without its uneconomic parts. According to Leopold, when land is viewed solely from the perspective of economic self-interest, "We abuse the land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect" (1966, xviii-xix). It should come as no surprise then, that Leopold attributed intrinsic value to all living organisms despite their instrumental use to humans. Moreover, he believed, "We can be ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in" (1966, 251). In addition to love, admiration, and respect, Leopold wanted landowners to value land not merely economically, but philosophically. Thus, Leopold contended that the only way to circumvent such abusive

practices was through the development of ethical obligations on the part of private landowners. Ethical obligations induced by a mindset characterized by "thinking like a mountain" (1966, 140) honor and perpetuate long term, holistic relationships with the environment as vividly depicted by Leopold: "Only the mountain has lived long enough to listen objectively to the howl of a wolf" (1966, 137). Environmental ethics are best achieved through communal partnership with the entire ecosystem rather than through solitary estrangement. "Thinking like a mountain" thus promotes a sustainable existence through an appreciation of the profound long-term connectivity of all elements of the ecosystem.

Recognizing that landowners, in perceiving their relationship to the land in terms of short-term economic gains rather than long-term community obligations, engage in practices that lead to degradation and outright destruction, Leopold thus proposed guiding principles for distinguishing between right and wrong forms of land use. These guiding principles comprised his famous land ethic: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise" (1966, 262).

Before moving on, it is important to understand the structure and meaning of the land ethic and what each of the guiding principles entail. Integrity refers to the "wholeness" (Gunter and Oelschlaeger 1997, 11) of nature. In other words, ecological integrity determines the level of biodiversity and biogeochemical functioning of an ecosystem. Due to short-term, selfinterested economic thinking, the integrity of the world's ecosystems is in rapid decline due to fragmentation of habitat. According to Gunter and Oelschlaeger, "Habitat is no longer habitat when only fragments of it remain. Whatever the measure of 'wholeness,' every conservationist knows that it is a vanishing species" (1997, 12).

Stability, Leopold's second guiding principle, is related to integrity. While integrity refers to wholeness, stability concerns the resiliency of an ecosystem or the ability to sustain itself and to recover from disturbance. An ecosystem with a high level of integrity also has a high level of stability. Thus, through the varied anthropogenic activities that are fragmenting habitat, humans are dismantling the stability of the world's ecosystems. The destabilization and degradation of global ecosystems is quite disconcerting given the consequences of global climate change. For ecosystems to survive these adverse circumstances, integrity and stability are crucial.

It should be noted that Leopold did not equate stability with the concept of the balanceof-nature. In "From the Balance of Nature to the Flux of Nature," J. Baird Callicott states, "Leopold expressly rejects the balance-of-nature idea and embraces natural change" (2002, 99). Leopold recognized the inherent and integral dynamic nature of the functioning of a healthy ecosystem. As Callicott further comments, "Leopold knew that conservation must aim at a moving target. How can we conserve a biota that is dynamic, ever changing, when the very words 'conserve' and 'preserve' - especially when linked to 'integrity' and 'stability' - connote arresting change?" (100). The solution to overcoming this problem, Callicott contends, lies in the ecological concept of scale, which includes both the notion of rate and scope (100). As apparent in "The Land Ethic," Leopold was clearly cognizant of the importance of scale in relation to landscape ecology and ecosystem management. As Leopold astutely observed in *A Sand County Almanac*, "Evolutionary changes...are usually slow and local. [Whereas] Man's invention of tools has enabled him to make changes of unprecedented violence, rapidity, and scope" (1966, 254). Thus, it is essential that careful attention is given to selecting a particular

spatial and temporal scale when conducting landscape ecology and ecosystem management studies because the scale selected directly determines the questions which can be asked and the phenomenon that can be taken into consideration. Callicott incorporates the notion of scale by "formulating a dynamized summary moral maxim for the land ethic: *A thing is right when it tends to disturb the biotic community only at normal spatial and temporal scales. It is wrong when it tends otherwise*" (2002, 104).

The third and final guiding principle contained in Leopold's land ethic is beauty. For Leopold, the criterion of beauty served as a counterbalance to utility. Leopold did not contend that beauty and utility were dichotomous. Rather, he believed that preserving the beauty of a landscape produced not only ecological, but also economical sustainability (1966, 14-15). Leopold's criteria of integrity, stability, and beauty of a biotic community that form the basis of his land ethic also serve as good benchmarks for managing ecosystems and watersheds.

Considering that Leopold conceived his land ethic almost 70 years ago, he was as a visionary ecologist who had the foresight to advocate for these guiding principles even before there was a formally recognized science of ecosystem management, the term was not even coined until 1992. In 1935, Leopold bought 80 acres of abandoned and degraded farmland on the banks of the Wisconsin River. This land was a living laboratory in which he could test his theories about environmental ethics, conservation, restoration, and ecologically based land management. As participating members of the land community, Leopold, along with family, relatives, and friends, successfully reversed the abuses of the previous landowners and restored the ecological integrity, stability, and beauty of the farm (Leopold 2004, 150). For Leopold, the "Sand County" farm was a professional experiment in using ecological restoration as a means of

facilitating environmental learning. Through the efforts of restoring the native ecosystem on the property, his children developed a "deep enthusiasm for environmental issues" (Leopold 2004, 150) and all five of his children became environmental professionals in some capacity. Thus, as "Aldo Leopold and his family transformed the land of his Sand County farm, in the process they were transformed by the land."²⁴ The essays in *A Sand County Almanac* tell a poignant story not only of a family's shared land project, but also the origin of the new environmental concepts of ecological restoration and ethical responsibility. In the words of Aldo Leopold's son, "The story is a metaphor of the contagious value of restoration in bringing people back to the natural world in a mutually beneficial relationship. At the same time, it fortifies a personal sense of ethical responsibility to the natural world" (2004, 150).

Being in Relationship: Whitehead and Merleau-Ponty

At its core, Leopold's land ethic is about the development of a moral relationship between humans and the natural world. The emphasis on being in relationship with nature is also central to the metaphysics of Alfred North Whitehead. Whitehead was a British mathematician, educator, and philosopher. In terms of his philosophical work, he is best known for his process philosophy that radically broke from most Western philosophy in that Whitehead grounded metaphysical reality in change rather than permanent substance. His philosophy of organism sought to overcome the problem of duality of mind and matter first introduced by Descartes by replacing matter with organism (1925, 194). Mind and matter are

²⁴ Comment obtained through personal communication with Maria Kopecky, Outreach Education Coordinator for the Aldo Leopold Foundation in Baraboo, Wisconsin, while attending a Land Leadership workshop in August 2016.

thus unified in the sense that mind is now a function of organism thereby reducing Descartes' dualism to monism.

Whitehead's philosophy of the organism sought to overcome the problems stemming from the emphasis of modern science and philosophy on the mind and consequently the individual. The individual was foregrounded in thought and ascribed intrinsic value; whereas matter was backgrounded in thought and denigrated as purely mechanistic and attributed as having no inherent value (1925, 194-195). The advent of the Industrial Revolution augmented the significance of the doctrine of individualism with deleterious consequences regarding environmental ethics. The doctrine of individualism led "directly not merely to private worlds of experience, but also to private worlds of morals" (1925, 195-196) and therefore yielded a limited moral outlook. Whitehead contended that the combination of morality's focus on making the most of your own individual opportunities and the assumption of matter being valueless "led to a lack of reverence in the treatment of natural or artistic beauty" (1925, 196). This lack of reverence gave birth to two evils: the ignorance of the relationship between organism and environment and the failure to grasp the intrinsic worth of the environment. Whitehead contributed much of this lack of reverence to the modern method of training professionals through specialization.

For Whitehead specialization creates two significant problems for modern society. The first problem stems from heretofore unseen rates of progress generating challenges that require innovative solutions. Unlike past ages, these complex challenges can't be met by a "fixed person for fixed duties" (1925, 196) who has been trained to respond to problems by contemplating a given set of abstractions and proffering a given set of solutions. As noted

earlier, this method of training yields professionals with "minds in a groove" and prevents what Whitehead denotes as "straying across country" (1925, 197) or what Thoreau refers to as "sauntering." Whitehead taught that modern problems require knowledge not of abstractions, but complete facts born of experience. This is especially true of today's "wicked problems." In 1973 two urban design theorists, Horst Rittel and Melvin M. Webber, coined the term wicked problem²⁵ to denote problems of social policy and planning that are difficult to define and solve solely based on the classical paradigm of science and engineering. Indeed, Rittel and Webber contend, "Social problems are never solved. At best they are only re-solved – over and over again" (160). Environmental issues, including urban water supply and management, qualify as wicked problems because the policy and planning challenges they entail are multifaceted and comprise social, political, economic, and cultural dynamics that are intertwined with the domains of technology, hydrology, and ecology. They are also "wicked" social and cultural problems due to the diversity of stakeholders who hold differing opinions. To address wicked problems, professionals need to stray, meander, or saunter across disciplinary boundaries and work collaboratively to identify and understand the full array of factors contributing to the complex environmental issues confronting us today.

The second problem Whitehead recognizes is that the modern method of professionalization results in the imbalance of intellect (1925, 197). Professionalization

²⁵ Rittel and Webber delineate ten distinguishing properties of "wicked problems:" A lack of definitive formulation; no stopping rule that determines when a solution has been found; good or bad solutions rather than true or false solutions; lack of immediate and ultimate tests of solutions; solutions are "one-shot" operations rather than trial and error; lack of criteria that indicate all solutions have been identified; the uniqueness of every wicked problem; any wicked problem could be viewed as a symptom of another problem; any discrepancies in a wicked problem can be explained in multiple ways; and planners have no right to be wrong in that they are responsible for outcomes that result from the actions they take. See Rittel, Horst W. and Melvin M. Webber. 1973. "Dilemmas in a General Theory of Planning." *Policy Sciences* 4:155-169.

constricts rather than enlarges the intellectual sphere. According to Whitehead, "Wisdom is the fruit of a balanced development" (1925, 198); therefore, the aim of education should be the "balanced growth of individuality" (1925, 198). To this end, Whitehead advocated balancing professionalized knowledge with embodied, experiential intuition. Pure intellectual analytical knowledge, in other words, should be augmented by direct perception and aesthetic growth or what Whitehead referred to as "habits of aesthetic apprehension" (1925, 199). Wisdom thus evolves from knowledge contextualized in time and place through a combination of action and concrete reflection. In the *Pedagogy of the Oppressed*, Freire similarly contends that "praxis," reflection and action upon the world, is necessitated in order to transform it (1995, 33). Praxis, then, is a means of training the habit of apprehension of what lies beyond oneself in its completeness. Praxis is the path to knowledge and wisdom and opens the door to the possibility of transformation. Aesthetic education, according to Whitehead, is achieved through art because it promotes habits of aesthetic apprehension (1925, 199). Art, in this sense, is considered to be any means designed to arrange concrete facts in a manner to draw attention to particular values that can be presented by such facts (1925, 200). In so doing, art is an invitation to engage in a relationship of direct experience of concrete facts that transcends the thin world of abstractions. Such direct experiences can be fertile grounds for nurturing the values of integrity, stability, and beauty, that comprise Leopold's land ethic. I explore in detail in Chapter 5 the pivotal role that art can play in changing a 20th century water mindset to that of a 21st century mindset by reimagining the human-water relationship and thus changing the urban water narrative.

There is a strong correspondence between Whitehead's aesthetics of nature and Merleau-Ponty's relational ontology. "All the organisms in Whitehead's blooming, budding world interperceive each other" (Gunter 2004, 315), through a process he refers to as "prehension" or "uncognitive apprehension" (Whitehead 1925, 69). Prehension then is the realization of actual entities perceived through the direct experiencing and structuring of a gathering of things into a unity characterized by "a *here* and a *now*" (1925, 69).²⁶ In this process some features of the actual entities are foregrounded or emphasized and some features are backgrounded or de-emphasized according to what Whitehead terms "concrescence" or the way in which the experience or event is constructed from other events (Gunter 2004, 315).

The phenomenology and relational ontology of Merleau-Ponty, a 20th century French phenomenological philosopher, facilitates an integrated being *in* and *with* the world and thus serve as a bridge "between 'subject' and 'object,' self and world without effacing the differences between them" (Küpers 2015, 27). Integrated being is pivotal to reimagining the human-water relationship. In Chapter 5, I thus will argue that it is possible to reconceptualize the human-water relationship through the utilization of Merleau-Ponty's relational ontology.

In *The Structure of Behavior* (2015), Merleau-Ponty, influenced by Gestalt psychology, explores the basic structure or form of human perceptual experience based on the foundation of some "figure" against some "ground" (92). "Structure" does not exist in the world in and of

²⁶While Whitehead's aesthetics of nature is organismic, Bennett develops a theory of distributive agency drawing on the concepts of Spinoza's "affective" bodies, Deleuze and Guatarri's "assemblage," and Latour's "actant" that extends agency to inanimate matter – "vibrant matter." Bennett argues that all *things* are alive in their complex collaborative, cooperative, or interactive interrelationships. I explore how Bennett's understanding of agency "as a confederation of human and nonhuman elements [may] alter established notions of moral responsibility and political accountability" (2010, 21) in Chapter 4 of this dissertation. See Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham: Duke University Press.

itself, rather, it emerges in relation to a phenomenal field. The primary objective of the project undertaken in The Structure of Behavior is to "understand the relations of consciousness and nature" (3). In this work and in *Phenomenology of Perception* (2012), Merleau-Ponty strives to bridge the rift between intellectualism and empiricism by detailing how consciousness emerges in the world holistically as a structure, a by-product of lived experience, and not through a mechanistic process that atomistically can be reduced to the body or the mind. In *The Structure* of Behavior, Merleau-Ponty substantiates Gestalt theory's fundamental principle that the whole is greater than the sum of its parts when he states the "genesis of the whole by composition of the parts is fictitious. It arbitrarily breaks the chain of reciprocal determinations" (2015, 50). The relation between consciousness and nature is revealed through operative intentionality or the structure of action. A living organism responds to virtual conditions brought into existence by the system itself (145) via an embodied dialectical orientation to its Umwelt or "milieu" (151). Moreover, this dialectic relation is characterized by reciprocity, the organism shapes the milieu, and the milieu shapes the organism. As such, the phenomenal body "must be a center of actions which radiate over a 'milieu' (157) [I]t is a unity of signification.... [It] is not an appearance, it is a phenomenon" (159). It is a network signifying the spatial and temporal unfolding of intertwining ideal unities.

The structure of human experience, thus, is a matter of contingency. The embodied dialectic is a form of consciousness emerging in the world as a structure, a being-in-the-world representing "the synthesis of matter and idea" (137). This generalized structure of being can only be understood when it is emerging as a specificity. A revealing of a different specificity generates a different emerging structure or being-in-the-world. Reflection and judgment are

not "coextensive with the life of consciousness. Rather, consciousness is a network of significative intentions which are sometimes clear to themselves and sometimes, on the contrary, lived rather than known" (173). Mind, body, and world are dialectically intertwined such that all parts contribute to the sense of the experience. If any part of the dialectic is changed, the existence of the structure is changed. This represents a new form of unity whereby the Cartesian mind and body cannot exist separate from their embodied experience. Consciousness emerges *in* the world as the result of a dialectical integration and not solely as a product of a "pure thing" or a "pure idea" (207). *The Structure of Behavior* develops the main theme of the *Phenomenology of Perception* (2012): the phenomenological description of lived perception and the problem of perception. For Merleau-Ponty, the solution to the problem of perception lies in Husserl's concept of phenomenological reduction.

In "The Philosopher and His Shadow" (1964a), Merleau-Ponty "interrogates" the traditional canon of Husserl to unveil an "unthought-of element in his works which is wholly his and yet opens out on something else" (160). Husserl's reflections deliberately go beyond scientific naturalism's "ideal correlation of subject and object" (163) to "unveil a third dimension" (162) that is "relatively founded" (163) and "true derivatively as a constitutive result...[of] its proper time and place" (163). Merleau-Ponty interprets Husserl's phenomenological reduction as both a returning to oneself and a distancing of oneself; a shift away from a purely absolute and idealizing "theoretical attitude" (162) and a turning towards a "natural attitude" (163) that "involves a higher truth that we must regain" (163). Merleau-Ponty argues that Husserl's reflections go beyond the idealistic surface relationship between subject and object and his excavations uncover a deeper fundamental truth to reveal the

"mystery of a primordial faith" (163) in the world not grounded in reflection and theoretical attitude but in an ancient original opinion derived from our very existence which gives "us not a representation of the world but the world itself" (163).

Husserl's notion of a phenomenological reduction is the result of an epoché, an ancient Greek term meaning "suspension of judgment." This suspension of judgement entails the bracketing of unquestioned beliefs about the world to allow for an examination of the world as it genuinely appears untainted by preconceptions. Husserl's phenomenological reduction is comparable to Bachelard's "epistemological rupture or break" in that both conceptualizations serve to deconstruct systems of thought to foster a new way of being in relationship with the world. Embodied experience that places the focus on aspects of the natural environment that usually remain unseen rather than on the common aspects of our usual modern-day technology-mediated culture can initiate an *epoché* or suspension of judgment thereby "creat[ing] a rift in the continuity of the psychic numbness that inhibits people from reacting to our current path of destruction of Earth" (Endredy 2002, xvi). In Phenomenology of Perception (2012), Merleau-Ponty characterizes the phenomenological reduction as the true path to ascertaining our lived experience and to acquiring an attitude of "standing in wonder before the world" (Ixxvii). Similarly, Spinoza's pantheistic metaphysical understanding that reality is composed of a single infinite substance, Deus sive Natura (i.e., "God or Nature"), emphasizes the interrelation of the divine with nature and therefore deems the world as "worthy of our awe and reverence" (Holt 2013, 34).²⁷ According to *The Internet Encyclopedia of Philosophy*, the

²⁷ Benedict De Spinoza, *Ethics: Demonstrated in Geometrical Order*, Edited by Matthew J. Kisner, (United Kingdom, Cambridge University Press, 2018). In this posthumously published book, Spinoza equated god with nature,

phenomenological reduction, or coming to the world without prior theory or knowledge in hand, gives rise to an "experience of astonishment." I believe this experience of astonishment is what Jane Bennett, a contemporary philosophical political theorist, refers to as "enchantment" in *The Enchantment of Modern Life* (2001). Bennett's book "tells a story of contemporary life that accentuates its moments of enchantment and explores the possibility that the affective force of those moments might be deployed to propel ethical generosity" (3). Bennett asserts that enchantment can be fostered through the use of deliberate techniques, including the resistance of the "story of disenchantment of modernity" (4). In Chapter 5, I discuss in detail how the states of wonder, awe, reverence, astonishment, and enchantment can be manifested through the activities of Watershed Education Community Action Networks (WE CANs) to inspire the "enactment" (3) of a participatory water ethic.

In *Phenomenology of Perception* (2012), Merleau-Ponty agrees with the way Husserl's assistant, Eugen Fink, characterized the phenomenological attitude as a stepping back "in order to see transcendences spring forth" and loosening of the "intentional threads that connect us to the world in order to make them appear" (Ixxvii). To achieve a state of wonder, awe, reverence, astonishment, and enchantment thus necessitates looking at the world fresh and anew, a continual beginning again and again. In Zen Buddhism, this state is referred to as *soshin*, beginner's mind. Rather than approaching an object, person, or situation with expectations and preconceived ideas, a beginner's mind is open. In *Zen Mind, Beginner's Mind*, Shunryu Suzuki asserts, "In the beginner's mind there are many possibilities, but in the expert's

stressing the interchangeability of god and nature and the lack of distinction between the creator and the created. See the Preface of Part IV and the Proof of Proposition IV in Part IV.

mind there are few" (2001, 21). In essence, Fink's phenomenological attitude of stepping back is analogous to dropping the "expert's mind" to see everything with fresh eyes, curiosity, and wonder to facilitate the emergence of possibilities. Beginning anew also describes Arendt's political philosophy of natality and its connection to plurality and action described in *The Human Condition* (1998). Arendt believes humans, through political action, have the capacity to bring forth the new and the unexpected into a world characterized by plurality and an awareness of different possibilities of perspectives (9, 178). In Chapter 5, I describe how Watershed Education Community Action Networks (WE CANs) can be sites of collective initiative, creativity, and agency to give birth to a new water mindset by viewing anew the human relationship with water. The phenomenological reduction requires the capacity to distance which is an embodied not a rational capability.

In *Phenomenology of Perception* (2012), Merleau-Ponty defines phenomenology as both the study of essences²⁸ and a philosophy that situates essences within the realm of existence and contends that understanding humanity and the world begins with understanding "facticity" (lxx), our embodied experience, or what Heidegger referred to as "being-in-the-world." This understanding is not an abstraction, it is always an understanding within a place and time. Embodiment, or lived experience, is central to Merleau-Ponty's concept of intentionality (i.e.,

²⁸ In *Phenomenology of Perception*, Merleau-Ponty uses the term essence to mean a return to our facticity or lived experience. "Seeking the essence of the world is not to seek what it is as an idea, after having reduced it to a theme of discourse; rather, it is to seek what it is in fact for us, prior to every thematization (2012, lxxix). In other words, for Merleau-Ponty, phenomenology is a philosophy that acknowledges that "the world is always 'already there' prior to reflection – like an inalienable presence – and whose entire effort is to rediscover this naïve contact with the world" (2012, lxx).

directed consciousness), specifically operative intentionality,²⁹ "the intentionality that establishes the natural and pre-predicative unity of the world and of our life" (lxxxii). In developing his notion of intentionality, Merleau-Ponty repudiates the paradigms of empiricism/realism and intellectualism/idealism; for him, intentionality does not constitute mental representation of the world, but rather bodily engagement or the inhabitation of the world. In commonly presupposing a ready-made world, he argued that empiricism and intellectualism fail to account for the inherent historical and embodied nature of experience. Perception is not solely comprised of sensory and intellectual perspectives, but also bodily perspective. For Merleau-Ponty, this bodily perspective clarifies the relation between the objective world and the experienced world. According to Merleau-Ponty, "the body is our anchorage in a world" (146) and "[t]he body is our general means of having a world" (147).

Thus, Merleau-Ponty aims to develop a new mode of analysis of consciousness, existential analysis, that goes beyond the classical alternatives of empiricism and rationalism (138). He contends that beneath intelligence and perception a more fundamental function exists such that our conscious lives are "underpinned by an 'intentional arc' that projects around us our past, our future, our human milieu, our physical situation, our ideological situation, and our moral situation, or rather, that ensures that we are situated within all of

²⁹ As does Husserl, Merleau-Ponty differentiates between two different types of intentionality, act intentionality and operative intentionality. Act, or thetic, intentionality refers to the explicit acts of making judgments and decisions. Operative intentionality, or non-thetic (lived), intentionality "appears in our desires, our evaluations, and our landscape more clearly than it does in objective knowledge" (2012, lxxxii). For this reason, Merleau-Ponty stresses the importance of operative intentionality in acquiring a deeper and enriched understanding of our lived and embodied experience of the world because it is based on a prior, primary, and original consciousness of "being-in-the-world." Objective knowledge or intellectual acts, such as language, only can expand and refine the meaning of our experience that is "always already" present in the situation, events, and things prior to discovering them in thought and language.

these relationships. This intentional arc creates the unity of the senses with intelligence, and the unity of sensitivity and motricity" (137). This non-thetic or pre-thetic consciousness or lived/operative intentionality is a more primary and original form of experience upon which thetic (intellectual) processes depend. By the end of *Phenomenology of Perception*, Merleau-Ponty has "uncovered, beneath act or thetic intentionality - and in fact as its very condition of possibility - an operative intentionality already at work prior to every thesis and every judgment" (453).

Similarly, in *The Primacy of Perception* (1964b), Merleau-Ponty asserts "all consciousness is perceptual," and the "perceived world is the always presupposed foundation of all rationality, all value and all existence. This thesis does not destroy either rationality or the absolute. It only tries to bring them down to earth" (13). Merleau-Ponty argues that phenomenology discredits the theoretical attitude that knowledge can be based on absolute and unchanging ideas of the world upon which perception can be based. Rather, perception is "an original modality of consciousness" (12). Perception is an emergent consciousness resulting from inhabiting and experiencing the world as an embodied being-in-the-world. Perception is a dynamic and relative relationship between the perceiver and the perceived. Merleau-Ponty's relational ontology negates the Western idealist notion of *pensée de survol*, "thinking from above" or "thinking from a God's eye view," and that philosophical reflection can transcend the embodied world of lived experience. Rational consciousness is itself perceptual consciousness; "[w]e experience a perception and its horizon 'in action'...rather than by 'posing' them or explicitly 'knowing' them" (12). Not surprisingly, in *Phenomenology of Perception* (2012), Merleau-Ponty claims, "[t]he fundamental philosophical act would thus be to return to the lived

world beneath the objective world" (57); thereby rejecting the notion of *pensée de survol*. Central to his study of perception is the concept of embodiment; indeed, in *Phenomenology of Perception*, Merleau-Ponty asserts that a perceiving mind is an embodied mind. "I consider my body, which is my point of view upon the world, as one of the objects of that world.... Likewise, I treat my own perceptual history as a result of my relations with the objective world (73)." In other words, for Merleau-Ponty, the body is at once a power of exploring the world and is necessarily of the world; the body and the world are intertwined.

In *The Visible and the Invisible* (1968), Merleau-Ponty develops the concept of intertwining, or chiasm, which plays a pivotal role in his relational ontology. Chiasms are therefore structures of mediation; it is through chiasmic relations that reversibility, "the ultimate truth" (155) becomes possible, "my eyes which see, my hands which touch, can also be seen and touched" (1968, 123). Similarly, as one's body is open to the world and is enveloping the world with its gaze, it is a body of the world and is simultaneously enveloped (268). Thus, sensing entails a co-existence or communion between one's body and the world, there is an inherent reciprocity in being both open *to* the world and *of* the world. This has important implications for creating the conditions for the emergence of a new human-water relationship and a new cultural narrative. As Merleau-Ponty states in *Phenomenology of Perception* (2012), "Given that relations among things or among the appearances of things are always mediated by our body, then the setting of our own life must in fact be all of nature; nature must be our interlocutor in a sort of dialogue" (334). Chiasm is an interweaving exchange of communication between the sentient and the sensible that allows for the

recognition of kinship while at the same time maintaining separateness, much like the woof and warp of a tapestry.

Merleau-Ponty refers to the place of all chiasmic relations as "flesh" and hence develops a new ontological understanding of an intertwining relationship or existential structure created by a shared world or experience between our bodies and other entities in our world. This intertwining always already exists prior to any transcendental knowledge (i.e., knowledge of how it is possible to experience objects as objects). In *Phenomenology of Perception* (2012), Merleau-Ponty contends that in the phenomenal field "the structures of the For-Others must already be the dimensions of the For-Self" (474). This implies a primordial and perceptual intertwining; a shared belonging and reciprocity inherent to the reversible flesh of the world that enables a social recognition or knowing prior to the distinctions of self (subject) and other (object). Similarly, Merleau-Ponty asserts in the phenomenal field sensing as opposed to knowing is the "living communication with the world that makes it present to us as the familiar place of our life (53)." Merleau-Ponty uses the concept of flesh to describe the space necessary between the sentient and the sensible for the phenomena of reversibility to occur; to permit the possibility of a folding back that is perpetually blocked so that the sentient and sensible do not coincide. This allows there to be a perception of ontological continuity and a retention of separateness. Although many environmental philosophers, including David Abram and Ted Toadvine,³⁰ have provided different interpretations of Merleau-Ponty's relational ontology, my research reflects Bryan E. Bannon's conception of the notion of flesh.

³⁰ See Abram, David. 1988. "Merleau-Ponty and the Voice of the Earth." *Environmental Ethics* 10:101-120; Abram, David. 1996. *The Spell of the Sensuous: Perception and Language in a More-Than-Human World*. New York:

According to Bannon in his article "Flesh and Nature: Understanding Merleau-Ponty's Relational Ontology," the most prevalent and generally accepted scholarly interpretation of Merleau-Ponty's relational ontology is dependent upon the conception of flesh as a perceptual experience (2011, 329). Specifically, this interpretation provides an anthropomorphic account of sensory experience whereby nature, other-than-human beings, and things receive their vitality or dynamism from the human perceptual field. This view is problematic because it privileges human lived experience. Bannon notes that environmental philosophers, however, not only claim that Merleau-Ponty's idea of flesh is his paramount contribution to the discipline, but also that his philosophy offers a non-anthropomorphic account of sensory experience (2011, 328). Despite this agreement amongst environmental philosophers regarding the implications of Merleau-Ponty's philosophy for recovering a sustaining relationship with the environment, differences of opinion exist as to how his notion of flesh should be interpreted. Bannon proposes a general theory of affect that challenges the traditional understanding of flesh. In so doing, he questions the basic assertion that flesh is the fundamental perceptual structure (2011, 341).

In developing his alternative theory of affect, Bannon emphasizes that flesh is not itself a being, but rather a relationship. Flesh is a relation or connection between bodies that allows for each to be a separate identity but holds together in one world. Specifically, Bannon states, "because flesh is an open relationship of affection [between beings] ...each relation will have a

Vintage; and Toadvine, Ted. 2009. *Merleau-Ponty's Philosophy of Nature*. Evanston, IL: Northwestern University Press. See also Toadvine, Ted. 2005. "Limits of the Flesh: The Role of Reflection in David Abram's Ecophenomenology." *Environmental Ethics* 27:155-170 and Abram, David. 2005. "Between the Body and the Breathing Earth: A Reply to Ted Toadvine." *Environmental Ethics* 27:171-190.

specific affective or meaningful character dependent upon the constitution of those bodies, the history between them, etc." (2011, 345). Thus, each body exists in its own right in terms of the relationship between it and its environment; the relationship is one of reflexive affect and not one dependent solely on the lived experience of a perceiving subject. This intertwining and reflexive relationship is what Merleau-Ponty refers to as chiasm and chiasmic relations constitute the flesh. Bannon proceeds to claim, "that each thing, independent of human sensibility, possesses its own flesh, which is to say that a thing is a collection of relations, which are defined by how it is open to its environs" (2011, 347).

For Merleau-Ponty, each body is a "dimensional this," meaning that the way a body is open to its surrounding is a dimension. A body is a composite of various dimensions through which it interacts with the world and derives meaning. Although consciousness is a dimension of the human body, other beings have other dimensions by which interiority can be attributed to a thing (e.g., rivers, lakes, seas). This interiority results in the "pregnancy of possibilities," due to the stochastic nature of interiority that allows for systemic behavior to emerge. This is what Merleau-Ponty refers to as "pure passage." Nature is not mechanistic or deterministic because, as Bannon notes, it is a process of "mutual relations obtaining between beings along the dimensions through which they are open to their milieu" (2011, 349). Moreover, Bannon contends that the dualism of nature and culture no longer exists because "[n]ature is simply the largest field of flesh that provides the living spatiotemporal context of our existence and in which we actively participate" (2011, 351).

Bannon's transformation of the concept of flesh is non-anthropomorphic in that perception is only one form of relation between bodies and sentience is not required. In other

words, a river and a mountain will have spatiotemporal relations whether or not a human is present. Bannon's aforementioned statement that nature is a process of mutual relations or harmonies between beings (including non-human beings) via the particular aspects to which they are receptive to their surrounding context is significant and key to building a bridge to the development of Leopold's notion of an ecological conscience. In Chapter 5, I illustrate how Merleau-Ponty's relational ontology, specifically his concepts of operative intentionality, chiasm, and flesh, can be incorporated in the development of community action networks whose missions are to cultivate a new water mindset as well as a participatory water ethic. I argue that this new water mindset and participatory water ethic co-evolves with a corollary ecological conscience constituted by what Leopold referred to as "thinking like a mountain." However, the unfolding of this new water mindset and participatory ethic requires a deliberate education for critical consciousness.

Education and Critical Consciousness: Freire

In delineating his land ethic in A Sand County Almanac, Leopold states:

Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail's pace; progress still consists of letterhead pieties and convention oratory.... The usual answer to this dilemma is 'more conservation education.' No one will debate this, but is it certain that only the *volume* of education needs stepping up? Is something lacking in the *content* as well? (1966, 243).

My answer to Leopold's query is yes, there is something lacking in the content of conservation education, and what is missing is the vital component of education for critical consciousness. Over almost three-quarters of a century ago, Leopold argued, "[Conservation education] defines no right or wrong, assigns no obligation, calls for no sacrifice, implies no change in the current philosophy of values. In respect of land-use, it urges only enlightened self-interest" (1966, 244). In this regard, I contend that not much has changed in the scope of conservation education. In answer to Leopold's question, "Just how far will such education take us?" (1966, 244), undoubtedly, I would answer not very far considering that almost 75 years have elapsed, and we are still battling the same conservation issues despite the continued increase of environmental risk and consequent harm to human and non-human communities. When *A Sand County Almanac* was first published in 1949, Leopold lamented, "Land-use ethics are still governed wholly by economic self-interest..." (1966, 245), and in 2021 they largely so remain.

Paulo Freire was a 20th century Brazilian educator and philosopher who advocated for critical pedagogy. In *Education for Critical Consciousness* (2013), Freire states that a when society is in transition, men and women must be able to "perceive the marked contradictions which occur in society as emerging values in search of affirmation and fulfillment clash with earlier values seeking self-preservation" (2013, 6). This ability requires a "critical spirit" or critical consciousness to perceive and understand ways of being that were needed in the past versus new ways of being that are needed currently and in the future. Freire refers to this time of societal transition as a historical-cultural "tidal wave" (2013, 6); this "tidal wave" is analogous to Bachelard's concept of "epistemological rupture." Due to this break in societal epistemology, critical consciousness is no longer submerged, but rather emerges as men and women renounce the role of passive spectator characteristic of a pedagogy of oppression and domination and demand the role of subject engaged in active intervention characteristic of a pedagogy of freedom or liberation.

For this reason, environmental education and ethics must consider the social, political, and economic structures of society. Merleau-Ponty's phenomenology emphasized historicity or the interpretation of "all historical events according to external structures and causal relations" (Landes 2013, 94). Conservation and, more broadly, environmental education must include the critical questioning of these structures as well as the relationship between humans and the land. Since citizens are formed by a sociohistorical context of relations, in Pedagogy of Freedom, Freire contends that men and women need to "become capable of comparing, evaluating, intervening, deciding, taking new directions, and thereby constituting [themselves] as ethical beings" (1998, 38). These capabilities are vital not only to participatory democracy, but, I argue, to the development of a participatory water ethic. A participatory water ethic, or guide to "right" conduct in decision-making made by relevant stakeholders regarding the protection, conservation, and use of freshwater natural resources, will be discussed in more detail in the fifth chapter. In *Pedagogy of Freedom* (1998), Freire not only identifies "correct" or "right" thinking as knowledge of our historicity and our consequent capability of intervening and transforming our world (35), but also asserts that is impossible for the human condition to be detached from the ethical condition (39). In other words, humans are inherently ethical beings. Critical education, therefore, addresses the moral formation of learners as well as the teaching of subject matter. It is relevant to note that the Latin root for education, educere, means to "to draw forth." In Chapter 5, I provide an alternative solution to the water policy problem briefly summarized in the first chapter and later detailed in the fourth chapter that "draws forth" a participatory water ethic through the awakening of critical consciousness. According to Freire in the Pedagogy of the Oppressed (1995), the skill of critical

questioning and the awakening of critical consciousness are products of problem-posing education rather than banking education.

In banking education, the role of the teacher is narrating subject and that of the student is passive, listening object. The teacher's task is to fill the students, who are empty "containers," with narrated content which characteristically is detached from reality and is alien to the lived experience of the students. Freire states, "Education is suffering from narration sickness" (1995, 52). This statement unfortunately describes the education today in the United States that pervades our public education system in general and informal environmental education in particular. Banking education simultaneously minimizes or annuls creativity and stimulates credulity both of which serve the interest of those in power who wish to maintain the status quo and "care neither to have the world revealed nor to see it transformed" (1995, 54). The suppression of creativity and the manufacture of credulity is accomplished by turning students into passive entities who will adapt to the conditions of the world due to the deliberate submersion of their critical consciousness and unquestioning assimilation of communiqués. "The more completely [the students] accept the passive role imposed on them, the more they tend simply to adapt to the world as it is and to the fragmented view of reality deposited in them" (1995, 54). Banking education is analogous to Plato's allegory of the cave in that the students are "chained" to the illusions of the shadows cast by a system of indoctrination. In Plato's *Republic*, Socrates postulates that students must receive education that turns their minds around and reorients them to reality (Plato 1968, 197). This form of education is typified by Freire's problem-posing education and will be discussed later in this section. I contend that the type of education espoused by Socrates and Freire is essential to

achieve the ability to "think like a mountain." Unfortunately, those in power seek to "preserve a profitable situation" and "react almost instinctively against any experiment in education which stimulates the critical faculties and is not content with a partial view of reality but always seeks out the ties which link one point to another and one problem to another" (Freire 1995, 54-55). Because it is grounded in a holistic understanding of the interconnectedness of all components of the web of the natural environment, an ecological conscience or "thinking like a mountain" is therefore not possible under a banking education system.

As Freire states in *Pedagogy of the Oppressed*, "Implicit in the banking concept is the assumption of a dichotomy between human beings and the world: a person is merely *in* the world, not with the world or with others; the individual is spectator, not re-creator." (1995, 56). This false dichotomy reinforces learned passivity, alienation, and adaptation and "serves to obviate [authentic] thinking" (1995, 57). Freire defines authentic thinking as "thinking that is concerned about *reality*" and "does not take place in ivory tower isolation, but only in communication" (1995, 58). The banking method is dehumanizing in that it precludes the emergence of solidarity through the cooperative and collaborative construction of meaning inherently reliant on the existence of dialogical relations. The process of humanization or authentic liberation for Freire is not another deposit of content to be made, but rather is a "praxis" – "the action and reflection of men and women upon their world in order to transform it" (1995, 60). Freire further contends, "...apart from inquiry, apart from the praxis, individuals cannot be truly human. Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other" (1995, 53). In other words, genuine education is based on

relationship, and as Freire states in *Education for Critical Consciousness*, "To be human is to engage in relationships with others and with the world" (2013, 3). Relationship is an important recurring thread through the philosophic fabric of Leopold, Whitehead, Merleau-Ponty, Freire, and as I will highlight in the next two sections of this chapter, Dewey and Arendt.

The development of an ecological conscience is dependent on a community of learners, working in partnership to create meaning for themselves *in* and *with* the world. Critical consciousness results from intervention in the world as a transformer of that world (Freire 1995, 54). Problem-posing education acknowledges education and knowledge are processes of active inquiry and dialogical relations. "People teach each other, mediated by the world, by the cognizable objects....or medium[s] evoking the critical reflection of both teacher and students" (1995, 61). As co-investigators, the teacher and students are engaged in critical dialogical relations to unveil the reality of the world with which and in which they mutually find themselves. The process of co-investigation characterized by dialogue facilitates the "emergence of consciousness and critical intervention in reality" (1995,62). Through dialogue, community groups are challenged to acknowledge and analyze their mutual social-historical experience to attain a new awareness in understanding their reality. In Pedagogy of Freedom (1998), Freire asserts, "The experience that makes possible the 'breakthrough' is a 'collective' experience" (77). Community members are no longer content to sit on the sidelines and accept the explanation of "facts," they want to participate in forming their own understanding of their world.

Freire's pedagogy of freedom or liberation rejects "assistencialism," policies that attack symptoms and not causes of social problems; and accepts the key tenet of community

organizing and field philosophy, searching for solutions *with* the people, not *for* them. In *Education for Critical Consciousness* (2013), Freire asserts that the primary importance is "to help [people] help themselves, to place them in consciously critical confrontation with their problems, to make them the agents of their own recuperation" (13) so that they are able to acquire through direct experience a "strong sense of social responsibility and of engagement in the task of transforming society" (11). In *The Need for Roots* (2002), Simone Weil, 20th century French philosopher, includes responsibility as one of the needs of the human soul and says for this need to be satisfied, "it is necessary that a man should often have to take decisions in matters great or small affecting interests that are distinct from his own, but in regard to which he feels a personal concern" (15). Being engaged is critical to being integrated, recognized as a subject rather than an object, with one's reality and problem posing education naturally incorporates both engagement and integration. Freire acknowledges the roles of engagement and integration in *Pedagogy of the Oppressed*:

Students, as they are increasingly posed with problems relating to themselves in the world and with the world, will feel increasingly challenged and obliged to respond to that challenge. Because they apprehend the challenge as interrelated to other problems within a total context, not as a theoretical question, the resulting comprehension tends to be increasingly critical and thus constantly less alienated. Their response to the challenge evokes new challenges, followed by new understandings; and gradually the students come to regard themselves as committed. (1995, 62)

The pedagogy of freedom avows that the human-world relationship is inescapably intertwined; people are not isolated and disconnected from the world. In these human-world relations, Freire declares, "consciousness and world are simultaneous: consciousness neither precedes the world nor follows it" (1995, 62). This view is also espoused by Merleau-Ponty. In *Phenomenology of Perception* (2012), he develops the concept of intentionality or embodiment to explain the bond or intentional arc between a human's lived body and the world. As noted in the previous section, he contends that any expressly conscious act is grounded by an "intentional arc" shaped by all facets of a fluid historicity. Merleau-Ponty, thus, rejects the empiricist and intellectualist approaches to explain the human-world relationship because both embrace a problematic and unquestioned assumption that the objective world exists as a ready-made reality, separate from the lived body. Instead, he asserts that consciousness arises from intentional and reflective acts that entail the coherence of lived experience. Merleau-Ponty's concept of an intentional arc is inherent in Freire's problem-posing education: "In problem-posing education, people develop their power to perceive critically *the way they exist* in the world *with which* and *in which* they find themselves; they come to see the world not as a static reality, but as a reality in process, in transformation" (1995, 64).

In *The Unconscious Civilization* (1995), John Ralston Saul argues, "we are a dangerously unconscious civilization" (4) because we are not able to convert knowledge into action. Saul defines knowledge as an instinctual understanding of the "relationship between what you know and what you do" (5). This relationship is critical yet lacking in contemporary society. There is a disconnect between what we know and our actions: "Our actions are only related to tiny, narrow bands of specialist information, usually based on a false idea of measurement rather than upon any knowledge – that is, understanding – of the larger picture" (5). Reality based on expert or professionalized knowledge is an interiorized, disciplinary, truth. In other words, "Truth is not in the world, it is in the measurements made by professionals" (9). In this dissertation, I argue reliance on professionalized knowledge is devoid of the coherence of lived

experience of citizens and thus creates a disconnect between knowledge and action. For decades, science has repeatedly documented the environmental damage caused by human activity. Yet, as Saul also recognizes, "The statistics of our crisis...are clear and unforgiving. Yet they pass us by – in newspapers, on television, in conversations – as if they were not reality. Or rather, as if we were unable to convert knowledge into action" (10). This begs the question, how is knowledge converted into action? My answer to this question is through education, specifically problem-posing education because it is inherently based on experience and action.

Philosophy of Experience, Eclipse of the Public, and the "Great Community": Dewey

John Dewey was a 20th century American political philosopher and an influential education and social reformer. In *Experience and Education* (1963), Dewey meticulously develops a philosophy of experience to address the inadequacies of traditional and progressive education. Dewey's conception of the traditional method of education and Freire's notion of the banking method of education are one and the same. Both are based on the transmission of information from the teacher to the student. Traditional education is a model focused on "forming habits of action in conformity" (1963, 17) with rules and standards developed externally by authorities. Curriculum is formulated to prepare students for the work force and is presented as a static, "finished product" (17). Similarly, progressive education for Dewey is remarkably like Freire's problem-posing method of education. Both are based on collaborative, active learning using relevant problems to lived experience. The curriculum is fluid and acknowledges the importance of historicity and the active application of knowledge to present and future circumstances. However, in *Experience and Education*, Dewey argues that
educational reform based on any "ism" (e.g., progressivism) is problematic because the principles guiding the new reform are based on negative reactions to a former educational method and not education itself which entails a "comprehensive, constructive survey of actual needs, problems, and possibilities" (6). He argues that the sets of values inherent in traditional and progressive methods of education are not only different, but both are essential for learning. He claims that traditional and progressive education both can be non-educative and mis-educative if they are devoid of a meticulously developed philosophy of experience. Dewey asserts that the conditions for true learning include "longitudinal and lateral dimensions. It is both historical and social. It is orderly and dynamic" (11). Once again, the importance of historicity and relationship arises in the work of yet another philosopher.

In *Individualism Old and New* (1999) Dewey contends that modern society was not mentally or morally prepared for the changes in values and mindset necessitated by the Industrial Revolution (8). As a result, old creeds became entrenched, and the status quo was idealized in individuals, society, and cultural institutions. Dewey asserted that the 20th century was dominated by a "money culture," mired in materialism and an obsessive devotion to increasing private profit (15). This is the same economic self-interest governing land-use ethics as noted by Leopold. The machine age issued in by the industrial and technological developments in the 19th and 20th centuries submerged certain types of individuality making them all but invisible. Dewey argued the Industrial Revolution produced the need for the construction of a new individuality that is compatible with contemporary societal conditions. He cogently declared, "[t]he problem of constructing a new individuality consonant with the objective conditions under which we live is the deepest problem of our times" (16). Dewey notes that previous attempts to solve the problem of contradiction inherent in society undergoing epochal transition have been erroneously and unsuccessfully approached using one of two methods, avoidance and escape. Avoidance involves clinging to the notion that the only cogent individuality is that which preceded the Industrial Revolution, and escape embraces the assumption that the current situation is permanently fixed. The method Dewey recommends in *Individualism Old and New* is consonant with Freire's problem-posing education: "Only as [the situation or problem] is treated as transitive and moving, as material to be dealt with in shaping a later outcome, only, that is, as it is treated as a *problem*, is the idea of any solution genuine and relevant" (Dewey 1999, 16).

Dewey recognizes what Bateson refers to as "the pattern that connects" historicity and relationship – experience. In *Mind and Nature* (1979), Bateson states, "Break the pattern which connects the items of learning and you necessarily destroy all quality" (8). Like Dewey, Bateson was criticizing traditional education and lamenting the fact that educators teach almost nothing about the "pattern that connects." Although Dewey acknowledges in *Experience and Education* that the new progressive philosophy of education incorporated "the idea that there is an intimate and necessary relation between the processes of actual experience and education" (1963, 20), he adamantly declares that the veracity of the above relation between experience and education is dependent on the "correct idea of experience" (20). For Dewey, not all experiences are educative. What is of paramount importance is the *quality* of the experience. Quality refers to the influence that an experience has upon later experiences. Dewey refers to this as the "principle of the continuity of experience" or the "experiential continuum" (28).

that the "central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences" (28). Thus, the task and the challenge of the educator is to create an educative experience by selecting quality experiences. Dewey's philosophy of education is built on the foundation of a philosophy of experience. More eloquently expressed by Dewey, "the philosophy in question is...one of education of, by, and for experience" (29). The principle of continuity of experience promotes continual intellectual and moral growth. In this regard, Dewey contends, "Every experience is a moving force. Its value can be judged only on the ground of what it moves toward and into" (38). Dewey also emphasizes the social aspect of human experience due to the involvement of contact and communication. To ensure that an experience is educative and leads to intellectual and moral growth, an educator must assume responsibility not only for shaping experiences but also utilizing the physical and social environs to encourage interaction. Continuity and interaction are synergistic and "provide the measure of the educative significance and value of an experience" (44-45). Continuity and interaction facilitate the creation of a social learning community. A social learning community is held together by shared common activities and an emergent social order whereby "control of individual actions is effected by the whole situation in which individuals are involved, in which they share and of which they are co-operative or interacting parts" (53). This echoes Leopold's emphasis of the social aspect of the establishment and maintenance of a land ethic: "I have purposely presented the land ethic as a product of social evolution because nothing so important as an ethic is ever 'written.'" It evolves in the "minds of a thinking community" (1966, 263). Although Leopold's land ethic stresses community, he does not specifically address how to build and maintain a social

learning community. To this end, the works of Freire and Dewey are particularly significant and extremely influential in the development of my recommendation of an alternative way to respond to urban water crises through participatory water ethics and Watershed Education Community Action Networks (WE CANs). A detailed discussion of the role of participatory water ethics and WE CANs can be found in Chapter 5.

Both Dewey and Freire perceive education as a social process and, for Dewey, as expressed in *Experience and Education*, the quality of experience developed through interaction is dependent on the degree to which the community forms a group (1963, 58). Like Freire, Dewey recognizes that the teacher is also a vital member of the community group owing to the role of facilitator of interactions and intercommunications of the social community. A field philosopher and community organizer function in the same capacity. Both Freire and Dewey saw education as a means and end to freedom or the intellectual growth of individuals. According to Dewey, "The only freedom that is of enduring importance is freedom of intelligence, that is to say, freedom of observation and of judgment exercised in behalf of purposes that are intrinsically worth while [sic]" (61). Dewey argues that freedom does not solely spring from freedom of movement or external activity, but also from internal activity or freedom of thought. He therefore asserts that the cultivation of freedom of intelligence resides in a combination of external and internal activity expressed through the reflection of action (63), which is analogous to Freire's conception of "praxis." The reflection on action or "praxis," generates the power to evaluate consequences and thus serves as a means of impulse control; a way of abating eros or desire until contemplation allows for "a union of observation and memory" to aid in the formation of a more integrated plan of action (64). The adage of "stop

and think" is sound advice and a practice advocated by both Dewey and Arendt. In *The Human Condition* (1998), Arendt proposes a reconsideration of the human condition from a mid-20th century, modern-age, perspective devoid of complacency derived from "trivial and empty" truths. She asserts that her proposal is fundamentally simple, in that it requires "nothing more than to think what we are doing" (5). So, for both Dewey and Arendt, action and reflection are intertwined and integrally significant for understanding and addressing societal or public problems.

In *The Public and its Problems* (2016), Dewey contends, "The public consists of all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for" (69) by representative officials. According to this definition, a public does not exist until evoked by a negative externality that prompts the community of ordinary citizens to organize to alleviate the problematic consequences of transactions of outside parties (82). A public, thus, is not eternal and absolute; rather, a public is constituted according to spatial-temporal factors (52) and is inherently stochastic and fluid. Given that our world today is characterized by an economic model that externalizes many costs and negative consequences to the realm of general society, Dewey's definition of the public is exceptionally relevant in discussing contemporary urban water issues. Dewey argues that a public should engage in discriminating criticism marked by intelligence and critical consciousness. Discriminating criticism, according to Dewey, generates effective political action by focusing on consequences of human action rather than causal factors of acts performed by individuals (70-71).

Dewey acknowledges in The Public and its Problems, that the public has been eclipsed by a multiplicity of powerful forces: "big business" and financial interests, political party factionalism, special interests, specialization, machine-age effects on nature of consequences and obfuscation of community, self-centered focus on work and play, diversionary entertainment, and acceleration of mobility and lack of attachment. He concedes, "...the Public seems to be lost; it is certainly bewildered" (149). Dewey's explicit concern is to "state how it is that the machine age in developing the Great Society has invaded and partially disintegrated the small communities of former times without generating a Great Community" (157). The machine age, made possible by technological innovations, expanded and diversified the public to the point of liquefaction. Zygmunt Bauman, in his book *Liquid Modernity* (2012), writes extensively on the transition of societies from "solid" to "liquid" because of the indirect consequences of a highly technological world. Solid societies, according to Bauman, are marked by order and stability, whereas liquid societies are characterized by uncertainty and change. Dewey, in *The Public and its Problems* (2016), recognized this transformation early in the 20th century and astutely theorized that these changing conditions produced an incompatibility between previously acquired political and social habits and existing circumstances. As a result, political apathy is pervasive and "thought is brought to a standstill and action paralyzed" (164) because "[m]ental and moral beliefs and ideals change more slowly than outward conditions' (169). There has thus been no concomitant transformation in ideas and ideals to align with the changing circumstances.

Despite all of the aforementioned powerful disintegrating forces, Dewey maintains that a sense of the public can be regained through improved communication; for, "Communication

can alone create a great community" (170). Furthermore, until communication can convert the "Great Society" into a "Great Community," Dewey proclaims that the public will remain eclipsed and shared experience will not be possible. Dewey's emphasis on communication is echoed in *Ways to Wisdom* (2015) by Karl Jaspers, "Unity [of mankind] can be gained only from the depth of historicity, not as a common, knowable content but in boundless communication of the historically different in never-ending dialogue, rising to heights of noble emulation" (106). Jaspers is not equating communication with utopic unity, but with a philosophic path of life marked by "mutual understanding through acting, speaking, and keeping silence together" (122). Here again, the need for reflection, or keeping silence together, is acknowledged. Although, like Dewey, Jaspers laments the unstable, isolated, indifferent, and disintegrated nature of modern-age communities, he posits that authentic communication, dialogue between people, is not only the aim of philosophy, but the source of truth (26-27).

The task before us in the 21st century is the same task that Dewey identified first in *Individualism Old and New* and later in "Creative Democracy;" older institutions and ideas that formed the foundation of our democracy in a time of expansion of physical frontiers need to be readapted and recreated to meet the new and challenging situations of an age requiring the expansion of moral frontiers. The key tools in achieving this task are communication and the "habit of amicable cooperation" (1988, 228). Dewey, in "Creative Democracy: The Task Before Us" (1988), contends this feat can be accomplished through engagement of innovative thought and action signifying democracy as a "personal way of individual life" (225). Dewey further asserts that the powerful enemies of democracy elucidated in *The Public and its Problems*, can be successfully overcome only by a faith in the possibilities of human nature and not through

defense of an external political mechanism separated from individual attitudes embodied as personal character.

Once formed, a democracy is not automatically self-perpetuating, a democracy depends on the "faith in the capacity of human beings for intelligent judgement and action if proper conditions are furnished" (227). For Dewey, these proper conditions constitute the capacity of intelligence to respond to information provided by "free inquiry, free assembly, and free communication" (227). Anything that obstructs these conditions represents a barrier that needs to be overcome to preclude divisive and antagonistic factions that exert an undermining influence on democratic life (227). Democracy as a way of life demands that individuals depart from thinking externally and develop a vested and active ownership in the maintenance of democratic processes through continual personal development of attitudes and disposition stemming from perpetual collaboration with others. Instead of molding our democratic expectations to external institutions, we need to recreate and readapt existing institutions to reflect predominant personal attitudes and character.

To this end, the dual processes of serious education and quality experience are vital. Democracy is, according to Dewey, "the faith that the process of experience is more important than any special result attained.... Since the process of experience is capable of being educative, faith in democracy is all one with faith in experience and education (229). Dewey believes that education and experience create the capacity of intelligence that enables cooperation and collaboration to prevail when disputes, controversies, and conflicts inevitably arise. Knowledge is actively constructed through experience. What does Dewey mean by experience? Experience "...is that free interaction of individual human beings with surrounding conditions, especially

the human surroundings, which develops and satisfies need and desire by increasing knowledge of things as they are. Knowledge of conditions as they are is the only solid ground for communication and sharing; all other communication means the subjection of some persons to the personal opinion of other persons" (229). Knowledge of "things as they are" includes the acknowledgement of differing beliefs and recognizing that exposure to and tolerance of different opinions is the foundation of a democratic way of life and can lead to self-growth and enrichment. "Democracy as compared with other ways of life is the sole way of living which believes wholeheartedly in the process of experience as end and as means...and which releases emotions, needs and desires so as to call into being the things that have not existed in the past" (230). Thus, democracy strengthens what Arjun Appadurai, a contemporary anthropologist, refers to as the "capacity to aspire" (2004, 59), opening the way for culture to actively orient to the future. The capacity to aspire is related to Arendt's theory of action; the potential of action and speech to create new public spaces of community power.

Theory of Action: Arendt

Hannah Arendt was a 20th century German-American political philosopher. Arendt's theory of action is particularly relevant to my research and is summarized in this section. Plurality, disclosure, and freedom are the key components of Arendt's theory of action. In *The Human Condition* (1998), Arendt stipulates that labor, work, and action are three fundamental human activities corresponding to a basic condition of human life on earth (7). The activity of action is tied to the condition of plurality:

Action, the only activity that goes on directly between men without the intermediary of things or matter, corresponds to the human condition of plurality, to the fact that men,

not Man, live on the earth and inhabit the world.... Plurality is the condition of human action because we are all the same, that is, human, in such a way that nobody is ever the same as anyone else who ever lived, lives, or will live. (7-8)

The plurality of humans is the basic condition of both action and speech and is characterized by both equality and distinction: equality in that we all belong to the same species and can understand and communicate with each other, distinction because we all are unique in the sense that we do not share the same historicity and, thus, perspective (175-176). Through speech and action, humans are able to distinguish themselves, to disclose their unique identity to others. According to Arendt, a life without speech and action ceases to be a human life since word and deed are the means by which "we insert ourselves into the human world" (176). We appear to each other as human beings rather than simply physical objects through the modalities of action and speech. Through insertion, through action and speech, we reveal "who" we are rather than "what" we are, in so doing, our "unique distinctness" appears to others.

A central feature of action is freedom, the capacity to take the initiative, to begin something new, to set something in motion, to do the unexpected (177-178). Taking the initiative and doing the unanticipated lies at the root of revolutions and uprisings. In *On Revolution* (2006), Arendt asserts, "revolutions are the only political events which confront us directly and inevitably with the problem of beginning" (11). For Arendt, a revolution is not mere change, but the founding of a new political order that aims for the generation of freedom from the liberation of oppression (25). Revolutions thus represent new beginnings. I argue in Chapter 5 that revolutions are akin to Bachelard's notion of epistemological ruptures and that changes

in mindset are types of revolutions that can occur on both micro and macro scales. A human being's appearance is dependent on one's own initiative.

Another central feature of action, identified by Arendt in *The Human Condition*, is plurality which means that an individual cannot act in isolation; action requires the presence and judgement of others. Without the presence and acknowledgement of others, the action is meaningless; the action is devoid of context without the differing perspectives and consent of others. Action is a mode of human togetherness, a being *with* others rather than for or against them, that foregrounds the revelatory nature of action and speech (1998, 180). When human togetherness is lost, action is devoid of significance becoming just another form of achievement among a host of others and speech is deprived of revelation becoming merely talk, rhetoric, or propaganda. Through speech, specific acts are attributed to particular actors, in other words, agency is ascribed.

However, the manifestation of the "who," the full disclosure of the identity of the actor, is made possible retrospectively through narrative and remembrance. Action, as noted earlier, is the only activity that takes place between humans without the intermediary of things or matter. Human affairs thus are plagued by fragility and intangibility because they are not solidified in tangible objects (183). Arendt refers to the realm of human affairs as the "web of human relationships," a network of actions, sustained by communicative interaction through the "production" of stories. The reciprocity of action and speech (i.e., action entails speech and speech entails action) are embodied through language, through the fabrication of stories. This reciprocity of action and speech constitutes the potentiality of power according to Arendt: "Power is actualized only where word and deed have not parted company, where words are

not empty and deeds are not brutal, where words are not used to veil intentions but to disclose realities, and deeds are not used to violate and destroy but to establish relations and create new realities" (200). The function of a story told through the lens of a poet, artist, historian, philosopher, or any other storyteller is to reveal consequences and to preserve a record of past actions that can serve as a source of instruction for future actions and enable the identification of future problems and publics.

Although action only fully reveals itself to the "backward glance of the historian," (192) the story itself requires a community of citizens to serve as witnesses. Power is manifested in a space of appearance and for Arendt this space of appearance is the *polis*. As opposed to the Greek notion of *polis* as city-state, a specific geographical, physical location, Arendt articulates the *polis* as the "organization of the people as it arises out of acting and speaking together, and its true space lies between people living together for this purpose, no matter where they happen to be" (198). The polis, then, is an emergent public realm constituted of free and equal citizens who assemble together as a political community through action and speech. The emergent character of the space of appearance, a *polis*, or in Deweyian terms, a public, is stressed by Arendt, "[the polis] does not survive the actuality of the movement which brought it into being but disappears not only with the dispersal of men...but with the disappearance or arrest of the activities themselves. Wherever people gather together, it is potentially there, but only potentially, not necessarily and not forever" (199). The space of appearance is a potential, fragile space requiring continual re-creation, becoming actualized only through the collaborative communication of matters of public concern and action undertaken to resolve negative consequences impinging on a group of concerned citizens. Power, the potentiality of

togetherness, is only dependent on one material aspect and that is the living together of people (201). According to Arendt's theory of action, power is the capacity for citizens to come together as a community for the purpose of affecting a public-political change. Her focus on action and speech aligns well with Dewey's claim that the eclipse of the public can be overcome by authentic communication between people who form a public and constitute a "Great Community." Arendt's theory of action gave birth to a new conception of participatory democracy that I argue is applicable to the creation of a participatory water ethic.

Braiding Philosophical Streams of Thought

Our challenge in the 21st century is to move beyond a frontier mentality and turn toward embracing the challenge of sustainability. Is it possible to build a way of life in which humans and nature can exist in productive harmony? I believe it is, and I believe that the answer lies in braiding the philosophical streams of thought I have discussed in this chapter. Leopold's concepts of the land ethic and ecological conscience, Whitehead and Merleau-Ponty's emphasis on relationship, Freire's pedagogy of critical consciousness, Dewey's philosophy of experience and his perceived importance of the public and the "Great Community," and Arendt's theory of action can be viewed as tributaries of philosophical thought that have the ability to give rise to a new urban water narrative. Just as a braided stream is comprised of a network of multi-threaded channels that branch and merge to create the characteristic pattern of a braided stream, these threads of philosophical thought can be merged to create the foundation of what I refer to as Watershed Education Community Action Networks (WE CANs). My aim in this dissertation is to provide a means of developing an ecological conscience that entails moving from a 20th century mindset characterized by "thinking inside the pipe" to a 21st century mindset characterized by "thinking outside the pipe." My recommendation of an alternative way for humans to be in relationship with water focuses on the role of participatory water ethics and Watershed Education Community Action Networks (WE CANs). Both participatory water ethics and WE CANs are primarily grounded in the philosophical concepts presented in this chapter.

Leopold's land ethic has failed to take prodigious root in contemporary society not because of any inherent problem with the land ethic itself. Rather, the merit of his land ethic has not been embodied in human consciousness because society has simply failed to ascribe to its fundamental, yet radical truths. Why? I assert that it is primarily because the land ethic challenges us to change "the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such" (Leopold 1966, 240). Thus, Leopold's land ethic requires us to expand our moral frontier and to reconceive human beings as ecological beings. Unfortunately, humans seem to have lost not only the ability to belong with one another but also with the earth. It is therefore necessary to resurrect the sense of what Thich Nhat Hanh (1987) refers to as "interbeing;" the realization that everything is interrelated, nothing can exist alone. Moreover, an ethical relationship to the land is contingent upon the development of an ecological conscience.

This challenge to develop an ecological conscience has not been supported by the means for achieving this desired mindset. As such, Leopold's land ethic and ecological

conscience have in effect served as an isolated mid-channel sand bar in a single-thread stream of thought. Stream channels comprised of the braiding of multiple-streams are highly dynamic and produce mid-channel bars which are formed, consumed, and re-formed continuously. The integration of other streams of philosophical thought with Leopold's land ethic and ecological conscience, co-creates the foundation underlying the development of Watershed Education Community Action Networks. As detailed in Chapter 5, WE CANs are emergent sites of community-based experiential education arising from a problem affecting a particular public that immerse the community in dialogue and cooperative action and raise critical consciousness. My proposed solution to the contemporary urban water crisis is in large part a rediscovery of a public in conjunction with the formation of a participatory water ethic. Past and current water community education and outreach are primarily based on a traditional model of education, (i.e., banking method of education). For genuine transformation to occur, educational efforts need to provide the opportunity of praxis and the formation of a social learning community (i.e., problem-posing method of education). Water community education and outreach need to be based on a philosophy of experience – an experience that engages. What does this mean? How does engagement relate to a quality experience?

In Chapter 4 of this dissertation, I discuss the results of a survey that was conducted in North Central Texas (NCT) by myself and three water resource professionals to ascertain barriers to engagement of the community in urban water issues. Various water-related institutional entities are and have been involved in community education and outreach in NCT, yet the values of water stewardship are not prevalent in the community. I argue that this lack of effectiveness is a result of the lack of conditions for citizens to develop personal capacities and

to organize themselves into a public. Education should engage and empower citizens. Given that community education and outreach is and has been occurring, I contend that the type of education being offered is not sufficient to evoke a change in values and to motivate the formation of a coherent public. Education should facilitate the formation of a public enabled to take effective political action in response to an identified social issue.

Before moving to these detailed discussions, the following chapter, Chapter 3, explores how a 20th century mindset characterized by thinking "inside the pipe" has been acquired.

CHAPTER 3

THINKING INSIDE THE PIPE – 20th CENTURY MINDSET: RELIANCE ON THE WATER IMPORT MODEL

There it is. Take it.

-William Mulholland

Vignettes: Balinese Water Temples and the Los Angeles River

"Landscapes tell stories."³¹ Filmmaker Wen Wenders made this comment during one of the sessions of the Re-Envisioning the L.A. River program hosted by the Urban and Environmental Policy Institute at Occidental College in 1999 and 2000. He also remarked that "landscapes ask for their own stories to be told." Water in its myriad forms - as streams, lakes, rivers, and oceans - have stories that need to be told and heard. In this section, I have chosen to briefly tell the stories of the Balinese water temples³² and the Los Angeles River. I selected these two stories because they epitomize the role of cultural narrative in shaping water policy, supply, and management decision-making processes. The primary contention of my dissertation is that we need to re-imagine the way in which water is managed by transforming our 20th century mindset characterized by thinking inside the pipe to a 21st century mindset of thinking outside the pipe. The Balinese water temples and Los Angeles River stories are embodiments of these contrasting water mindsets.

Following the vignette section, the remaining sections of this chapter trace the path humanity has taken to shift from a mindset of water as a revered commons to water as a

³¹ For a more in-depth study of the story of the Los Angeles River see Robert Gottlieb and Andrea Misako Azuma, "Bankside Los Angeles" in *Rivertown: Rethinking Urban Rivers*, edited by Paul Stanton Kibel, 23-46. Cambridge, MA: MIT Press, 2007.

³² For a more in-depth study of the story of the Balinese *subak* system of water management see Brian Fagan, "The Power of Waters" in *Elixir: A Human History of Water*, 77-95. London: Bloomsbury, 2011.

utilitarian commodity. Humanity's shift in mindset strongly parallels the rise of disciplinarity and the divergence of humanities and science as a result of new ways of perceiving the world and humanity's place in that world. In the words of Aldo Leopold, humans went from viewing themselves as "plain members and citizens" to "conquerors" of the land community. The development of a new scientific methodology generated a mechanical view of nature that could be dominated by humans. As a result, natural resources, including bodies of water, became mere commodities to be controlled by humans. This dominance model of civilization, exemplified in the Los Angeles River vignette, is contrasted with the partnership model portrayed in the Balinese water temple vignette. Social models of civilization produce cultural narratives that impact decision-making processes and determine the "story" we enact. All these steps in the trajectory from viewing water as a revered commons to a utilitarian commodity are discussed in detail in the sections following the vignettes.

Balinese Water Temples: Water as a Revered Commons

The Balinese water temples play an integral role in the traditional water management method for irrigating rice fields in Bali, an island in the Indonesian archipelago located south of the equator just east of Java. This conventional system which began over 1,000 years ago was designated in 2012 as a UNESCO World Heritage Cultural Landscape.³³ The Balinese *subak* water management system, dating back to the 9th century, is based on the philosophy of *Tri Hita Karana* or the three causes of well-being: a harmonious relationship between the three realms of *parahyangan* (spirit), *pawongan* (human), and *palemahan* (nature). Thus, the *subak*

³³ See UNESCO, "Cultural Landscape of Bali Province: the *Subak* System as a Manifestation of the *Tri Hita Karana* Philosophy. Accessed September 20, 2019. https://whc.unesco.org/en/list/1194.

system is not just a means for managing water and growing rice, but also for attaining happiness and well-being by living with water and acknowledging the "complexities of the human relationship with a priceless resource" (Fagan 2011, 77) and recognizing that rice, water, and the *subak* system are integral components of religious life. As such, agricultural practices and social behavior are intertwined in honoring and revering the sacredness of the humanwater relationship. A *subak* is a democratic and egalitarian association of farmers that cooperatively manage water through a system of canals and weirs to grow rice in a prolific manner to meet the high demand of a dense population. According to the UNESCO World Heritage Centre (2019), "Water temple rituals promote a harmonious relationship between people and their environment through the active engagement of people with ritual concepts that emphasize dependence on the life-sustaining forces of the natural world." In Elixir: A Human History of Water (2011), anthropologist Brian Fagan describes the Balinese subak water management system in detail. The supreme water temple of Pura Ulun Danu is located on the shore of Lake Bratan, a volcanic crater lake regarded as the realm of the goddess Dewi Danu and the place where the "power of the waters" resides (77). Lake Bratan is a natural reservoir considered by Balinese priests to be a "sacred mandala (universe) of water fed by springs lying at each wind direction" (80). Each spring of Lake Bratan is regarded as the originating source of water for each different hydrological region in central Bali. In addition to the supreme Pura Ulun Danu temple, each village has a water temple to provide "spiritual oversight of irrigated rice fields" (78).

According to Fagan, "Balinese water management lies in the hands of deities" (80). The *subaks* make regular pilgrimages to the Pura Ulun Danu temple on Mount Batur, the home of

the "Goddess of the Lake," Dewi Danu, to make offerings and engage in rituals to ensure the successful irrigation of their cultivated rice fields. The Pura Ulun Danu water temple is always open and is managed by a hierarchy of twenty-four priests led by a single high priest. All the priests are selected in infancy by a virgin princess whose voice, while in a trance, becomes commanded by Dewi Danu. J. Stephen Lansing, an anthropologist who conducted a definitive study of the Bali water management system, quotes the Jero Gde, the single high priest believed to be the earth-bound representative of Dewi Danu, "It is only she, the Goddess of the Lake, who can properly give water. She already embodies, incarnates water, which she gives to her subaks, from the lake" (Lansing 2007, 76). The Jero Gde maintains authority over the water allocation sanctified by his relationship with the Goddess, Dewi Danu. In this role, the Jero Gde symbolizes the "power of the waters" and "bridges the living or visible world and the realm of the intangible" (Fagan 2011, 82). Thus, the traditional water management system of Bali depends on an intimate and twining interdependence between the water temples and the subaks. This interdependency epitomizes what Fagan connotes as a "hydro-logic" (82): an integrated approach to water management that acknowledges and weaves together the realms of the divine, human, and nature.

In addition to the meticulous management of irrigation cycles and water supplies, decisions on coordinating harvests, draining fields, controlling pests, and fallowing land need to be made. These decisions are made not by single families but collectively by larger social units, the congregations of village temples. Each village temple congregation is comprised of several *subaks*, and these collective decisions subsequently are put into effect by individual *subaks* in the smaller temples that each *subak* maintains. The success of the Bali irrigation systems not

only depends on the year-round cooperation of all the farmers in the area, but also on the offerings and rituals in each *subak's* water temple that reflect the importance of reciprocity to ensure growth and fertility. As Fagan notes, "the daily management of irrigation works is deeply embedded in an intricate social milieu and a hierarchy of water temples" (88) that is characterized by a "hydrological dependency" (89) of the majority of subaks on upstream releases of water. The effective management of water supply relies on a "control system link[ing] watershed and river to weir, weir to tunnel and canal, and village to village in a web of interconnectedness that can be maintained only by intricate social controls" (89).

This intricate social control is achieved through the Balinese water temples. Although the traditional rulers of Bali were divine kings, the water temples were not mainstreamed and foregrounded into the realm of politics. Rather, the water temples were backgrounded in village rituals, ceremonies, and folk stories. Rituals and ceremonies define the role of the water temple in the village and facilitate voluntary cooperation between different villages and society as a whole in carrying out the necessary tasks to maintain the irrigation system and to successfully cultivate crops. Rituals, ceremonies, and folk stories are profound and powerful communal events that entertain, educate, and heal. These events create a sense of belonging and reconnection to all aspects of a place. Rituals, ceremonies, and folk stories convey the cultural narrative of the interrelationship between all beings and things to new generations and inoculate older generations against alternative worldviews that can damage the harmonious relationship between the realms of spirit, human, and nature.

In 1971, Dutch colonial rule and the Green Revolution came to Bali. With it came a new cultural narrative, human-water relationship, and irrigation agricultural practice including the

use of fertilizers and continuous cropping, that effectively transferred control from the water temples to a centralized bureaucracy. "The inevitable result was chaos in water scheduling, and explosion of pests, and a constant race between farmers and pests centering on the latest pestresistant rice forms" (Fagan 2011, 95). The new irrigation agricultural practices commonly used in the 20th century simply did not work. The Balinese returned to their traditional *subak* irrigation systems that served them well for nearly one thousand years.

In many ways the Balinese water management system can be used as a model for a new way of envisioning water supply and management in the United States. More specifically, in Chapter 5, I explore how Watershed Education Community Action Networks (WE CANs) can be utilized to create a new urban water narrative that honors a web of interconnectedness similar to the functioning of the *subak* irrigation system in Bali. As articulated in an earlier quote, effective management of water supply necessitates concatenation or linkage; the linking together of watersheds, sub-watersheds, the divine, humans, and nature like interconnecting links in a chain with a recognition of the dependency on the cultural narrative that defines the human-water relationship upstream. In the 21st century model of water management I propose, the WE CANs function much like the Balinese water temples and strongly rely on the grounding and community-building capabilities of ritual, ceremony, and storytelling.

The Los Angeles River: Water as a Utilitarian Commodity³⁴

Although the Los Angeles River of the 21st century has been the subject of revitalization

³⁴ For an in-depth historical account of the historical epic quest for water and how the hunt for water transformed the American West, including Los Angeles, see Reisner, Marc. 2017. *Cadillac Desert: The American West and its Disappearing Water*, rev. ed. New York: Penguin Books. In video format, see also Jon Else, et al. 1997. *Cadillac Desert*. Alexandria, VA: PBS Video. Note: The PBS video on DVD is very difficult to obtain. Segments of the PBS video can be viewed on YouTube at https://www.youtube.com/watch?v=hkbebOhnCjA. It can be found under the title *Cadillac Desert: Part 1: Mulholland's Dream* (Segments 1-9).

and renewal, the history of the river is marked by the cultural narrative of a "declaration of war on the L. A. River."³⁵ The Los Angeles River underwent a series of changes as Los Angeles transformed from the settlement of small groups of Native Americans prior to the first European contact in 1769, to the official founding of El Pueblo de la Reina Los Angeles (The Town of the Queen of Angeles) by Spanish colonizers in 1781, to a boom town from 1870-1970 growing from a village of 6,000 to a city of 2.8 million people, to an estimated population of almost 4 million in 2019.

The story of Los Angeles is essentially the story of the city that imported water built. The PBS documentary entitled *Cadillac Desert* begins with a montage of quotes describing the history of the development of the American West. "Our great cities stand in a desert that is drier than the plains of North Africa, it would all be impossible without the breathtaking manipulation of water.... We engineered the desert out of existence,"³⁶ proclaims the narrator. "The idea of subduing nature has captivated the whole country. Congress cannot appropriate enough money fast enough to build more dams,"³⁷ says Marc Reisner, the author of *Cadillac Desert: The American West and its Disappearing Water*. These dams according to the narrator were built with "little thought to the consequences."³⁸ Supplying water to the population of Los Angeles "was a little bit like the sorcerer's apprentice, you have to have more water, more

 ³⁵ This quote appears in "Bankside Los Angeles," the second chapter in the book *Rivertown: Rethinking Urban Rivers*, edited by Paul Stanton Kibel, Cambridge, MA: MIT Press, 2007. The quote is attributed to a U.S. Army Corps of Engineers official in two sources: 1. Andrew Boone, "River Rebuilt to Curb Floods", *Scientific American*, Nov. 1939, p. 265 and 2. "Flood Control Program for Los Angeles" in *Western Construction News*, Nov. 1939, p. 148.
 ³⁶ Jon Else, et al. 1997. *Cadillac Desert*. Alexandria, VA: PBS Video. Note: The PBS video on DVD is very difficult to obtain. Segments of the PBS video can be viewed on YouTube at

https://www.youtube.com/watch?v=hkbebOhnCjA. It can be found under the title *Cadillac Desert: Part 1: Mulholland's Dream* (Segments 1-9). This quote can be found at 1:57 on Segment 1.

³⁷ Ibid. This quote can be found at 2:15 on Segment 1.
³⁸ Ibid. This quote can be found at 2:35 on Segment 1.

water, more water,"³⁹ explains Catherine Mulholland, granddaughter of William Mulholland, the hero or villain of the story of the Los Angeles water supply depending on one's perspective. "We have forgotten that the natural West is barren and fatally dry and that our now bountiful West is a fragile construction,"⁴⁰ remarks the narrator at the conclusion of the introduction to the documentary. According to Reisner in the second segment of the first part of the PBS documentary *Cadillac Desert*, Los Angeles "never had a reason to be there. It had no minerals, no metals, no forests. In other words, everything that any major American city used to develop itself, LA lacked, and above all, it lacked water."⁴¹

The main character in the story of Los Angeles water supply and management is William Mulholland, who came to Los Angeles in 1878 from Ireland and eventually found work as a ditch digger on Los Angeles' dilapidated water system. Mulholland taught himself hydraulic engineering and climbed through the ranks, becoming Superintendent of the Los Angeles Water System in 1886. Although he tried at first to modulate the demand for water by encouraging the expanding population of Los Angeles to conserve water, his efforts went unheeded and in 1903 the demand for water in Los Angeles led to the depletion of the supply of its only source of water, the Los Angeles River. The Los Angeles River channel was cemented over by 1960. Mulholland was thus tasked with the quest for finding a new water source to feed the insatiable thirst for more water for a continually growing city. Reisner (2017), describes Mulholland's task as that of a "modern Moses," but with a significant exception, "instead of leading his people through the waters to the promised land, he would cleave the desert and

³⁹ Ibid. This quote can be found at 3:07 on Segment 1.

⁴⁰ Ibid. This quote can be found at 3:29 on Segment 1.

⁴¹ Ibid. This quote can be found at 6:19 on Segment 1.

lead the promised waters to them" (62). In the documentary *Cadillac Desert*, Reisner suggests that Mulholland underwent a change at this time; seeing "himself as a sort of builder of a Roman master work, as somebody who kept a great hydraulic engineering tradition alive."⁴² Whereas Mulholland initially approached his responsibility of water supply and management from the perspective of a conservationist, Reisner purports that Mulholland viewed himself as an "empire builder" because of his continual quest for new water sources.

In 1904, Fred Eaton, former mayor of Los Angeles, encouraged Mulholland to explore the Owens River, 230 miles north of Los Angeles, and to consider it as a potential new source of water. For centuries, the Paiute Indians lived along the Owens River and practiced sustainable agriculture using small irrigation canals. The Paiutes' use of water reflected their belief that water was a shared commons and, as such, water belonged to the whole community. In the late 1800's, white settlers forced the Paiutes off the land and denied them access to the water, an action reflecting a different mindset and a shift from viewing water as a commons to a private property designated by river rights, in other words a commodity. When Mulholland and Eaton visited the Owens Valley in 1904, there was enough water in the Owens River to provide for Los Angeles' water needs for at least thirty years and due to the elevation differential between Owens Valley and Los Angeles, the diverted river water would flow by gravity to Los Angeles the entire way.

However, there was a dilemma. All the water rights in the Owens Valley were owned by farmers who were using the water to irrigate approximately 60,000 acres of agricultural land and that land was being further developed by the Bureau of Reclamation. Eaton and

⁴² Ibid. This quote can be found at 3:38 on Segment 2.

Mulholland thus had to figure out a way to acquire the water from the farmers and the federal government. Their solution was to have "agents" of the city of Los Angeles and its Department of Water and Power clandestinely purchase the water rights to the Owens River. In his book Cadillac Desert, Reisner asserts, "Los Angeles employed chicanery, subterfuge, spies, bribery, a campaign of divide-and-conquer, and a strategy of lies to get the water it needed" (2017, 62). In the PBS documentary, Reisner describes the economic and political climate of Los Angeles as "getting what you want any way you can get it."⁴³ A July 1905 *Los Angeles Daily Times* article with the headline "Titanic Project to Give City a River" reported the closing of the deal and boasted Los Angeles would gain, "30,000 inches of water, or about ten times our present water supply, enough for a city of 2,000,000 people...This new water supply, immense and unfailing, will make Los Angeles forge ahead by leaps and bounds and remove every specter of drought or doubt."⁴⁴ By August 1905, several newspaper headlines revealed that a Los Angeles real estate syndicate would make millions of dollars from the Owens Valley water plan. According to Reisner, this syndicate of people "represented the power structure of Los Angeles."⁴⁵ By 1933, Los Angeles had purchased 85% of residential and commercial property and 95% of agricultural land in Owens Valley.⁴⁶

⁴³ Ibid. This quote can be found at 7:01 on Segment 2.

⁴⁴ A copy of this article can be viewed on the Santa Clarita Valley television website scyhistory.com. See SCTV. 1905. "Owens River Water Rights Obtained for Los Angeles Aqueduct." Accessed June 22, 2021. https://scyhistory.com/scyhistory/lat072905.htm.

⁴⁵ See Jon Else, et al. 1997. *Cadillac Desert*. Alexandria, VA: PBS Video. Note: The PBS video on DVD is very difficult to obtain. Segments of the PBS video can be viewed on YouTube at

https://www.youtube.com/watch?v=hkbebOhnCjA. It can be found under the title *Cadillac Desert: Part 1: Mulholland's Dream* (Segments 1-9). This quote can be found at 7:53 on Segment 2.

⁴⁶ See Inyo County Water Department. January 2008. "Owens Valley Water History." Accessed June 22, 2021. https://www.inyowater.org/documents/reports/owens-valley-water-history-chronology.

In 1905, in the middle of a drought and with temperatures exceeding 100°F, the citizens of Los Angeles voted 10:1 to approve the Owens River bond that allowed Mulholland to construct a 233-mile aqueduct to convey the water of the Owens River across the Mojave Desert to be delivered to Los Angeles. Moving a river from the Owens Valley to Los Angeles was deemed as progress and was a popular project not only with the citizens of Los Angeles, but also with President Theodore Roosevelt who cited the feat as "the greatest good for the greatest number."⁴⁷ On November 5, 1913, as water cascaded down the aqueduct into the San Fernando Valley and before a crowd of thousands of people, Mulholland declared to the mayor of Los Angeles, "There it is. Take it." According to Reisner, the Los Angeles aqueduct, a project of the city's Department of Water and Power, was an engineering accomplishment never before seen in the world and changing the course of the Owens River not only profoundly changed the environment but also "in effect created contemporary Los Angeles."⁴⁸ In 1924, Owens Lake dried up and the local farmers and ranchers began protesting water rights over a period of several years by seizing the aqueduct gates and dynamiting the water pipeline 17 times to stop the flow of water to Los Angeles. The political conflict over water rights between the city of Los Angeles and the Owens Valley farmers and ranchers became known as the California water wars. Mulholland viewed the civil insurrection of the Owens Valley citizens as a

https://www.youtube.com/watch?v=hkbebOhnCjA. It can be found under the title *Cadillac Desert: Part 1: Mulholland's Dream* (Segments 1-9). This quote can be found at 0:01 on Segment.

⁴⁷ See Jon Else, et al. 1997. *Cadillac Desert*. Alexandria, VA: PBS Video. Note: The PBS video on DVD is very difficult to obtain. Segments of the PBS video can be viewed on YouTube at

⁴⁸ Jon Else, et al. 1997. *Cadillac Desert*. Alexandria, VA: PBS Video. Note: The PBS video on DVD is very difficult to obtain. Segments of the PBS video can be viewed on YouTube at

https://www.youtube.com/watch?v=hkbebOhnCjA. It can be found under the title *Cadillac Desert: Part 1: Mulholland's Dream* (Segments 1-9). This quote can be found at 4:58 on Segment 3.

threat to the survival of Los Angeles and in 1927 Mulholland ordered a massive show of armed force to curtail the protests and devised a plan to secure Los Angeles' right to Owens Valley water. In March of 1928, the Saint Francis Dam, a part of the Owens Valley aqueduct, ruptured and killed more than 400 people, making it the "worst American civil engineering disaster of the 20th century."⁴⁹ When the dam began to leak, Mulholland inspected the dam just hours before it failed and pronounced it to be safe. Although he initially blamed the dam collapse on the dynamiting done by protestors, he eventually assumed complete responsibility and resigned in November of 1928 after months of hearings. Mulholland's reputation was sullied, and his career was destroyed.

Unfortunately, what seemed like a bountiful supply of Owens Valley water proved not to be adequate to keep pace with the growing demands of Los Angeles. The Owens River allowed the city of Los Angeles to expand at three times the rate Mulholland had used in calculating the supply of water that his aqueduct would provide. Despite the fourfold surplus of water that the Owens River delivered to Los Angeles, the city was running out of water only 10 years after the completion of Mulholland's aqueduct. In the PBS documentary *Cadillac Desert*, Reisner describes Los Angeles as being "almost defined by an obsessive, constant search for more and more water."⁵⁰ Mulholland had been considering the Colorado River, the Feather River, and an extension to the Mono Lake Basin as new sources of water for the ever-expanding city of Los Angeles. The Los Angeles City Council, Chamber of Commerce, and Board of Realtors

⁴⁹ See Association of State Dam Safety Officials. 2022. "Lessons Learned from Dam Incidents and Failures: Case Study: St. Francis Dam (California, 1928)." Accessed July 26, 2022. https://damfailures.org/case-study/st-francis-dam-california-1928.

⁵⁰ Ibid. This quote can be found at 5:08 on Segment 7.

continued Mulholland's quest for ever more water to sustain the unremitting population growth and expansion of the city. Motivated by water shortage rhetoric, voters continued to approve funding for new sources of water, and in 1930 the voters of Los Angeles approved a bond to fund an extension of the Los Angeles aqueduct 105 miles north of Owens Valley to the Mono Lake Basin, resulting in a total aqueduct length of 338 miles. City officials again ascribed their intentions with "seeking the greatest good for the greatest number."⁵¹ The construction of the northern extension began in 1936 and was completed in 1940. Although Mulholland originally conceived the Colorado River Aqueduct, the Metropolitan Water District (MWD) of Southern California was created by the state legislature in 1928 to construct the Colorado River aqueduct and in 1931 the voters of Los Angeles approved a bond for the construction of a second aqueduct that would carry the water of the Colorado River 242 miles to urban Southern California. In November 1934, for the only time in American history, one state, Arizona, declared war against another state, California. Arizona attempted, to no avail, to prevent California from diverting water from the Colorado River. The Colorado River aqueduct was completed in 1941. After depleting the Los Angeles River and the subsequent diversion of water from two rivers (i.e., Owens and Colorado), the water supply remained insufficient to meet the insatiable demands of the growing city. So, once again, the voters of Los Angeles, with state aid, approved a bond in 1960 to fund a third aqueduct. The 444-mile California aqueduct, a California State Water Project, diverts water from the Feather River, a tributary of the Sacramento River located 600 miles north of Los Angeles. According to the PBS Cadillac Desert documentary, the California aqueduct carries "enough water to fill the Rose Bowl every 90

⁵¹ Ibid. This quote can be found at 5:50 on Segment 7.

minutes."⁵² By the late 1960's, although Los Angeles was diverting water from three rivers, 200 miles in one direction, 250 miles in another direction, and 600 miles in a third direction, there was still not enough water to satisfy the unquenchable demand of the city. Unfortunately, attests Marc Reisner, at the time, "nobody was challenging the idea of using eight gallons of water per flush in a toilet or irrigating your lawn to the point where it's standing an inch deep in water. Nobody thought about conservation. People only thought about supply."⁵³ In 1970, the Department of Water and Power used Mulholland's plans to construct a second parallel aqueduct to divert twice the amount of water from the Mono Lake Basin to increase the water supply capacity to Los Angeles. The level of Mono Lake fell two feet every year.

The water diversion from Mono Lake, an ancient, approximately 750,000 years old, saline lake with freshwater tributary streams, wreaked havoc with its unique and productive ecosystem. Mono Lake is home to alkali flies and brine shrimp which attract millions of migratory birds and is famous for its tufa towers, limestone formations. By 1976 a small team of young biologists studying Mono Lake's fragile ecosystem discovered it was on the brink of collapse. By this time, the lake had fallen 40 feet and was three times saltier than the ocean. In addition, the continual and excessive draw-down of water from Mono Lake resulted in alkali dust storms and air pollution. The same was true for Owens Valley; in 1974 Owens Valley had the worst particulate pollution in the United States.

In 1978 the Mono Lake Committee was formed by two biologists, David Gaines and Sally Judy, to protest Los Angeles' diversions of water from Mono Lake due to the catastrophic

⁵² Ibid. This quote can be found at 3:52 on Segment 8.

⁵³ Ibid. This quote can be found at 2:00 on Segment 8.

effects the diversion was having on the ancient lake's ecosystem. In 1979, in a classic battle of "might" versus "right," the Mono Lake Committee, in collaboration with the National Audubon Society, stood up to the "Goliath" of the Los Angeles Department of Water and Power and achieved a precedent setting Supreme Court decision. Speaking about the mission of the Mono Lake Committee in the Cadillac Desert documentary, David Gaines stated, "What we are asking, what Mono Lake is asking all of us, is where are we going to draw the line? If we don't share some water with Mono Lake what will be next?... Will it be on and on until the last of our singing rivers and beautiful lakes are gone because we have taken every last drop?... It's asking us how much we are going to share with the earth."⁵⁴ More generally, the question being asked was and still is, "To whom does the water belong?" In 1983 the Supreme Court of California ruled that depleting the Owens River or the tributary streams of Mono Lake constituted a violation of the public trust doctrine. In 1988, Los Angeles was forced to return water to Mono Lake. The Supreme Court of California decision led Los Angeles to begin conservation measures on a scale never before seen in the United States and to introduce progressive water policies. Los Angeles now shares water with Owens Valley and Mono Lake. Prior to 1970, no one was questioning the damage being done to the environment due to Mulholland's water diversions from Owens Lake. However, the environmental movement in the United States in the 1970's and powerful new environmental laws began to shift public opinion. The city of Los Angeles and its Department of Water and Power also experienced a shift in mindset and aborted the plan to divert water from the Klamath and Columbia Rivers. In the concluding segment of Part 1, Mulholland's Dream, of the PBS documentary Cadillac Desert, Marc Reisner's comment has

⁵⁴ Ibid. This quote can be found at 0:49 on Segment 9.

resonance with water supply issues today, "I think ultimately it was people's feeling, why bring more water in if it just encourages more growth that forces us to bring more water in."⁵⁵ This change in mindset did not occur overnight and was the result of lived experience and environmental education. As Gaines, the lead member of the Mono Lake Committee stated, "When I grew up in Los Angeles, I never learned where water came from."⁵⁶

Relevance of Vignettes to North Central Texas

The Balinese Water Temple and the Los Angeles River vignettes powerfully illustrate how the mindsets of water, as a revered commons and as a utilitarian commodity, respectively, impact the human-water relationship. In subsequent chapters of this dissertation, I will refer back to these two vignettes to substantiate my argument that there needs to be a shift from a predominant 20th century utilitarian mindset of "thinking inside the pipe" to a 21st century mindset that restores the conception of water as a sacred commons and requires "thinking outside the pipe." The Balinese Water Temple vignette provides an example of the management of water supply that shifted from a successful traditional model viewing water as sacred to an unsuccessful 20th century model treating water as a commodity and after major cascading setbacks the eventual return to the traditional model of managing water supply and revering water. The Los Angeles River vignette illustrates the paradigmatic method of supplying and managing water in the United States. In Chapter 4, I explore the supply and management of water in North Central Texas, specifically the Trinity River watershed and how it reflects a "thinking inside the pipe" mindset and the cultural narrative established by Mulholland of

⁵⁵ Ibid. This quote can be found at 6:50 on Segment 9.

⁵⁶ Ibid. This quote can be found at 2:18 on Segment 9.

"There it is. Take it." The model of supply and management of water in North Central Texas strongly parallels that of Los Angeles in terms of reliance on feats of engineering rather than conservation, importation of water from rural to urban areas incorporating an unspoken "might makes right" justification, decision-making that is effectively relegated to the domain of "experts," the limitation of public participation to voting on bond issues to fund the necessary infrastructure to import water (campaigns for bond issue votes are tainted with dishonesty, lack of transparency, the use of scare tactics and scarcity propaganda), the social and environmental justice issues that inevitably follow in the wake of actions that precipitate from a "thinking inside the pipe" mindset, interplay of public versus private rights in water (i.e., eminent domain), and the interpretation of water law (prior appropriation, public trust doctrine, etc.). Not surprisingly, these differences in mindsets and cultural narratives are reflected in the historical context of water policy, supply, and management.

Historical Context of Water Policy, Supply, and Management

A phenomenological analysis of the historical and contemporary human-water relationship reveals a change in the human experience of water from reverence to that of commodity. Phenomenology is commonly defined as the study of conscious experience, that is, the way humans experience the appearance of "things" in the lifeworld. Phenomenology ultimately addresses the meaning or significance humans ascribe to these "things" (i.e., objects, events, time, self, others, etc.). However, from the perspective of Merleau-Ponty, the 20th century French phenomenological philosopher, "phenomenology is the study of essences" (2012, lxx). He furthermore asserts that phenomenology is also a "philosophy that places

essences back within existence" and aims to "rediscover [a] naïve contact with the world" (lxx). In other words, phenomenology strives to provide an account of the "lived" experience of the world that is "always 'already there' prior to [human] reflection" (lxx). In this chapter, I argue that the loss of human respect for water is directly related to a difference in the human perception of the essence of water brought about by technological innovation.

The history of human civilization is closely tied to water. Virtually every great city was founded near rivers or the ocean. Given that human life is not possible without water, it is not surprising that early human civilizations established cities in places with access to freshwater. This dependence on freshwater for survival gave rise to a close relationship between humans and water that was epitomized and expressed in ancient societies in multitudinous ways (Fagan 2011, xii). One way is through ancient legends, myths, images, symbols, and philosophy that acknowledge the essence or intrinsic nature of water that determines its character. The ancient Greek philosopher Thales of Miletus (c. 624-545 BC), for example, was interested in the phenomenon of change and believed that all things were composed of one thing that changed yet did not change. Thales believed that there must be something that is primary and that persists. Being familiar with the four elements of air, fire, water, and earth, Thales was certain that all things were reducible to one of these elements. His observations of the many transformations of water led him to believe that water was the originating principle or *arche* and, therefore, all things were composed of water. Another ancient Greek philosopher interested in the constant process of change was Heraclitus of Ephesus (c. 535-475 BC). Heraclitus asserted that reality is composed of a process of continual creation and destruction. In other words, all things are in a state of flux. As such, in comparing things to the current of a

river, Heraclitus claimed that it was impossible to step into the same river twice because the river and the man were not the same due to the inevitable process of change. In addition, Heraclitus was fascinated with the conflict or tension of opposites. For Heraclitus, reality is one but also many. In this regard, Heraclitus' observations of transformational flux foreshadow Merleau-Ponty's phenomenological notion of co-constitution. The ancient Taoist philosopher Lao-Tzu acknowledged the paradoxical nature of water by noting in his *Tao Te Ching*, "Nothing in the world is as soft and yielding as water. Yet for dissolving the hard and inflexible, nothing can surpass it. The soft overcomes the hard; the gentle overcomes the rigid" (1988, 78). Water was thus recognized as a vital and merciless force and was treated with respect.

Ancient civilizations revered water and placed it in the foreground of human experience. Rivers were wild and free; they meandered, flooded, and receded. Ancient societies celebrated and lived with their rivers because they perceived rivers as life-giving, mystical, and mysterious. Indeed, their reverence for water is evident in their cultural traditions. Water was incorporated into sacred rituals as well as into the architectural design of several important ancient cultural sites. In ancient Greece, the Oracle of Delphi, the priestess of the Temple of Apollo, used water from the sacred Castalian Spring, pictured in Figure 3.1, to perform her ritual purification ceremony before delivering her prophecies. It was believed that the water from the spring could cleanse the souls of visitors to Apollo's temple. The 14th century Alhambra Palace in Granada features a number of majestic fountains that provide the aesthetically pleasing sound of water from every room in the palace. Although water is a symbol of power in an arid environment, the Islamic ruler required water to provide for basic hygiene, but perhaps more importantly, to legitimize his role as religious leader because water was necessary for ablutions



Figure 3.1. Castalian Spring in Delphi, Greece.⁵⁷

before prayer (Najjaj 2015, 3). Deep in the forests of Cambodia, the ancient stone city of Angkor Wat, part of the Khmer Empire, is another example of hydraulic engineering design that incorporates religious symbolism. The temple's moats simulate the oceans surrounding Mount Meru, the home of the Hindu gods. The architects of India's Taj Mahal Garden incorporated a system of water devices to create a heavenly aura for the tomb of a Persian princess. The design of the garden and the water devices pay tribute to Paradise as described in mystic Islamic texts. These representative examples illustrate how ancient societies commemorated water by sacred shrines and rituals.

⁵⁷ Photo credit: Teresa Moss, July 30, 2018.
Although humans throughout history have manipulated rivers for irrigation, navigation, and flood protection, the Industrial Revolution in the eighteenth and nineteenth centuries dramatically changed the role of rivers in human society. The cosmogonic power and spiritual transformative capacity of water that characterized ancient societies' relationship with water gave way to modern society's focus on the economic aspects of water made possible by the advent of steam power, turbine pumps, and large earth moving machinery. The relationship of humans with water changed from recognizing water as a scarce, sacred, and respected resource to a commodity to be conquered, controlled, and consumed, in other words a commodity to be dominated and exploited. Modern human societies placed water in the background of experience. Since rivers were now associated with energy production and economic activity, they "were increasingly confined to the mercantile back regions of towns.... Often they were exiled underground, or dried, paved over, and turned into roads.... [and] Until recently...treated as cheap waste transportation to the sea" (Klaver 2012, 15). Rivers in modern society were dammed, channelized, and restrained; they no longer meandered, flooded, or receded according to their natural rhythm. Rivers were forgotten, neglected, and abused in modern societies. As a result, humans were disconnected from water.

Due to the modernization of technology, hydraulic engineers were capable of unprecedented irrigation feats. As of 2007, International Rivers reports that approximately 800,000 dams have been built worldwide, of which over 40,000 are large dams; 400,000 km² of land area have been flooded; and between 30 and 60 million people have been evicted from

their homes.⁵⁸ These statistics do not include the massive environmental damage that has ensued globally. To put this dam building activity in perspective with the relationship of humans with water, one only needs to refer to the comment of India's first Prime Minister, Jawaharlal Nehru, who called dams "temples of modern India." With these words, Nehru "perfectly expressed the engineering culture of modernity in which temples are associated with the mystical, traditional and ancient, while dams signify rationality, progress and modernity" (Klaver 2012, 17). For Nehru, dams were an integral component of his plan to modernize and industrialize India because the dammed water could be used to run power and steel plants. The 20th century adulation of dams is also epitomized by the American Society of Civil Engineers selection of the Itaipu dam, located on the Paraná River between Brazil and Paraguay, as one of the "Seven Wonders of the Modern World." Although the dam may represent an amazing engineering achievement, it is also responsible for permanently changing the course of the Paraná River, the seventh biggest river in the world, running through Brazil, Paraguay, and Argentina in Central South America. The dam construction displaced 10,000 families from their homes, submerged and later blasted Guaíra Falls, a series of 18 immense waterfalls on the Paraná River that produced the world's greatest volume of water (International Rivers 2008).

Pervasive dam construction has led to "an orgy of consumption" (Fagan 2011, xiii) resulting from water being taken for granted due to its easy access and the illusion that water is both cheap and abundant. This is especially true in the industrialized West, where people only must turn a faucet for water to appear. This appearance of water is not even considered

⁵⁸ For these and other statistics related to dams, see International Rivers. 2007. "Damming Statistics." Accessed July 27, 2022. https://archive.internationalrivers.org/damming-statistics.

miraculous. The availability of water to meet any and all human needs and desires in the industrialized areas of the world has led people to be indifferent to water. In fact, according to a nationwide poll, 77% of American people who rely on public water supplies are not able to identify their source of drinking water (The Nature Conservancy 2015). Despite water being a resource that is absolutely necessary for life, people not only have become indifferent to it, but also feel entitled to it.

Due to the progressive increase in the world population and the expansion of urban areas, more and more water is needed for agriculture and industry. As a result of these trends, the demand for water has skyrocketed and the world's water supply is declining. It is projected that by the year 2025, 2 billion people, over a third of the world's population, will be living in water-short regions (Black and King, 2009, 22). Because fresh water is a critical limiting factor for health, food security, economic growth, biodiversity, and environmental sustainability, it is thus a limiting factor for human culture (Klaver 2012, 20). An old adage states that by following a river you will eventually be led to a sea. In the 20th century, that saying is no longer true. Due to impoundment and overuse due to agriculture and industry, many of the world's major rivers (e.g., Amu Darya, Colorado, Euphrates, Indus, Nile, Rio Grande, Tigris) dry up before reaching their intended final destination. Similarly, due to over-pumping and pollution, the world's groundwater supplies are declining. In fact, using satellite imagery from NASA, scientists have determined that more than half of the planet's largest 37 aquifers have declined since 2003 (USA Today 2015). Contemporary human society should pay heed to these statistics.

Throughout history there is a record of civilizations that have collapsed due to a lack of water (e.g., Akkadian Empire of Syria, ancient Egypt, Maya, Tang Dynasty, Anasazi, Khmer

Empire). The collapse of a civilization is generally due to a multitude of complex events, but according to Justin Sheffield and Eric Wood, drought experts and the authors of Drought: Past Problems and Future Scenarios (2011), drought is often either the primary or a significant contributing factor (78). In their book, Sheffield and Wood identify several civilizations that most likely collapsed, in part, because of drought. Based on evidence from dust deposition in marine sediments, the Akkadian Empire in Syria and the Old Kingdom in Egypt collapsed from a 100-year drought that occurred 4,200 years ago (78). In terms of ancient Egypt, the drought produced a cascade of events which resulted in the collapse of the civilization. The drought significantly decreased the regular flooding of the Nile River and led to poor harvests and famine. The poor harvests resulted in reduced tax income. The lack of sufficient funds to finance the government ultimately hastened the demise of the ancient Egyptian civilization. The Mayan civilization (2600 BC-1200 AD), despite having a well-developed scientific and social structure, suddenly collapsed in the 9th century AD. Paleoclimate data from tree rings and lake cores suggest that the civilization experienced a series of devastating droughts during this time (79-80).⁵⁹ Coincident to the collapse of the Maya civilization, the Tang Dynasty (700-907 AD) was also experiencing the demise of its empire due to drought-related crop failure and famine. Lake sediments indicate that there was a sudden and substantial decline in the monsoon rainfall during the years of decline of the civilization.⁶⁰ Closer to home, in the Southwest United

⁵⁹ To learn more about the collapse of the Mayan civilization see Haug, G. H., et al. 2003. "Climate and the Collapse of Maya Civilization." *Science* 299:1731-1735 and Diamond, Jared. 2005. *Collapse: How Societies Choose to Fail or Survive*, New York: Penguin Books, 173-174.

⁶⁰ To learn more about the collapse of the Tang Dynasty see Yancheva, G., et al. 2007. "Influence of the Intertropical Convergence Zone on the East Asian Monsoon." *Nature*, 445:74-77. To learn more about drought in China, read Fagan, Brian. 2011. "China's Sorrow." In *Elixir: A Human History of Water*, 222-243. London: Bloomsbury.

States, the Ancestral Puebloans, formerly referred to as Anasazi by the Navajo, survived several earlier droughts before succumbing to the 300-year drought called the "Great Drought" which began in 1150 AD, notes Jared Diamond, author of *Collapse: How Societies Choose to Fail or Survive* (2005, 422). After the collapse of agriculture and social order, the Ancestral Puebloans abandoned their settlement and became dispersed and integrated with other cultures. In *Drought*, Sheffield and Wood attribute the downfall of the Khmer Empire in Angkor, Cambodia (802-1431 AD) to multiple severe "decadal droughts," two of which occurred between the late 1300s and early 1400s as recorded by tree-ring records (2011, 86-87).⁶¹ Severe droughts would have been crippling to a civilization dependent on irrigation for growing rice. According to the analysis of lake sediments, the Ming Dynasty (1368-1644 AD) in China collapsed in 1644 due to the impacts of an intense drought that Sheffield and Wood attribute to a weakened monsoon driven by El Niño conditions in the Eastern Pacific (84-86).

The collapse of these cultures should serve as sobering examples of what can happen to civilizations when "sustainability evaporates" (Fagan 2011, xxii). Scientists are claiming the current megadrought being experienced in the Western region of the United States is the worst drought since 800 CE, and the drought is being exacerbated by anthropogenic climate change.⁶² We can no longer assume that we can continue to consume water in whatever quantities we desire or for whatever purposes we wish. Nor can we continue to ignore and deny the myriad signs that are indicative of an impending global water crisis. Contemporary society must make a

⁶¹ For more information on the role of climate in the demise of the Khmer Empire, see Buckley, B. M. et al. 2010. "Climate as a Contributing Factor in the Demise of Angkor, Cambodia." *Proceedings of the National Academy of Sciences of the United States of America* 107:6748-6752.

⁶² See Osborne, Margaret. 2022. "The Western U.S. is Experiencing the Worst Drought in More Than 1,200 Years." *Smithsonian Magazine*, February 17. Accessed July 27, 2022. https://www.smithsonianmag.com/smart-news/the-western-us-is-experiencing-the-worst-megadrought-in-more-than-1200-years-180979590.

concerted effort to live within their hydrological means. Hence, conservation has to move to center stage. According to Sandra Postel of the Global Water Policy Project, conservation is our "last oasis" (Postel 1997). For this to successfully occur, humans must change their relationship with water. We must once again learn how to respect and revere water and to realize its true value. As Benjamin Franklin once said, "When the well's dry, we know the worth of water." The current era of water wastefulness must be transformed into an era of water conservation. After all, "history teaches us that the societies that last longest are those that treat water with respect, as an elixir of life, a gift from the gods" (Fagan 2011, xxvii).

Rise of Disciplinarity: Divergence of Humanities and Science

Whether or not a culture views water, or other natural resources, as "a gift from the gods" is a derivative function of the prevailing cultural narrative or story. Before the birth of philosophy, there was mythology. The etymological origin of the word mythology comes from the combination of two Greek root words, *mythos* (story) and *logos* (speech). Thus, mythology is the spoken story of a people or civilization. The first attempts to explain the origin and nature of the world were accomplished through myths; stories initially told through an oral-poetic tradition. The myths with which the Western world is most acquainted are the classical Greek and Roman myths. Around 750-700 BCE, Homer and Hesiod, ancient Greek poets, were the first in Europe to create a written record of the long oral tradition of the myths that provided a supernatural explanation of the origin and interrelationship between the cosmos, world, gods, supernatural beings, and humans. These myths provided a sense of order in what often was perceived as a chaotic world. The ancient Greek myths appealed to divine authority and

tradition for making sense of the world and the role of humans in that world because humans were not believed to be capable of ascertaining the nature of reality on their own. As such, the validity of myths was not questioned and appeals to evidence or need for critical scrutiny was deemed unnecessary, divine warrant was sufficient.

In the 6th and 5th centuries BCE, rational thought emerged from the confines of mythology with the pre-Socratic philosophers' systematic approach to explaining the cosmos. The pre-Socratic philosophers demanded naturalistic explanations of natural phenomena derived from their sheer power of reason rather than from authority and religious tradition. In so doing, the pre-Socratics embarked on a highly original and unprecedented mode of inquiry into the nature of things that was markedly different from the mythopoeic perspective of Homer and Hesiod. The pre-Socratic philosophers not only presented and defended their own views of the nature of reality, but also critiqued the views of others, thus establishing *logos* or reasoned discourse and giving birth to philosophy in the Western world.

Western philosophy began in the Mediterranean Greek-speaking world in the 6th century BCE with Thales of Miletus, identified as the first Western philosopher, who questioned, "What is the basic material of all things?" On May 23, 585 BCE, Thales predicted a solar eclipse; in so doing, he may also be considered the first Western scientist. This is an important point; it was not uncommon for the pre-Socratic philosophers to be virtually indistinguishable from natural scientists. At this point in time, philosophy and science had not diverged as separate academic disciplines. Philosophy housed all fields of study (including astronomy and mathematics) and is regarded as the mother of all disciplines. In "The Problems of Philosophy," Bertrand Russell (2011) explains, "…as soon as definite knowledge concerning

any subject becomes possible, this subject ceases to be called philosophy, and becomes a separate science" (1142). In other words, modern science began as natural philosophy, an admixture of philosophy and science.

Philosophy and science gradually diverged as approaches to attaining knowledge changed. A distinction between philosophy and empirical science first began to appear in the works of the ancient Greek philosopher and scientist, Aristotle (384-322 BCE), who valued evidence and observation. The gap between philosophy and science grew more marked when Theophrastus, Aristotle's successor, shifted the focus of the Lyceum from logic to experimentation. In "The Origin of the Separation Between Science and Philosophy" (1952), Philipp Frank, 20th century physicist and philosopher, asserts, "The period around 1600 marked the 'birth of modern science and philosophy'" (123). During this time of the Scientific Revolution (1543-1687), Francis Bacon, Galileo Galilei, Johannes Kepler, René Descartes, and Isaac Newton advocated for using a new scientific methodology that relied on direct experimentation and data analysis to describe phenomena with mathematical precision. This new methodology, emphasizing the value of formulating simple laws of nature over the reporting of unenlightened sense impressions, marked a turning point in intellectual history and changed the prevailing myth or cultural narrative that explained the way society understood the universe and the role of humanity in that universe. The trajectory of science away from the tradition of Greek mythology and philosophy resulted in elevating rationality, the workings of the mind, over the spiritual and mystical ways of embodied knowing. Indeed, in *Meditations on* First Philosophy, the metaphysical revelations of Descartes' thought experiment of doubt led

not only to the Cartesian dualism of the mind-body problem, but also to the problem of disenchantment with the natural world.

Descartes' approach, which separated mind and body, subject and object, deemed "real" only that aspect of human experience which is objectively measurable or quantifiable. This advance led, notoriously, to the abject neglect of "irrational," subjective phenomena. His breakthrough...enabled late Renaissance people to rid the world of superstition, witchcraft, magic, and the gamut of mythical creatures - both evil and good - in one clean, scientific sweep. But as [Rollo] May laments, "what we did in getting rid of fairies and the elves and their ilk was to impoverish our lives.... Our world became disenchanted, and it leaves us not only out of tune with nature, but with ourselves as well." (Diamond 1991, 182)

Disenchantment is thus a consequence of the bifurcation of mind from body and body from

world. In terms of Merleau-Ponty's relational ontology, Cartesian dualism and scientific

objectivism result in a disembodied existence rather than an embodied existence in the world

and engagement with the world. In other words, disenchantment is the absence of his

ontological concept of "flesh," which he describes in The Visible and the Invisible as a formative

way of being that envelops both the sentient-sensible and the sensed-sensible (1968, 147).

This problem of disenchantment was also acknowledged by Joseph Campbell in his

conversation with Bill Moyers in *The Power of Myth* (1991).

One of our problems today is that we are not acquainted with the literature of the spirit.... Greek and Latin and biblical literature used to be part of everyone's education. Now, when these were dropped, a whole tradition of Occidental mythological information was lost. It used to be that these stories were in the minds of people. When the story is in your mind, then you see its relevance to something happening in your own life. It gives you perspective on what's happening to you. With the loss of that, we've really lost something because we don't have a comparable literature to take its place. These bits of information from ancient times, which have to do with the themes that have supported life, built civilizations, and informed religions over the millennia, have to do with deep inner problems, inner mysteries, inner thresholds of passage, and if you don't know what the guide-signs are along the way, you have to work it out yourself. (1-2)

In other words, the lens of science created one way of viewing the world and it essentially obliterated an older way of knowing that was provided by the mythological stories contained in the humanities. In Chapter 5, I will discuss how disenchantment and the lost sense of wonder, inhibits the possibility of seeing the world in new ways. The proclivity of the modern scientific worldview to create order by reducing the complexity of the universe to more manageable simple laws and mechanics generates preconceptions that limit our experiences and our potential to discover different ways of explaining reality.⁶³

The utilitarian aspect of modern science can be seen in Descartes' "tree of philosophy" that explicates the metaphorical relationship between the structure of science and philosophy and the parts of a tree: philosophy (i.e., metaphysics), representing general philosophical principles originating in introspection, is analogous to the roots of a tree; physics, symbolized by the trunk of a tree, represents the laws governing the physical world; and the applied sciences (i.e., technology) are represented by the branches of the tree that produce and bear the fruit. In "The Origin of the Separation Between Science and Philosophy," Frank notes, "Descartes did not ascribe any utility to general principles alone; they had to be checked through their observable consequences or 'fruits'" (1952, 124). In other words, philosophy became subservient to science in that general principles needed to serve the practical needs of the technical engineer. The split between humanities and science was created by a perceived hierarchal divide between intellectuality and practicality. The emphasis of modern science on

⁶³ For a detailed discussion of how preconceptions, or what Thomas Kuhn refers to as "paradigms" or "worldviews," structure the way in which we understand and explain reality, see his classic and landmark book, *The Structure of Scientific Revolutions*, 2nd ed. (Chicago: University of Chicago Press, 1970).

practicality and the goal of the Industrial Revolution (1760-1840) to improve the efficiency of production spurred increasing levels of specialization.

In 1959, Charles Percy Snow, a British novelist and scientist, gave a Rede Lecture at Cambridge University describing the split of the Western intellectual and practical life into two cultures: the "literary intellectuals" and the "physical scientists." The lecture was based on his own personal and professional experience as both a novelist and a scientist. These two cultures are now broadly identified in academia as the humanities and sciences. This polarization has resulted in an absence of dialogue between the two cultures primarily stemming from a "gulf of mutual incomprehension" (169). In his famous "The Two Cultures" lecture, published in *Leonardo* in 1990, not only does Snow "believe the intellectual life of the whole of western [*sic*] society is increasingly being split into two polar groups," he also expounds on how this split poses a major hindrance to solving societal problems (169). He argues that the lack of understanding of the value and relevance of the other academic culture leads to impoverishment of not just the two disciplines in particular but of society in general, "...at the heart of thought and creation we are letting some of our best chances go by default. The clashing point of two subjects, two disciplines, two cultures...ought to produce creative chances. In the history of mental activity that has been where some of the break-throughs came. The chances are there now. But they are there, as it were, in a vacuum, because those in the two cultures can't talk to each other" (172). He argues that both disciplines are "tone-deaf" to the other in large part because they dismiss those in the other culture as "ignorant specialists" and ironically are blind to their own level of ignorance and specialization (172).

Marcelo Glesier (2016), a 21st century theoretical physicist and writer, explains that as these two cultures diverged from one another, they created separate languages, methodologies, academic values, and questions to investigate. This divergence created two different narratives and ways of knowing and being in relation to the world. Snow argues that the only viable solution to this polarization conundrum is to rethink education, specifically decreasing the intensity of specialization. He asserts that the process of specialization "…is a disastrous process, for the purpose of a living culture" and, in fact, may prove to be fatal to the ability "to perform our practical tasks in the world" (1990, 173). Gleiser agrees. He argues that both the humanities and the sciences can mutually benefit from sharing their knowledge and creating a joint narrative to tackle what he calls the "big questions" that have sweeping social implications.

In Socrates Tenured: The Institutions of 21st-Century Philosophy (2016), field philosophers Robert Frodeman and Adam Briggle, lament the concurrent institutionalization of philosophy with the advent of the modern research university. Frodeman and Briggle posit, "Specialization, accreditation, professionalization...while the *sine qua non* of academic life, should be recognized as problematic to philosophic inquiry" (59). In Chapters 4 and 5, I argue not only the disciplining of philosophy, but also the disciplining of all branches of science is problematic. The boundaries between the two cultures of humanities and science are illusory and prohibit interdisciplinary engagement to better understand the philosophical and ethical consequences of scientific and technological advancements and to creatively address and potentially solve societal problems. Moreover, Brian Swimme, a mathematical cosmologist and author of *The Hidden Heart of the Cosmos: Humanity and the New Story* (1996), acknowledges

that the destructive phase of science on European and traditional worldviews is ending and a new integrative period is beginning (3). He states, "...the opportunity of our time is to integrate science's understanding of the universe with more ancient intuitions concerning the meaning and destiny of the human" (3). In this regard, Swimme is recommending a deep integration of the humanities and science that includes ancient ways of knowing and being in the world, an integration of *mythos* and *logos*. In Chapter 5, I will explicate how a new narrative can facilitate a re-imagining of the relationship between humanity and water by reconverging humanities and science, *mythos* and *logos*.

Fortunately, today in the 21st century, there is a growing awareness of the need to merge the bifurcation between the humanities and sciences and to dismantle the barriers that have been erected between the two fields. To first understand and eventually to solve the wicked problems confronting the world today requires both humanistic and scientific mindsets. The two disciplines are not incompatible, rather they are complementary. Each discipline has a different way of seeing and approaching the world. In this regard, I am reminded of the children's story *Seven Blind Mice* by Ed Young. Each of six blind mice investigate a different portion of a "strange Something by their pond." Not surprisingly, each investigation results in six different interpretations. However, the seventh blind mouse explores the entirety of the "strange Something" and arrives at a different, but accurate interpretation. As the author articulates, the moral of the mouse story is, "Knowing in part may make a fine tale, but wisdom comes from seeing the whole." Working as separate disciplines, the humanities and the sciences arrive at different and diverging interpretations of the world because of their different approaches. Working together, the two disciplines can re-analyze their different interpretations

through the convergence and synthesis of their different ways of seeing and interpreting into a more coherent whole by allowing the space for imagination and creativity sparked by the diversity of views.

It should be noted that the transition from *mythos* to *logos* had significant ramifications not only in the way individuals theorized and understood the world, but also in the way humanity confronted and experienced the world around them. Prior to the pre-Socratics, the causation of events and phenomena were attributed to the agendas of gods, spirits, and other supernatural forces. For the pre-Socratic philosophers, impersonal and natural forces were responsible for the events and phenomena observed and experienced in the world. In "Myth and Reality" (1946), Henri Frankfort, a 20th century archaeologist who extensively studied Mesopotamia and Egypt, uses the "I-Thou" and "I-It" distinction first conceptualized by Martin Buber, a 20th century prolific philosophical author and scholar, to fundamentally differentiate between the thinking of "ancient/primitive" and "modern scientific man" regarding the surrounding world. According to Frankfort, the mythopoeic thought of ancient and primitive man interpreted the phenomenal world as a "Thou," and consequently perceived all entities as animate, full of life and spirit with intentions of their own. In contrast, the analytical thought of modern scientific man perceives the phenomenal world as an "It," and considers part of the phenomenal world to be inanimate and subject to be manipulated and utilized for the benefit of humanity (4).

For ancient/primitive man, "Thou" is perceived as a living presence with an unpredictable character known through the revelation of itself (5). In other words, the relation between "I" and "Thou" is analogous to a "subject-subject" association. "It," on the other hand,

is comprehended by modern scientific man as an object ruled by universal laws, making "It's" behavior consequently predictable (5.) The "I-It" relationship is typified by a subject-object association. Contrary to popular belief, Frankfort clarifies, ancient/primitive man did not impart human characteristics to an inanimate world. Rather, ancient/primitive man had no conception of an inanimate world, the world was completely and fully alive (5). Ancient/primitive man thus experienced "Thou" emotionally in a dynamic and reciprocal relationship. Although the products of mythopoeic thought are products of the imagination, they are not fantastical elaborations as exemplified by legends, fables, and fairy tales; true myths are presented with a compelling authority that substantiates the revelation of a "Thou" (7). The myth of ancient/primitive man "reveals a significant, if unverifiable, truth...a metaphysical truth. But myth has not the universality and the lucidity of theoretical statement" (7). However, this does not represent a flaw with myth, it simply portrays the lived experience and attitude of ancient/primitive man in relation to the world. Myths were justified by faith and not by critical analysis.

Modern scientific thought reduces phenomena through critical and analytical means to universal laws and in so doing, Frankfort asserts, "... it creates an increasingly wide gulf between our perception of the phenomena and the conceptions by which we make them comprehensible" (11). The "I-It" relation allows modern scientific man to distinguish between subjective and objective knowledge and between reality and appearance. These distinctions were not available to ancient/primitive man since they viewed the world through the relation of "I-Thou" (11). According to Frankfort, causality is recognized by both ancient/primitive and modern scientific man, but he notes some significant differences. Ancient/primitive man would

not agree with the "impersonal, mechanical, and lawlike functioning" attributed to causality by science (15). Since ancient/primitive man was innately grounded in the phenomenal world, the search for a source of causality could not be removed from immediate experience; "It [the primitive mind] looks, not for the 'how,' but for the 'who,' when it looks for a cause. Since the phenomenal world is a 'Thou' confronting early man, he does not expect to find an impersonal law regulating a process. He looks for a purposeful will committing an act" (15). Modern scientific explanations that rely on universal laws reduces phenomena to generalities and this view also would not satisfy the concrete, individual experiences of ancient/primitive man (16). Rather than analyzing an event intellectually and reductively, ancient/primitive man experienced phenomena holistically and embraced its "complexity and individuality" (16). Accordingly, "Since he [ancient/primitive man] does not isolate an event from its attending circumstances, he does not look for one single explanation which must hold good under all conditions" (Frankfort 1946, 16). A mythopoeic mind is consequently characterized by a multiplicity of approaches to problem-solving.

In many respects, I find the workings of the mythopoeic mind of ancient/primitive man to be curiously comparable to the 20th century conceptions of Merleau-Ponty; both acknowledge the inherent reciprocal relationality between and among entities (i.e., animate and inanimate), the process and power of revelation of presence (i.e., agency), and the primary importance of historicity (i.e., understanding of situated context) and corporeality (i.e., embodied experience).⁶⁴ I also find congruence between mythopoeic thought, Buber, and Merleau-Ponty in terms of the encounter or revelation of presence taking place in an in-

⁶⁴ I discuss these concepts of Merleau-Ponty in detail in Chapter 2 of this dissertation.

between, mutual space which resonates with Merleau-Ponty's conceptualization of flesh and the nature of revelation permitted by an "I-Thou" distinction as explicated by Buber and which Frankfort applies to the mythopoeic thought of ancient/primitive man. To summarize the complicated nature of myth, Frankfort offers these words, "Myth is a form of poetry which transcends poetry in that it proclaims a truth; a form of reasoning which transcends reasoning in that it wants to bring about the truth it proclaims; a form of action, of ritual behavior, which does not find its fulfillment in the act but must proclaim and elaborate a poetic form of truth" (8). Myths and rituals played an integral role in the culture of ancient/primitive man.

From the perspective of the 21st century, this begs the question, "Are myths, stories told to explain how the world came to be and the human role in that world, a thing of the ancient past?" The answer according to Mary Midgley, a 20th century British philosopher, the resounding answer is "No." Myths have been, and still are, a part of every culture in the world. Midgley's book, *The Myths We Live By* (2004), begins with the assertion, "We are accustomed to think of myths as the opposite of science. But in fact, they are a central part of it: the part that decides its significance in our lives" (1). This statement is not surprising given that Midgley avidly opposed scientism, reductionism, and the substitution of science for the humanities. Midgley defines myths as "imaginative patterns, networks of powerful symbols that suggest particular ways of interpreting the world. They shape its meaning" (1). She provides the example of how machine imagery introduced in the 17th century as an explanatory tool reflected the reductionist and atomistic ideology of science.⁶⁵ Although the reductionist and

⁶⁵ A reductive and atomistic explanation of the universe contends that complex wholes can be understood by breaking them down into their smallest elementary constituent parts. Atomism can be traced back to two ancient

atomistic perspective was still pervasive in the 20th century; it is beginning to change because of the findings of quantum physics. However, mechanistic imagery still plays a dominant role in shaping our view of reality, but Midgley argues that there are three 17th and 18th century Enlightenment myths that incorporate a reductionist and atomistic worldview which bolster mechanistic symbolism: the social contract myth, the progress myth, and the myth of omnicompetent science (8).

Midgley asserts that the social contract myth is a "typical piece of Enlightenment simplification" (12) espousing the idea that "morality is essentially just a contract, freely made between fellow citizens for civic purposes and ultimately for individual self-interest" (11). Although Midgley acknowledges the appropriateness of creating the social contract myth to negate the doctrine of the divine right of kings and to ground political authority in the consent of the governed, she stresses the major limitation of the social contract myth, "it leaves no room for duties to outsiders" (12). In essence, the social contract myth develops and supports the dualistic ideology of "us" (humans, whites, males, etc.) versus "them" (nature, people of color, females, etc.). The social contract myth, according to Midgley, is thus in "conflict with another equally central Enlightenment idea, namely, the unity of all humanity" and subsequently the advocacy of universal rights (12). These two Enlightenment ideas were and are still seen to be in direct opposition to each other. Midgley states the social contract myth represented "the formal, legalistic, reductive" (12) side and the appeal for universal rights expressed the "outgoing, generous, sympathetic" (12) side of a humanitarian campaign within

Greek philosophers, Leucippus and Democritus, who argued that the everything in the universe can be accounted for by the combination and interaction of indivisible atoms.

the same culture that became equated with a conflict between reason and feeling. In the next section, I will discuss how these two sides exemplify two different models of social organization: partnership and dominator. However, Midgley argues that this perceived duality is an illusion, "Thought and feeling are not opponents, any more than shape and size. They are complementary aspects which appear on both sides of any argument" (13). A mindset of "us" versus "them" is analogous to Buber's "I-It" in terms of the types of relationships which are made possible in the cultural narrative. I will explore this notion further in Chapters 4 and 5.

The myth of inevitable progress and the myth of the omnicompetence of science are intertwined and are closely linked with what Midgley characterizes as "intellectual imperialism" (18). It should be noted that when Midgley refers to the omnicompetence of "science," by and large, she is referring to the physical sciences, namely the disciplines of physics and chemistry. She criticizes the physical sciences for assuming that early modes of thinking apply across all forms of knowledge, time, and culture. Embedded in the assumption of the physical sciences is the belief that these early modes of thinking are the only forms of rational thought and therefore should be sweepingly applied to all topics, hence the term "intellectual imperialism." The myth of omnicompetence portrays science as able to answer every kind of question including questions about value (3). Much like the society of Bensalem in Bacon's New Atlantis, Midgley contends that we live in "an age that is *quided* by science" and, as such, our society selects its ideals and values based upon the provisions of scientific research (21). In the 20th century, and perhaps to a lesser degree in the 21st century, the term "scientific" has been used to convey a sense of moral value to influence the direction and scope of societal change. Midgley asserts using the word "scientific" in this manner has meant that the term "often has

not stood for any particular form of scientific knowledge but for a new scale of values, a new priority system, leading to particular political projects" (21). In the last section of this chapter, I will discuss how these three myths shape the cultural narrative and thus impact the decisionmaking process involved in water supply and management.

These three myths, as do any myths, determine how we imagine and ascribe value to the world and entities of the world. Midgley states that these three myths are problematic and need to be rethought because they "still shape our intellectual and moral thinking" even though the world has undergone radical changes since these myths were first forged 300-400 years ago (10). She explicates the urgent need to question these myths because "...patterns of thought that are really useful in one age can make serious trouble in the next one. They don't then necessarily have to be dropped. But they do often have to be reshaped or balanced by other thought-patterns in order to correct their faults" (5-6). Midgley's statement substantiates my argument that we need to shift from "thinking inside the pipe" to "thinking outside the pipe." To be clear, in championing a shift in mindset, I am not promoting completely "throwing the baby [science and technology] out with the bathwater." I am not even suggesting that science and technology in and of themselves are a problem, rather, the underlying myths that have heretofore served as the foundation for science and technology need to be reformulated and better aligned with the current context of water issues plaguing contemporary society. Both types of thinking, inside and outside the pipe, are needed to solve the wicked problems manifest in water supply and management in the 21st century. Identifying and solving water issues today is not a simple question of "either-or;" rather, it is a complex question of "bothand." We definitely need science and technology, but wicked problems cannot be solved by

science and technology alone. I am advocating, therefore, for an integration of the *mythos* and *logos* ideologies to help guide decision making relative to wicked problems in the 21st century. A balance of both types of thinking are needed to solve contemporary water problems.

A professional and cultural shift in mindset towards water issues will not occur overnight. As Midgley astutely acknowledges, "The belief in instant ideological change is itself a favourite [*sic*] myth of the recent epoch.... Prominent ideas cannot die until the problems that arise within them have been resolved.... They are organic parts of our lives, cognitive and emotional habits, structures that shape our thinking.... Instead of dying, they transform themselves gradually into something different, something that is often hard to recognize and to understand.... We do better to talk organically of our thoughts as an ecosystem trying painfully to adapt itself to changes in the world around it" (6-7). New mindsets emerge through time in response to epistemological rupture. Myths have the capability of transforming reality, and in so doing, can affect the way in which a society structures the relations between humans and between humans and nature. In *The Chalice and the Blade: Our History, Our Future* (1995), social scientist and cultural historian, Riane Eisler, identifies and discusses the historical cyclicity of two contrasting principles of societal organization, partnership and dominator, and the profound effect these organizational principles have on thought and action.⁶⁶

⁶⁶ For an expanded discussion of how behaviors, values, and socioeconomic institutions develop differently in a partnership versus dominator model of society see Eisler, R. and Douglas P. Fry. 2019. *Nurturing Our Humanity: How Domination and Partnership Shape our Brains, Lives, and Future*. New York: Oxford University Press.

Partnership versus Dominator Models of Civilization

Using data from what James Mellaart, a 20th century English archaeologist, described as an "archeological revolution" revealing a hidden past, made it possible for Eisler to consider "the whole human history (including our prehistory) as well as the whole of humanity (both its female and male halves)" (1995, xv), in order to weave together a new story of our cultural origins. Using evidence gleaned from a diversity of fields, including art, archaeology, religion, social science, history, and others, Eisler identified two patterns of social organization in the cultural evolution of Western society, partnership and dominator, that "affect our cultural, social, and technological evolution" (105). The partnership model of society is characterized by social relations that are linked rather than ranked. This egalitarian model of society does not equate diversity with the hierarchical principles of inferiority or superiority. In addition to being gender-balanced, a partnership system of society is characterized by peacefulness, collaboration, and sustainability. The dominator model of society not only ranks one half of humanity over the other (i.e., patriarchy or matriarchy), it also ranks race over race, and humanity over nature. Eisler's concept of a partnership society is resonant with Buber's "I-Thou" distinction, whereas her dominator system correlates with the Buberian concept of "I-It."

Based on her analysis of the data, Eisler constructs a "Cultural Transformation" theory proposing, "the original direction in the mainstream of our cultural evolution was toward partnership but that, following a period of chaos and almost total cultural disruption, there occurred a fundamental social shift" (xvii). Eisler is not the only scholar that has noted this shift. Marija Gimbutas, former Professor Emeritus of Archaeology at the University of California at Los Angeles, renowned for her research on the Neolithic and Bronze Age cultures of "Old

Europe," wrote extensively on the social organizational shift that occurred in Old Europe as a result of Indo-European invaders from the north. Prior to the invasion, Old Europe was a "matrifocal, sedentary, peaceful, art-loving, earth- and sea-bound culture...[that was an] unstratified, egalitarian society" (Bolen 2014, 20). The invaders, on the other hand, were "patrifocal, mobile, warlike, ideologically sky-oriented, and indifferent to art...[and] viewed themselves as superior people because of their ability to conquer the more culturally developed earlier settlers" (20). This shift in social organization was from a partnership to a dominator model of society. According to Eisler, partnership societies "worshiped the life-generating and nurturing powers of the universe" (1995, xvii) that historically have been symbolized by the ancient chalice and dominator societies worshipped the "power to take rather than give life...to establish and enforce domination" (xvii) symbolized by the blade. Eisler moreover states that there has been a concomitant shift in the emphasis of our technologies away from those that sustain and enhance life to those that are designed to destroy and dominate (xx).

The fundamental structuring of societal relations between the two halves of humanity not only effects institutions, values, and the direction of cultural evolution as Eisler asserts, but also, I contend it changes the cultural narrative which impacts decision making and the human relationship with the environment, thereby effecting the ecological balance. At the beginning of this chapter, I provided vignettes exemplifying two different mindsets toward the natural resource of water. The Balinese water temples not only reflect a mindset of viewing water as a revered commons, but also reflect a societal organization based on partnership. The Los Angeles River vignette, on the other hand, describes a mindset that perceives water as a

utilitarian commodity and a natural resource to be conquered, reflecting a societal organization based on a dominator model of society. Contemporary water supply and management problems are not surprising when viewed from a dominator model of society. The stories that Eisler shares in her book lead her to contend that the combination of a dominator model of social organization and our advanced level of technological development in the Western world have created the dire social and environmental global problems we are currently experiencing (xxiii). She also asserts that these problems cannot be solved within the same model of society in which they were created. This begs the question of whether or not it is possible to shift back to a partnership system of social organization. Eisler's answer is it is possible to move into a new era of partnership "through new ways of structuring politics, economics, science, and spirituality" (xxiii). She argues that this shift represents a "break*through*" rather than a breakdown of cultural evolution.

It is my contention that this "break*through*" will only occur with a shift in the cultural narrative that will consequently lead to a shift in social structure that provides the potential of giving rise to a new pattern of thoughts and action. A shift in social system organization would not be unprecedented. In the *Chalice and the Blade*, Eisler discusses the periodic alternations between partnership and dominator societies that historically have taken place. These alternations in social organization also have coincided with a shift in values, "reflected…in the periodic struggle between the stereotypically hard 'masculine' values, symbolized by the Blade, and the stereotypically soft or 'feminine' values symbolized by the Chalice" (137). Based on the aforementioned writings of Frankfort and Midgley, I assert that the partnership and dominator models of society embrace the *mythos* and *logos* ideologies, respectively. I will discuss this

assertion in detail in Chapter 5 where I will also describe how Watershed Education Community Action Networks (WE CANs) can be created based on a partnership model of society. In this chapter, I have provided background information to facilitate an understanding of the key factors that have led to a mindset characterized by "thinking inside the pipe" and therefore a reliance on policy that focuses on importing water to meet demands that has left a wake of social and environmental injustice. The next section explores the prevailing cultural narrative of the 20th century and how narratives in general provide a lens through which water issues are viewed, thus having a direct impact on the type of decisions that are made.

Impact of Cultural Narrative on Decision-Making Process

In the philosophical novel entitled *Ishmael* (1992), the author, Daniel Quinn, engages two characters, a gorilla teacher named Ishmael and his student the human narrator, in a Socratic dialogue to explore the origins of humanity, the relationship between nature and humans, and the possibility of surviving the human-induced destruction of the planet. Early in the novel, Ishmael declares that to understand how our global problems came to be and to identify possible solutions it is important to define three key concepts: story, to enact, and culture. A myth is a *story* to explain how things came to be the way they are and to describe the interrelation of man, the world, and the gods; *"to enact* a story is to live so as to make the story a reality" and "a *culture* is a people enacting a story" (41).

Any cultural narrative, as Quinn explains, contains unquestioned influences and hidden premises that influence how members of that culture experience the world and how they think and act in that world. In *Ishmael*, Quinn asserts that humanity has enacted essentially two

separate cultural narratives based entirely on different and contradictory premises: a "Taker" narrative that began to be enacted approximately 10,000 years ago and has led to the dire consequences we are now facing and a "Leaver" narrative that began to be enacted over 2-3 million years ago and is successfully still being enacted (38-39). The narrative of the Takers came to be the same narrative of people of our modern scientific culture and the narrative of the Leavers is the narrative of the people of all other cultures, cultures Quinn refers to as primitive, which equates to Frankfort's earlier description of ancient/primitive man. Of note are the resonances of Quinn's Taker culture with a culture infused with a *logos* orientation to the world and what Eisler would identify as a dominator model of social organization and the Leaver culture with a culture imbued with a *mythos* orientation to the world and what Eisler would identify as a partnership model of social organization. I contend that a culture with a "thinking inside the pipe" mindset derives from a Taker cultural narrative, whereas a culture with a "thinking outside the pipe" mindset evolves from a Leaver cultural narrative. Quinn argues that the Taker cultural narrative is self-destructive in its promotion of the status quo which holds our culture captive by shackling us to unquestioned and hidden premises which obscure the possibility of exploring other ways of being in the world. In this way, members of a Taker culture are the epitome of the prisoners in Plato's allegory of the cave. Takers have been told an explaining story, a myth, that placates and pacifies and thus prevents them from searching for the bars of their cage of captivity. Through a Socratic dialogue, Ishmael and the narrator, engage in a mental archaeological excavation and uncover the hidden premises of the Taker culture. First, as depicted in Figure 3.2, man is the pinnacle of creation, "Man is the end product of creation. Man is the creature for whom all the rest was made: this



Figure 3.2. Humanity as hierarchy, humanity as community.⁶⁷ Graphic representation of "taker" and "leaver" views on humanity's role in the environment.

world, this solar system, this galaxy, the universe itself" (57). Second, the world was made for humanity, "The takers regard the world as a sort of life-support system, as a machine designed to produce and sustain human life" (59).

The reductionist machine-imagery of the world that was a product of the new scientific thought that arose during the scientific revolution in the 16th and 17th century is part of a Taker culture. A consequence of this second premise is, "If the world was made for us, then it belongs to us and we can do what we damn well please with it" (61). Furthermore, if man is the apex of creation, humanity can't live at the mercy of the world, but must find a way to exert control over the environment. Becoming agriculturalists allowed humans to overcome the problem of food exhaustion and made human settlements possible. "Settlement gave rise to division of labor. Division of labor gave rise to technology. With the rise of technology came trade and

⁶⁷ Adapted from Michael Sanders, 2015. https://www.michaelsanders.co/blog-1/2016/2/1/speciesism-evolution-cruelty-to-plants.

commerce. With trade and commerce came mathematics and literacy and science, and all the rest...." (69). Included in "all the rest" is the exponential increase in human population made possible by the Industrial Revolution.

But there are still more hidden premises in the Taker's cultural narrative that need to be revealed. The world was not just made for man, man was made to rule the world. However, according to the Taker's narrative, "The world would not meekly submit to man's rule, so...man's destiny was to conquer and rule the world" (73-74). Ishmael and the narrator agree that the current environmental crises are the result of enacting a story, cultural narrative, that "casts mankind as the enemy of the world" (75). This is a result of shifting from an "I-Thou" to an "I-It" distinction, it sets up the illusory dichotomy of humanity versus nature. With the world on the brink of environmental disaster, according to the Taker cultural narrative, "Only one thing can save us. We have to increase our mastery of the world. All this damage has come through our conquest of the world, but we have to go on conquering it until our rule is absolute. Then, when we're in complete control everything will be fine" (80). This sentiment is in direct opposition with the thoughts of Einstein and Eisler, who believed that problems cannot be solved using the same mindset that created them. To reconcile the presumption that under human rule the world would be turned into a paradise with the hellish devastation currently plaguing the world, the Taker narrative includes the premise that man is tragically flawed. As a result of man's "stupidity, greed, destructiveness, and shortsightedness," the desired state of paradise cannot be not achieved (83). However, Ishmael disagrees, "There's nothing fundamentally wrong with people. Given a story to enact that puts them in accord with the world, they will live in accord with the world. But given a story to enact that puts them at odds

with the world...they will live at odds with world. Given a story to enact in which they are the lords of the world, they will act like lords of the world. And, given a story to enact in which the world is a foe to be conquered they will conquer it like a foe, and one day, inevitably, their foe will lie bleeding to death at their feet, as the world is now" (84). Put another way, cultural narratives determine the organization system that structures society; the Taker narrative is incorporated in the dominator model of organization and the Leaver narrative is integrated in the partnership model of organization.

Ishmael creatively illustrates how cultural bias can be blinding and serve as an obstacle to seeing clearly. According to Quinn's Taker narrative, the existence of current environmental problems is a result of the fundamental flaw with human nature itself, rather than questioning if humanity may be doing something wrong (119). Perhaps the cultural narrative has misguided humanity in how they ought to live, how they should perceive their relationship with nature. Indeed, in *The Power of Myth* (1991), Campbell asserts, "The only mythology that is valid today is the mythology of the planet - and we don't have such a mythology" (28). A planetary mythology would emphasize understanding that all things are interrelated and acting in accordance with this knowledge of inherent brotherhood with all beings, animate and inanimate. However, according to Campbell, there are two totally different orders of mythology: 1) a mythology that relates you to your nature and to the natural world, of which you are a part and 2) a mythology that is strictly sociological, linking you to a particular society (28). The first type of mythology is nature-oriented and is characteristic of Leaver cultures and the second type of mythology is socially oriented, giving rise to a "us (humans) - them (nature)" mindset, and is typified by Taker cultures. Nature-oriented cultural narratives "are not attempts to control nature but to help you put yourself in accord with it" (29). Socially oriented cultures that view humanity as separate from nature, condemn nature. Unfortunately, "when nature is thought of as evil, you don't put yourself in accord with it, you control it, or try to..." (29). The Judeo-Christian biblical tradition is an example of a socially oriented mythology.

In 1967 Lynn White wrote an infamous paper, "The Historical Roots of Our Ecological Crisis,"⁶⁸ that appeared in the prestigious journal *Science*. He stressed the need to rethink not only the "presuppositions that underlie Western modern technology and science," (1204) but also how those premises were influenced by how Christianity defined the relationship between humans and the environment (1205). The story told in Quinn's novel, *Ishmael*, is substantiated by White's argument, "What people do about their ecology depends on what they think about themselves in relation to things around them. Human ecology is deeply conditioned by beliefs about our nature and destiny - that is by religion" (1205). White contends that the shift from paganism to Christianity shifted the perceived relation between humans and nature and "not only established a dualism of man and nature but also insisted that it is God's will that man exploit nature for his proper ends" (1205). White also admonishes a blind allegiance to science and technology and to the myth of progress and the myth of the omnicompetence of science that fortify the modern technoscience ideology.⁶⁹ He states, "What we do about ecology

⁶⁸ In this provocative article, White explores Christianity's influence, including biblical texts, on human attitudes to the environment. An in-depth discussion of this article is beyond the scope of this chapter. To read White's entire critique see White, Lynn. 1967. "The Historical Roots of Our Ecological Crisis." *Science* 155(3767):1203-1207. Three years after White's article appeared in *Science*, Lewis Moncrief published a rebuttal to White's argument. See Moncrief, Lewis W. 1970. "The Cultural Basis for Our Environmental Crisis." *Science* 170(3957):508-512. Moncrief expands White's argument by providing a more elaborate model of explanation, but I essentially believe it is the same basic argument. In his concluding statement, Moncrief asserts that affluence is responsible for environmental destruction. I, however, would argue that affluence, in and of itself, does not create environmental destruction, rather the values and mindset of the affluent are what determines actions.

depends on our ideas of the man-nature relationship. More science and more technology are not going to get us out of the present ecologic crisis until we find a new religion or rethink our old one" (1206). White and I have the same intention. We are not arguing that science and technology are bad and therefore need to be dispensed with, nor are we saying that religion, specifically Christianity, in and of itself is unwelcome. Rather, the presuppositions of humanity's nature and destiny underlying science, technology, and religion need to be re-examined. In "The Cultural Basis for Our Environmental Crisis" (1970), Lewis Moncrief, stipulates there are three dominant factors in the United States that serve as obstacles for quickly resolving our environmental issues: lack of ethics regarding how natural resources are utilized, inability of social institutions to make necessary adjustments, and perpetual faith in technology (510). All these factors can be addressed in the creation of a new cultural narrative.

Quinn uses Ishmael, the Socratic teacher-gorilla, as a mouthpiece to increase awareness of the failings of the Taker story and the need to create a new story. In *The Hidden Heart of the Cosmos* (1996), mathematical cosmologist, Swimme, similarly advocates for "a new mind and a new story that will enable us to inhabit successfully this quantum evolutionary cosmos" (26). Swimme is referring to the need for a new story that intertwines science and the humanities. He argues that the scientific enterprise has predominantly focused on questions about the function of the Earth and universe and has relegated questions about meaning and value to the exclusive domain of religion. This separation prevents the current era of technoscience from engaging in cosmological speculation of what is the proper place of humans in the world (9). Rather than gathering in caves to celebrate the mysteries of life and share through dance, music, and art the sacred stories of how the world came to be, the role of humans in the world

and universe, and what it takes to live a noble life or according to Aristotle a life of *eudaimonia*, humans in today's era sit in classrooms and study science (9 & 11). All the while, our ecological crisis continues to escalate at a frightening pace.

Quinn's philosophic novel, *Ishmael*, begs the following questions which are relevant to the focus of my dissertation: Is the narrative that has provided the foundation for science and technology the answer or the problem? Is there another way of being in the world that needs to be explored? Another story? What story are we enacting in terms of water supply and management? What is the story being enacted by "thinking inside the pipe?" What story about water is being enacted in North Central Texas? I will address these questions in Chapters 4 and 5. Cultural narratives are powerful because they influence what questions are being asked, and these questions in turn facilitate the shaping of policy. Vandana Shiva, in her book Water Wars: Privatization, Pollution, and Profit (2016), enumerates several fundamental questions that have continued to plague society throughout history regarding water rights: "Who does water belong to? Is it private property or a commons? What kind of rights do, or should people have? What are the rights of the state? What are the rights of corporations and commercial interests?" (19). These questions are addressed in national and state water policies. In analyzing water policy, Irene Klaver advocates for the consideration of another set of questions: "Who is making decisions? Who is benefitting? Who is suffering? Who is participating?"⁷⁰ I discuss the answers to these questions in depth as they relate to North Central Texas in Chapter 4. Before

⁷⁰ Questions obtained from Philosophy of Water Issues (PHIL 6650) class notes dated 9-6-2016. This course was taught by Dr. Irene Klaver at the University of North Texas in Denton, Texas during the Fall 2016 semester.

moving on, an important question remains to be addressed in this chapter: How do cultural narratives influence the questions being asked and the shaping of water policy?

I introduced this chapter with the following quote by filmmaker Wen Wenders, "Landscapes tell stories." As Wender noted, "landscapes ask for their own stories to be told." Unfortunately, the stories that have been told about the landscape in Western industrialized society primarily are told from the sole perspective of humans and these stories do not give an authentic voice to the various natural forms of water (i.e., streams, lakes, rivers, and oceans). Instead, these stories reflect the human cultural narrative constructed on the foundation of technology. Narratives influence the questions being asked and the shaping of water policy because they are "enframing," they frame the issues. Enframing is the way we think about, relate to, and engage with the world. It is a framework that structures our beliefs, values, images, and understandings; thereby shaping the way we perceive and experience the world around us. In "The Question Concerning Technology" (1977), 20th century German philosopher, Martin Heidegger, explores how "Ge-stell,"⁷¹ translated as enframing, constitutes the essence of technology. He asserts, "the essence of technology is by no means anything technological;" (4) the essence of technology is not to be found in the machines or within human modes of production, rather the essence of technology is a frame of a mind, a mindset that views the world as raw resources to be stockpiled in a "standing reserve" (17). Heidegger recognizes that there are different types of technology with different ways of relating to the world. In his essay

⁷¹ "Enframing" is a translation for the German word "*Gestell*." Heidegger hyphenates the word as *Ge-Stell*, to draw attention to the prefix and the root of the word. Etymologically, the prefix *Ge-* means "gathering" or "collection" and the verb, *stellen* means "to put in place," "to order," and in a military context, "to challenge," "to engage."

Heidegger is specifically referring to modern technology and its use of powerful machinery to conquer the world by turning it into consumable resources that can be quantified, stored, distributed, and rationed. Technology is a way of revealing or challenging nature (14) and is characterized by instrumentality (12).

Heidegger states that all ways of thinking are guided through language (3). He provides as an example the hydroelectric plant on the Rhine River in Germany. As a result of being dammed up, the water of the Rhine River "appears as something at our command" and the Rhine is conceived as a "water power [*sic*] supplier" deriving its essence from the power station rather than from being a river (16). Heidegger invites the reader to consider the "monstrousness that reigns here" by examining what is conveyed by the title "'The Rhine' as dammed up into the *power* works, and 'The Rhine' as uttered out of the *art* work [*sic*], in Hölderlin's hymn by that name"⁷² (16). Although the Rhine is still a river embedded in the landscape, the cultural narrative of the Rhine as a supplier of waterpower conveys an instrumental ideology, reducing the river to an object, whereas, in Hölderlin's poetic art, the Rhine River is a subject. In other words, the enframing of modern technology in Heidegger's Rhine River example reveals an "I-It" relationship and the enframing of art reveals an "I-Thou" relationship.

Heidegger argues that if humanity is to escape the shackles of technology, it will be through perceiving its danger rather than the outright rejection of technology. In

⁷² Hölderlin travelled frequently on foot and acquired an embodied experience of the landscapes he traversed. His poems sought to capture the grandeur and beauty of these landscapes for his readers. He invested the landscapes with spiritual power and portrayed the intertwining of nature and humans. To view the lyrics to Hölderlin's "The Rhine," see https://billsigler.blogspot.com/2019/03/hymns-by-holderlin-rhine.html.

"Understanding Heidegger on Technology," (2014) political philosopher Mark Blitz interprets Heidegger's central message to be, "Reestablishing the experience of reverence is central for limiting the control of technological thinking" (78). In other words, technology is only one way of revealing, there are other ways in which entities can be revealed that avoid reducing nature and even humanity (i.e., "human resources") to mere pieces of inventory and commodities. Blitz contends that the technoscientific approach to the world, according to Heidegger, restricts the human capacity to understand opportunities for action because it "flattens the richness of ordinary concern" (2014, 68). Since the technoscientific approach to perceiving and acting in the world is touted as THE one and only correct way to engage with the world because it is purported to be "objective," it prohibits the revealing of other ways of knowing and being in the world. The enframing of the world through a technoscientific lens is the keystone supporting the perpetuation of the myth of the omnicompetence of science. Just like the Takers in Quinn's philosophical novel, staunch proponents of the veracity of technoscience are in actuality enacting a story. In reality, there are many stories that may be enacted. As a phenomenologist, Heidegger purports the solution is a return to the fundamental realm of embodied experience of the world. In Chapter 5, I will discuss how Watershed Education Communication Action Networks (WE CANs) can facilitate a shift away from a technological mindset by reviving an earlier understanding of technology as art. Etymologically, "technology" is derived from the Greek root word *technē* meaning art or craft. An intertwining of science and humanities, technology and art, can create a new mindset based on the embodied experience of the interrelationship of nature and humanity; recovering a holistic revelation of nature, what

it means for something to *be* outside the constraints of a detached and neutral technoscientific view, thus allowing for the possibility of sacredness and reverence to re-emerge.

The language used in relation to the Los Angeles River by the perspectives of modern technology and art conveys how different cultural narratives enframe the natural resource of river water. In "Bankside Los Angeles" (2007), researchers Robert Gottlieb and Andrea Azuma, document the challenges of transforming and renewing urban rivers, including the role played by language. The Re-Envisioning the L.A. River program was "organized to explore how the discourse about the river could be changed to reorient the policy framework regarding the management and future design of this heavily engineered and reconstructed urban waterway and the related land-use considerations for the areas bordering it" (23). How the fundamental question, "What is the Los Angeles River?" is answered both frames the issue and influences the policy framework. The flood control managers with the Army Corps of Engineers answer this question with the term "flood-control channel" (30). In contrast, the Friends of the Los Angeles River (FoLAR), a non-profit founded by a poet and performance artist named Lewis MacAdams, answers the question with the word "river" (30). Changing the discourse from a flood-control channel to a river facilitated FoLAR to "mobilize support and influence policies in support of community and ecological revitalization" (24).

The language that is used in communication can represent an abstraction or engender a sense of place. It also reveals the values embedded in our cultural narrative as acknowledged by Toko-Pa Turner, author of *Belonging: Remembering Ourselves Home* (2017), "language is much more than a means of communication. It is a vehicle in which values, cultural heritage, eco-biological knowledge, and even cognitive perception of reality is carried.... For the Western
Apache, the names of places are not only descriptive of their landscape, but are embedded with stories in which are contained codes of wisdom and morals" (201). Similarly, language conveys the presence or absence of reciprocity. Turner is aware of the reciprocal nature of language and experience, "Language, song, and story reflect life as we experience it - in return, life emulates the stories we carry" (203). The language we use enframes our experience, truth, reality - our way of being in the world. For example, in Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants (2013), environmental biologist, Robin Wall Kimmerer, writes, "In Potawatomi, we speak of the land as *emingoyak*; that which has been given to us. In English, we speak of the land as "natural resources" or "ecosystem services," as if the lives of other beings were our property" (383). The different languages convey a different sense of the responsibility for reciprocity. The Potawatomi language conveys the notion of being one with the world, whereas the English language imparts the idea of a hierarchical relationship. In terms of Leopold, the Potawatomi cultural narrative epitomizes a land ethic of being a plain member of the land community, whereas the English cultural narrative exemplifies a land ethic of being a conqueror of the land community.

In exploring the question of how humans came to sever their ancient reciprocity with the natural world, in *The Spell of the Senusous* (1996), American ecologist and philosopher, David Abrams, concludes that the language used in Western society has created a perceptual shift (28). Language in indigenous, oral cultures, functions to vitalize embodied experience through sensorial participation. Rather than being a tool for mere dialogue, oral language, expressed through song, prayer, and story, of indigenous cultures serves as an invitation to "converse with the more-than-human cosmos to renew reciprocity with the surrounding

powers of earth and sky, to invoke kinship even with those entities which, to the civilized mind, are utterly insentient and inert" (71). Conversely the language in Westernized societies is used to perpetuate the cultural narrative that Quinn explicates in *Ishmael*: Earth was made for humanity and humanity is destined to conquer and control the planet because all evolution has led to the superiority of humans. In other words, language has come to be conceived as evidence for human superiority and to demonstrate the specialness of humans relative to all other species (78). Thus, to understand global, national, and local problems of contemporary water supply and management necessitates a serious analysis of what story is being enacted by our modern Westernized culture in order to identify possible solutions.

Contemporary Challenges: Promethean Endeavor and Narcissean Dilemma

I began this chapter with two vignettes, the Balinese water temples and the Los Angeles River, because they recount two different stories of the role played by the cultural narrative in shaping water policy, supply, and management. These two vignettes also relate to two popular ancient Greek mythologies: the myth of Prometheus, Epimetheus, and Pandora and the myth of Narcissus. In the first myth, the Greek God Zeus tasked Prometheus and Epimetheus, two brothers, with creating life on Earth. In classical Greece, Prometheus means "foresight" and Epimetheus means "hindsight." These names and their meanings are significant as they define the proclivity of the two brothers in how they relate to the world. Gifted with foresight, Prometheus was said to be wise due to his consideration of the needs of the future. Epimetheus' skill of hindsight led him to only care about the past and as a result was said to be impulsive. Not surprisingly, Prometheus was diligent in his creation of man after the image of

the gods, whereas Epimetheus was rash in crafting the beasts with little thought, bestowing them with all the gifts from the gods and thus leaving none for Prometheus' humans who lived a life of harshness and suffering as a result. This situation led Prometheus to be filled with melancholy and prompted him to devise a plan to give his humans the gift of fire, which he stole from the gods. The gift of fire marked the beginning of human civilization because man could now thrive given their new ability to craft tools and weapons from iron ore and to live in defiance of the seasons making them superior to the animals. Zeus was livid and punished Prometheus for his transgression by sending him to spend eternity chained to a mountain where his liver could be devoured by an eagle every day. As a second form of punishment, Zeus ordered the crafting of Pandora and commanded Pandora to marry Epimetheus. Upon leaving Olympus, the gods gave Pandora a box with the instructions never to open it. Epimetheus, despite his brother's warnings to not accept gifts from Zeus, married Pandora. Eventually, plagued with curiosity, she opened the box and allowed all the ills of the world to escape; however, she managed to close the lid of the box before Hope could escape. This myth has been viewed an allegory of the consequences of human enlightenment and the scientific revolution in that it delivers a message about the real-world issues with which we are living today, including the wicked problem of water supply and management.

According to Greek mythology, Narcissus, son of the River God Cephissus, was known for his beauty and his rejection of all romantic advances. After Narcissus scorned and refused the love of the wood nymph Echo, Nemesis, the goddess of revenge, decided to punish Narcissus by luring him to a pool of water where he fell deeply in love with a reflection of himself, illusively believing the image was real and someone else. Narcissus was so enamored

and filled with passion, he could not stop staring at the reflection and remained there suffering from a lack of reciprocity until he eventually died. This myth warns against the danger of vanity. If we as humanity, are filled with self-importance (e.g., believing the humanity reigns supreme over the rest of nature), our perception is restricted and as such our thoughts, questions, and actions are limited. Humanity, like Narcissus, then becomes trapped in potentiality rather than progressing towards actuality. In *The Dilemma of Narcissus* (1993), Louis Lavelle, 20th century French philosopher, states that in so doing, "He [Narcissus] has made the most fatal error he could make, namely to imagine that by creating this seductive image of himself he has created his true being.... He is condemned to a premature and needless death..." (30).

How do these two Greek myths relate to the contemporary problem of water supply and management? In "The Rebirth of Epimethean Man" (2018), Ivan Illich, Roman Catholic priest, philosopher, and social critic of contemporary Western institutions, contends, "It is the history of the Promethean endeavor to forge institutions in order to corral each of the rampant ills. It is the history of fading hope [trusting faith in the goodness of nature] and rising expectations [reliance on results which are planned and controlled by man]" (105). Illich also notes that the replacement of hope with expectations began with the ancient Greeks. This replacement coincides with the timing of the shift from *mythos* to *logos*. Not only were institutions being engineered by the Greeks to cope with the ills released from Pandora's box, the Greeks "became conscious of their power to fashion the world and make it produce services they also learned to expect" (106). As a result, Promethean men proudly view themselves as *homo faber*, Latin for "Man the Maker." Illich states, "He [Prometheus] tricked the gods out of their monopoly of fire, taught men to use it in the forging of iron, became the god of technologists, and wound up in iron chains" (115). Over time, as technology has advanced, humans have lost their respect for the intertwining of humans and nature, including water. Technology gives humanity the temporary and illusory sense of transcending nature thus creating an attitude of disdain. I maintain the Balinese water temples are an illustration of an Epimethean approach to water supply and management because the *subak* system is immersed in reverence for the entwining and reciprocal relation of humans and nature. The Balinese approach to water supply and management through the lens of hope and their actions demonstrate faith in the goodness of nature. On the other hand, I claim the model of water supply and management illustrated by the Los Angeles River vignette is an example of a Promethean endeavor. It is a model historically centered on increasing expectations - increasing food supply through technological innovations of agriculture and irrigation, increasing population, and increasing demands on natural resources. The problem of increasing demands on natural resources has historically been met by the proposed solution of more technological innovations to meet increasing demand through a reliance on engineering and technological feats planned and controlled by man. This constitutes a mindset of "thinking inside the pipe" characterized by homo faber. I agree with Illich (2018) that there is a small but growing "suspicion that something is structurally wrong with the vision of *homo faber*" (114). As discussed in Chapter 2, Arendt also perceives that humanity is currently suffering from the image of homo faber. Do we need to move beyond the conception of homo faber? If so, to

what, *homo cognito*,⁷³ *homo credente*?⁷⁴ In "*Homo faber* Revisited: Postphenomenology and Material Engagement Theory" (2018), authors Don Ihde and Lambros Malafouris, argue that "we are *homo faber* not just because we make things but also because we are made by them" (195). Because humans and things are co-constituted, Ihde and Malafouris assert that humans

⁷³ For a detailed discussion of homo faber and homo cognito, see Tillmanns, Maria daVenza. 2015. "The Need to Move Beyond Homo Faber." Philosophy Now 106:13-15. In this article, Tillmanns postulates that there are two different orientations of thinking, homo faber, looking from the inside out, and homo cognito (a term the author invented), looking from the outside in. To solve complex problems (e.g., wicked problems), Tillmanns asserts that a holistic approach is warranted because it starts from the context in which the problem is embedded rather than centering on the problem itself. The homo faber (i.e., "Tool Wo/Man") orientation focuses on the problem and is primarily instrumental in nature due to a focus on how a "tool" can be used to solve the problem. In contrast, the homo cognito (i.e., "Examining/Inquiring Wo/Man") orientation operates from a holistic perspective and works collaboratively with the community to solve a problem. This orientation of homo cognito epitomizes the mission of a field philosopher, identifying problems with a community, not finding solutions from outside to apply to a community issue. Additional contrasting characteristics of the two orientations to thinking are that homo faber seeks to determine the "right" answer to a problem and creates systems, or as Illich would say "institutions," to address community problems; whereas homo cognito aims to discover the best solution to a problem and addresses all relevant aspects of a problem within the context that the particular problem exists. In other words, a homo faber orientation is similar to a one-size-fits-all solution and a homo cognito orientation would be like a customized made-to-fit solution. In seeking the best rather than the "right" solution, a homo cognito orientation believes that there are no ultimate answers to complex problems, only better or worse solutions. The homo cognito orientation works collaboratively with the community to create a specific solution to a complex problem rather than attempting to reduce the problem to a simple problem with a fixed answer. Moreover, the homo cognito orientation encourages the questioning of the lens being used to see and interpret the world and, as such, to avoid relying solely on the authority of experts and to question the reliability of the sources. Tillmanns contends that a *homo cognito* orientation responds rather than reacts to a problem and thereby permits relationships instead of facts to predominate. As such, a homo cognito orientation aligns with Buber's "I-Thou" (i.e., subjectsubject) rather than "I-It" (i.e., subject-object) principle.

⁷⁴ For a detailed discussion of homo faber and homo credente, see Tonsing, Detlev L. 2017. "Homo faber or Homo credente? What Defines Humans and What Could Homo naledi Contribute to this Debate?" HTS Teologiese Studies/Theological Studies 73(3), 4495. https://doi.org/10.4102/hts.v73i3.4495. In this article, Tonsing argues that there may be a need based on the burial practices of *homo naledi*, to shift the definition of what it means to be human from a focus on mastery and control of the world through tools towards a focus on trust, including religious trust. Tonsing agrees with the Hannah Arendt and Max Frisch that being human is more than being able to manipulate and dominate the world through the use of tools: humans are more than just homo faber. Tonsing further contends that the human quest for instrumental domination of the world has been detrimental to both human society and Earth's ecology and, thus, we need more than technical reason. He asserts that the instrumental rationality Heidegger identified as "calculating thinking" needs to be supplemented with meditative thinking. According to Tonsing, if calculating thinking predominates, it changes the relationship of humans to the world in such a way that the world is perceived as nothing more than a natural resource to be exploited by humanity. Calculating thinking precludes a receptivity to mystery. An awareness of values deeper than utility for survival and an appreciation of mystery can be recovered through the meditative thinking of homo credente (a term the author invented). Homo credente is a person of faith, or as Illich would say "hope," who experiences the world not only in terms of utility but also in terms of awe and wonder. Tonsing states that humans need more than science which is associated with calculating thinking; humans need to recover an awareness of mystery to shift the way we view our relationship to the world.

are not solely the products of nature or culture but are the result of inter-relations between humans and things (196).

In the 21st century, if humanity looks into a pool of water, what image is reflected back to them? An image of Promethean man, *homo faber*, with an expectation for science and technology to overcome natural limits? An image of Epimethean man, *homo cognito/credente*, with an attitude of hope and faith that nature is good, not evil, and does not need to be conquered? Does the image convey the intertwining nature of water and humans? The reflection of Narcissus in the pool of water is an image that is inherently co-constituted by the interaction of Narcissus and the pool of water. Narcissus did not understand the interweaving relationship between himself and the water. His enamor for the illusory image led to his downfall and death. Similarly, contemporary society is enamored with the illusory image of human transcendence over nature, including water; will this lead to the downfall and death of humanity?

I hold that we need a balance of the skills of both Promethean and Epimethean man, foresight and hindsight, respectively, to become re-aware of the entangled relationship between humans and water.⁷⁵ This need for balance can be seen in the words of Louis Lavelle expressed in *The Dilemma of Narcissus* (1993), "I cannot see myself in any other way than by turning round [*sic*] and contemplating my past, but that is to contemplate something I have already ceased to be. To live is to create my own being by turning my will towards a future in

⁷⁵ The myth of Narcissus illustrates Merleau-Ponty's relational ontology delineated by Merleau-Ponty in *The Visible and the Invisible*. There is a chiasmic relation between Narcissus and the pool of water, a crisscrossing exchange between Narcissus' body and the water. The resultant reflection of Narcissus in the water constitutes Merleau-Ponty's notion of the "flesh." The sentient (Narcissus) and the sensible (water) never purely coincide, rather they are separated by the space in which the reflection appears.

which I do not yet exist, and which will not become an object which can be contemplated until I have not only reached it, but have gone beyond it" (29). I would also contend that humanity needs not only the ability to reflect on the past and to plan for the future, but also the ability to look inward. How is this done? In this regard, further words of Lavelle are particularly relevant, "It is only as a man advances in life that he begins to be capable of seeing himself. Then he may turn round [*sic*], take stock of the ground covered, and observe the tracks his feet have left" (30). These words are particularly reminiscent of Plato's allegory of the cave in the *Republic*. The shackled prisoners are unable to turn their heads and thus mistakenly take the illusory shadows cast on the cave wall as reality. In this way the prisoners in Plato's allegory are much like Narcissus who erroneously perceives his reflection in the pool of water as a real entity. When the prisoners are unshackled from their chains, they are able to turn their heads and acquire a truer grasp of reality.

One way to interpret Plato's recurrent use of the imagery of turning around is to see education as the process of turning one's attention to what Plato would deem to be true conceptions of reality (i.e., justice, beauty, goodness, etc.). The task of education is to reorient students in the right direction by turning their attention around to focus on what is more real and true. This method of "turning around" is philosophy, particularly field philosophy. Learning in this way naturally challenges the premises of the cultural narrative that has shaped the beliefs, values, and actions of humanity. I argue in Chapter 5 that this unshackling and turning around and inward can be accomplished through a new approach to community outreach, education, and engagement made possible by Watershed Education Community Action Networks (WE CANs). However, before jumping into a discussion of WE CANs, in Chapter 4, I

narrow my global and national focus to a regional exploration of the historical and current state of water supply and management in North Central Texas. As part of my exploration, I present the findings of a survey to ascertain the perceived barriers and boundaries to water community outreach and education.

CHAPTER 4

BARRIERS, BOUNDARIES, AND BRIDGES: A CASE STUDY OF NORTH CENTRAL TEXAS

Not till we are lost, in other words, not till we have lost the world, do we begin to find ourselves, and realize where we are and the infinite extent of our relations.

-Henry David Thoreau

Introduction

This chapter provides background information on the human-water relationship in North Central Texas. It begins with vignettes summarizing two reservoir projects to import water from East Texas to meet the water demands of the Dallas-Fort Worth metroplex and two urban river renewal projects in North Central Texas. These vignettes are followed by a description of how the 2022 Texas Water Development Board's State Water Plan, which incorporates information provided by the regional water planning group for North Central Texas (i.e., Region C), aims to meet the water needs of the region for the next 50 years. This problem description is followed by a description of trends and an analysis of conditions that have previously or are currently impacting the supply and water management goals of the state and Region C. Based on the identified trends and conditions, I delineate my projections of likely future outcomes and how these outcomes will influence future water supply and management plans. Before concluding my problem analysis, I outline my recommended resolution for addressing the problem of water supply and management in the state and North Central Texas region. My recommended resolution will be discussed in detail in Chapter 5. This chapter ends with an analysis of a North Central Texas community engagement survey project which I undertook with three water-professionals who work in the Dallas-Fort Worth metroplex. Lack of engagement of the public is often bemoaned by water industry professionals. However, what professional education and outreach staff mean by "engagement" is unclear. My collaborators and I not only wanted to know how water professionals define "engagement," but also, we were curious to know if water non-professionals had the same conception of what it means to be "engaged." Since the individuals in the water non-professional group were active volunteers in a variety of water-related agencies and activities, my collaborators and I thought it would be enlightening to send a survey to both groups to ascertain whether the two groups had similar or different notions of community engagement. Our study was different from other water survey studies in that we adopted a public philosophy approach, the goal of our study was to garner information from professionals and non-professionals that would be relevant beyond the academic community and could be applied to a real-world problem plaguing water providers. The results of this project provide support for my recommended resolution of Watershed Education Community Action Networks (We CANs).

Problem Analysis

As noted in Chapter 1, the 2021 Region C Water Plan projects the urban population of North Central Texas will experience a 93% increase between 2020 and 2070, from approximately 7.6 million to 14.7 million people (2.6). Based on currently connected water supplies, Region C has projected that North Central Texas water demand will increase by 81% requiring an additional 1.3million acre-feet/year of water supply.⁷⁶ This raises the critical question: How will cities in North Central Texas respond to the rising scarcity of water?

⁷⁶ An acre-foot of water is equivalent to approximately 326,00 gallons of water; enough water to cover an acre of land (i.e., roughly the size of a football field) about one foot deep.

An analysis of the Region C Water Plan reveals that although the new water plan does include an increase in reliance on water conservation and reuse, it still relies heavily on new water infrastructure projects (i.e., construction of new reservoirs and pipelines) to provide water to meet a projected increase in demand. The plan to continue to meet increasing water demand with increasing imported water supply is in essence a positive feedback system and a disincentive for conservation. I argue that this model of constant growth needs to be eliminated. Without a change in the relationship of humans to water in North Central Texas, an increase in supply will only lead to an increase in demand; the resultant increase in demand drives the need for more water supply. Thus, building new reservoirs is a short-term solution to a long-term problem. For better management of demands, there must be a change in the relationship of humans to water. Past and current water plans for this region are drenched in a utilitarian mindset, one that perceives water only as a commodity. The current mindset is if the water is there, it is ours for the taking. This mindset is clearly evident in the controversy surrounding the construction of the Bois d'Arc Reservoir and the proposed construction of the Marvin Nichols Reservoir in Northeast Texas. I use these reservoir controversies to re-surface the submerged relationship that inherently exists between water and power. The historic and contemporary relationship of water and power is further elaborated by exploring the history of the Trinity River and the urban river renewal projects in the two biggest cities in North Central Texas.

Vignettes: Reservoirs and Urban River Renewal Projects

Bois d'Arc and Marvin Nichols Reservoirs. The 16,641-acre Bois d'Arc Lake constructed by North Texas Municipal Water District (NTMWD) is located outside the city of Bonham, 90

miles north of Dallas in rural Fannin County. It is the first new major reservoir to be built in Texas in almost 30 years. The reservoir began to impound water on April 14, 2021.⁷⁷

According to a WFAA-TV online article, after the 2006 drought, NTMWD fast-tracked its plan to build the reservoir to meet the water demands of the growing population of the six counties (i.e., Collin, Rockwall, Kaufman, Dallas, Denton, and Hunt) it serves, a customer base that is expected to increase by two million over a 50-year period.⁷⁸ Normally, lake approval and construction requires a 30-year period of time, but NTMWD needed the reservoir in place no later than 2020. Bois d'Arc Reservoir is projected to meet the needs of NTMWD's service area until 2040.⁷⁹

The proposed construction of the reservoir sparked a contentious controversy over where the water to meet the demands of Dallas suburbs should be obtained. NTMWD estimates the total cost of construction of the reservoir and related projects to be \$1.6 billion.⁸⁰ The construction of the reservoir submerged farmlands, roads, homes, and a small church under 45 feet of water. Supporters of the reservoir laud the economic benefits to the county from increases in property values and the development of a tourism industry. However, this financial gain to the county comes at the expense of individual property owners. A local activist started a group to oppose plans for the Bois d'Arc Reservoir because of common sentiment that

⁷⁷ More information on Bois d'Arc Lake is available on the North Texas Municipal Water District website devoted to the lake. "Bois d'Arc Lake." Accessed November 9, 2021. https://boisdarclake.org.

⁷⁸ Jonathan Betz. October 19, 2009. "Planned Reservoir Could End Dreams in Fannin County." Accessed November 9, 2021. https://www.wfaa.com/article/news/local/planned-reservoir-could-end-dreams-in-fannin-county/287-338773695.

⁷⁹ NTMWD. "Bois d'Arc Lake." https://boisdarclake.org.

⁸⁰ Ibid.

the community would "lose a lot of history, income, and the way of life"⁸¹ that people who move to the area are seeking. Many farmers lost farmland owned and worked by generations of family because of the construction of Bois d'Arc Reservoir. One farmer's family had farmed 2,100 acres of land for 116 years. The construction of the lake submerged his land under water and took away the ability of his family to pass the land on to younger generations.

Environmentalists argued that lake construction was not needed because NTMWD could import water from already existing reservoirs. Executive Director of the Texas Conservation Alliance, Janice Bezanson, stated, "People who use this water don't have a clue the impact it's going to have. They [NTMWD] want their own lake instead of having to buy water from someone else."⁸² However, NTMWD spokeswoman, Denise Hickey, commented, "Conservation and reuse won't meet the needs of our area. We do have sympathy for those individuals, but we also have to be stewards and provide the water."⁸³ This statement begs several questions. What does it mean to be a steward of water? Should cities continue unlimited growth when water must be imported from other areas? Should rural areas bear the burden of providing water to urban areas? How is water being used in the urban areas? What are real water needs? One landowner's comments speak to many of these questions, "When they're taking your land and your house and your property and everything to ship to somebody to water their lawn and fill up their swimming pool...well, that's not right."⁸⁴

⁸¹ Betz. "Planned Reservoir Could End Dreams in Fannin County."

https://www.wfaa.com/article/news/local/planned-reservoir-could-end-dreams-in-fannin-county/287-338773695. ⁸² lbid.

⁸³ Ibid.

⁸⁴ Ibid.

Another aspect of the water management strategy for Region C is the proposed construction of the Marvin Nichols Reservoir in the North East Texas Regional Planning Area (Region D). The reservoir is projected to cost \$4.4 billion and would be constructed on the main stem of the Sulphur River in Red River, Titus, and Franklin counties. The reservoir would flood 66,103 acres of land adjacent to the Sulphur River and would impound 10,156 acres of bottomland hardwood forest and 21,444 acres of forested wetland (Jaspers 2021). These wooded wetlands, representing one of the most biologically diverse ecosystems in the state, are found only along rivers and streams and are increasingly rare, and are home to 4 to 20 species federally classified as threatened or endangered. Over 75% of the bottomland hardwood forests in East Texas have been destroyed over the last 200 years. At least another 130,000 acres of land will need to be acquired to mitigate the environmental effects as proscribed by federal law (Jaspers 2021). Most of the water from the reservoir would be piped 170 miles uphill to the Dallas-Fort Worth metropolitan area (Texas Living Waters Project 2016).

In addition to the environmental impacts resulting from the immense amount of land to be flooded, the Marvin Nichols Reservoir would have a decimating impact on the local economy by eliminating approximately 10-20% of local farming, ranching, and logging jobs (*Texas Tribune* 2014). Moreover, the reservoir would necessitate flooding family cemeteries and historic Native American sites and would displace many families from 100⁺-year-old homesteads (Texas Living Waters Project 2016). Due to the negative environmental and economic impacts, there is strong opposition in the Northeast Texas area to the reservoir project. Indeed, the planning group for Region D recommends against building the dam and reservoir and refuses to put the

reservoir in its regional water plan (Sansom 2008, 55 and Texas Development Water Board 2015).

However, in January 2015, the Texas Water Development Board unanimously voted to retain the Marvin Nichols Reservoir in the state water plan (Satija 2015). Allowing the reservoir to stay in the state water plan makes the project eligible to receive state water infrastructure financing to assist with planning and construction costs. The dispute between Dallas-Fort Worth water planning officials in Region C and opponents in Northeast Texas, including the water planning officials for Region D, has been a source of contention since the push for the construction of Marvin Nichols Reservoir began in 2001. However, the Marvin Nichols Reservoir has been considered as a potential future water supply since the 1984 State Water Plan.

The dispute has once again heated up with the approval and release of *Water for Texas:* 2022 State Water Plan (2022) by the Texas Water Development Board. Region C water officials argue that the reservoir is needed to provide the solution to meeting DFW's growing water demands due to the projected doubling of the population. Region D water officials and a new Northeast Texas coalition opposed to the reservoir construction argue that the reservoir is unnecessary, and DFW should instead focus efforts on meeting increasing water needs through conservation measures. Opponents see no valid reason for "displacing locals, disrupting wildlife, and harming their economy" (Vaughn 2021) to provide water for the DFW metroplex. The Northeast Texas opponents argue that it is unfair for a large urban area with more clout to force the reservoir construction with its corresponding sacrifices on a small, rural area lacking comparable means to fight back.

In a *Dallas Observer* article, Kevin Ward, the chair of the Region C Regional Water Planning Group, is quoted as stating, "We would have hoped...that we could conserve our way out of building any new projects....No one wants to build a project if they don't have to....We need water for the metroplex for it to continue to grow according to population projections, and we represent probably 30% of the economic activity in the state of Texas" (Vaughn 2021). This comment begs several questions. Has the DFW region explored and exhausted *all* possible conservation measures? Must the DFW metroplex continue to grow according to population projections? Should there be a limit to urban growth? If a region cannot meet its water needs within the boundaries of its region, is it just to import water from outside the region? Does the fact that Region C makes up 30% of the economic activity in Texas give it the right to force its will on other regions? Is the aforementioned statement by Ward concerning economic activity a justification and confirmation of the age-old adage "Might makes right?"

In 2015, Region C and Region D agreed to postpone the Marvin Nichols Reservoir project until at least 2070. However, the projected gap between water supply and water demand by 2070 has prompted Region C water officials to fast track the completion of the construction of the reservoir by 2050. According to Janice Bezanson, Executive Director of the Texas Conservation Alliance, the Marvin Nichols Reservoir will wreak social and economic havoc on the impacted northeast region, "...thousands of people...will be forced to sell their land...family cemeteries will be inundated...a huge number of archaeological sites [dating] back at least to the Clovis people, which is 12,000 years ago...will be lost" (Vaughn 2021). A member of the Preserve Northeast Texas coalition asserts that a total of 200,000 acres of private land ownership will be lost due to construction of the reservoir and the mitigation required by

federal law. Bezanson believes that the Dallas-Fort Worth region can meet its water needs without these negative consequences by increasing its conservation efforts, especially by reducing the amount of water used to water non-native turf lawns and increasing the reliance on reservoirs that already exist (Vaughn 2021).

Conservation requires the motivation of residents to not only reduce their per capita usage of water, but also to become stewards of their watershed. This motivation can be induced by changing the relationship of residents to water, specifically the watershed in which they reside. Fort Worth and Dallas have both developed and are in the process of implementing urban river renewal projects for the Trinity River. Before discussing these projects, it is beneficial to first provide general background information on the Trinity River.

Brief Description and History of the Trinity River. The first European to discover the Trinity River was Robert Cavalier de Salle in 1687. However, General Alonzo de Leon named the river La Santisima de la Trinidad (The Most Holy Trinity) in 1690. As illustrated in Figure 4.1, the Trinity River arises from the confluence of its four forks (i.e., West, Elm, Clear, and East) in the northern part of the watershed basin. The Clear Fork and West Fork merge near downtown Fort Worth and the East Fork and Elm Fork near downtown Dallas. Just south of the Dallas/Fort Worth Metropolitan area, all four forks merge to give rise to the main stem of the Trinity River. From its headwaters to its mouth and eventual emptying into the Gulf of Mexico, the Trinity River is 715 miles long. This distance makes it the longest river that begins and ends within the state of Texas. The Trinity River basin drains almost 18,000 mi² and includes all or parts of 34 counties. The population of the Trinity River watershed is over nine million and is the largest of any river basin in the state. The Trinity River provides water to over half of the population of



Figure 4.1. Trinity River watershed.⁸⁵

Texas, including the major cities of Fort Worth, Dallas, and Houston. Due to the scarcity of groundwater, residents within the basin depend upon surface water for their water supply. As such, water quality within the basin is a major parameter to consider. Humans are not the only users of the Trinity River basin; therefore, water quality is of paramount importance to maintaining a healthy aquatic ecosystem. Although water quality is important, these issues are beyond the scope of this dissertation which primarily focuses on water quantity. However, it should be noted that water quality and water quantity issues are intertwined. The amount of potable water is decreased if the quality of the water falls below acceptable standards.

⁸⁵ Wikipedia: The Free Encyclopedia, 2022.

https://en.wikipedia.org/wiki/Trinity_River_(Texas)#/media/File:Trinity_Watershed.png

From the mid 1830s to the early 1970s, many entities have held dreams of the Trinity River being navigable from the Gulf of Mexico to Dallas.⁸⁶ The driving force behind these dreams was an economic incentive to have the ability to move goods directly from the Gulf of Mexico to Dallas and vice versa. Attempts to navigate the Trinity River were repeatedly impeded by low water, sandbars, and snags (i.e., natural debris). Railroads came to Dallas in 1872 and 1873 and essentially ended the riverboat era on the Trinity River. However, "Growing dissatisfaction with high railroad freight rates and the dream of Dallas as a major port kept the interest in river traffic alive."⁸⁷ Several governmental surveys were conducted on the Trinity River between 1872 and 1900 that resulted in the construction of several locks and dams beginning in 1902. World War I and the high project costs ended any further building on the Trinity River. The dream of the Trinity River being navigable by barges once again was resurrected in the mid 1950s because of a more stable water flow in the Trinity River made possible by the construction of three flood water protection projects (i.e., dams and reservoirs) in North Central Texas. By the mid 1960s and early 1970s, the plan to make the Trinity River a barge canal had been approved by the United States Army Corps of Engineers and Congress and funding was being secured. "But growing budget problems and criticism from many quarters that the Trinity canal was nothing more than a huge pork-barrel project and a potential ecological disaster eventually doomed the idea."⁸⁸ The Trinity River authority, in 1973, asked

 ⁸⁶ Wayne Gard (Texas State Historical Association). 2021. "Trinity River Navigation Projects." Accessed December
27. https://www.tshaonline.org/handbook/entries/trinity-river-navigation-projects.

⁸⁷ Ibid.

⁸⁸ Ibid.

voters to approve a property tax to finance the project but the proposition was rejected, and the project was abandoned.

The Trinity River has a long history of water quality problems. As early as the late 1800's, the level of waste in the low flow characteristic of the Trinity River during the summer months resulted in the City of Dallas curtailing the direct pumping of water from the main stem of the river. In the early 1900's as the cities of Fort Worth and Dallas continued to grow, once again the distinctive low flow of the Trinity River in the summer in conjunction with waste from two large slaughterhouses in Fort Worth made the river a danger to the health of humans as well as other living animals. Human deaths from typhoid fever and dead animals near the river led the Texas Department of Health in 1925 to label the Trinity River as a "mythological river of death" (Trinity River Authority of Texas 2016). Unfortunately, increased development and changes in land use continue to threaten the water quality of the river. The Trinity River is more than 90% treated wastewater during the dry and hot months of the Texas summer when more water evaporates from the land than falls as precipitation from the sky.

Not surprisingly, humans historically have viewed the hydrological regime of the Trinity River as problematic. The Trinity River has a history of major flood events; the May 26, 1908 event in the upper portion of the basin, which killed 11 people and caused more than five million dollars in damages, led to the eventual control of the Trinity River. Minor flooding occurs frequently to this day within the basin. In attempts to tame the Trinity, the river was channelized, and levees were built along its banks. However, as the population increased and development expanded, more concrete infrastructure was laid, creating more impervious surface. Rain is subsequently prevented from infiltrating into the soil and thus runs off the land

entering the municipal storm-water system and ultimately entering the river. This storm runoff once again makes the river prone to flooding. These pulses of stormwater also have negative impacts on the riverine corridor.

During the course of the Trinity River's history, successive generations have become further removed from direct contact with it. Except during periods of excessive rain and the resultant flooding, the Trinity River goes unnoticed by most of the people especially in the major metropolitan areas. Like many urban rivers, the Trinity River in large part has been forgotten and neglected. This situation is changing not only for the Trinity River, but also for many urban waterfronts globally. This pervasive change in the perception of urban rivers is epitomized in the number of urban river renewal or revitalization projects. Urban rivers are being rethought and are once again meandering into the awareness of the community. However, the goal of rethinking some urban rivers is not always prompted purely by aesthetic, recreational, environmental, or water supply and management needs, but rather is economically driven.

Trinity River Vision and Trinity River Corridor Urban River Renewal Projects. According to Matt Oliver (personal interview, November 2015), Public Information Officer with the Trinity River Vision Authority (TRVA), flood control was the driving force behind the initial vision for the revitalization of the Trinity River in the downtown area of Fort Worth. As a result of the 1922 and 1949 floods, the Army Corps of Engineers constructed new and improved levees on the river. After Hurricane Katrina, flood control and levee standards changed. As a result, the Trinity River levees became outdated, having been built with a 1960's population in mind. Fort Worth has experienced a 51% growth in population since 2000, making it the fastest growing city in its size category (500,000 residents). Consequently, Fort Worth has outgrown the levee system north of downtown Fort Worth. In 2006, 80% of the levees failed.

In 2001, Streams & Valleys, a non-profit organization committed to saving, sharing, and celebrating the Trinity River, provided an important impetus for visualizing how to be imaginative with the new levee construction. The organization suggested exploration of whether the city of Fort Worth could develop a waterfront business area modeled after San Antonio and emphasized access of the river to the residents of Fort Worth. In short, community desire for access to the river coupled with the need for a new levee system resulted in the inspiration for the Trinity River Vision Project (TRVP). The project is a partnership involving the Tarrant Regional Water District, the city of Fort Worth, Tarrant County, Streams & Valleys, and the Army Corps of Engineers. In terms of project outcomes, the staff and board of directors of the TRVA hope to accomplish the following:

- flood control by taking 2,700 acres of neighborhoods out of the flood plain,
- construction of a mixed-use development to complement and double the size of downtown Fort Worth,
- programming and community development to get people into the Trinity River.

According to Oliver, the Trinity River Vision Authority has no current plans to provide formalized environmental education and outreach. In terms of community engagement, the TRVA wants to change the perception of the residents of Fort Worth of the water quality in the Trinity River. To this end, TRVA intends to get people in the Trinity River through a water quality campaign including various events on the river (e.g., tubing, kayaking, paddleboarding, etc.). When asked about the relationship between the TRVA plans for the Trinity River and those of the city of Dallas, Oliver said that the Fort Worth Trinity River Vision Project and the Dallas Trinity River Corridor Project are two separate projects and there are no plans for collaboration because the two cities are approaching the projects differently.

East of Fort Worth lies the city of Dallas. It, too, has an urban river renewal project in progress. The Trinity River Corridor Project (TRCP) is similar to and yet different from the Trinity River Vision Project in Fort Worth. According to its website, like Fort Worth's Trinity River Vision Project, the TRCP is a public works and economic development project (Trinity River Corridor Project, 2015). The TRCP has similar goals to the Trinity River Vision Project: flood control, transportation, recreation, environmental stewardship, and business development. The department of Trinity Watershed Management oversees the Trinity River Corridor Project, yet the project has multiple public and non-profit partners. Public partners include the City of Dallas, Dallas Area Rapid Transit (DART), Dallas County, North Texas Tollway Authority, Texas Department of Transportation (Dallas District), Texas Parks and Wildlife Department, and the U.S. Army Corps of Engineers. Among the non-profit organizations are The Trinity Trust, the Trinity Commons Foundation, and the Trinity River Audubon Center. The Trinity River Corridor Project covers 20 miles and approximately 1,000 acres along the Trinity River.

Although like Fort Worth's TRVP, The Trinity River Corridor Project highlights condominiums and townhouses, modern office towers, outdoor restaurants, and retail businesses, the TRCP appears to have a much stronger focus on nature than the urban river renewal project in Fort Worth. The TRCP is designed around "wild" areas and amenities;

wildlife, wetlands, and the Great Trinity Forest⁸⁹ are incorporated into a framework to envision a different style of urban development. The TRCP website provides educational information on the geography, climate, and history of the Trinity River as well as a variety of options for experiencing the Trinity River, the majority of which do not appear to be driven by economics.

Urban River Renewal Projects and Human Relationship to the Trinity River. Recent and projected future shortages in water availability in North Central Texas stemming from prolonged drought events and massive increases in population, respectively, represent opportunistic disruptions to invite residents in North Central Texas to recover their primordial relationship with water. Urban river renewal projects can play a vital role in shaping the human relationship to water. Specifically, urban river renewal projects can foreground the background of a riverine landscape by creating a common public space that embodies and celebrates the intertwinement of nature and culture. However, the two urban river renewal projects underway in the DFW metroplex serve to recapitulate a utilitarian mentality whereby rivers are objectified and the human relationship to the river is predominantly mediated by the economy. These urban river renewal projects fail to recognize their inherent power to function as generative mediums for re-framing the human relationship to the Trinity River. However, of the two projects, the Dallas project appears to be more oriented to improving the human

⁸⁹ The Great Trinity Forest is an urban bottomland hardwood forest located in southern Dallas. The forest essentially follows the course of the Trinity River and once the river exits the forest, it travels approximately 450 miles to enter the Gulf of Mexico. At 6,000 acres, it rivals the size of New York City's Central Park. Many different habitats exist within the forest including bottomland hardwood forest, riparian zones, wetlands, ponds, a natural spring (Big Spring), grassland, and the Trinity River itself. The Great Trinity Forest is primarily owned by the city of Dallas and is part of the Trinity River Corridor Project. For more information, see City of Dallas Trinity River Corridor Project. 2015. "Great Trinity Forest." Accessed November 10, 2021. https://trinityrivercorridor.com/recreation/great-trinity-forest.

relationship to the Trinity River through the provision of more embodied and reflective experiences. The Dallas project also appears to be more oriented to being accessible to a diverse segment of the city's population than the Fort Worth project. I will discuss in depth in the following chapter how Watershed Education Community Action Networks (WE CANs) can augment both the Fort Worth and Dallas urban river renewal projects' efforts to re-frame the human relationship to the Trinity River and to create a new urban water narrative.

Description of Problem

There are many barriers and boundaries inherent in the historical and current approach to water supply and management for North Central Texas. Major barriers include drought, projections for dryer and hotter weather patterns due to global climate change, evaporation and sedimentation rates of reservoirs, disengagement of community from its watershed resulting in a lack of stewardship, and ineffective environmental education. Major boundary problems encompass imported water from outside the region and associated conflicts, siloism,⁹⁰ and an outdated mindset, as I have continued to stress, of "thinking inside the pipe" (i.e., overreliance on technoscientific solutions dominated by building more reservoirs). I describe some of these barriers and boundaries in this section, and I will describe others in the next section of this chapter.

Texas has a long history of periods of extreme drought. The state experienced severe drought conditions as recently as 2010-2014. Although the average annual rainfall for the state

⁹⁰ Siloism is a term used to describe the existence of silos of knowledge and skill that develop within technoscientific and academic institutions. Siloism is characterized by the unwillingness to share knowledge and skills between departments in the same industry or institution. Siloism results in a lack of collaboration between institutional departments and represents a sequestering of knowledge and expertise.

is generally 37 inches, during those five years the average annual rainfall in the Dallas-Fort Worth (DFW) metropolitan area was 27.9 inches (National Weather Service Weather Forecast Office 2016). According to the National Drought Mitigation Center website, the majority of the counties in the DFW metropolitan area experienced severe to exceptional drought conditions in 2011-2014. As of December 9, 2021, most of the counties located in North Central Texas are either classified as being abnormally dry or in a moderate drought (National Drought Mitigation Center 2021).

In response to the drought of the 1950s, the Texas Legislature created the Texas Water Development Board (TWDB) to prepare plans and develop supplies to meet the future water needs of the state. As such, the TWDB has published eleven *State Water Plans* to date, including the latest in 2022; a new plan is published every five years. Each state water plan aims at meeting water needs of the state for the next 50 years and incorporates information provided by the sixteen Regional Water Planning Groups in the state. Each planning group, comprised of at least 12 state-mandated members representing a variety of interests and water-users, analyzes population and water demand projections, as well as the availability of existing water supplies during times of drought (Texas Water Development Board 2016).

The DFW metropolitan area is centrally located within the Region C Regional Water Planning Area that includes all or parts of 16 counties. Figure 4.2 shows that most of the counties in Region C are in the upper portion of the Trinity River Basin, although portions of some counties lie in the Red River, Brazos, Sulphur, and Sabine River Basins. Region C comprises 25% of the Texas population. The counties of Dallas and Tarrant, comprising 63% of the population, are the two most populated counties in heavily urbanized Region C; 84% of the



Figure 4.2. Counties in Region C water planning group.⁹¹

region's population live in cities of more than 20,000 people. Projections indicate that, as previously noted in this chapter, between 2020 and 2070 the population in Region C will grow from approximately 7.6 million to 14.7 million people: a 93% increase.

Not surprisingly, overall water demands in this region are projected to increase 81% during this time frame (Region C Water Planning Group 2020, ES.5). Specifically, municipal

⁹¹ North Texas e-News, 2015.

http://ntxe-news.com/cgi-bin/artman/exec/view.cgi?archive=60&num=95955&printer=1

water demands for the region between 2020 and 2070 are projected to increase by roughly 77%, accounting for roughly 92% of total projected demands (2020, 2.15). According to Region C's Regional Water Plan, the projected demand of water is 2.9 million acre-feet/year. Based on current water supplies, there will be a regional shortage of water equivalent to 1.3 million acrefeet/year by 2070; a shortage necessitating the development of significant new water supplies within a 50-year time frame (2020, ES.5).

The hydrological regime for Region C is characterized by more water abundance moving west to east due to higher precipitation and runoff rates in the east and higher evaporation rates in the west. According to the 2021 Region C Water Plan, surface water currently provides roughly 90% of the water in the region; most of which comes from reservoirs in and outside of the region (2020, ES.3). The remaining water supplies for Region C come from groundwater (7%), authorized reuse (14%), and run-of-river permits (<1%) (2020, 3.3). According to the 2021 Region C Water Plan, based on current existing supplies these water supply percentages remain essentially the same for the projected future (2070), varying by only 1-4% (2020, 3.3). Although 90% of water supply comes from surface water, groundwater is an important source of water for rural areas within Region C; the largest groundwater source in the region is the Trinity aquifer. However, the current regional use of groundwater is not sustainable and is "close to or greater than long-term reliable supply" (2020, ES.3). Based on currently connected supply data in the 2022 State Water Plan Data Summary Workbook, Volume 1, Abbie Gardner, Professional Engineer with Freese and Nichols, Inc., calculates that "in 2020 approximately 76% of Region C's existing supplies are from reservoirs or reservoir systems, and of that, 73% of the total existing

supplies from reservoirs originate from Region C.^{"92} These percentages change very little by 2070, supply coming from reservoirs or reservoir systems is projected to be 70% and of that 70%, supply coming within Region C remains at 73%.⁹³ How do these statistics change if you in factor in the water management strategies recommended⁹⁴ in the 2021 Region C Regional Water Plan?

How these statistics change is unclear and is not stated in the 2022 State Water Plan nor in the 2021 Region C Water Plan. Attempts to acquire these statistics have not been successful. However, the 2012 State Water Plan indicates that 58% of Region C's surface water supply came from existing reservoirs in the area and 22% from surface water supplies located outside of the region (Texas Water Development Board 2012a, 46). To meet projected needs through the year 2070, the planning group for Region C recommended a variety of water management strategies with a total capital cost of \$30.44 billion (Region C Water Planning Group 2020, ES.7). The plan recommends the construction of seven new major reservoirs accounting for an additional 17% of the future water supply (ES.8). The proposed Marvin Nichols Reservoir would provide 34% of the new surface water supply (5A.10). This is in addition to the existing water supply, including existing reservoirs and reservoir systems, which accounts for 36% of the water supply for 2070 (ES.8). Another 13% of future water supply is slated to come from connecting to existing sources of water including existing reservoirs and reservoir systems (ES.8). Future water supplies stemming from new groundwater and run-of-river sources are both less than 2% (ES.8). The relative share of water supply due to municipal conservation and reuse in Region C's

⁹² Abbie Gardner, e-mail correspondence, December 9, 2021.

⁹³ Ibid.

⁹⁴ The cost of implementing all of the new water management strategies is \$30.44 billion (2020, ES.7).

2021 Water Plan constitutes 31% (ES.8), an increase of just 4% over the previous 27% allocation stated in the 2016 Region C Water Plan (ES.10). Why is there just a 4% increase in water supply from conservation and reuse by 2070? Regarding the recommended water management strategies, Gardner, the Freese and Nichols consultant, was able to provide the following statistics, "Approximately 32% of the volume of recommended water management strategies in 2020 is from reservoirs or reservoir systems which increases to 56% by 2070. In 2020, 98% of the supplies are sourced in Region C which decreases to 38% in 2070."⁹⁵ However, these figures do not include current existing supplies, but what is clear from these figures is that a large percentage of water supply for Region C is currently and increasingly sourced from reservoirs outside of the region.

Dependence on reservoirs for most of the municipal water supply can be problematic given the history of drought, global climate change predictions, and evaporation and sedimentation rates of reservoirs. Due to the drought conditions in 2010-2014, the reservoir storage levels in the Region C planning area were down by approximately 35% (Texas Water Development Board 2014). Global climate change in North Central Texas is expected to result in hotter and drier conditions, both of which augment drought. Moreover, Region C's 2012 Water Plan projected a decline in total water supply by about 3% by 2060 due to reservoir sedimentation (Texas Water Development Board 2012a, 46). However, according to the 2021 Region C Water Plan, roughly 50% of municipal water use is now discharged as treated effluent from wastewater treatment plants and is projected to serve as a significant source of water supply in the future due to reclamation and reuse projects (E.3). Increases in return flow due to

⁹⁵ Ibid.

reuse offset the decline in water supply due to sedimentation in reservoirs; consequently, current water supplies are almost constant over time (ES.5). What about the effects of evaporation? Researchers from Texas A&M University have determined that the long-term mean evaporation from all reservoirs in the Texas water rights permit system is estimated to be 7.53 billion m³/year, which is equivalent to 61% of total agricultural or 126% of total municipal water use in the state (Wurbs and Ayala 2014, 1). Given the aforementioned problems with drought, global climate change, sedimentation, and evaporation, it is perplexing that seven new reservoirs⁹⁶ are included in Region C's recommendations for meeting future water demands through the year 2070 (Region C Water Planning Group 2020, 5C.2). Given the cost of reservoir construction and dredging to restore storage capacity lost due to sedimentation, not to mention evaporation losses and the destruction of habitats and dislocation of families from privately owned land, the wisdom of this strategy should be questioned. Reservoirs and imported water may be solutions to meeting future water supply demand, but it is a short-term solution, especially given a mindset of continual growth. Perhaps, a solution to the wrong problem is being sought. I will explore this notion further in the "Recommended Resolution of Problem" section of this chapter.

Municipal use accounts for 90% of the projected water supply needs for Region C (Region C Regional Water Plan 2020, ES.3). Indeed, despite the geographical and climatological limitations of this area, in 2016, DFW area residents used more than 200 gallons of water per

⁹⁶ According to the 2021 Region C Regional Water Plan, these seven new reservoirs include Bois d'Arc Lake in the Red River Basin, four potential reservoirs in the Sulphur River Basin (this would include the Marvin Nichols Reservoir), Lake Tehuacana in the Trinity River Basin, and Lake Columbia in the Neches River Basin. Four of these seven reservoirs (Marvin Nichols, Lake Columbia, and North and South George Parkerhouse) are located outside of Region C and constitute 57% of the proposed new reservoirs.

person per day (gpcd); compared to 159 gpcd and 147 gpcd for Houston and San Antonio, respectively (San Antonio Water System 2016). The recommended conservation and reuse strategies in the Region C 2021 Water Plan aim to reduce dry-year⁹⁷ per-capita municipal use from 121 gpcd in 2020 to 96 gpcd by 2070 (2020, 5B.40). In comparison, Region C's 2016 Water Plan aimed to reduce dry-year per-capita municipal water use from 199 gpcd in 2020 to 105 gpcd by 2070 (2015, 5E.37). The 2021 Region C Water Plan aims for less than a 1% decrease from the 2016 Region C Water Plan in dry-year per-capita municipal use by 2070. Given that these two plans were developed five years apart, why is there only a reduction of less than 1%? Is this a significant and sufficient reduction? Is there more that can be done to reduce percapita municipal water use? The 2021 Water Conservation Package includes three state and/or federally mandated initiatives to reduce water usage by simply replacing high-water use fixtures and appliances (i.e., clothes washer and dishwasher). Also included in the conservation plan are time-of-day irrigation and twice weekly irrigation restrictions. Why does the conservation plan not include restrictions of water usage for private residential swimming pools? What water usage reduction would be possible with such a restriction? Is it right for people living in rural areas to lose their land and way of life for reservoirs to be constructed so people living in urban areas have water to water their lawns and fill their swimming pools? This water use is not a necessity. The conservation package, in addition, contains an enhanced public and school education component. However, the term "enhanced" is not defined in the

⁹⁷ Historically, high water use years are associated with dry weather conditions which result in higher outdoor water use due primarily to lawn watering. With the implementation of water restrictions in dry years, this pattern of high-water use is beginning to change in Region C. For further information see Region C Water Planning Group. 2020. "2021 Region C Water Plan: Volume 1." Accessed May 21, 2021. https://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp, particularly page 1.9.

Region C Water Plan and there is no description of the public and school education component. Does "enhanced" mean an increase in quantity, an increase in quality, or increases in both? Roughly half of the municipal water in the DFW area is allocated to residential use, with nonnative turf grass yards consuming 125 gallons of water per 1,000 square feet a day (*Denton Record-Chronicle* 2015). According to *Water Conservation by the Yard*, published by the Sierra Club, Lone Star Chapter and the National Wildlife Federation and produced by the Texas Living Waters Project, outdoor water use accounts for approximately 33% of annual residential water use in Texas.⁹⁸ The Texas Water Development Board's Technical Note entitled, "The Grass is Always Greener: Outdoor Residential Water Use," stipulates that of outdoor water use in Texas, 80-90% is devoted to maintaining lawns, gardens, and plants (2012b, 3). Can public and private conservation efforts in combination with other strategies be used to bridge the water supply gap that is projected by 2070? If so, how? Is it a matter of more conservation education?

This was a question that Aldo Leopold pondered almost 75 years ago. While lamenting the lack of progress in conservation efforts despite a plethora of propaganda spanning roughly one hundred years, in "*A Sand County Almanac* (1966) Leopold writes, "The usual answer to this dilemma is more 'conservation education.' No one will debate that, but is it certain that only the *volume* of education needs stepping up? Is something lacking in the *content* as well?" (243). I argue that something is lacking and *that* something is engagement. The results of the North Texas Community Engagement Survey sent out by me with the collaboration of three

⁹⁸ For more information on the critical role outdoor water use will play in future water conservation efforts in Texas see Sierra Club, Lone Star Chapter and National Wildlife Federation. 2015. Water Conservation by the Yard: Estimating Savings from Outdoor Watering Restrictions. Accessed November 9, 2021. https://texaslivingwaters.org/wp-content/uploads/2015/03/SC_WaterConservByYard_report_031115_R.pdf.

local water professionals, provide substantiation of my argument. I will elaborate on the results of the survey in the last section of this chapter. Leopold identifies further fault in conservation education, "It defines no right or wrong, assigns no obligation, calls for no sacrifice, implies no change in the current *philosophy of values* [emphasis added]" (244). I discuss in detail in Chapter 5 how Watershed Education Community Action Networks (WE CANs) can increase engagement and conservation efforts, while also promoting a change in mindset, values, and behaviors within North Central Texas.

Identification of Trends, Conditions, and Projections

Many of the past and current environmental and social trends and conditioning factors that exist on the macroscopic scale of the United States or even globally that were discussed in Chapter 1 also exist on the microscopic scale of the North Central Texas region. These social and environmental trends create barriers to achieving watershed stewardship. To overcome the water supply and management challenges in North Central Texas, the relationship of people to water and to the Trinity River watershed must be changed.

A major social trend ubiquitous in North Central Texas is the disconnect between people and the Trinity River watershed. A sense of community is lacking not only amongst people but between people and the larger interdependent parts of the watershed. Although Aldo Leopold stresses the concept of community in his essay "The Land Ethic," he does not stipulate how to form and maintain a sense of belonging to the land community. His land ethic invokes a change in relationship to the land from that of conqueror to citizen, but he does not explicate the process for doing so. However, this change in role is crucial because as Leopold stated, if people regard the land as a commodity belonging to people instead of viewing the land as a community to which people belong, the land will be treated with disrespect and a sustainable relationship and stewardship will not be possible. In the next chapter, I will describe in detail how Watershed Education Community Action Networks (WE CANS) can facilitate the change in role from conqueror to citizen of the land community (i.e., watershed). In Braiding Sweetgrass (2013), environmental biologist and Director of the Center for Native Peoples and the Environment at the State University of New York, Robin Kimmerer, relates the Anishinaabe Windigo myth⁹⁹ to the conqueror's frontier and economic mentality criticized by Leopold and typified by American culture. The Windigo legend was used by the Anishinaabe people to control the "greedy part" (306) of human nature and "to encourage negative feedback loops in the minds of listeners" (305). In systems theory, stable, balanced, and sustainable systems are characterized by negative feedback loops. The current practice of supplying more water to meet ever increasing demands for water is an example of an unsustainable positive feedback loop, a change in one parameter promotes a similar change in another parameter. A Windigo nature is rife with insatiable consumption driven by a frontier and economic mindset that views natural resources as commodities. As noted by Kimmerer, "Cautionary Windigo tales arose in a commons-based society where sharing was essential to survival and greed made any individual a danger to the whole" (307). Windigo thinking is epitomized by Mulholland's commentary regarding the importation of water from Owens Valley to Los Angeles, "There it is. Take it."

⁹⁹ The Anishinaabe Windigo myth is a tale of a legendary monster that was driven to cannibalism from the madness of hunger. According to the legend, a Windigo is not born, it is made; thus, the myth was designed to promote self-discipline to overcome selfishness and greed. A Windigo's hunger is never sated; the more it eats, the more ravenous it becomes. A Windigo is forever doomed to suffer from the cravings and pangs of hunger and greed.
Unfortunately, the frontier and economic mentality is exacerbated by faith in what Mary Midgley described as the myth of the omnicompetence of technoscience.

Technology and modern science are conditioning factors that have contributed to the disengagement of people from their watershed. The disengagement of the North Central Texas community from the Trinity River watershed takes many forms: being unaware and unappreciative of water, relying on the immediate and unlimited delivery of water by turning on a tap; watering non-native turf yards, violating outdoor water restrictions on the time of day and the frequency permitted to water lawns; littering; disposing of grease, oil, and grass clippings in stormwater drains; and choosing to be engaged with mobile phone devices, television, social media, etc. to the exclusion of the natural environment. Unfortunately, the relationship of people to water in North Central Texas is predominantly tap-mediated rather than watershed-mediated. This, however, is not a recent problem. In 1949, Aldo Leopold wrote in A Sand County Almanac, "Perhaps the most serious obstacle impeding the evolution of a land [watershed] ethic is the fact that our educational and economic system is headed away from, rather than toward, an intense consciousness of land [watershed]. Your true modern is separated from the land by many middlemen, and by innumerable physical gadgets. *He has no* vital relation to it [italics added]" (1966, 261).

In "Thinking Energy and Ethics After Illich," philosopher Carl Mitcham states, "The problem with advanced forms of energy production is that they progressively depend on expertise and alienation - turning citizens into consumers" (2017, 21). Mitcham's statement can be related to water supply and management in North Central Texas in two ways. First, the relationship to water of many residents of North Central Texas is primarily that of a consumer.

Faucets in kitchens and bathrooms and dishwashers and washing machines are turned on without any thought about how the water came to be available for household use. Many lawns are watered through automated sprinkler systems, as a result, this use of water often goes unnoticed. Most residents of North Central Texas are not cognizant of the amount of water they use. However, once a month a water bill arrives that may draw attention to the amount of water that has been consumed, but unfortunately for many, even the quantity of water used often goes unnoticed unless the amount owed has substantially increased.

Philosopher Albert Borgmann, in Technology and the Character of Contemporary Life: A *Philosophical Inquiry* (1984), elucidates how the power of the technological paradigm is manifested in "the assembly of commodities that constitutes the world of consumption" (33). Although Borgmann acknowledges that technology has served humanity well in some respects, it has led to effortless and thoughtless consumption. Borgmann explains how technology has unraveled means and ends through the advent of a "device" which is comprised of both machinery and the commodity procured by that machinery (40-48). Technological advances in the machinery (i.e., the means) become more and more concealed and unfamiliar while the availability of the commodity (i.e., the end) remains a prominent feature. For example, dams and reservoirs, underground pipes, electrical power plants (to pump water), water and wastewater treatment plants are all but invisible to residential consumers. What is prominent to residential water customers is the availability of clean water at the simple turn of a faucet and the mysterious and mystical disappearance of dirty water down a drain. Due to technology, not only are these services "rendered instantaneous, ubiquitous, safe, and easy" (41), but they also create a chasm between people and water. The acquisition of clean water and the disposal

of dirty water does not require any physical engagement with the natural world of water, rather, through devices (i.e., tap or faucet and drains) water is procured and removed free from any burdens and encumbrances on the part of the residential consumer.

This disembodied and technologically mediated relationship with water isolates the public from obtaining a true phenomenological understanding of the procurement and disposal of water. In many ways, the situation is analogous to the scene in the movie *The Wizard of* Oz where Dorothy and her entourage realize that the mysterious and powerful wizard of Oz is just a man behind a curtain producing a technologically mediated illusion through the pulling of levers and pushing of buttons. The words, "Pay no attention to the man behind the curtain," uttered by the wizard, characterize the relationship to water cultivated by the traditional mindset of what I have been referring to as "thinking inside the pipe." "Pay no attention to the processes for procuring and disposing of water, just turn on your tap, and pay your water bill." This alienation precludes the possibility of conducting a philosophical archaeology of the historical context from which the prevailing urban water narrative was derived and exploring key questions such as "Is the technoscientific approach to water supply and management the solution or the problem?" and "Is the 20th century urban water narrative the best narrative for the challenges of the 21st century?"

The water-use scenarios described above characterize the typical relationship of North Central Texas residents to water. No understanding or thought exists concerning the source of the water; how the water is cleaned and disinfected for consumption; where the water goes after it is used; how the water is conveyed to and from its destination; the true cost of water; the existence of water quality and quantity issues; the environmental, social, and economic

costs and side effects of building supply reservoirs; and a myriad other details of water supply and management. This alienation not only arose due to the lack of direct experience with water made possible through innovations of science and technology, but it also derived from the concomitant ideology of expertise and siloism that typically characterize advanced forms of commodity production.

Alienation produced by expertise is the second way in which Mitcham's foregoing quote relates to North Central Texas water supply and management. The siloes of expertise represent barriers and boundaries for collaboration between professionals and between professionals and the public. For example, water supply and stormwater management are often separate municipal departments even though stormwater can be a viable form of water supply if the goals of these two departments can be reimagined as being one and the same. The power of partnership is also lost in terms of the silos and boundaries created between professionals and the public. The current model of water supply and management is drenched in expertise. Critical thinking, problem solving, decision-making and action are relegated to the domain occupied by experts. As a result, deliberation is constrained by thinking characterized by Whitehead's "minds in a groove" mentality rather than being expanded by tapping into the differing wells of experience and ethics of the public domain. In *Forbidding Science* (2009), bioethicist Leon Kass, recommends that deliberative councils of any type should intentionally reflect the diversity of opinion that exists in the community at large and that "the ultimate arbiters of the proper relations between science [technoscience] and society are the people and their representatives" (277). Although Kass recognizes that experts have their role to play

in public discussions, so does the nonprofessional public. Similarly, I contend that water issues cannot be solved solely by experts.

All stakeholders within the watershed need to have the genuine opportunity to be engaged in a collective social process as a deliberative community. John Dryzek, a contemporary political scientist, prefers the use of the term "discursive" to that of "deliberative" in describing democratic paradigms for effecting social change. In *Deliberative* Democracy and Beyond: Liberals, Critics, and Contestations (2002), Dryzek defines a discursive process as necessarily social and intersubjective, encompassing a more expansive form of communication (i.e., unruly and contentious communication from the margins) enabling the raising and challenging of traditional arguments or discourses (vi). In other words, discursive democratic processes foster what anthropologist Arjun Appadurai calls the "capacity to aspire;" the ability "to strengthen the capacity of the [public] to exercise 'voice,' to debate, contest, and oppose vital directions for collective social life" (2004, 66) with an aim to alter the cultural narrative and framework. Dryzek maintains that although cultural narratives can condition individual and societal thought, these stories or myths do not necessarily lead to a metaphorical imprisonment and captivity. Rather, "the essence of engagement and challenge across discourses is that individuals can be brought to reflect upon the content of discourses in which they move" (2002, 163). Without questioning and reflection, escape from captivity is not possible because the bars of the cage are not perceived. As Daniel Quinn's gorilla interlocutor in Ishmael instructs, "If you can't discover what is keeping you in, the will to get out soon becomes confused and ineffectual" (1992, 25). Questioning the traditional and prevailing cultural

narrative that water supply and management are solely the province of experts requires the opportunity for contestation of discourses to occur in the public sphere.

However, the "public" has been eclipsed and liquefied resulting in the dissolution of the public political arena and the dilution of political agency, consequently creating a dehumanized culture. Zygmunt Bauman, a 20th century Polish sociologist, comments on the rise of the individual and the fall of the public citizen in *Liquid Modernity* (2012). According to Bauman, "the other side of individualization seems to be the corrosion and slow disintegration of citizenship" (2012, 36). The rise of the social and political ideology of individualism, the view that the needs of the individual are more important than those of the group, resulted in a focus on self-achievement and fulfillment, a retreat into the private world and an indifference to the public world of democratic society and institutions. Individualism dissolves community through the processes of isolation, fragmentation, and alienation. Consequently, Bauman asserts, "public space is increasingly empty of public issues. It fails to perform its past role of a meetingand-dialogue space for private troubles and public issues...individuals are being gradually, but consistently stripped of the protective armour of citizenship and expropriated of their citizen skills and interests" (40). Problems are not solved through participatory community-based decision making and problem solving, they are relegated to the private sphere of expertise. Common space and common concerns, places of encounter and questioning, need to be resurrected because they are necessary for the liberation from dehumanizing alienation. The current task of critical theory according to Bauman is "to redesign and repopulate the now largely vacant agora [sic] – the site of meeting, debate and negotiation between the individual and the common, private and public good...to reconnect the two edges of the abyss which has

opened between the reality of the individual *de jure* and the prospects of the individual *de facto*.¹⁰⁰ And individuals who relearned forgotten citizen skills and reappropriated lost citizen tools are the only builders up to the tasks of this particular bridge building" (41). In Whose Justice? Whose Rationality? (1988), Alasdair MacIntyre explores the question of whether discursive democracy, engagement across discourses, is possible. MacIntyre argues that discursive democracy is particularly possible when a tradition or cultural narrative experiences a crisis or disruption that cannot be rectified through the means of its own framework (364-365). Although MacIntyre's "crisis," Husserl's "phenomenological reduction," Bachelard's "epistemological rupture," and Freire's "tidal wave," differ in terminology, all express the need to deconstruct systems of thought that are no longer viable. A break in the prevailing societal epistemology is an opportunity for critical consciousness to rise to the surface as citizens reengage with public issues and re-imagine and create a new cultural narrative. Brené Brown, in Daring Greatly (2012) uses the term "disruptive engagement" (187) to describe a process of rehumanization. Water issues in North Central Texas are pregnant opportunities for all stakeholders to engage disruptively by reigniting creativity, innovation, and education to overcome disengagement, alienation, and dehumanization and to infuse regional water issues with a network of people who "dare greatly" to participate in a discursive approach to water supply and management.

The environmental trends of expropriation of water from rural to urban areas, reliance on engineering approaches to water supply, and regional effects of global climate change,

¹⁰⁰ Zygmunt Bauman. 2012. *Liquid Modernity*. Cambridge: Polity Press. In the first chapter of this book, Bauman distinguishes between an individual *de jure*, concerning law, and an individual *de facto*, concerning fact.

singly and in combination, represents a compelling crisis or rupture inviting the deconstruction of the traditional mindset of building more water infrastructure (i.e., reservoirs, pipelines, etc.). The conditioning factors of these environmental trends are increasing population, urban sprawl, decreasing water supply, state water policy and politics, and economic incentives. These challenges beg the question, "How is North Central Texas preparing for its water future?" Although there is a Texas State Water Plan that includes a regional water plan for North Central Texas, it is based on traditional planning using the 1950 "drought of record."¹⁰¹ This means that planners are tasked with locating water supplies in sufficient quantity to meet the 50-year projected demand in water during a repeat of the 1950 drought. Some water professionals and policymakers are questioning the validity of that planning approach given the climate variability and uncertainty associated with climate change. The traditional water planning method is still used in Texas because of the politics of climate change. As reported by Bret Jaspers (2021) in a KERA publication, Jennifer Walker, Deputy Director of the National Wildlife Federation's Texas Coast and Water Program, contends, "There is not a mechanism to incorporate climate change into the regional and state water planning process." Indeed, the Texas State Water Plan does not include the phrase "climate change." The States at Risk website provides a report card on each American state in relation to the preparedness actions taken to meet climate threats.¹⁰² Texas received an overall grade of "F" and grades of "F" in heat and "D-" in drought preparedness. The analysis was conducted by Climate Central and ICF International and grades

 ¹⁰¹ Between 1949 and 1957, Texans experienced the worst drought ever recorded. Texas received 30-50% less rain than it normally receives. In addition, above average temperatures exacerbated the effects of decreased rainfall.
¹⁰² States at Risk. 2015. "America's Preparedness Report Card 2015." Accessed January 13, 2022. https://reportcard.statesatrisk.org.

were awarded relative to other states and the magnitude of each climate threat. The Texas

report card summary states:

While Texas has taken *extensive action* to address its current drought, wildfire, and coastal flooding risks, it has taken only a *fair amount of action* to prepare for its current heat risks. Texas does not include extreme heat or drought in its *Emergency Management Plan.* Looking to the future, Texas has taken *almost no action* to understand its future climate vulnerabilities, plan for them, or implement programs that aim to increase its resilience. This lack of action places Texas far behind the curve: most states have taken at least *limited action* to prepare for future climate threats. Crucially, the state has not conducted a statewide climate change vulnerability assessment, and does not have an adaptation plan in place.¹⁰³

Despite the projection that Texas will face the highest overall summer drought threat of any state through 2050, the state has taken very little action to mitigate or adapt to this threat. Walker advocates using "scenario planning" in lieu of traditional water planning because rather than relying on one scenario like the drought of record, scenario planning identifies a range of possible future conditions. However, the Texas Water Development Board does not have the funds or authority to adopt scenario planning, both money and mandate come from the Texas Legislature that unfortunately is not receptive to addressing climate change issues and continues to pass bills favoring the oil and gas industries. However, Kevin Ward, general manager of the Trinity River Authority and chair of the Region C water planning group, claims that the state can give special allowance for a region "to plan for both the drought of record and a one-year reserve supply in existing reservoirs" (Jaspers 2021). According to Walker, although an extra water supply may provide enough water for a drought worse than the 1950 drought, building the infrastructure to meet this higher water supply benchmark is not "efficient or resilient."

¹⁰³ Ibid.

The strategy of North Central Texas to depend on reservoirs to supply water to meet the projected extreme heat and drought conditions associated with climate change in conjunction with meeting projected increases in population and water demand is mired in a techno engineering mindset I keep referring to as "thinking inside the pipe." Given that there are substantial environmental, social, and economic costs associated with this approach (as previously discussed in this chapter), including the loss of water due to evaporation and the loss of reservoir storage capacity due to sedimentation, the question must be asked, "Why is conservation not a bigger component of the regional water plan?" One answer may be that an emphasis on conservation would conceivably rupture the myth of progress and the myth of the omnicompetence of technoscience and necessitate the elimination of a frontier and economic mindset. The myth of progress perpetuates the incessant growth of the Dallas-Fort Worth metroplex. Growth is claimed to be needed to fuel the economy of the region and the state. Water managers claim that conservation measures will not eliminate the need to build more reservoirs because conservation cannot keep pace with increasing water demand. Would water conservation be enough to curtail the building of new reservoirs if the myths of inevitable progress and omnicompetence of technoscience were eliminated? Why is the growth of the region not curtailed by the constraints of water supply? Unlimited growth of an area with finite resources is not sustainable. Moreover, the expropriation of water from reservoirs constructed outside of the region is an issue of social and environmental justice. At what point will growth in Region C be limited? Why do municipalities and water utilities rarely enforce outdoor watering restrictions? The municipalities of Allen and Plano, for instance, have not issued violations since 2015 (Jaspers 2021). The general manager of the Trinity River Authority and

chair of the Region C water planning group stipulates that increasing fines and enforcement of outdoor watering rules will not result in decreases in water use because, "If you make something mandatory, you lose ownership" (Jaspers 2021). If this is true, then why do cities issue outdoor watering ordinances? By their very nature, they are mandatory and enforceable. Ward also asserts that a regulation implies that "it" is someone else's problem. Ward's comment makes sense in terms of the regard given to the ideology of individualism in Texas. But, here again, does the good of an individual trump the good of the community?

Another tool for encouraging less water usage is to increase the price of water. However, as explained in Chapter 1, raising water prices creates an issue of social justice. This strategy may create inequitable water use patterns favoring those who can afford to pay higher rates than those who cannot. Another issue with the price of water is its low cost charged to customers. According to the KERA article, by Jaspers (2021), the North Texas Municipal Water District "sells water to its member cities for \$2.99 a thousand gallons, about a quarter of a penny per gallon." Why are water rates so reasonable in the DFW metroplex if current water supply cannot meet future demands? Does the low cost of water encourage and perpetuate the mentality of "thinking inside the pipe?" After all, more water usage has historically translated to more reservoir construction. Is a quarter of a penny per gallon the true cost of water or has the cost been externalized?¹⁰⁴ A gallon of water being sold for a quarter of a penny certainly stands in stark contrast to the price tag of \$4.5 billion for the construction of one new reservoir alone.

¹⁰⁴ Externalization is a socioeconomic term used to describe how a business or industry can maximize profit by "externalizing" or shifting cost indirectly to a third party, often taxpayers.

Another question that needs to be contemplated is, "When water is sold for profit, what is the economic incentive for water utilities to promote water conservation?"

There are numerous other economic and political questions that need to be raised in conjunction with water supply and management in North Central Texas. In terms of Region C, why is the construction of reservoirs almost always awarded to the same environmental engineering firm? Why is a proposed new reservoir named after a former chairman of the Texas Water Development Board and a former partner of a local environmental engineering firm? Why are the Region C water plans prepared by engineering firms in that region? Does this constitute a conflict of interest if those same engineering firms are awarded construction contracts? What are the political and economic incentives to maintain the status quo of "thinking inside the pipe?" Does Texas water policy and law favor unlimited consumption or conservation?

In "Texas Water Law and Organizations" (2011), Ronald Kaiser, Chair of the Water Management and Hydrological Sciences program at Texas A&M University, states, "In many ways, Texas law is out of sync with the hydrologic interconnectedness of water. It is based on three geologic containers for water: (1) surface water in lakes, rivers, and streams; (2) diffused (drainage) surface water; and (3) percolating groundwater. A different set of laws governs the allocation system and ownership in each container" (26). Surface-water is owned by the state and held in trust for the public. To use state-owned water, a permit must be filed to obtain a "water right" from the Texas Commission on Environmental Quality (TCEQ). A water right is a "usufructuary right;" a non-possessory right to impound, divert, or use state-owned water. In other words, a water right does not transfer ownership from the state to the permit holder. Texas surface-water law is governed by the doctrine of prior appropriation that simply can be defined by "first in line, first in right," or "first come, first served." Under the Texas appropriation system, seniority of water rights is based on the date the permit is filed with TCEQ. Senior water right holders are entitled to their allotment of water before junior water right holders; however, this usually does not become a problem except in emergency situations (i.e., drought). During shortages, allotment of water is determined by seniority. A permit allows the holder to withdraw a specific amount of water, at a specific location, for a specific purpose. According to Texas water law, water rights may be canceled if the water is not fully used in a 10-year period.¹⁰⁵ This is known as the "use it or lose it" condition of Texas surface-water law. Thus, the nature of surface-water law provides no incentive for any water right holder to conserve water and certainly not for senior permit holders who are first in line to receive their allotment of water during times of shortage. According to Oklahoma State University's Extension department, "Virtually all surface waters are currently appropriated, and in some cases over-appropriated"¹⁰⁶ in Texas. This leaves very little water for instream flow needed to maintain ecologically healthy streams, rivers, bays, and estuaries. Recognizing this, the Texas legislature passed Senate Bill 2 (2001) and Senate Bill 3 (2007) to address the issue of environmental flow. Although this is a vital water issue, it is outside the scope of this dissertation. Diffused surface-water (i.e., storm runoff flowing diffusely over the land surface) is privately owned and may be captured and used by a landowner without a state permit.

¹⁰⁵ Texas Water Code. §11.171-11.186.

¹⁰⁶ M. D. Smolen, Aaron Mittelstet, & Bekki Harjo. April 2017. "Whose Water is it Anyway?: Arkansas, Oklahoma, Texas, New Mexico, Georgia, Alabama, and Florida. https://extension.okstate.edu/fact-sheets/whose-water-is-it-anyway.html. Accessed January 18, 2021.

Unlike surface-water, groundwater is not owned by the state of Texas; rather,

groundwater is designated by law to be the private property of the landowner and no permit is required. The question of how much groundwater a landowner is entitled to use is answered by the rule of capture which essentially stipulates that "landowners have the legal right to capture and pump unlimited quantities of groundwater from beneath their land, regardless of the effect on neighboring wells" (Kaiser 2011, 31). Since the only thing restricting the amount of water a landowner can use is their pump, the rule of capture is also commonly referred to as the "rule of the biggest pump." This rule provides an incentive and advantage to have the deepest and biggest pump even if the withdrawal of water from beneath one's land results in other nearby and shallower wells to go dry. Technically, the landowner does not own the water beneath their land, only the right to pump whatever water is available. Once again, groundwater law in Texas provides no motivation to conserve water. After all, he/she who has the bigger pump wins! In "Water Management Guidance from Texas" (2011), Ronald Griffin, Professor of Water Resource Economics at Texas A&M University, ascribes much of the problem associated with the rule of capture to the "invisibility" of groundwater which facilitates the ability to deny that others are affected by pumping (231). Griffin notes that an exception was made in 1993 regarding the Edwards Aquifer and the Texas legislature established quantified groundwater rights, severing water rights from land rights for the first time. However, Griffin contends even in the exceptional case of the Edwards aquifer, "Texas is having a hard time mustering the political will to stand by the pumping limits it was forced [by federal authority] to adopt in 1993. The urge to enable popular visions of economic development is too great" (231). Since the rule of capture provides such weak motives for conservation, Texas has experienced a serious

depletion of its aquifers, most notably the Ogallala aquifer.¹⁰⁷ According to Griffin, the most pressing groundwater issue in Texas is the concerted application of groundwater districts, "to shift some decision-making responsibility to locally elected authorities with the ability to regulate or tax pumping, particularly when confronted by proposals to export water to distant areas" (232). In North Central Texas, although only 7% of water supply comes from groundwater, primarily sourced from the Trinity aquifer, groundwater is especially important to rural areas of Region C.

Water law and policy in Texas, like most Western states, is written from the conception of water as a commodity rather than a commons. Dividing all the water into the three categories or silos of surface, diffused, and ground underscores a lack of understanding of the hydrologic interconnectedness of these resources, all water is the same water, it inevitably is one water. Hydrologic interconnectedness necessitates a different approach to supplying and managing water throughout Texas. The One Water movement is discussed briefly in a later section of this chapter.

Based on the trends and conditioning factors discussed above, my projection of water issues on the microscopic scale are essentially the same as my projection of water issues on the macroscopic scale; that is, water policy, supply, and management will continue to be dominated by a 20th century mindset of expertise focused on engineering feats associated with the expropriation of water. My projection is based on the deep-rooted and ever-present driving

¹⁰⁷ The Ogallala, one of the world's largest aquifers, underlies the Great Plains in eight states: Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. After World War II, water began to be extracted from the Ogallala for agricultural irrigation. The aquifer supports approximately 20% of the U.S. production of wheat, corn, cotton, and cattle. The aquifer is also used as the main water supply for the High Plains region of Texas.

force of the myths of unlimited progress and the omnicompetence of technoscience. These myths foster what Leopold called a "frontier and economic mindset" and promote the needless barriers and boundaries constructed by scientific reductionism, disciplinary silos, and expertise. A mechanistic and incomplete understanding of urban water issues has created a centralized model of water supply and management or an inverted pyramid of watershed management.

As depicted in Figure 4.3, this model is characterized by policy decisions made and applied from a bottom-up approach based on a small group of primarily political, business, development, and water industry experts who represent a narrow segment of all stakeholders in Region C. For example, the Region C water planning group is comprised of 22 members,



Figure 4.3. Inverted pyramid model of watershed management.

three officers and 19 group members. Of these, two members are women, and all members are white. Each member serves to represent one of twelve specific interests in accordance with the Texas State Water Development Board (i.e., river authorities, industry, municipalities, water utilities, water districts, agriculture, small business, electric utilities, environment, counties, groundwater management areas, and public). For Region C, there are two members on the water planning group representing the public interest. With a population approximating 7.6. million people in Dallas-Fort Worth, two people on the Region C water planning group representing the public interest seems woefully inadequate. Moreover, the individuals representing the interest of the public and the environment have strong professional backgrounds in business development, including marketing and public relations for companies and brands. This begs the question, "Can these individuals faithfully represent the interests of the public any taint of conflict of interest?" The composition of the regional water planning group does not adequately represent the stakeholder diversity of Region C in terms of race, gender, or interest. Because each of these groups may experience water issues differently, there is a pragmatic need to diversify the composition of the regional water planning group. According to Region C's by-laws, the following process is followed for selecting members of the water planning group.

After a vacancy occurs of a voting member, the RCWPG shall have an agenda item on the next available publicly posted meeting notice declaring the vacancy and considering nominations from the public and the membership. If no nominations are forthcoming, the Chairman shall appoint a nominating committee to provide nominations at the next regular meeting of the RCWPG.¹⁰⁸

Public posting is done on the Region C planning group website. There is not a calendar of upcoming meetings posted. Currently, there are no meetings posted. This is more often the case than not. This process seems to give the illusion not only of open meetings, but also an

¹⁰⁸ Texas Water Development Board. 2022. "Region C Water Planning Group." Accessed February 12. https://www.twdb.texas.gov/waterplanning/rwp/regions/c/index.asp, page 4 of by-laws.

open nomination process. In practice, not posting future meetings well in advance serves to exclude outside participation in the meetings and nomination process.

Water policy-making capabilities reside exclusively in the public governance arena (i.e., state, regional, municipal, water district & utility arena). This model of water management has contributed to disconnecting and disengaging all sectors of the region from an embodied experience and understanding of the interconnectedness of the problems responsible for creating urban water issues. Policy decisions about supply and management based on the inverted pyramid model perpetuate the myths of inevitable progress, including the notion of unlimited growth and the omnicompetence of technoscience. Because input is so heavily weighted to favor the status quo of supply and management, it limits input from a diversity of participants and stifles the voices which can spark creative and innovative approaches to water supply and management. The current model of decision making encourages solutions from an entrenched economic and development perspective. In terms of sustainability, this style of management does not offer long-term stability and necessitates a change in the process of policy making that requires a concomitant change in the urban water narrative.

A change in narrative will produce new ways of being, thinking, and acting in relation to water and, more broadly, the watershed. Creating a new urban water narrative is innovative and daring. In his essay "Conservation is Good Work" (2018a), Wendell Berry, American writer, environmental activist, cultural critic, and farmer, asserts that for conservation of natural resource efforts to succeed, "we have got to get more radical" (32). What he means is that the existing gap between the public (i.e., political) and private sectors needs to be bridged. If a person wishes to change some aspect of urban water issues, the contemporary model of water

management leads to the inevitable conclusion that public policy must be changed. According to Berry, although it may be "much easier to improve a policy than it is to improve the community the policy attempts to affect," there is a limit to politics (32). Therefore, Berry contends that "some changes required by conservation cannot be politically made and that some necessary changes will have to be made by the governed without the help or approval of the government" (32). As seen with the COVID-19 pandemic in the United States, mandating the use of face masks and vaccines has not been politically possible. Similarly, mandating conservation of water through outdoor watering restrictions has also met with resistance, although more on the level of private citizens than public policy. Berry further asserts, "the root of the problem is always to be found in private life. We must learn to see that every problem that concerns us as conservationists always leads straight to the question of how we live.... If conservation is to have a hope of succeeding, then conservationists, while continuing their effort to change public life, are going to have to begin the effort to change private life as well" (32). For conservation to succeed, Berry believes the gap between what we say and do needs to be bridged (28). Rather than paying lip service to the concept of conservation, all stakeholders need to engage in thoughts and actions in concert with conserving water. To this end, there must first be the realization that urban water issues cannot be solved solely by "experts" in the political, hydrological, and environmental realms, rather communities, families, and individuals also need to engage in the problem-solving process. In another essay, "Sex, Economy, Freedom, and Community" (2018b), Berry states, "The indispensable form that can intervene between public and private interests is that of community" (119).

Recommended Resolution of Problem

Simply put, my recommended resolution to the barriers and boundaries detailed above is to build bridges, not literal bridges, but metaphoric bridges through the activities of Watershed Education Community Action Networks (WE CANs). The WE CANs dissolve the problems created by the barriers and boundaries characteristic of historic and contemporary water supply and management in North Central Texas by re-imagining the relationship between humans and water. An in-depth exploration of WE CANs is provided in the next chapter.

The current model of water management lacks an interface between public policy makers and the diversity of private watershed stakeholders (i.e., individual citizens, businesses, etc.). There is a communication and participation gap between the policy making and the policy following arenas. As illustrated in Figure 4.4, this gap can be bridged by the reconstitution of



Figure 4.4. Revised inverted pyramid model of watershed management.

community, a forum of dialogue, interaction, reflection, and action and the resurrection of the *agora*. In Greek, *agora* means the "assembly of the people." In ancient Greece, the *agora* was a `place for assembly, an open space that served as a meeting ground for various activities of citizens. The concept of *agora* includes both the physical setting and the assembly of participants. The Watershed Education Community Action Networks would function as *agoras*. I will discuss how WE CANs represent the resurrection of the ancient Greek concept of the *agora* in more detail in Chapter 5. Although the model in Figure 4.4 is an improvement over the one in Figure 4.3, I argue that there is still a problem with both these models of watershed management, they are unidirectional and hierarchical. Therefore, I recommend a web-based model of watershed management as depicted in Figure 4.5. This model is analogous to a wagon



Figure 4.5. Recommended web-based model of watershed management

wheel with the community arena, the *agora*, serving as the hub. The community arena or *agora* provides the opportunity for dialogue, interaction, reflection, and action between all segments of the public and private arenas. This conceptual model is built on the power of circle which I will discuss more extensively in the next chapter.

Regarding water supply strategies, rather than build new reservoirs, why not invest the funds in alternative strategies such as public and private conservation projects. At a Texas Master Naturalist Regional Conference on April 9, 2017, Sharlene Leurig, Project Director of the Texas Environmental Flows Project and a consultant on sustainable water investments, gave a talk entitled "Growing Water: The City as a Reservoir." Leurig, a critic of the water supply strategy of Texas and its dependence on the construction of reservoirs, asserts that all water infrastructure needs to be water supply infrastructure.¹⁰⁹ This is a water supply strategy that emerges not from a stagnant mindset stuck in a groove, or as I have said before "thinking inside the pipe," but rather from an innovative mindset I refer to as "thinking outside the pipe." It emerges from asking a different set of questions. How does a city start to become a source of water? How does a city become a sponge, a store of water? Leurig argues that cities should be inviting water to stay within the city by increasing stormwater capture. According to this new mindset, the current model of separating a city's stormwater and water departments is counterproductive. The stormwater department devises strategies to move stormwater out of the city as fast as possible to prevent flooding problems and the water department seeks sources of water from other localities outside of the region to supply the city. According to a

¹⁰⁹ Sharlene Leurig, "Growing Water: The City as a Reservoir," Texas Master Naturalist Regional Conference (Copper Canyon, TX), April 9, 2017.

study conducted by Texas A&M University scientists, climate change will not only result in hotter and drier droughts in Texas, but also more urban flooding due to extreme rainfall becoming more frequent and severe.¹¹⁰ What would happen if stormwater and water departments were not housed in their individual siloes of expertise and worked collaboratively to solve the regional water supply issue? This is a barrier that needs to be dissolved to create a self-sustaining model of water supply. In this model, Leurig asserts the city itself is water infrastructure.¹¹¹ This entails merging stormwater and water departments and a revisioning of what a reservoir looks like. It also encourages all stakeholders within Region C to acquire a new relationship with water by inviting water to stay within the city to be reused. Schools could be used as demonstration sites for strategies to capture and reuse water that can be implemented on a smaller scale at private residences. Such strategies include rainwater harvesting, rain gardens, soil water storage and infiltration systems, reduction in impermeable surfaces, and landscaping practices consonant with a regional landscape ethic (i.e., using regionally native or adapted plants). Leurig maintains the key to creating a sustainable watershed is to build a conservation ethic and habit in advance since waiting for a crisis brought on by a drought that immediately forces people to quickly reduce their water consumption may not be the most efficient way to instill conservation behaviors. Wimberley ISD had the first "One Water"¹¹²

¹¹⁰ See Kiah Collier. March 5, 2020. "A & M Study: The Future of Texas Depends on Climate Preparedness." https://www.texastribune.org/2020/03/05/study-future-texas-depends-climate-preparedness. Accessed December 10, 2021.

¹¹¹ Ibid.

¹¹² The hub for the One Water movement is the U.S. Water Alliance. The alliance was formed in 2008 to facilitate the implementation of an integrated systems approach to water supply and management. Although the alliance was seeing "silo-busting examples of integrated and inclusive approaches to water resource management," these practices were not occurring on a full-scale. The name "One Water" is derived from the belief that all water has inherent value and is part of one cycle. While this perspective embraces water sustainability, its mission is to

school in Texas. The Blue Hole Primary School is designed to capture and reuse water to offset water usage, using half as much potable water as traditional schools and reusing all wastewater.¹¹³ The design of the school is such that the infrastructure of the school's water and wastewater system is made visible to the students. In a YouTube video¹¹⁴, students take turns explaining the function of each different feature in providing water to the school or disposing of wastewater. For example, one feature is the "plumbing window." In the video, a second-grade student explains the "plumbing window" is a space allowing color-coded pipes to be visible to the students. Each color of pipe corresponds to a different type of water: potable, gray, and site-harvested water. The One Water movement requires a different experience of water and water supply infrastructure. All water needs to be treated as a functioning part of the hydrological cycle.

To this point, Amy Hays, an educator with the Noble Research Institute in Ardmore, Oklahoma, contends that droughts and floods are not problematic if the water cycle is functioning properly.¹¹⁵ If drought and floods are a problem, then the hydrological cycle is broken, and the questions need to be focused on "how." How did the water cycle become broken? How can it be restored?¹¹⁶ The new questions being asked by Leurig and Hays require

achieve sustainability through the goals of "thriving local economies, community vitality, and healthy ecosystems." The US Water Alliance publication entitled *One Water Roadmap: The Sustainable Management of Life* can be accessed by visiting the following website.

http://uswateralliance.org/sites/uswateralliance.org/files/publications/Roadmap%20FINAL.pdf. Accessed January 18, 2021.

¹¹³ Nabid Remadna. August 13, 2021. "Wimberley ISD: Blue Hole Primary School Puts Focus on Conserving Water." https://www.kxan.com/news/local/hays/wimberley-isd-blue-hole-primary-school-puts-focus-on-conserving-water. Accessed January 18, 2021.

¹¹⁴ YouTube. May 26, 2021. "Blue Hole Primary - One Water School Student Tour."

https://www.youtube.com/watch?v=LMmIVsBN83. Accessed March 4, 2022.

¹¹⁵ Amy Hays, phone call conversation, December 14, 2021.

¹¹⁶ Ibid.

moving from a "downstream" or lower level of perception to an "upstream" or higher level of perception. For example, in *The Four Insights: Wisdom, Power, and Grace of the Earthkeepers* (2006), Alberto Villoldo explains water quality issues seen from a downstream perspective focus on pollution, whereas, from an upstream perspective the focus in on the use of plastics. The lower-level perspective focuses on recycling as a solution, the higher-level perspective focuses on the elimination of one-time plastic product use (17-18). Although this example refers to the pollution of water by plastics, I use this example to illustrate how the questions and solutions to water supply has been limited to a "downstream" or lower level of perception by focusing on how to obtain more and more water to meet increasing demand. An "upstream" or higher level of perception would focus on conservation, how to reduce demand for water by living within the hydrological means of the region. This example illuminates how different perspectives yield different questions and different solutions to the same problem.

Watershed Education Community Action Networks (WE CANs) can bridge the gap between the "downstream" historical and contemporary mindset of "thinking inside the pipe" and an "upstream" community-based integrated watershed stewardship mindset of "thinking outside the pipe." WE CANs can address the problems currently plaguing water supply and management in North Central Texas in multiple ways: (1) Recovering public space and political agency via community-based projects that give rise to participatory water ethics, (2) reconverging humanities and science to encourage and stimulate multiple perspectives on urban water issues, (3) reframing the current urban water narrative to create a sustainable story about the relationship between people and water, (4) revitalizing urban watersheds

through a focus on socioecological interactions, and (5) rethinking urban water policy, supply, and management. Each of these WE CAN goals will be discussed in detail in the next chapter. *Conclusion of Problem Analysis*

The background information in this chapter provides a synopsis of the latest plan for water management in North Central Texas. Although the 2021 Region C Water Plan still relies heavily on water infrastructure projects (i.e., construction of new reservoirs) to provide water to meet a projected increase in demand, the new water plan does include an increase in the reliance on water conservation and reuse. However, the new water plan is still too light on conservation and reuse and too heavy on reservoir construction. Despite the environmental, financial, and social costs inherent in constructing reservoirs, there are still plans to build new ones. This reliance on reservoirs is even more problematic considering that at least 27% of the water supply in North Central Texas is projected to come from surface water supplies located outside of the planning region that require pipelines and energy to transfer the water from region to another. The plan to continue to meet increasing water demand with increasing water supply is in essence a positive feedback system and a disincentive for conservation. Without a change in the relationship of humans to water in North Central Texas, an increase in supply will only lead to an increase in demand; the resultant increase in demand drives the need for more water supply. Thus, building new reservoirs is a short-term solution to a long-term problem; it is analogous to placing a Band-Aid on a severed aorta. In addition, due to increased local and environmental opposition, it is questionable whether any new reservoirs will be built regardless of being in the state water plan and may thus be unrealistic sources of water. The Marvin Nichols Reservoir controversy has been ongoing for over 15 years, and the reservoir is not

scheduled to be built until 2050. If the projected new reservoirs are not built, where will the additional water come from to meet projected demand? What will happen if Region C falls short of anticipated water supplies?

For better management of demands, there must be a change in the relationship of humans to water in North Central Texas. Past and current water plans for Region C are drenched in a utilitarian mindset, one that perceives water as a commodity. As the Mulholland quote at the beginning of this chapter alludes, the current mindset is if the water is there, it is ours for the taking. This sentiment is clearly embodied in the fact that the DFW metropolitan area is already living beyond its local hydrological means, and has been for some time, yet it continues to expand. Instead of curtailing growth and focusing on living within our hydrological means, there is an ever-present search for potential sources of water lying outside of the water-planning region. Water is not respected; it is consumed. Solving water problems in North Central Texas requires the development of different mentality, a water mentality, a hydrological intelligence.

"Mind the gap." This is the warning the London Underground uses to remind passengers to pay attention to the gap that exists between the subway door and the station platform. In *Daring Greatly* (2012), Brené Brown, a researcher and professor at the University of Houston Graduate College of Social Work, suggests the phrase, "mind the gap," can be generalized as a reminder to "pay attention to the space between where we're standing and where we want to go" (173). The preceding social and environmental trends and the conditioning factors are barriers and boundaries, respectively, which create a gap that needs to be bridged to engage and create a community of watershed stewards.

Brown asserts that culture, "who we are," is just as important, or more so, as strategy, "what we want to achieve," to consider in cultivating the necessary changes needed to bridge the disengagement divide (173-182). An understanding of culture and its concomitant narrative allows discrepancies between "what we say" (i.e., aspirational values) and "what we do" (i.e., practiced values) to rise to the surface and become visible (175). To isolate problems and develop effective transformational strategies, an analysis needs to be conducted of the gulf that exists between aspirational values and practiced values. This value gap is what Brown refers to as "the disengagement divide" (177). How does a culture fuel disengagement and disconnection? Brown contends that "dehumanizing cultures foster the highest levels of disengagement" (177) creating value gaps that can't be successfully navigated because there is a misalignment between values and actions. If the goal is to facilitate reconnection and reengagement, the gap must be minded, and values have to be aligned with action (181-182). In other words, the talk must be walked. Individuals, communities, corporations, and governments claim to value water, but the actions of these entities often betray this espoused value. What is the best way to align environmental values and actions?

In 1968, Baba Dioum, Sengalese poet, ecologist, and environmentalist, gave a speech to the general assembly of the International Union for Conservation of Nature that included this oft-cited quote, "In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught." However, what does it mean to be "taught?" Taught how? By whom? The teaching of facts, the mere transmission of information, does not equate to the love of the environment. This quote is problematic because it excludes a vital component of education, the emotional, visceral, embodied connection made

through experience. For this reason, Bill Scott, Emeritus Professor of Education and former Director of the Centre for Research in Education and the Environment at the University of Bath in the United Kingdom, revised Dioum's quote: "In the end, we will conserve only what we love, we will love only what we value, and we will value only that we have come to appreciate through experience."¹¹⁷ Although education is considered to be vital to aligning values and actions, and there are numerous water education and community outreach programs in the region, a disconnect between people and the Trinity River watershed remains. Why? This question led me to collaborate with three water professionals in North Central Texas.

North Central Texas Community Engagement Survey

To obtain a better perspective on the question of why North Central Texas residents are disconnected from water, particularly the Trinity River watershed, I contacted several water professionals in the region. Three of these water professionals, Michele Birmingham, Fort Worth Water Department Conservation Specialist; Dustan Compton, Tarrant Regional Water District Regional Conservation Manager; Stephanie Zavala, Rogue Water Chief Executive Officer; and I designed a survey to gather feedback from water professionals and non-professionals on their perception of community engagement regarding urban water issues. In this section, I will discuss the highlights of the survey findings.¹¹⁸ The survey data analysis was conducted by

¹¹⁷ Bill Scott, February 3, 2012. "Will We Really Understand Only What We are Taught?," https://blogs.bath.ac.uk/edswahs/2012/02/03/will-we-really-understand-only-what-we-are-taught. Accessed January 20, 2021.

¹¹⁸ See the appendices for copies of the Institutional Review Board (IRB) application approval letter, informed consent notice, community engagement survey recruitment letters, and survey questions and summarized raw data.

myself, and the interpretation of the data solely represents my views and not necessarily those of the three water professionals with whom I worked on the survey design.

In February 2019, electronic surveys were sent to 130 water professionals and 400 water non-professionals, 22 and 92 responses were received for a 17% and 23% response rate, respectively. For the purposes of this study, water non-professionals were defined as invested members of the public (i.e., water-related volunteers or previous or current participants in water-related events). The respondent demographic information gathered by the surveys disclosed a lack of diversity. All the water professionals and 89% of the water non-professionals identified with a white ethnicity. Roughly two-thirds of both respondent groups reported the attainment of advanced college or other professional degrees. There was a definite gap in the age of the respondents for both groups, 70% of the water professionals were in the 25-44 age bracket whereas 63% of the water non-professionals were in the 55-74 age bracket. The gender identity of the water professionals was essentially evenly divided between female and male, whereas more than twice as many water non-professionals indicated their gender identify as female (69%) than male (31%). Of the top five residential zip codes of the water nonprofessionals, three are associated with either Fort Worth's cultural district or the area surrounding Texas Christian University. The lack of respondent diversity is a shortcoming of the survey methodology used in this study and the significance of this limitation is addressed in Chapter 6.

The first community engagement question on both surveys was open-ended and responses were qualitatively interpreted via a thematic analysis using the Environmental Education Continuum designed by the United States Environmental Protection Agency (EPA).

Each response was coded as exemplifying one or more of the seven stages in the environmental education continuum as shown in Figure 4.6. Each descriptor was assigned a code that



Figure 4.6. EPA environmental education continuum.¹¹⁹

correlated with one of the seven stages in the continuum. The question posed to the water professional was "From the perspective of your institution, what does it mean to 'engage' the community?" A similar question was posed to the water non-professional, "From your individual perspective, what does it mean to be 'engaged' in water-related issues in your community?"

Both groups were instructed that the question was asking them to describe what "engagement" entailed or looked like from their institutional or individual perspective. Awareness and knowledge-coded responses included passive learning by attending classes, workshops, seminars, and events geared toward increasing awareness of water issues and disseminating pertinent information. Across both surveys no respondents expressed any item describing critical thinking, only one of the water non-professionals mentioned solving problems, and two respondents on each survey identified the ability to make informed personal or public policy decisions. Responses were coded as action if the responses involved personal or community active participation on the part of the intended audience (i.e., water conserving

¹¹⁹ Adapted from United States Environmental Protection Agency Grant Program Webinar (Slide 16), 2020. https://www.epa.gov/sites/default/files/2020-01/documents/ee_local_grants_webinar_12_20_2019.pdf.

actions and behaviors, civil agency activities such as writing letters to editors, speaking at city council meetings, etc.). Only one water non-professional used the word stewardship in his/her response, and it was related to practices indicative of wastewater and stormwater stewardship. One water professional's response acknowledged that for individuals to *remain* good "stewards" they need to be networked with the necessary human and non-human resources. The use of the word "remain" in terms of being a steward is significant because it implies that once stewardship is attained, it may not be permanent. This notion has important implications for the EPA's environmental education continuum. I will discuss this is more detail later in this section.

As can be seen in Tables 4.1 and 4.2, the results of the thematic analysis indicated a definite gap between the responses of both groups. It should be noted that 11 water professionals and 64 water non-professionals provided responses to this open-ended question. Water professionals described engagement primarily in terms of awareness and knowledge. Whereas the water non-professionals indicated that engagement entails more than acquiring awareness and knowledge, it also involves action. Only 18% of water professionals provided a response that was coded as action, whereas 73% of water non-professionals provided responses are aware that before meaningful action can take place, an individual needs to have a foundation of prior awareness and knowledge.

In the words of one water non-professional respondent, "At the lowest level, engagement is just paying attention to water-related issues. For example, I read the news and note water issues, and I read the water quality reports that come with my bill. On the other end

Table 4.1

Water Professional Thematic Analysis Results for Open-Ended Engagement Question 1

Q. From the perspective of your institution, what does it mean to "engage" the community? (i.e., what does engagement entail or look like?)

Awareness –	→Knowledge –	Critical	Problem	Decision	Action —	Stewardship
		Thinking	Solving	Making		
9 (82%)	9 (82%)	0 (0%)	0 (0%)	2 (18%)	2 (18%)	0 (0%)

Table 4.2

Water Non-Professional Thematic Analysis Results for Open-Ended Engagement Question 1

Q. From your individual perspective, what does it mean to "engage" the community? (i.e., what does engagement entail or look like?)

Awareness –	→Knowledge –	Critical	Problem	Decision	Action —	Stewardship
		Thinking	Solving	Making		
34 (53%)	38 (59%)	0 (0%)	1 (1.6%)	2 (3%)	47 (73%)	1 (1.6%)

of the spectrum people who are really engaged are attending public meetings, petitioning government officials, initiating social movements, and taking part in other more active and time-consuming forms of engagement." Another water non-professional respondent wrote, "Engaged involves not only learning about the issues, but also participating in activities that will continue to broaden the knowledge of those who may not know about the issues at the present time. This would include speaking to groups on the issue, one on one conversations [*sic*] with individuals, and putting what I have learned into use in my own life." Three water non-professional respondents mentioned that engagement takes many forms and is multi-leveled but begins with effective environmental education and outreach (i.e., awareness and knowledge).

There were some surprising results among the water non-professional responses. One individual wrote, "Engagement in water related issues means that you own the land the local water board wants to put a lake on. Your idea of fair market value may be different from the government agency that is wanting your land. Or your land does not need to belong to the water agency [however] their percolation test may limit what you may grow, raise or live in on a reservoir's run off area." For this individual, being engaged in water-related issues entails direct involvement in owning land required for or affected by reservoir construction. Another respondent commented, "I have never been actively involved, nor have I been invited to become involved." This response, begs two questions: 1.) Would this person become involved if invited? 2.) How many other North Central Texas residents would concur with this comment? One of the water non-professional respondents replied, "To be engaged to me means to care about the outcome." This individual was the only person to mention the concept of care. It would be informative to discover how this individual defines "care." Unfortunately, since the survey responses were anonymous, it is impossible to follow-up with these three individuals to engage them in a more nuanced conversation related to their responses. This, of course, represents a limitation of survey methodology and will be discussed further in Chapter 6.

Figure 4.7 shows word cloud graphics I created to provide a visual representation of the open-ended responses to supplement the thematic analysis of the qualitative question included on both surveys. The words that most frequently were included in responses are denoted by a larger font size. The most significant finding is that water professionals never once used the words conservation, conserve, or conserving to describe engagement. However, 41% of the



Figure 4.7. Word clouds for responses to open-ended engagement question 1.

water non-professional responses included these words. This is an interesting result given that on the same survey 46% of the water professionals ranked outdoor water conservation and 18.2% ranked indoor water conservation in their top three core messages they wished to communicate to the public. The responses to the qualitative question on the surveys mirrored the responses to the quantitative questions, again exposing a gap between the traditional community education and outreach methods (i.e., dissemination of information via classes, workshops, school programs, traditional and social media, and water bill inserts, etc.) used by water professionals to engage the public and what water non-professionals self-report as behaviors (i.e., obtaining a certification, taking action on a water issue, discussing water issues with others , etc.) consonant with engagement. Indeed, these results are exactly what led the EPA to design the environmental education continuum. Proposals for EPA environmental grants were replete with descriptions of programs that aimed to create watershed stewardship. However, the means described in the proposals to achieve stewardship were too often steeped exclusively in awareness and knowledge, two components of environmental information and outreach. The EPA environmental education continuum clearly shows that there are four intermediary stages between environmental information and outreach and the achievement of stewardship. According to the EPA, environmental education entails more than just awareness and knowledge. The qualitative survey questions expose the prevalent misconception of water professionals that awareness and knowledge are adequate means to gain stewardship. The responses of the non-water professionals indicate the recognition that engagement goes beyond the level of awareness and knowledge.

The thematic analysis results for both groups of respondents revealed the need for meaningful interactions, the ability to initiate conversations, sharing information with neighbors and other community members, informed dialogue, connections to people, collaboration, and teaching through actions and example. This data suggests that the EPA environmental education continuum needs to be revised because the continuum does not address these needs which are crucial for effective engagement. Because the continuum does not contain these aspects of engagement it appears to propose that stewardship (i.e., engagement) is strictly an individual process. An additional problematic aspect of the environmental education continuum is its linearity which suggests once stewardship is achieved
it is permanent. I argue that stewardship is not static, it is fluid and requires continuous input and action to sustain.

The gap between the differing conceptions of water professionals and non-professionals regarding what constitutes engagement begs the question, "How do you educate to engage?" In Braiding Sweetgrass (2013), Robin Kimmerer, Professor of Environmental and Forest Biology at the State University of New York, shares the story of taking her premed students to a forest in a local nature reserve during her early academic career. Dismayed by her students' "total disinterest in ecology" (216) and any "biological story" (217) that wasn't about humans, Kimmerer was determined to find a way to engage them in natural history and instill in them an appreciation for the beauty and intricacy of ecology. Receiving reluctant permission from her dean, Kimmerer took her students into the Great Smoky Mountains for a three-day ecological field experience. At the end of the third day as the group was hiking back to the vans, Kimmerer believed she had failed, "I had given them so much information, all the patterns and processes laid on so thick as to obscure the most important truth. I missed my chance, leading them down every path save the one that matters most. How will people ever care for the fate of moss spiders if we don't teach students to recognize and respond to the world as a gift? I'd told them all about how it works and nothing of what it meant.... In effect, against all my prejudices, I'd worn a white lab coat into the wilderness" (221). Soon after these reflections, a student behind her began singing Amazing Grace and one-by-one the other students joined in song. Kimmerer realized though her students once were blind, now they saw and so did she, "I came to know that it wasn't naming the source of wonder that mattered, it was wonder itself.... As an enthusiastic young PhD, colonized by the arrogance of science, I had been fooling myself that I

was the only teacher. The land is the real teacher. All we need as students is mindfulness. Paying attention is a form of reciprocity with the living world, receiving the gifts with open eyes and open heart. My job was just to lead them into the presence and ready them to hear" (222). Kimmerer's curriculum gave them not only information, but it entailed an immersive experience involving critical thinking, problem solving, decision making, and action. Because her narrative only covers a snapshot in time, no conclusion can be drawn about whether the threeday outdoor field trip resulted in her premed students transforming into environmental stewards, however, according to the EPA environmental education continuum, Kimmerer provided the stages necessary to promote stewardship.

Both the results of the survey and Kimmerer's experience with her premed students in the field resonate with Edgar Dale's cone of experience. In 1946, American educator and professor at Ohio State University, Edgar Dale, published a book entitled *Audiovisual Methods in Teaching*. In his book, Dale introduced his intuitive, theoretical model of learning known as the cone of experience or learning pyramid. In 1970, Dale published an excerpt of his book as an article entitled "A Truncated Section of the Cone of Experience." The purpose of the cone of experience model was to illustrate the "interrelated and interdependent" (98) nature of the three levels of experience, direct, pictorial, and highly abstract, necessary "in the process of complete communication" (97). As can be seen in Figure 4.8, the broadest base of the cone is represented by direct purposeful experiences and the narrow apex of the cone is represented by verbal symbols. In between are various types of instructional methods that represent a gradation from concrete to abstract experience. The bottom levels of the cone of experience entail more utilization of the senses than the upper levels of the cone. According to Dale's



Figure 4.8. Edgar Dale's cone of experience.¹²⁰

theory, "difficulties arise when abstractions have inadequate foundations" (98). In other words, a learner must have a foundation of personal relevant experience to connect to an abstract symbol. Dale cautions that his model is an analogy and should be used as a guide for enhancing teaching methodology. In his words, "The individual bands of the Cone of Experience stand for experiences that are fluid, extensive, and continually interacting.... Obviously these banddivisions do not mean that the experiences and materials of our learning fall into rigid, inflexible patterns. There is a continual interaction among all these experiences and materials in learning" (98). I argue that there is a direct correlation between the EPA 's environmental

¹²⁰ Adapted from Edgar Dale. 1970. "A Truncated Section of the Cone of Experience." *Theory into Practice* 9(2):96.

continuum and Dale's cone of experience. Environmental stewardship is based on a foundation of direct purposeful experiences **and** awareness and knowledge, traditionally comprising environmental information and outreach that is typically dependent on the use of verbal and visual symbols. Again, there is a gap that needs to be bridged in the methodology used by water education professionals to facilitate the engagement of North Central Texas residents in water stewardship behaviors. The illustration of the field study conducted by Kimmerer and her students in the Great Smoky Mountains is a perfect illustration of how Kimmerer's methodology of instruction included a range of the cone of experience and environmental education continuum levels or stages.

Since adults comprise a large percentage of the audience for the messaging of the water industry, the principles of andragogy¹²¹ developed by Malcolm S. Knowles, American adult educator and professor, warrant discussion. In his 1977 book entitled *The Modern Practice of Adult Education: Andragogy versus Pedagogy*, Knowles delineates what he considered to be four key principles to effectively teach adult learners (Table 4.3). The responses of the water

Table 4.3

Knowles' Principles of Andragogy (1977, p. 39)

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- 2. Adult learners utilize the vast reservoir of their experience on which to build new knowledge.
- 3. Adult learners perceive themselves as self-directed and therefore require a sense of responsibility for their learning. Adults learn best when they are intrinsically motivated and feel a level of control over their learning.
- 4. Adult learners are problem-focused and desire education that will provide them with the necessary information, skills, and abilities to solve real-life problems.

¹²¹ Andragogy is the method and practice of teaching adult learners.

non-professionals corresponded with Knowles' principles of andragogy. Respondents reported that relevancy is crucial to being engaged in local water issues and watershed stewardship. Most of the water non-professionals indicated that being aware and acquiring new knowledge were ways to inform their future actions. Many of the responses of the water non-professionals addressed the desire to take personal responsibility for ameliorating water issues and being active in seeking solutions to local water problems. It is apparent that adult learners require more than just the passive dissemination of information.

According to Amy Hays at the Noble Research Institute,¹²² water districts, utilities, and cities are not expected or funded to move past awareness and knowledge, the first two stages in the environmental education continuum. Community outreach educators within these institutions are hired for formal education and they do not know how to do informal and applied education. The EPA is calling for water educators to move beyond the first two stages in the continuum to achieve the goal of watershed stewardship. In other words, the EPA argues that it is not enough to be a content provider, water community outreach and education needs to provide opportunities for the application of content information to facilitate the attainment of stewardship. Unlike public K-12 education, there is no accountability for water-related institutions to move past awareness and knowledge to stewardship. As a result, water educators tend to prioritize expert-based outreach first and as a result overlook the needs of learners. The learning strategies utilized by these educators are passive and heavily rely on verbal and visual symbols, the top two levels of Dale's cone of experience, and rarely use learning strategies that are more active and experiential. It is interesting to note, that when

¹²² Amy Hays, phone call conversation, December 14, 2021.

water professionals were asked on the survey how their institutions measure the effectiveness of community engagement efforts, the top metrics used were the number of attendees at classes, workshops, tours, etc. and the number of comments on social media. Only 18% of respondents reported the preferred method used by their institutions to assess community engagement effectiveness was the measurement of water use in gallons per capita per day. The choice of institutions to evaluate community engagement efficacy in metrics rather than actions of stewardship probably reflects the ease in quantifying number of attendees, social media followers, etc., and these probably have been the conventional measures used in reports to substantiate accountability, especially in terms of funding.

I revised the Environmental Protection Agency's environmental education continuum to incorporate its seven process attributes with Dale's cone of experience, Knowles' principles of andragogy, and Columbia's five learner attributes. As can be seen in Figure 4.9, the public arena



Figure 4.9. Revised EPA environmental education continuum.

(the outer circle) is comprised of the seven process attributes on the EPA's environmental education continuum. These are the essential educational strategies that should be used by educational programs to achieve environmental stewardship. Instead of the process being linear, I have revised it to be cyclic. Stewardship, once gained, must be actively maintained. The private arena is represented by the inner circle and contains Columbia's five learner attributes (i.e., confident, responsible, reflective, innovative, and engaged). I have also conceptualized the learner attributes of individuals as cyclic and not linear because growth as a learner is not static, it is dynamic and emergent. As defined by Cambridge, a learner with these five learner attributes is confident working with information and ideas of their own and of others; responsible for themselves, and responsive to and respectful of others; reflective and becomes a life-long learner; innovative, resourceful, and creative; engaged and participates constructively in society.¹²³ The five Cambridge learner attributes closely parallel Knowles's principles of andragogy. The gap between the public and private arena is bridged by the community arena, the space or interface for the active interaction between the public and private domains. The establishment of a community arena is in essence a resurrection of the ancient Greek conception of the agora. This intermediary circle is the domain of the Watershed Education Community Action Networks (WE CANs). The educational work done in this inner circle incorporates the levels of Dale's cone of experience and Knowles' principles of andragogy. Figure 4.9 illustrates the complexity involved in education and the interrelationship between the public and private arena and the community domain, including the watershed environment.

¹²³ Cambridge University Press and Assessment. 2022. "The Cambridge Learner Attributes." Accessed February 15. https://www.cambridgeinternational.org/why-choose-us/parents-and-students/in-class/the-cambridge-learnerattributes/

Residents of North Central Texas are disengaged with watershed stewardship because they are lacking direct embodied experience with the Trinity River watershed primarily because their relationship with water is passively mediated largely through the invisible technology behind the tap. I will describe in Chapter 5 how Watershed Education Community Action Networks can be used as a bridge to achieve watershed stewardship by building a broad base of direct purposeful experiences upon which awareness and knowledge can stand. Water education and outreach need to include experiential or action learning to achieve the desired end goal of watershed stewardship. In *The Unconscious Civilization* (1995), Saul argues, "knowing seems to have no effect upon our consciousness" (11). In other words, knowledge in and of itself can leave people in a state of being overwhelmed and indifferent and thereby produces no effect. Saul also asserts that passivity entrenches ideology. However, a crisis necessarily demands thinking that may also evoke the act of re-thinking an outdated mindset and a re-emergence of public action.

Paul B. Sears, a 20th century American ecologist and conservationist, advocated for a deepened interest and understanding of ecology that could provide a new perspective on the role of humans in nature. Ecology, according to Sears, has the power to provoke the reconsideration of the place of humans in the natural world. In a 1964 *Bioscience* article, Sears referred to ecology as a "subversive subject" because of its ability to "endanger the assumptions and practices accepted by modern societies, whatever their doctrinal commitments" (11). Sears argued that ecology threatened the established and conventional ideological frameworks of economics, religion, politics, etc. that provided the foundation, or cultural narrative, for societal beliefs and actions. However, although he recognized ecology as

a legitimate scientific discipline, in *Deserts on the March* (1980) he boldly acknowledged, "Science has the power to illuminate, but not to solve, the deeper problems of mankind. For always after knowledge come choice and action, both of them intensely personal" (216). For this reason, Sears called for all scientists, but particularly ecologists, to clearly communicate scientific findings to political leaders and the public to facilitate an understanding of the urgent need to change beliefs and actions to rebalance the relationship between humans and nature. He thus proposed the hiring of a "resident ecologist" (224) in each county not only to collect and provide local ecological data but to "devote his energy to study and his thought to the future...and furnish the sustaining background of policy which...is too often lacking in the daily strain of meeting problems directly" (225). The resident ecologist would work with residents to solve local problems without the interference of outside governmental entities.

The ecologist, with all of his professional training, should be chosen with some regard for his talents as a publicist. People, no less than plants and animals, are a part of his material. He should of necessity have the equipment to work with them, comprehend their problems, and admit them to his own confidence, for unless the general citizenry catch an understanding of the whole scene of which they are part, they will not be fitted to participate in a solution of their own problems. And upon their capacity to do so, if they have been honestly and well informed, are free institutions predicated. (225-226)

These words convey the need for "experts" to collaborate with local citizens in identifying and implementing solutions to local problems. As Sears said, "sound ecological counsel [should] be made available to citizens where they live, where environmental problems arise, and where informed action must be taken if the individual is to be respected as a political force" (249). For Sears, science was limited to providing information, the solution of problems ultimately depended on the action of the people. Sears description of the role of the resident ecologist is like the role of a field environmental philosopher, an advocate of empowering the people to

reoccupy their niche of political agency. In *Speaking for Nature: How Literary Naturalists from Henry David Thoreau to Rachel Carson Have Shaped America* (1980), Paul Brooks, nature writer and environmentalist, recognized Sears as a scientist who "deplored the failure of most scientists to impart their knowledge to the general public, to bridge the gulf between what C. P. Snow later called 'the two cultures'" (238). As discussed earlier, Snow deplored the cultural divide separating science and the arts and called for practitioners from both domains to build bridges which would benefit the entire society.

Moreover, Aldo Leopold was not the only ecologist critical of the economic mindset of unlimited growth. Sears also advocated for natural resource conservation and suggested an ethical reevaluation of the American way of life was imperative to solve natural resource problems. In Present Needs for Research on the Use and Care of Natural Resources (1953), Sears says, "underlying all technological aspects of conservation is the need for a value system, generally accepted, that takes into account the limitations and possibilities of biological [ecological/hydrological] process, from which neither society nor the individual can escape" (2). In his essay "Ethics, Aesthetics, and the Balance of Nature" (1958), Sears comments on the economic doctrine espoused by John Kenneth Galbraith, Canadian-American economist, that excessive rates of consumption be curbed by working on the denominator of the supply/demand ratio with the following words, "If ever I heard a subversive idea, this is it. And if ever I welcomed one, this is the occasion" (109). Both the comments of Galbraith and Sears are pertinent to water issues in North Central Texas. To view water supply, both in terms of guality and guantity, as an unlimited commodity that is there for the taking will never lead to a sustainable situation. Water is sacred and is vital for all life, thus the human relationship to

water should be characterized by an understanding and respect for the interrelatedness of all aspects of a watershed. An ethical reevaluation could also serve as a bridge between Snow's two cultures. In Chapter 5, I argue that Watershed Education Community Action Networks (WE CANs) can facilitate an ethical reevaluation of the human relationship to water. It is interesting to note that Sears (1953), suggested "the establishment of a center, or centers, free alike from industrial and governmental pressures" (1) to address natural resource conservation.

While serving in this capacity, WE CANs would also dissolve the barriers to engagement identified by the respondents to this study's survey. The water professionals identified lack of engagement with institutional programs (40%) and lack of collaboration due to disciplinary silos (33%) as the top two challenges for engaging the public in local water issues. Water nonprofessionals indicated three main obstacles to being engaged: lack of awareness of local water issues (51%), not understanding the relevancy of local water issues to self and family, (33%), and the assumption that their awareness and actions won't make a difference (33%). When asked to identify solutions to these barriers water non-professionals suggested water conservation incentives (45%) and pilot projects and demonstration sites (25%) as their two top strategies. In *Belonging* (2017), Turner writes, "The work of undermining the barriers between things moves us from alienation to intimacy" (194). She advocates for a different form of learning that would entail an intimate engagement with the environment and the contextualization of topics to facilitate an understanding of the greater whole (193). In terms of WE CANs, the understanding of the greater whole would be an understanding that the health of the watershed depends on humans and humans depend on the health of the watershed. An understanding of this basic and crucial reciprocity would give rise to sentiments of gratitude

and a sense of belonging to place. "In the practice of belonging," asserts Turner, "we are not seeking prowess or dominion over anyone else, but the ability to live into the conversation between things. This is a deepening movement into relationship with self and others" (194).

By applying Leopold's land ethic, Whitehead and Merleau-Ponty's relational ontology, Freire's emphasis on raising critical consciousness through problem-based learning, Dewey's philosophy of experiential learning, and Arendt's theory of action, Watershed Education Community Action Networks (WE CANs) would utilize conversation and conservation as the means for enabling residents of North Central Texas to re-imagine their relationship to water through varied embodied experiences. WE CANs would address Leopold's concern that more environmental education is not necessarily what is needed to create a community of environmental stewards. WE CANs would provide what has been lacking from environmental education, individual and community engagement through direct concrete and embodied experience built on a foundation of conversation and conservation. A quote of Martin Buber poignantly expresses how WE CANs would function to change the urban water narrative from "inside the pipe thinking" to "outside the pipe thinking."

I have no teaching. I only point to something. I point to reality, to point to something in reality that had not or had too little been seen. I take him who listens to me by the hand and lead him to the window. I open the window and point to what is outside. I have no teaching, but I carry on a conversation.¹²⁴

 ¹²⁴ ABC Religion and Ethics. 2021. "Martin Buber - Philosopher, Outsider, Prophet." Last modified March 23.
https://www.abc.net.au/religion/martin-buber-as-outsider-and-prophet/10873250. ABC Religion and Ethics. 2019.
"All Actual Life is Encounter:' Jewish Existentialism's Challenge to Philosophy." Last modified November 12.
https://www.abc.net.au/religion/buber-rosenzweig-jewish-existentialism-challenge-to-philosophy/11697596.

CHAPTER 5

THINKING OUTSIDE THE PIPE – 21st CENTURY MINDSET: PARTICIPATORY WATER ETHICS & WATERSHED EDUCATION COMMUNITY ACTION NETWORKS (WE CANs)

We know not through our intellect but through our experience. —Maurice Merleau-Ponty

These are the principles for the development of a complete mind: Study the science of art. Study the art of science.... Realize that everything connects to everything else.

—Leonardo da Vinci

Watershed Education Community Action Networks (WE CANs)

In this chapter I will describe my vision for how WE CANs can facilitate watershed stewardship by bridging the gap between the historical and contemporary "downstream" mindset of "thinking inside the pipe" and a community-based integrated watershed stewardship "upstream" mindset of "thinking outside the pipe." After a general and brief introduction to Watershed Education Community Action Networks, I present two vignettes. The first vignette illustrates the need for building bridges to achieve connectedness, and the second vignette epitomizes how a community of citizens reclaimed their public asset of water. The remaining five sections of this chapter describe how Watershed Education Community Action Networks can address the myriad problems currently plaguing water supply and management in North Central Texas by recovering common public space and political agency, reconverging the humanities and science, reframing the current urban water narrative, revitalizing urban watersheds, and rethinking urban water policy, supply, and management.

In her essay entitled "Where Do We Go from Here?" (2005), Susan Seacrest, President of The Groundwater Foundation, provided a reflective answer to this question. Seacrest stated, "[W]e need to move toward a closer connection with each other and to the water resources that nourish us. It is my belief that to become able water stewards in the 21st century we must become more aware of each other's needs, more receptive to the importance of vital communities and an expanded sense of place, and finally more committed to our common interest in a plentiful, safe, water supply" (427). In the preceding chapter, I drew attention to the London Underground's cautionary phrase to "mind the gap" and how this phrase can be a reminder that a gap needs to be bridged to create and engage a community of watershed stewards in North Central Texas. My recommended solution to dissolve the barriers and boundaries created by the social and environmental trends and the conditioning factors analyzed in Chapter 4, is the development and implementation of Watershed Education Community Action Networks (WE CANs).

As I discussed earlier, urban water supply and management is a wicked problem that cannot be solved by traditional approaches. There is a body of research that has demonstrated that wicked problems are best undertaken using network approaches that emphasize addressing a problem from a systems perspective. The success of networks can be attributed to the foundation created by the formation of "co-owned space" by all stakeholders in the system (Waddell, McLachlan, and Dentoni 2013, 24). This "co-owned space" functions as what Foucault termed a heterotopia¹²⁵ (1984, 4) due to the epistemological rupture caused by its lack of hierarchical structure. Since the networks are composed of a diversity of stakeholders, each stakeholder must operate outside of the comfort zone created by their traditional silo

¹²⁵ Foucault described heterotopias as socio-cultural spaces that are somehow different or other. These spaces are composed of immeasurably more layers of meaning or relationships than is apparent. Heterotopias are often described as worlds within worlds in that they mirror the outside world while also distinguishing themselves from the outside world through disturbance or transformation. Later in this chapter, I will discuss how rivers, streams, and lakes can be seen to function as heterotopias.

boundary, and consequentially there is a shift in power and accountability. In this co-owned space, standard rules that once served to limit action are suspended and new rules are instituted that facilitate innovation. In the "co-owned space," stakeholders are now accountable to the system's well-being rather than their organization.

One type of network approach is called Global Action Networks (GANs), these are learning and transformative networks that weave together new ways of generating accountability and action among stakeholders for the benefit of the health of the system. In *Learning and Transformative Networks to Address Wicked Problems: A GOLDEN Invitation* (2013), Waddell, McLachlan, and Dentoni, delineate seven definitional characteristics of GANs: 1) combination of formal and informal interorganizational triple-layered relationships, 2) multistakeholder to encourage diversity, 3) community-action research to develop both knowledge and action, 4) multilevel, including local, regional, and global, 5) public goods providers creating value for society, 6) systemic change agents focused on transformation, reform, and scaling up, and 7) voluntary leaders willing to push the boundaries to achieve environmental, social, and economic outcomes (24-25). Watershed Education Community Action Networks embody all seven of these characteristics, and therefore are in essence Global Action Networks. Each of these seven characteristics will be discussed in more detail in the sections following the vignettes.

Although I advocate Watershed Education Community Action Networks (WE CANs) should play an integral role across all North Central Texas, I illustrate my vision on the submicroscopic scale using the city of Fort Worth in Tarrant County. I propose the creation of five WE CANs in Fort Worth to serve as permanent nodes of watershed stewardship education.

In conjunction with the Trinity River Vision Project in downtown Fort Worth, I argue that there should be a central WE CAN which would function primarily as a nexus of the four decentralized, regional WE CAN nodes. These would be dedicated to telling the story of the Trinity River and the people of North Central Texas through a variety of means (e.g., river museum and art gallery, festivals and celebrations, water-related seminars and conferences, etc.). Panther Island, part of the Trinity River Vision Project (TRVP) of the Tarrant Regional Water District and overseen by the Trinity River Vision Authority (TRVA), would serve as an ideal location for a central WE CAN. Panther Island is an urban waterfront district located adjacent to downtown Fort Worth that includes a public space known as Panther Island Pavilion, a waterfront event venue that hosts a variety of programs, including concerts, festivals, runs, etc. The primary mission of the Trinity River Vision Project is to provide flood control, but the mission also includes the goals of improving infrastructure, creating recreational opportunities, developing unique public spaces, and ensuring environmental enhancements.¹²⁶ Although these aims do not specifically address watershed stewardship, it does not require a stretch of the imagination to envision how watershed education and stewardship could be folded naturally into the mission of the Trinity River Vision Project.

The focus of the four decentralized nodes would be on watershed issues pertinent to the main body of water situated in that quadrant. These four regional nodes would also serve to showcase the work accomplished by the emergent and ephemeral WE CANs that pop up throughout each region to ameliorate watershed problems on a subregional scale. It should be

¹²⁶ Trinity River Vision Authority. 2022. "A Vision Emerging." Accessed 3-21. https://pantherislandcc.com/assets/ documents/A-Vision-Emerging.pdf.

noted that the pop-up WE CANs do not necessarily have to be affiliated with a major body of water. For example, a schoolyard could be used as a demonstration site for encouraging the incorporation of conservation landscape practices on private residential property. I will discuss these emergent and ephemeral WE CANs in more detail in subsequent sections of this chapter. As depicted in Figure 5.1, the four regional WE CANs would correspond to the four geographic



Figure 5.1. Map of Fort Worth city council districts, significant bodies of water, and proposed central and regional WE CANs. Note: Numerals denote Fort Worth city council districts.

areas of the city (i.e., northwest, northeast, southwest, and southeast) and roughly with two to three city council districts. There are currently eight city council districts in Fort Worth, and some districts overlap into other quadrants. A closer inspection of Figure 5.1 reveals that each quadrant contains a body of water bearing significant importance to water supply in North Central Texas. In the northwest lies Eagle Mountain Lake, owned by the Tarrant Regional Water District (TRWD), and Lake Worth, a reservoir which TRWD uses for storing water and is owned and operated by the city of Fort Worth. The Fort Worth Nature Center and Refuge, one of the largest city-owned nature centers in the United States, is located between Eagle Mountain Lake and Lake Worth. Although a reservoir does not exist within the city limits of Fort Worth in the northeast quadrant, this region contains a large section of the West Fork of the Trinity River. Lake Arlington, located in the southeast quadrant between the cities of Arlington and Fort Worth, is owned and operated by the City of Arlington. However, because Lake Arlington borders both cities, a collaboration between Arlington and Fort Worth is necessitated and has been established. TRWD owns and operates two reservoirs in East Texas that supply the majority of water to Lake Arlington. The home of a new nonprofit called Living Waters Park is being built on the western side of Lake Arlington in Fort Worth. Part of the mission of Living Waters Park is water and land stewardship. I will discuss this new nonprofit in more detail in the last section of this chapter. In the southwest region of Fort Worth lies Lake Benbrook which is owned and operated by the Fort Worth division of the U.S. Army Corps of Engineers. TRWD stores water in Lake Benbrook.

In October of 2021, I attended a public meeting offered by the Fort Worth Stormwater Department to showcase a new city initiative, the Fort Worth Open Space Conservation Program that seeks to identify and protect the most important undeveloped areas in the city

for current and future residents. To this end, the Trust for Public Land (TPL),¹²⁷ working with the city of Fort Worth, identified sixteen spotlighted areas for potential open space prioritization. Figure 5.2 is a presentation slide used by Brandi Kelp, Senior Planner with the City of Fort Worth, to display the mapped location of TPL's selected natural areas. Red and orange-colored areas were deemed as very high to high levels of priority.



Figure 5.2. Areas in Fort Worth identified as priorities for the Open Space Conservation Program. This figure is a slide from the October 28, 2021 Zoom public meeting presentation given by Brandi Kelp, City of Fort Worth Senior Planner.

¹²⁷ Trust for Public Land is a national non-profit committed to protecting natural green space areas to sustain healthy, equitable, and climate-smart communities. Through the protection of green spaces, the Trust for Public Lands program endeavors to deeply engage the community by fostering community relationships and culture. The Trust for Public Land has programs in every state of the Union. For more information, visit TPL's website at https://www.tpl.org. Accessed 4-18-22.

Most of the priority areas correspond to streams, rivers, and lakes. Interestingly, respondents to a city-wide survey conducted by Fort Worth's Open Space Conservation program identified the need for ecosystem preservation and stream, river, and lake health as the top two priorities for open space conservation, respectively. One of the key takeaways from the survey participants was the desire for educational programming and outdoor education. Given the existing involvement of multiple government entities (i.e., Fort Worth city government, Tarrant Regional Water District, Trinity River Vision Authority, Trinity River Authority, and the Army Corps of Engineers) along with the public's stated top prioritization for lake, stream, and river areas in Fort Worth's Open Space Conservation program, the development and implementation of the five permanent WE CANs would foster the creation of a partnership between all involved government entities and the public. This partnership or assemblage of key stakeholders would serve as a model of how participatory water ethics could reframe the human relationship to the Trinity River and create a new urban water narrative.

Watershed Education Community Action Networks (WE CANs) would constitute socialcultural-political nodes comprising the "flesh"¹²⁸ of the city of Fort Wort. Each WE CAN will be pregnant with possibilities and will have the capacity to aspire and inspire. These centers, representing the intersection of power and place, would foster a web of relations engaged in creating a story of the journey of collaborative interactions to change the human-water relationship in North Central Texas. The WE CANs would be reflective and revelatory places that engender a sense of the sacredness and enchantment of place in general and the Trinity River

¹²⁸ Recall that "flesh" is a term used by Merleau-Ponty to describe a place of chiasmic relations, intertwining and reciprocal relationships that exist between our bodies and other entities in the world.

specifically. Moreover, the Watershed Education Community Action Networks would be actionoriented nodes designed to empower key stakeholders in evaluating water policy, supply, management, and watershed stewardship. They would thus help recover participatory democracy, public political voice, and agency. The decentralized WE CANs would be spatially and temporally emergent sites of relational assemblages engaged in the co-constitution of an urban water narrative that represents a fluid meandering of solid and liquid modernity. Finally, the WE CANs would be sites of community-based celebration and ceremony to provide for the on-going constitution and continuity of the sacredness of story of power and place. The following two vignettes are international illustrations of how participatory water ethics reframed the human-water relationship in Meghalaya, India and Cochabamba, Bolivia.

Vignettes: Meghalaya, India and Cochabamba, Bolivia

Living Bridges of Meghalaya, India: A Need for Connectedness

The mountainous state of Meghalaya lying in the northeast region of India experiences heavy summer monsoon rains. Receiving an annual average of 11,871 millimeters of rainfall (i.e., 39 feet), Meghalaya is the wettest region in the world.¹²⁹ The remote villages in this area experienced isolation and disconnectedness due to geographical, climatological, and hydrological challenges. To visit neighboring villages, the lack of road access required villagers to climb down into valleys and to cross rivers. During monsoon season, swollen and rampaging

¹²⁹ Prasenjeet Yadav. 2020. "Photos: Living Tree Bridges in a Land of Clouds." Last modified August 1. https://www.npr.org/sections/goatsandsoda/2020/08/01/892983791/photos-living-tree-bridges-in-a-land-ofclouds. Accessed March 22. The photographs on this website spectacularly document the artful application of an ancient bioengineering experiment that enabled the local people to adapt to the challenges of their landscape.

rivers made these feats impossible. The need for connection could not be met without construction of a bridge. Fortunately, "Centuries ago, the villagers came up with an artful solution" (Turner 2017, 15). Once an ideal site is identified for a bridge, the villagers go into the forest to find rubber fig tree saplings (*Ficus elastica*) to plant on either side of the riverbank. After 10-15 years, the rubber fig trees put out aerial roots that can be coaxed across the river and eventually woven together to form a living bridge, called *jing kieng jri* in the native Khasi language. Eventually, the woven roots merge through a process known as anastomosis, forming a network of cross-connected roots. As the trees mature, they continue to add more roots to the network that are woven into the living bridge until it reaches a critical strength and can support the weight of pedestrians. To provide nutrition for the living bridge, villagers fill the gaps in the network of roots with fallen leaves which will decompose into humus. The root bridges are living ecosystems that support not just pedestrians, but also hundreds of other living beings, including birds, insects, moss, etc.

Living bridges can provide a solution to a problem that can't be worked out with traditional concrete engineered bridges. Unlike concrete bridges, living bridges grow more robust and resilient with age and can withstand the geomorphological challenges of Meghalaya. Living bridges also do not require any monetary investment by the villages, but the time investment is multigenerational. Thus, to keep the practice alive, the knowledge of how to bind the roots and maintain the living bridge must be transmitted from one generation to the next. By turning to nature to find a way to bridge the disconnect and isolation between villages wrought by the monsoon season, the Meghalayans not only honored their relationship to the land and water but also to an intergenerational cultural narrative respecting the reciprocity

inherent in a sense of place. It is my contention that WE CANs in Fort Worth, Texas can function in a similar capacity as the living bridges in Meghalaya, India. WE CANs are networks reciprocally connecting the living and nonliving components of a watershed, thus bridging the gap in the relationship between humans and watersheds and generating a new urban water narrative.

Water War of Cochabamba, Bolivia: Reclaiming the Public Asset of Water

As I have consistently pointed out, the management of urban water issues has been generally addressed from an engineering and/or economic perspective. However, in Social Power and the Urbanization of Water (2004), Erik Swyngedouw, Professor of Geography at the University of Manchester, acknowledges that urban water issues are often manifestations of more expansive "socio-ecological and political ecological" factors that contribute to inequalities in water supply, especially in the Global South (8). The Bolivian city of Cochabamba illustrates the social and political tension that is increasingly associated with the management of urban water supply. Cochabamba's, la guerra del agua, "water war," often internationally regarded as a David-versus-Goliath success, is an example of community grassroots resistance to privatization of water supply and management and is celebrated by anti-privatization activists. Cochabamba, the third-largest city in Bolivia, had long experienced contention over disparate water access. In Privatizing Water: Governance Failure and the World's Urban Water Crisis (2010), Karen Bakker, Professor and Director of the Program on Water Governance at the University of British Columbia, writes that although wealthy consumers and businesses received municipally subsidized water, half of Cochabamba's households, mostly comprised of indigenous and poor residents, depended on water delivered by tanker truck, private wells, or

small-scale community-run water systems (165). Attempting to solve Cochabamba's lack of water supply, Bolivia accepted a loan from the International Monetary Fund (IMF) in 1998 that was contingent on the privatization of Cochabamba's water supply and consequently the government passed new legislation to offer incentives to private water companies to manage public water supply systems.

In 1999 Aguas del Tunari, a subsidiary of two of the world's largest water companies, Bechtel and United Water, based in the United States and Britain, was awarded a forty-year contract with Cochabamba. Bakker notes that the contract guaranteed Aguas del Tunari a profit of 15% and gave the company exclusive rights to all water in the Cochabamba Valley (2010, 166). This was an extraordinary concession given that Cochabamba is in an intensely farmed valley where wells and streams used for drinking water and irrigation had traditionally been managed by local indigenous farmers. It was not long before Agua del Tunari increased water prices as much as 200% and installed water meters on both private wells and the water supply systems that were independently constructed and financed by rural residents (Bakker 2010, 166). These moves ignited a series of protests and within months of beginning operations, Aguas del Tunari was embroiled in a water war. Bakker contends that the diversity of protestors, including the Cochabamba Departmental Federation of Irrigators' Organizations (FEDECOR), unions, women's groups, environmentalists, and consumer groups, were united by the "sacredness of water and its cultural resonance for the indigenous population of the Andean highlands" (167).

A coalition of protestors known as the Coordinadora de Defensa del Agua y de la Vida (Coalition for the Defense of Water and Life) organized a city referendum in March 2000, which

enabled residents to voice their disapproval of the privatization contract. The referendum was quickly followed by widespread street protests that successfully immobilized the city. A military state of emergency was declared by the government and several members of the protest coalition were arrested and jailed. Violent confrontations resulted in the death of a seventeenyear-old male and the wounding of hundreds of protestors. The protests, however, continued until the contract was rescinded and the water supply was taken back under government control. The grassroots movement also forced the government to reform national water legislation to give greater protection to rural irrigators and to respect traditional water management practices. In addition, anti-privatization activists demanded community control of the water supply system.

Although the protests resulted in a modification of the law that essentially turned water into a commodity rather than a commons, not all the protestors' demands were achieved. Social control over the public water supply never materialized; the demand was diluted to include social representation on the board of directors for the city's water utility. However, there was a lack of community support for representation: "two rounds of elections of community representatives to the board attracted fewer than two thousand voters in a city of six hundred fifty thousand" (Bakker 2010, 168). Consequently, the wealthy areas of Cochabamba still receive government subsidized water service and those residents in poorer areas are still not on the water service network and are forced to create and pay for more expensive systems.

This vignette illustrates the ambiguous merits of community water-supply management. It also serves to contextualize and underscore the philosophical dimensions of water supply. Is

water a commons or a commodity? What role should the community play in the management of urban water supply? How is "community" defined and by whom? What are participatory water ethics? There is a growing interest in community-managed water supply. In fact, this dissertation advocates for community-managed water supply, but what does that mean? In the following sections of this chapter, I explicate how Watershed Education Community Action Networks (WE CANs) are a form of community-managed water supply.

Recovering Common Public Space: Resurrecting the Agora

In ancient Greek cities, the *agora* was an open space used as a public meeting ground for daily religious, political, social, and commercial activities. The *agora* was a community space. What is meant by "community" has varied across time and geographical location. Even in the academic literature focusing on participatory democracy, the concept of "community" is used in different and not always compatible ways (i.e., state-public community partnerships, public-private community partnerships, social-public partnerships, community-based privatesector water providers, community business partnerships, etc.). Despite the differing meanings of community, there has been a recent resurgence in the need for recognizing the notion of community in recovering common public space, including the public service of urban water supply. In "Making Space for Public Ownership: The Re-municipalisation of Public Services through Grassroots Struggle and Local State Action" (2013), Andrew Cumbers, Professor of Political Economy at the University of Glasgow, asserts "there is an urgent need for a more democratic, egalitarian and participatory politics that reclaims public services and assets from

their appropriation by elite interests...[however], there remains a paucity of alternative thinking about how a progressive reclaiming of public assets might take place" (547).

Michael Menser, Professor of Philosophy and Urban Sustainability Studies at Brooklyn College and Earth and Environmental Sciences and Environmental Psychology at the City University of New York Graduate Center, became hooked on the theory and practice of participatory democracy (PD) and participatory budgeting (PB) once he learned of how they were successfully being used in cities around the world. In his book We Decide! Theories and *Cases in Participatory Democracy* (2018), Menser explains that participatory democracy is defined by four characteristics: "1) collective determination; 2) capacity development and delivery of economic, social, and/or political benefits to members or constituents; 3) the replacement of unequal power relations with relations of shared authority; and 4) the construction, cultivation, proliferation, and interconnection of movements and organizations with overlapping normative frameworks" (4). PD is concerned with cooperative power; "Democracy is not just about having a voice; it's about exercising power. Participatory democracy is a process that enables people to equitably share that power" (67). Participatory budgeting is a tool used to achieve the goal of participatory democracy. It is a multistage process allowing non-elected citizens to control a portion of a public budget to directly benefit their communities; "constituents don't just voice their views; they directly decide how to spend the funds" (67). The goal of PB is not to just get more citizens involved in government, but to be involved actively with community-based projects to improve public services and address citizen-identified needs of their communities. The practices of PD and PB reposition the government from a position of authority to one of "partner' standing with, supporting, and

protecting" (242) the community. Menser refers to this configuration of shared authority between the government and community as a "social-public partnership" (242). Participatory democracy and participatory budgeting can be used to address the problem John Dewey referred to as the "eclipse of the public" and to transform the "Great Society" created by the industrial age into the "Great Community."

As explained in Chapter 2 of this dissertation, Dewey, in *The Public and Its Problems* (2016), perceived the "Public" to be lost, bewildered, scattered, disorganized, confused, and apathetic. He attributed this condition to the fragmentation created by the emergence of the "Great Society" in response to technological advances made possible by steam and electricity. Although a society was created, according to Dewey, there was no community. The "Public" was invaded by impersonal and mechanical modes of human behavior that were managed by trained specialists or experts. Dewey pondered how this inchoate "Public" would be able to coalesce into an entity capable of effective political action. Dewey identified some conditions under which the "Great Society" could be converted into a "Great Community." For Dewey, a rudimentary public can function democratically, "Wherever there is conjoint activity whose consequences are appreciated as good by all singular persons who take part in it, and where the realization of the good is such as to effect an energetic desire and effort to sustain it in being just because it is a good shared by all, there is in so far a community" (2016, 176). The keystone to participating in activities and sharing the results is communication:

"Communication can alone create a great community. Our Babel is not one of tongues but of the signs and symbols without which shared experience is impossible" (170). Signs and symbols make the possession and distribution of social knowledge possible. In *The Courage to Be* (2014), Paul Tillich supports the Deweyian assertions of the importance of community and

communication.

Men's participation in nature is direct insofar as he is a definite part of nature through his bodily existence. His participation in nature is indirect and mediated through the community insofar as he transcends nature by knowing and shaping it. Without language there are no universals; without universals no transcending of Nature and no relation to it as nature. But language is communal not individual. The section of reality in which one participates immediately is the community to which one belongs. Through it and only through it participation in the world as a whole and in all of its parts is mediated. (83-84)

Since each community is mediated by different words and norms (i.e., signs and symbols), the creation of space for the opportunity of conversation is necessitated.

Regarding urban water issues, how do we recover common public space and resurrect the agora? How do we engage in conversation about water issues? Watershed Education Community Action Networks (WE CANs) provide answers to both questions. WE CANs are emergent sites of community-based experiential education and action arising from a problem affecting a particular public that immerses the community in dialogue and cooperative action and raises critical consciousness. WE CANs are by necessity emergent, because, as Dewey notes in *The Public and Its Problems* (2016), "In no two ages or places is there the same public" (82). The public or community comprising a WE CAN is stochastic based on historicity, "Conditions make the consequences of associated action and the knowledge of them different" (82). Due to the changing conditions of inquiry, action, and knowledge, WE CANs are also fluid and experimental. WE CANs function as sites of epistemological rupture. As Dewey stated, "To form itself, the public has to break existing political forms" (81). Some may question the use of the word "political" when dealing with water supply and management, but urban water issues are indeed political on many levels. At the most fundamental level, as Carol Hanisch, a second-wave feminist, famously proclaimed, "The personal is political." Water is essential for life; nothing can be as personal as water is to a human's well-being. Water issues are therefore both personal and political. WE CANs surface when an assemblage of people gathers to engage in dialogue about a common urban water/watershed problem and to engage in participatory decision-making to decide on a cooperative course of action. In this process, a public is formed, and an old system of thought is deconstructed. The mindset of what Dewey calls the "Great Society," the same mindset I call "thinking inside the pipe," is transformed into the mindset of Dewey's "Great Community," analogous to what I call "thinking outside the pipe," and this new system of thought fosters a new way of being in relationship to water and watersheds. This social transition and its resultant break or rupture in epistemology is akin to a revolution on the microscale of a WE CAN. As mentioned in Chapter 2, Hannah Arendt asserted that a revolution occurs when there is a founding of a new political order. WE CANs facilitate the emergence of a new political order by providing the conditions for a public to coalesce and to surface a submerged critical consciousness. The public takes initiative to begin something new, individuals are no longer passive spectators, but participants engaged in active intervention to solve a community problem.

Neighborhood schools and outdoor open areas would be ideal spaces for hosting "popup" emergent WE CANs since they are familiar and neutral places to gather. What is crucial for a WE CAN gathering is that it must be free from hegemony. For this reason, the use of conversation circles is a powerful means to create community. The use of a circle for social organization dates to the advent of our ancestral hominids', *Homo erectus*, use of fire for warmth and cooking in the Lower Paleolithic era. Christina Baldwin and Ann Linnea, cofounders

of PeerSpirit, an educational company that teaches circle practice, state in their book, *The Circle Way: A Leader in Every Chair* (2010), "the circle as a *symbol* appears in cave paintings and carvings dating back 35,000 years" (7). As a result of their sixteen years of practice, these authors found that the form of the circle encourages, indeed, invites, participation and interaction.

The circle...is essentially a gathering of equals, people who set aside external hierarchal positions that categorize and separate them and sit down in a ring of chairs with a clearly defined intention or purpose symbolically represented in the middle.... [E]ach person contributes as a peer to the process of reflection, speaking, consideration, and action. The circle...is an energetic social container capable of helping a group draw on wellsprings of insight, information, and story that inspire collective wisdom and action. (xvi)

Not only is the circle a universal symbol for wholeness and the cyclic nature of the universe, according to Baldwin and Linnea, it is an archetypal group process (7). Interestingly, these authors state that the triangle also is a universal and archetypal symbol dating back to the Late Paleolithic. However, the form of triangle as social design has a different influence on group process than the circle. Baldwin and Linnea assert that the triangle represents hierarchical power, at the front of the meeting room stand leaders at the top of the chain of command transmitting information that has already been decided to a room full of followers. The form of the triangle, write Baldwin and Linnea, "lacks holistic understanding of networked systems and biological interdependence and connectivity" (11). The different effect of the circle versus the triangle on social design is depicted in Figure 3.2 in the third chapter of this dissertation. The circle reflects humanity as community whereas the triangle represents humanity as hierarchy. As I discussed in some detail in Chapter 3, these different conceptualizations of the structure of humanity result in different narratives of the human role in nature and thereby establish the

foundation for very different relationships of humans to the natural environment, citizen versus conqueror, respectively. Based on my personal experience, the triangle is the common social design structure used by a variety of water institutions in North Central Texas, including those institutions that utilize stakeholder groups. Baldwin and Linnea argue that by simply changing the arrangement of the chairs, we can change the world. The social design structure has tremendous influence on the outcome of the assemblage of the stakeholders. I am suggesting that WE CANs function to re-design the structure of power by encouraging stakeholders to engage with community-based projects which address citizen-identified needs of their communities. As such, WE CANs empower the community to accept responsibility and ownership for watershed problems rather than mindlessly deferring management to authorities, thus making watershed issues more visible to community members and increasing mindfulness of the role each stakeholder plays in the health of the watershed.

As discussed earlier in this chapter, wicked problems encompassing political, economic, social, and environmental issues are better addressed using the approach of Global Action Networks (GANs) that include the input and collaboration of a diverse group of stakeholders. Therefore, using the form of circle as a group process tool may increase the efficacy of GANs since the "circle includes everyone without distinction, welcomes and invites all to participate and creates equality among those gathered" (Baldwin and Linnea 2010, x), thus fostering creative reflection and collaboration. Moreover, in the context of urban water issues, the circle serves as a powerful symbol because it is linked to the hydrologic cycle. Both the circle and the hydrologic cycle represent wholeness and endlessness. As discussed in Chapter 4, watershed stewardship is not linear, it is an unending process. A circle is also a powerful symbol for WE

CANs in that a stone dropped in a pond creates ever increasing circular ripples. Similarly, the actions of one WE CAN is able to create multiple ripples of effect moving from micro (i.e., subwatersheds) to the macro (e.g., Trinity River Basin) scale. In this regard, WE CANs can be imagined as essentially ripples of conversation and conservation action forums. These forums are sites of change initiated at the grassroots level in the beginning, not originated from the top down. Eventually it is important for all stakeholders, including leaders from top-level organizations, institutions, and government agencies to be included in conversations to facilitate the forward movement of plans generated by the grassroots community group. In Turning to One Another: Simple Conversations to Restore Hope to the Future (2009), Margaret Wheatley, whose work focuses on organizational behavior and systems change, notes, "the world always only changes when a few individuals step forward.... It changes when we, everyday people gathering in small groups, notice what we care about and take those first steps to change the situation" (5). These words convey the same sentiment expressed by Dewey in The Public and Its Problems (2016) and by the oft-quoted words of cultural anthropologist Margaret Mead, "Never doubt that a small group of concerned citizens can change the world. Indeed, it is the only thing that ever has." Once a few people get together to discuss their water related concerns, they discover common ground and begin to engage in the simple act of conversation. This initial conversation then expands in ever increasing circles to include more stakeholders. As Wheatley has documented in her work, "When a community of people discovers that they share a concern, change begins. There is no power equal to a community discovering what it cares about" (2009, 26). It is therefore not surprising that a common tool used to maintain status quo by those in power is to divide and isolate the community, or in

Dewey's words to "eclipse the public." Although conversation is powerful, as discussed in Chapter 4, it is not enough, there must be a change in critical consciousness that can be evoked by a variety of experiences and actions.

In the 1960s, Paulo Freire used "cultural circles" to teach illiterate Brazilian adults to read. In so doing, these adults not only learned to read but were also empowered and transformed because the cultural circles generated critical conversation to motivate and pave the way for the awakening of critical consciousness and political action. I argue that these same cultural circles can be used to create a new urban water narrative in North Central Texas. WE CANs essentially function as "cultural circles," safe spaces that precipitate participatory water education and action through conversation and conservation. Every WE CAN is different because they emerge in response to varied geospatial and temporal contexts, values, needs, interests, and desires. How do WE CANs function as participatory democracies to recover common public space and resurrect the agora using cultural circles? As spaces devoted to critical pedagogy, WE CANs enable people to gain power through knowledge and taking constructive action. Since Freire acknowledged the crucial importance of education that is derived directly from lived experience, he immersed himself in the Brazilian communities to ascertain what the people who lived there believed to be important. This is the same tactic that is used today by field philosophers. In Reading Paulo Freire: His Life and Work (1994), Maocir Gadotti, Professor of Philosophy of Education at the University of São Paulo and former Director of the Paulo Freire Institute, identifies three stages of cultural circles: investigative, thematization, and problematization. In the investigative phase, the investigator (i.e., field philosopher) engages with people in their environment, the "dwellers of the place" (22) to

bring to light those beliefs, values, issues, and worldviews regarding water that are important to them. This can be done through informal meetings and conversations. The water community engagement survey conducted as part of this dissertation is a beginning step of this investigative phase. To gain more information and rapport with the community, follow-up focus groups need to be conducted. I will discuss these further in Chapter 6. The investigative phase of cultural circles approximates the process attributes of awareness and knowledge on the EPA environmental education continuum discussed in Chapter 4. In the thematization phase, the beliefs, values, issues, and worldviews uncovered in the first phase are thematized or contextualized to birth a critical vision. This phase of cultural circles incorporates the process attributes of critical thinking, problem solving, and decision making on the EPA continuum. By using a myriad of art forms (i.e., storytelling, literature, poetry, dance, photography, painting, music, etc.) and ecological revitalization, WE CANs facilitate critical thinking, problem solving, and decision making in the thematization phase of the cultural circle. In the next section of this chapter, I will explore how art can be used to re-engage the public to take on social and environmental challenges and develop participatory ethics to create a new urban water narrative. Problematization, the third phase of cultural circles, involves taking action. In this phase, the members of the cultural circle engage in "transformative praxis." Freire, in *Pedagogy* of the Oppressed (1995) argues that the transformation of a world challenge requires people to engage in critical intervention through the praxis of reflection and action (33). This third stage of a cultural circle corresponds to the process attributes of action and stewardship on the EPA continuum.

Freire's cultural circles engender a transformative praxis by using a problem-solving, dialogical approach committed to both reflection and action. Dialogue without reflection is "verbalism" or alienated "idle chatter" and action without reflection is "activism" or "action for action's sake" (1995, 68-69). Freire asserts that through dialogue in a cultural circle, the united reflection and action of participants in the circle is applied to the world, to the problem that needs to be transformed (69-70). According to Freire, dialogue both requires and generates critical thinking; without dialogue there is no communication and in the absence of communication no authentic education occurs (73-74). Authentic education involves the process of conscientization, *conscientização* in Portuguese, the development, strengthening, and changing of consciousness. How does engaging in dialogue change consciousness? Dialogue develops, stimulates, and maintains critical thinking. A University of Michigan website¹³⁰ devoted to problem solving articulates four components of critical thinking: 1) identifying and challenging assumptions; 2) challenging/recognizing importance of context; 3) imagining and exploring alternatives; and 4) engaging in reflective skepticism. Critical conversations encompassing these four components take place in a cultural circle. For example, in "Freirean Cultural Circles in a Contemporary Social Studies Class" (2020), Shelley Martin-Young explains how she deliberately created an epistemological rupture by changing her pedagogical method.

After exploring a topic in the school social studies textbook, students are invited to investigate the historical event from other perspectives. By using a variety of texts including newspaper articles, journals, eyewitness accounts, photographs, interviews, and a variety of children's and young adult literature, students will gain a more complete story of the historical event.

¹³⁰ University of Michigan. 2022. "Problem Solving: Critical Thinking." http://problemsolving.engin.umich.edu/strategy/crthink.htm. Accessed May 23.
In the cultural circle, students dialogue about what themes are emerging and perspectives that may be new to them. As students wrestle with the historical topic in the safe space of a cultural circle, a new understanding may emerge. Through critical analysis and critical questioning, students, instead of memorizing facts to regurgitate on a high-stakes test, move toward the earlier mentioned place of conscientization or a critical consciousness. They become individuals who interrogate their assumptions – assumptions in the textbook, the classroom, their society, and their world. (91)

The WE CAN cultural circles function similarly. They can be used to critique the cultural narrative of urban water. Using the three stages of Freire's cultural circles, members of a WE CAN are able to dialogically investigate, thematize, and problematize the political, economic, social, and environmental issues of the current urban water narrative that informs the policy, supply, and management of water in North Central Texas. Progress through these stages of Freire's cultural circle results in an awakening of critical consciousness and the evolution of a participatory water ethic. A new critical consciousness empowers WE CAN participants to re-evaluate the human relationship to water, to create a new urban water narrative, and to engage in community-based solutions to urban water issues. Participants in a WE CAN co-create the opportunity for everyone to engage in all the process attributes on the EPA environmental education continuum which are necessary to develop an ecological conscience constituted by "thinking like a mountain" and as a result become stewards of their watershed. The invitation to community is growing. In *The World Café: Shaping Our Futures Through Conversations that Matter* (2005), Juanita Brown, co-originator of the World Café, ¹³¹

¹³¹ The World Café is a community made up of organizational leaders and others who believe in the power of engaging in "conversations that matter" to shape the future. The community follows a follows a methodology of seven principles: 1) set the context; 2) create hospitable space; 3) explore questions that matter; 4) encourage everyone's contribution; 5) cross-pollinate and connect diverse perspectives; 6) listen together for patterns, insights, and deeper questions; and 7) harvest and share collective discoveries. For more information on the World Café see the World Café website at http://theworldcafe.com/key-concepts-resources/world-cafe-method/. Accessed May 24, 2022.

asks us to "imagine that we do have the power to make a difference through fostering conversation, community, and committed action.... [W]hen we help to change the collective conversation about a situation, we have the opportunity to influence the future of that situation, whatever it may be and at whatever level of scale it occurs" (209). Remembering the image of a pebble thrown into a pond, we can visualize how a few individuals engaging in "conversations that matter" can ripple and grow into ever increasing sizes of groups to culminate in large-scale change. The keystone to forming an effective community is utilizing the power of the circle. It is a common misconception that cultural circles do not entail leadership. As Toko-pa Turner states in Belonging (2017), "Leadership is essential to community," however, the leadership is reciprocal and rotates between members based on needs of the group, "engaging everyone to find the way forward. It is spherical in nature, rather than hierarchical" (216). Like Freire, Hannah Arendt, in The Human Condition (1998), contends that communities are extinguished when power is lost (200). Power exists only when speech and action co-exist. Arendt further states, "The space of appearance comes into being wherever men are together in the manner of action and speech.... Its peculiarity is that, unlike the spaces which are the work of our hands, it does not survive the actuality of the movement which brought it into being, but disappears not only with the dispersal of men...but with the disappearance or arrest of the activities themselves. Whenever people gather together, it is potentially there, but only potentially, not necessarily and forever" (199). WE CANs are Arendtian "spaces of appearance" that enable power and collective action. However, the bonds and power of community are ephemeral and need to be periodically strengthened. This can be achieved by WE CANs at the micro and macro level through ritual symbolic activities, like celebrations, festivals, ceremonies, etc. These community strengthening activities will be discussed in the "Revitalizing Urban Watersheds" section of this chapter. Although the first step to recovering common public space is engaging in dialogue in cultural circles, engaging all stakeholders in cultural circles requires bridging the disciplinary gap between the humanities and science.

Reconverging Humanities and Science: Emergence of Transdisciplinarity

Watershed Education Community Action Networks (WE CANs) intertwine science and art activities to achieve urban watershed stewardship. The science aspect is discussed in the "Revitalization of Urban Watersheds" section of this chapter. Art, (e.g., painting, photography, drama, dance, music, literature, etc.) is used to generate visual rather than mental images of the Trinity River Watershed to promote critical consciousness through aesthetic education.¹³² In *The Wisdom Pattern: Order, Disorder, and Reorder* (2020), Richard Rohr, a Franciscan priest and Director of the Center for Action and Contemplation in Albuquerque, New Mexico, discusses the significance of "imaginal knowing" (127) for the reconstruction of consciousness. He states, "Imaginal knowing is the only way that the unconscious can move into consciousness" (127). Rohr further argues that the symbology of art awakens us to what Merleau-Ponty would describe as an "always and already" way of knowing which is "sedimented" and latent and needs to be excavated and "re-membered" (129). This way of knowing differs from *logos* or pure reason and resides in the unconscious. Art, in essence, acts as midwife to pull forth, give

¹³² Aesthetic education entails the study and appreciation of beauty, especially in art. Etymologically, the word "aesthetic" is a derivation of the Greek word *aisthetikos*, meaning "of sense perception." Thus, aesthetic education is the study of the embodied perception of the senses. I use the word "aesthetic" to connote not the superficial love of art-for-art's-sake, but as a gateway to accessing a different way of knowing. In this regard, I imagine art as a portal that can transport individuals to a deeper understanding of lived experience that facilitates reflection and action, a Freirean praxis capable of catalyzing transformation.

birth, to an old but forgotten way of knowing and induces a "re-membering" (128). Ironically, Rohr's description of imaginal knowing resurrects the Socratic model of education, maieutic psychagogy,¹³³ and Plato's notion of anamnesis,¹³⁴ both of which are over 2,500 years old. Rohr also asserts, "It seems that the right brain and the unconscious do not know conceptually, but through images" (128). Rohr's words substantiate the argument I make in this section that the creation of a new urban water narrative necessitates the reconvergence of science and art because each contributes a different way of knowing, conception and perception, respectively, that can intertwine to give rise to "re-membering" the role of humans in the context of the larger environment. Imaginal knowing is integral to the work of reconstruction, maintains Rohr, because knowing through logic and reason is not sufficient to the enormous and eminent task of reconstruction, "Once we touch the way people *imagine a situation*, change will happen easily and naturally" (128).

WE CANs, as stated earlier, are essentially Global Action Networks (GANs). An exceptionally important characteristic of the non-hierarchical organization of GANs is the emergence of voluntary "leaders" across organizational sectors who make "commitments to push the boundaries of enhancing environmental, social, and economic outcomes" (Waddell, McLachlan, and Dentoni 2013, 25) related to the particular wicked problem they are addressing. The use of the word "leader" here does not imply hierarchy. Being a leader means

¹³³ Maieutic psychagogy was the method used by Socrates in Ancient Greece in his dialectical sessions with various interlocutors. Socrates believed that his role and art as a "teacher" was to serve as midwife in helping his students to give birth to what they already knew but had forgotten. See *Theaetetus*, 150b-e. Socrates did not profess that he had wisdom. Indeed, he believed he possessed no wisdom other than knowing that he knew nothing.
¹³⁴ In the *Meno* and the *Phaedo*, Plato reveals his epistemological theory that humans have innate knowledge within themselves that needs to be rediscovered. In the process of being reincarnated and embodied, an immortal soul forgets the knowledge previously acquired. The purpose of education is to recover this forgotten knowledge.

to lead. The verb "lead" is etymologically derived from the Old English laedan meaning to guide, as in to accompany and to show the way. Being a voluntary leader entails guiding or facilitating others to bring forth a desired collaborative action. Embedded in this description are two key concepts, commitments and pushing boundaries. In Chapter 4 I discussed in detail how engagement outside of the various water institutions in North Central Texas is lacking. According to the Merriam Webster online dictionary, engagement is defined as "involved in activity; greatly interested, committed." Functioning as a GAN, WE CANs are able to overcome this lack of engagement by intentionally facilitating the reconvergence of humanities and science through transdisciplinary approaches to addressing the wicked problem of urban water supply and management. New advances in science, particularly in quantum theory, chaos theory, and systems theory, are bringing to light the similar perspectives, the interconnectedness of all aspects of nature, in post-modern science, ancient Eastern philosophy and religion, and the wisdom traditions of ancient indigenous cultures around the world. Thus, a reconvergence of humanities and science is already in progress. Any attempt to solve a wicked problem would prudently include a transdisciplinary approach. This section describes the powerful work of art in the world. Art functions to challenge boundaries and to make borders open and permeable by providing new ways of seeing that are pregnant with the possibility of changing mindsets. Many philosophers have underscored the vital importance of art and an aesthetic education to the construction of an ecological worldview and/or to the functioning of a democratic society, including Aldo Leopold, Paulo Freire, Maurice Merleau-Ponty, Alfred North Whitehead, John Dewey, and Martin Heidegger to name a few.

In his address of the state of the profession (i.e., wildlife management) to the President of The Wildlife Society on March 18, 1940, Aldo Leopold laments the existence of the "senseless barrier between science and art" (344).¹³⁵ He argues that the profession of wildlife management needs to be engaged in "rewriting the objectives of science" (344) to include the "creation and exercise of wonder, of respect for the workmanship in nature" (344). To do so, Leopold contends that if wildlife managers communicated not just the abstract findings of science, but also the discoveries of "ecological dramas" through contributions to art and literature, a submerged state of wonder would surface. Through art, stories of attentive interaction with nature can be expressed and shared. Like Leopold, environmental biologist Robin Kimmerer proclaims in *Braiding Sweetgrass* (2013) that wonder plays a key role in connecting people to the natural world (222). So, what is wonder? How is wonder created and maintained? Regarding North Central Texas, is awareness and knowledge that is attained passively through typical water outreach education programs enough to stimulate a state of wonder for water and the Trinity River watershed, or does wonder require something more (i.e., active engagement through embodied experience)? The Oxford Languages online dictionary defines wonder as, "a feeling of surprise mingled with admiration, caused [emphasis added] by something beautiful, unexpected, unfamiliar, or inexplicable." This definition alludes to the necessity of a catalyst of some sort, much like an enzyme is needed for a chemical reaction.

¹³⁵ Aldo Leopold's address was printed in *The Journal of Wildlife Management*. See Aldo Leopold. "The State of the Profession," The Journal of Wildlife Management 4(3) (July 1940): 343-346.

Art, via its aesthetic education, can be used as a catalyst to create wonder and enchantment for urban watersheds. How? Art provokes epistemological rupture and, concomitantly, aesthetic education provides the fertile conditions for the emergence of critical consciousness. Art can give us pause and in the words of Hannah Arendt, "think what we are doing." In her March 2, 2015 lecture given to the MIT program in Art, Culture and Technology, Doris Sommer, Professor of Romance Languages and Literatures and Director of the Cultural Agents Initiative at Harvard University, provides real-life examples of how art has been used around the world to civically engage citizens to collaborate in creating solutions to social challenges.¹³⁶ Speaking on aesthetics, Sommer contends that art has two effects, pleasure and confusion. This confusion, or cognitive dissonance/epistemological rupture, generates a need for a pause to reflect on our response and trains us to develop aesthetic judgement which is different from scientific "pure reason." Aesthetic judgement, according to Sommer, provokes the need to dialogue with someone to inquire what they think in response to the art. Even though aesthetics is initially a subjective relationship to the world, it quickly transforms into a lateral and intersubjective relationship to the world. Sommer notes in her lecture that Immanuel Kant, Hannah Arendt, Fredrich Schiller, and Jürgen Habermas all argued that political agency could begin to be reclaimed by engaging in conversations about alternative aesthetics. In her book, The Work of Art in the World: Civic Agency and Public Humanities (2014), Sommer showcases examples of how art has been used to engage cultural agents in enacting societal change. For example, when Antanas Mockus was elected mayor of Bogotá in 1994, a Columbian

¹³⁶ Sommer, Doris, Marchr 2, 2015. "The Work of Art in the World: Civic Agency and Public Humanities." Accessed September 2, 2021. https://www.youtube.com/watch?v=AJANn193KD0.

city mired in corruption and social challenge, he "took an unconventional turn to art" (16) to identify creative ways to address the issues. Whenever Mockus felt stymied, he would ask himself "What would an artist do?" (15). To decrease the high rate of traffic fatalities plaguing Bogotá, Mockus replaced some corrupt traffic cops with mimes to demonstrate and encourage proper crosswalk behavior among the citizens. In the first year, traffic deaths were reduced by 50%. Closer to home, Becky Wilkes, an artist in North Central Texas, in one year collected, photographed, and created digital collages of 5,833 pieces of trash from one mile of shore of Eagle Mountain Lake to raise public awareness about how "individual fingerprints of personal irresponsibility" are negatively affecting the Trinity River watershed. Each of Wilkes' collages "yields a comic yet serious insight into the messages left by our possessions."¹³⁷ Both Mockus and Wilkes use art and aesthetic education to make people stop and think to change perceptions and behaviors by making what was a "familiar expression unfamiliar" (Sommer 2014, 27).

The creativity of art, making what is familiar unfamiliar, engages interest, encourages relationships through dialogue, and increases critical consciousness. Christine Ballengee-Morris, professor in the department of Arts Administration, Education, and Policy at Ohio State University, in her article "Paulo Freire: Community Based Arts Education" (1998), discusses how Freire employed interdisciplinary education using art to teach literacy. Although Freire was focused on empowering illiterate Brazilians to read and write, his pedagogical theory and

¹³⁷ Quotes are from a promotional brochure given to me by Becky Wilkes at the "Future Cities: Livable Futures" conference we were attending at the University of Texas at Arlington on August 17, 2019. The brochure is entitled "From Janie to Janie (Anatomy at Water's Edge). Her work described above can be accessed on her website at http://www.beckywilkesphotography.com/ditched-debris.

methods can be used to promote ecological literacy. Freire used art to facilitate a person's understanding of the relationship between self and the world and to stimulate critical reflection on culture. Why reflect on culture? Freire asserted that art and culture are instrumental in catalyzing societal change because they are "languages" that allow a diversity of people to express ideas in many ways (Ballengee-Morris 1998, 46, 50). As languages, they are integral in changing the cultural narrative. How WE CANs function to facilitate the creation of a new urban water narrative is discussed in the next section of this chapter. Aesthetic education is in effect a relational pedagogy that activates new ways of seeing, being, and knowing in the world because it invites members of the community to engage with one another and with the world. Freire believed that a community-based arts education encourages dialogue and develops critical consciousness by increasing the awareness of the intertwining environmental, social, historical, economical, and political realities (50). Rather than responding to community issues with passivity, apathy, and helplessness, art and aesthetics fosters activism, engagement, and empowerment to effect change through dialogue and problem-posing education involving a transdisciplinary, non-hegemonic, interorganizational, and multi-stakeholder approach. Art engages the interest of people. Arendt, in The Human Condition (1998), affirms, "These interests constitute, in the word's most literal significance, something which *inter-est*, which lies between people and therefore can relate and bind them together" (182). Art, as an object of reflection, is the epitome of Freire's problem posing education. Art, lying between people and the world, creates community and evokes critical reflection and dialogue. Since problemposing education involves the activities of critical thinking, problem-solving, and decisionmaking does it engender a state of wonder due to active engagement through embodied

experience? Does a state of wonder induce an ecological and sustainable relationship between humans and the environment?

Leopold's writings, especially in A Sand County Almanac, articulate his ardent belief that the treatment of land is based on how humans perceive the land. Is the land perceived as an abstract "object" or "thing" to be conquered or a living web of evolution of which humans are but one part? The answer to this question, yields a very different human interaction and relationship with the land. In his essay "Conservation Esthetic" in A Sand County Almanac (1966), Leopold elucidates how pivotal perception is to the development of a conservation ethic, it is not a job of "building roads into lovely country, but of building receptivity into the still unlovely human mind" (295). Through his own personal experiences, Leopold clearly understood that conservation stewardship can only be built on a foundation of perceiving the myriad intertwining relationships that exist in an ecological community. As Leopold expresses in his essay "The Farmer as a Conservationist," published in For the Health of the Land (1999), perception is the key to experiencing ecological drama, for "there is also drama in every bush, if you can see it.... When enough men know this, we fear no indifference to the welfare of bushes, or birds, or soil, or trees [or water] We shall then have no need of the word conservation, for we shall have the thing itself" (172). Perception is the gateway to overcoming barriers to experiencing wonder, awe, astonishment, enchantment, and reverence in response to embodied interactions with nature.

However, Andy Karr and Michael Wood, professional photographers and authors of *The Practice of Contemplative Photography: Seeing the World with Fresh Eyes* (2011), note an important caveat, "To see clearly, you need to untangle perception from conception" (36).

Why? Different images result from perception and conception. The visual images produced by perception occur because of the connection between consciousness and the eye; whereas the mental images formed by conception arise when consciousness and the conceptual mind connect. As such, visual images are a product of embodied experience and direct perception. Although concepts are useful, they "can also blind you to what is vivid and real" (38) because they are abstractions and are biased by language and narrative. Thus, Karr and Wood state, "The world of direct perception holds richness and detail that is totally lacking in the world of conception" (35). Karr and Wood's process of "untangling" perception from conception is analogous to conducting a phenomenological excavation. Merleau-Ponty, too, believed that perception, or what he called non-thetic or pre-thetic consciousness, could be uncovered from the sedimented layers of conception, or thetic consciousness, by reflecting on lived experience. In his essays, "Cézanne's Doubt" and "Eye and Mind," Merleau-Ponty explains how art, specifically painting, can reveal and express the pre-thetic consciousness or "operative intentionality already at work prior to every thesis and every judgment" (2012, 453). Although "Cézanne's Doubt" was written before "Eye and Mind," both essays incorporate Merleau-Ponty's concepts of reflexivity, chiasm, and flesh. Merleau-Ponty asserts in "Cézanne's Doubt," that the French and Post-Impressionist painter, Cézanne, "makes a distinction not between 'the senses' and 'the understanding' but rather between the spontaneous organization of the things we perceive and the human organization of ideas and sciences" (1993, 64). In other words, for Cézanne and Merleau-Ponty, painting enables the artist to untangle perception from conception to uncover the lived world that exists beneath conceptualization. As a process of

expression, "art is not imitation," (67) rather it, "make[s] *visible* how the world *touches* us" (70). The ability to awaken is the power of art.

It is not enough for a painter like Cézanne, an artist, or a philosopher, to create and express an idea; they must also awaken the experience which will make their idea take root in the consciousness of others.... The painter can do no more than construct an image; he must wait for this image to come to life for other people. When it does, the work of art will have united these separate lives; it will no longer exist in only one of them like a stubborn dream or a persistent delirium, nor will it exist only in space as a colored piece of canvas. It will dwell undivided in several minds, with a claim on every possible mind like a perennial acquisition. (70)

Art invokes the creation of ripples of relationship, between the artist, the "subject," and the art-in-process, the person viewing the art and the art itself, and between other members of a dialectical community, whereas conception involves no relationship external to self, it is inherently an internal individual process. The aforementioned quote of Merleau-Ponty captures the essence of the problem of trying to engage the public in water conservation and watershed stewardship primarily through communiques expressing the ideas and conceptions of science, they are not sufficient to catalyze an awakening of consciousness. The messaging conveyed through water education and outreach is derived from the perspective of scientific pensée de survol, thinking that looks on from outside or above rather than from lived experience. Consequently, the messaging does not express an intercorporeal being-in-the -world, it is embedded in abstractions rather than relations. Merleau-Ponty, in his essay "Eye and Mind," advocates rejecting the *pensée de survol* and returning to the "there is" of the concrete world (1993, 122). To that end, according to Merleau-Ponty, "art, especially painting...and only art," has the capacity to engage the "fabric of brute meaning" inherent in things themselves (123). The mind does not paint, the body paints; by "lending his body to the world" (123) the artist's body and the visible world intertwine giving rise to what Merleau-Ponty defines as reversibility.

The body simultaneously explores the world and is of the world, the body sees and is seen, touches and is touched (124). There is, thus, an inevitable reversibility of roles between the painter and the visible such that "it becomes impossible to distinguish between who sees and who is seen, who paints and what is painted.... The painter's vision is an ongoing birth" (129). This phenomenon of reversibility or intertwining creates a chiasmic relation, a crossing over of one into the other; however, the seer and the seen and the toucher and the touched do not completely collapse into one another. There is a space, the "flesh," in which the two interact that eclipses their unity. However, the "flesh" creates the space necessary for brute Being to appear, the invisible becomes visible because the painter is open to the world, he apprehends the world, but does not appropriate the world. The embodied experience gives rise to an expression of the richness of the world that would otherwise remain buried under conceptualizations. The painter interrogates the visible world with his gaze to "awaken an echo in our bodies" (125) to facilitate a recognition that, "Things have an internal equivalent in me; they arouse in me a carnal formula of their presence" (126).

This bodily awakening and arousal are exactly what is missing in scientific conceptualizations of the world. I am not making the argument that we do not need scientific conceptualizations; I am arguing that art and science produce different ways of knowing and relating to the world. We need both. But water policy, supply, and management have traditionally embraced only the reductionist scientific expression of water and watersheds. As Alfred North Whitehead asserted, art is an invitation to engage in a relationship of direct experience of concrete facts that transcends the thin world of abstractions. According to Whitehead, art draws out "habits of apprehension," not simply recognizing and appreciating

what lies outside of self, but valuing the completeness, rather than the abstraction, of the entity. For Dewey, as he explains in Art as Experience (2005), this sense of completeness is derived from experience, "the actual work of art is what the product does in and with experience" (1). When art is isolated from lived experience, or what Merleau-Ponty would call historicity, the artistic object's significance becomes opaque. For this reason, fine art in museums and galleries "seem anemic to the mass of people" (4). However, when art is seen as an enhancement of everyday life experiences, the artistic objects garner fascination and admiration. In cultures where art is incorporated to enhance daily practices, rites, and celebrations, the significance is retained. Historically, art has been used in this way to awaken wonder by appealing to the sensuous imagination. The use of art by WE CANs honors this historic practice and will be explained in more detail in the last section of this chapter. As stated by Dewey in The Public and Its Problems (2016), "Artists have always been the real purveyors of news, for it is not the outward happening in itself which is new, but the kindling by it of emotion, perception, and appreciation" (204). The evocation of the emotions of wonder, awe, and enchantment is the portal to engaging the public in connecting to the natural world. Direct experiences and habits of apprehension through artistic endeavors and expression thereby can be fertile grounds for nurturing the values of integrity, stability, and beauty, that comprise Leopold's land ethic.

Instead of there being a "senseless barrier between science and art," there needs to be a reconvergence of science and art, the humanities in general, because they generate two different ways of seeing and provide the opportunity for a holistic rather than a partial perspective. In this way, art opens the door to creative and innovative ways of seeing and being

in relationship and new ways of addressing problems which are critical to address wicked problems such as urban water policy, supply, and management. In the words of Thomas Berry in *The Great Work: Our Way into the Future* (1999), "The natural world demands a response beyond that of rational calculation, beyond philosophical reasoning, beyond scientific insight. The natural world demands a response that rises from the wild unconscious depths of the human soul. A response that artists seek to provide in color and music and movement" (55). I do not believe that wicked problems can be addressed by dualistic reduction. Neither science nor the humanities alone are adequate for exploring and proposing alternatives to solving the wicked problem of urban water supply.

Years ago, Albert Einstein acknowledged that problems cannot be solved by the same mindsets that created them. The contemporary urban water supply problem was created with the mindset of "thinking inside the pipe," a mindset that was constructed on the foundation of the myths of unlimited growth and the omnicompetence of science and technology, stories girding the Industrial Revolution. Urban water policy and management beliefs and actions were immersed in *logos*, reasoning, conception, and science. In his book, *The Four Insights* (2006), Alberto Villoldo calls for a "shift to a higher realm of perception" (7) to find solutions to 21st century problems. Although I agree that we need a different mindset, I do not agree with his use of the word "shift" or his phrase "higher realm of perception." A shift, I contend, implies throwing out one "realm of perception" in lieu of another and "higher" connotes a dualistic reduction (i.e., higher/lower, superior/inferior). Rather, I assert that what is needed is a return to another way of knowing *mythos*, sacred/spiritual, perception, and art. Each of these ways of knowing entail different narratives and relationships, one based on the mind and one based on

the body, to the natural world and give rise to different proposed solutions to the problems plaguing urban water policy, supply, and management. This reminds me of a Paracelsus quote, "One who lives within reason [*logos*], lives without the spirit [*mythos*, enchantment, wonder]." But could not the opposite also be said, "One who lives within spirit [*mythos*, enchantment, wonder], lives without reason [*logos*]?" Does it need to be either *logos* or *mythos*? Why not both? As mentioned earlier, new scientific advances are discovering that there is an inherent unity to the universe, there is an innate intertwining that necessitates a systemic mindset. A systemic mindset is a mindset that embraces both science and the humanities, albeit the science is holistic (i.e., quantum physics, ecology, etc.) and not reductionist.

Martin Heidegger's systemic mindset is revealed in his essay "The Question Concerning Technology" (1977). In this essay, Heidegger, as discussed in Chapter 3, explores how mindsets, specifically modern technological mindsets, shape our experiences of the world, but he also wanted to resurrect a different conception of technology. He does this by drawing attention to the etymology of the word "technology," derived from the ancient Greek word meaning "art," "craft," "technique," or "skill." He writes that "*technē* is the name not only for the activities and skills of the craftsman, but also for the arts of the mind and the fine arts" (13). Heidegger, in this way, makes a case for re-thinking technology, to return to the etymological meaning of the term. As such, Heidegger argues that technology is related to *poiēsis*, because it "belongs to bringing forth" and is a "mode of revealing" (13). Heidegger avers that modern technology is only one way by which entities are revealed; since modern technology dominates how we understand and relate to our world it obscures the essential being of natural entities and the interrelationships inherent in the natural world. Even though art, according to Heidegger, is also

a technology because it is "brings forth," it differs from modern technology because it reveals the hidden presence inherent in nature and invites humanity to "enter into a more original revealing and hence to experience the call of a more primal truth" (28). How does art make this revealing possible? Heidegger contends, like Whitehead, "We need only apprehend in an unbiased way" (18). Art untangles perception from conception giving rise to clarity, facilitating unbiased apprehension.

Although Heidegger specifically equates modern technology with "enframing," I contend that his concept of "enframing" can be used to explain how different cultural narratives are ways of revealing or "bringing forth" different human-nature relationships. The perspective of technology as art invites a revisioning of the relationship between humans and nature, opening the door for the creation of a different narrative, "enframing" the human-nature relationship as one of reciprocity guided by a "poetic revealing" (35) rather than a utilitarian revealing that conceives nature as a commodity, a "standing reserve," to be conquered and controlled by humans. Heidegger is not arguing art is a way of revealing that should replace modern technology's way of revealing. Rather, he maintains that acknowledging and embracing alternate ways of revealing promotes a recognition of the limits of a modern technological understanding and relationship to nature. Accepting modern technology as one way of revealing enables the questioning of the frequently heard argument: "technology is the fate of our age, where 'fate' means the inevitableness of an unalterable course" (25). In other words, if there is more than one way to reveal or bring forth, humanity is not confined "to a stultified compulsion to push on blindly with technology or, what comes to the same thing, to rebel helplessly against it and curse it as the work of the devil" (25-26). Art as technē and poiēsis is an

older more primal way of revealing natural entities that needs to be remembered and reinvigorated. The revival of art as a way of revealing may be the saving grace to avoid the danger of continuing blindly and unquestionably down the path of modern technology. In the words of Heidegger, "essential reflection upon technology and decisive confrontation with it must happen in a realm that is, on the one hand, akin to the essence of technology and, on the other, fundamentally different from it. Such a realm is art" (35). One of the functions of WE CANs is to encourage the rethinking of modern technology and to make visible its underlying narrative so that it can be questioned. By recovering public space and reconverging humanities and science, WE CANs create the possibility to reframe the urban water narrative. This section delineated the role of humanities in creating a new water mindset, in the next section I will explore the role of science in revitalizing the urban watershed and concomitantly providing impetus to change mindset from conqueror to citizen of the land community.

Revitalizing Urban Watersheds

The previous section discussed the reconvergence of the humanities and science with an emphasis on the role of art, as a part of the humanities, in effecting a change in consciousness (i.e., mindset) that can catalyze the development of a new human-water relationship and the creation of a new urban water narrative. This section focuses on the revitalization of urban watersheds, based on the science of ecological restoration, and the role revitalization plays in creating a sense of place. A sense of place is critical for building a foundation that will support a transition from viewing water as a commodity to a commons that needs to be stewarded. In *The Need for Roots* (2002), Simone Weil writes, rootedness in place is "the most important and

least recognized need of the human soul" (43). To become deeply rooted in place requires a decision to rediscover and reinhabit our local ecosystem and watershed. This means that humans need to reawaken their understanding that we are intimately connected to the environment and, indeed, that our survival depends on a relational knowledge of and respect for the local climate, geology, soils, rivers, flora, and fauna.

What does it mean to belong to a particular place? For most of human history there was no need to ponder this question because belonging to the land was directly connected with survival. As previously discussed elsewhere in this dissertation, the Industrial Revolution made it possible to meet our water survival needs without requiring an intimate connection to the source of our water. As a result, humans increasingly have become disassociated from water. The quenching of our thirst no longer comes from the local watershed, but from purchasing bottled water from a store or by turning on a faucet which delivers water upon demand that has been transported from places outside our local watershed. Consequently, humans are no longer aware of their connection to water in general and their watershed specifically. Therefore, it is necessary to remind ourselves what it means to be part of a particular place and that it is worth learning about the places we call home.

Contending that our hearts and minds require roots, environmental educator Mitchell Thomashow writes *In Ecological Identity: Becoming a Reflective Environmentalist* (1995), "When we are rooted to the place where we live, it is easier to see the whole, to see ourselves as part of the landscape. When we care enough about life to learn about our place, we understand more about our neighbors. We create the potential to nurture compassion for all beings" (197). A compassion for all parts of an ecosystem is exactly what Aldo Leopold was

advocating in his land ethic. For Leopold, being rooted in place meant "thinking like a mountain," understanding the deeper and hidden meaning of life and not taking the unique ecological and cultural attributes of place for granted. Thinking like a mountain honors the interconnectedness of the web of life and leads to the realization that humans are but one thread of that delicate web. Moreover, thinking like a mountain requires a change from shortterm and human-centered thinking to long-term and land community-centered thinking derived from relational encounters.

In short, thinking like a mountain, or more pertinent to the Dallas-Fort Worth area, thinking like a river requires living in place and embracing your bioregion as home. What is a bioregion? In *LifePlace: Bioregional Thought and Practice* (2003), Robert Thayer Jr., Professor of Landscape Architecture in the Department of Environmental Design at the University of California at Davis, provides the following definition of bioregion.

A *bioregion* is literally and etymologically a "life place" - a unique region definable by natural (rather than political) boundaries with a geographic, climatic hydrological, and ecological character capable of supporting unique human communities.... Most importantly, the bioregion is emerging as the most logical locus and scale for a sustainable, regenerative community to take root and to *take place*. (3)

There are several important concepts embedded in Thayer's definition of bioregion. First, instead of being determined by political boundaries, a bioregion emerges from a synthesis of ecological parameters. As such, the natural features of the land like watersheds, landforms, soils, vegetation, and living organisms define bioregions. Perhaps the most critical aspect of Thayer's definition of a bioregion is that of scale. Bioregionalism gives "priority to the local, in order to provide the experiential basis for the appreciation of the globe" (Murphy 2009, 41). Although it makes sense to begin by understanding one's local bioregion, in "Toward a Cosmopolitan Bioregionalism" (1999), Thomashow contends it is also necessary to move towards embracing a "cosmopolitan bioregionalism."

Bioregional sensibility should develop ways of exploring spatial and temporal relationships that show the connections between place-based knowledge and global environmental change, the interdependence of local ecology and global economies, and the matrix of affiliations and networks that constitute ecological biodiversity and multicultural and multispecies tolerance - allowing different people to understand all the different places that may be considered home. This is the basis of a local/global dialectic and emphasizes the necessity of a cosmopolitan bioregionalism. (121-122)

In other words, a bioregional sensibility is incomplete unless augmented by an awareness of how a particular place is integrated into the larger planetary community or how a particular river is integrated into the larger watershed community. Writing in the introduction to their book, The Biogregional Imagination: Literature, Ecology, and Place (2012), editors Tom Lynch, Cheryll Glotfelty, and Karla Armbruster state from a bioregionalist perspective, "the globe is an amalgamation of infinitely complex connections among variously scaled and nested places" (9). A stream, for example, is nested within an ecosystem, which is nested within a watershed, which, in turn, is nested within a bioregion, which is embedded within a global ecoregion. An understanding of global environmental issues begins not only by an understanding of place, but also through a lived experience of and engagement with place - a relationship with one's local bioregion. Thus, bioregionalism involves a shift in perspective and a reformulation of identity, a transcendence of an anthropocentric sociopolitical identity of belonging to a city, state, or nation to an ecocentric bioregional identity of belonging to a larger environmental community. Bioregionalism seeks "to create lifestyles and social institutions in harmony with their unique place, fitting culture to nature rather than the reverse. This means providing for energy, food, water, shelter, and transportation in a manner that promotes local self-reliance and long-term

sustainability" (Northwest Earth Institute 2007, I-2). North Central Texas' importation of water from reservoirs constructed in rural areas and piped over long distances to satiate the increasing demands of urban areas is not self-sufficient and does not "fit culture to nature." It therefore negates the bioregional perspective.

Proponents of bioregionalism believe that the suite of environmental crises that currently plague our planet can be mitigated and mediated through imagining and creating human communities that live sustainably in place. Therefore, the cultivation of a bioregional imagination is critically important in transitioning from a utilitarian industrial society to a sustainable society that values all parts of the ecological web. A bioregional imagination, as defined by Lynch, Glotfelty, and Armbruster, involves the transformative processes of reinhabiting, rereading, reimagining, and renewal (2012). Reinhabitation is a key term in bioregional discourse and is explained by activist Peter Berg and ecologist Raymond Dasmann in their paper "Reinhabiting California" (1977).

Reinhabitation means learning to live-in-place in an area that has been disrupted and injured through past exploitation. It involves becoming native to a place through becoming aware of the particular ecological relationships that operate within and around it. It means understanding activities and evolving social behavior that will enrich the life of that place, restore its life-supporting systems, and establish an ecologically and socially sustainable pattern of existence within it. Simply stated, it involves becoming fully active in and with a place. (399)

Since human activity has impacted nearly every place on earth, the principle of reinhabitation has universal applicability. Implicit within the aforementioned definition articulated by Berg and Dasmann are the concepts of ecological restoration and environmental education. More will be said about these concepts later. The second process, rereading, involves the practice of critically analyzing the bioregional narrative. As specifically explained by Lynch, Glotfelty, and

Armbruster, "Place-conscious readings of texts explore the complex dynamics of language systems and ecosystems and of people and the more-than-human communities in which...we are embedded" (2012, 18). Rereading gives voice to the bioregional imagination through the use of metaphor, myth, and storytelling. These are ancient modes of discourse that serve to embed humans in the context of their environment. Indeed, place has a primal connection to lived experience in oral cultures. As David Abram discusses in his book The Spell of the Sensuous: Perception and Language in a More-Than-Human-World (1996), "experienced events remain rooted in the particular soils, the particular ecologies, the particular places that give rise to them" (162). However, rereading also utilizes contemporary literary sources such as poetry and novels to aid in the critical analysis of the past, current, and possible future bioregional narratives. Reimagining, the third process, enables bioregional imagination to evolve. Reimagining involves the continual analysis and interpretation of bioregional thought and practice. As such, reimagining sparks debate and encourages dialogue. The last process, renewal, is integrally linked to bioregional pedagogy. As Lynch, Glotfelty, and Armbruster state, "Teaching is an ancient form of bioregional practice, connecting generations, renewing culture, and sharpening the (in)sight of student and teacher alike" (2012, 18). As shall be discussed shortly these four "R's" of bioregional imagination can be utilized in promoting ecological literacy via the pedagogical tool of urban ecological restoration. Embodied in each of the four "R's" is the vital concept of reciprocity. In Braiding Sweetgrass (2013), Kimmerer asserts, "Restoration is imperative for healing the earth, but reciprocity is imperative for long-lasting, successful restoration.... [E]cological restoration can be viewed as an act of reciprocity in which humans exercise their caregiving responsibility for the ecosystems that sustain them. We

restore the land, and the land restores us" (336). Kimmerer is describing the same reciprocal restoration effect experienced by Leopold and his family resulting from their efforts to heal the environmental damage wreaked on their Sand County farm.

Bioregionalism, including the concomitant processes of reinhabiting, rereading, reimagining, and renewal, can be a powerful means of promoting a sense of ecological identity as well as a sense of place. Across the globe, unique and special places are being transformed due to human development. This process has been termed biocultural homogenization by Ricardo Rozzi. In "Biocultural Homogenization: A Wicked Problem in the Anthropocene" (2018), Rozzi asserts that biocultural homogenization is a wicked problem that functions as "both a driver and a product of complex and interwoven losses of biological and cultural diversity at local, regional, and global scales" (22). Rozzi also notes that although biocultural homogenization is pervasive, it is neither completely understood nor are its widespread impacts broadly recognized. As a result of these widespread transformations, teaching about place is critical. In "Why Teach about Place?" (2008) Laird Christensen, Director of the graduate programs in Resilient and Sustainable Communities and Environmental Studies at Prescott College, and Hal Crimmel, Professor of English at Weber State University, assert, "Teaching about place provides a starting point for understanding and reacting to these transformations" (xii). In "The Land Ethic," Leopold recognized not only the need for ecological understanding, but also the lack of appropriate educational training.

One of the requisites for an ecological comprehension of land is an understanding of ecology, and this is by no means co-extensive with 'education;' in fact, much higher education seems deliberately to avoid ecological concepts. An understanding of ecology does not necessarily originate in courses bearing ecological labels; it is quite as likely to be labeled geography, botany, agronomy, history, or economics. This is as it should be, but whatever the label, ecological training is scarce. (1966, 262)

Leopold clearly was aware of the necessary link between ecological identity and ecological literacy. In fact, ecological literacy is an important means of turning toward an intense consciousness of the land. In his book, *Ecological Literacy: Education and the Transition to a Postmodern World* (1992), David Orr contends that ecological identity is a counterpart to ecological literacy and suggests that place is the learning laboratory of ecological literacy. The founder of The Land Institute and author of *Nature as Measure: The Selected Essays of Wes Jackson* (2011), Wes Jackson, echoes this call for education in his challenge to universities to offer majors in "homecoming."

What if the universities were to ask seriously what it would mean to have as our national goal becoming native in this place, this continent. We are unlikely to achieve anything close to sustainability in any area unless we work for the broader goal of becoming native in the modern world and that means becoming native to our places in a coherent community that is, in turn, embedded in the ecological realities of its surrounding landscape. (35)

Although Jackson's use of the word "native" in the context of a modern world may seem contradictory, I do not think it is. Jackson is articulating a need to "think globally, act locally." This has been an oft heard phrase regarding global climate change. In essence, it is an example of the ripple effect of tossing a pebble into a pond. Focusing on environmental problems locally allows an individual or community to reinhabit their surrounding locale and to develop a sense of place and to understand the vital reciprocal relationships between all aspects of nature. Reinhabitation, becoming native, can then create the potential to radiate changes outward on progressively larger scales. Instead of waiting for changes on a grand scale, individuals and communities can become empowered to make changes in their native environment and to consider the global implications of their actions. Again, the words of Arendt are applicable here, "think what we are doing," not simplistically and reductively, but holistically, from a systems perspective. I echo Jackson's call for an education in "homecoming" in my proposal to develop my model of Watershed Education Community Action Networks (WE CANs) in North Central Texas.

The creation of WE CANs would serve to encourage people living within the Trinity River watershed to rediscover, reinhabit, and reconnect with the Trinity River through the development of a sense of place. WE CANs function to facilitate the mediation and mitigation of the current and future water issues of the watershed by inviting the residents living and working within the Trinity River watershed to imagine and create sustainable communities that have a renewed respect for the river in particular and water in general. To accomplish such a goal in Fort Worth, the centralized WE CAN and the four decentralized regional WE CANs (refer to Figure 5.1 in this chapter) would utilize the transformative processes of reinhabiting, rereading, reimagining, and renewal that were discussed earlier in this paper to encourage the development of bioregional imagination to pop up in emergent and ephemeral WE CANs across the city of Fort Worth.

The centralized WE CAN, that I propose be affiliated with Panther Island and the Trinity River Vision Project, would provide historical and contemporary narratives to depict alternative ways of explaining the roles of river, land, nature, and culture. By telling the differing stories of the Trinity River and the people who have called it home, the residents of Fort Worth would be invited to engage in "reinhabitory discourse," a term penned by Bart Welling, a Professor of English and an Environmental Center Fellow at the University of North Florida, in "This is What Matters:' Reinhabitory Discourse and the 'Poetics of Responsibility' in the Work of Janisse

Ray" (2012). Reinhabitory discourse, simply put, not only refers to the reinhabitation of a particular place, but also the related process of opening dialogue amongst individuals who live in that place to facilitate the critical analysis of the traditional discourses. These discourses, according to Welling, "reflect and condition the terrain of consciousness occupied by the majority of the human inhabitants of the bioregion and thus must be engaged with if the bioregionalism's democratic potential in that area is to be realized" (122). Welling further explicates that "reinhabitory discourse" involves an "attempt to create new shared languages for bioregional stakeholders in places where discursive conflicts may have thwarted environmentalists or bioregional projects in the past" (123). As such, the Friends of the Los Angeles River (FoLAR) were engaged in "reinhabitory discourse" when they challenged the technoscientific experts use of the term "flood-control channel" to refer to the Los Angeles River instead of the term "river." Similarly, Heidegger encouraged "reinhabitory discourse" when he questioned whether the Rhine River should be referred to as a "water power supplier" or a natural component of the landscape, a "river." I contend that "reinhabitory discourse" is a necessary component to recovering common public space and establishing a participatory water ethic.

Reinhabiting place involves ways of repairing or mitigating environmental harm caused by previous policies and actions. In other words, one of the goals of reinhabitation is to restore and revivify a bioregional locale, to reestablish ecosystem structure, function, and the delivery of ecosystem services. This is also analogous to restoring the integrity, stability, and beauty of the land as espoused in Leopold's land ethic. In *Braiding Sweetgrass* (2013), Kimmerer claims the regenerative power of the land, its resilience, is dependent on the functioning of a

reciprocal relationship between the land and people (335). Relationship is the key word here, for Kimmerer later articulates, "ultimately it is the earth that will restore the structure and function, the ecosystem services.... We're not in control. What we *are* in control of is our relationship to the earth" (336). In a time marked by the challenges of climate change, what constitutes "Nature" will continually be reworked by the earth herself. Although many aspects of the natural world may change in response to climate change, Kimmerer asserts that the only thing that endures is relationship (336). Thus, she proclaims, "Here is where our most challenging and most rewarding work lies, in restoring a relationship of respect, responsibility, and reciprocity" (336).

Since the term "restoration" has many negative connotations, I adopt the term "revitalization" to describe the practice of repairing injuries sustained by the river, its watershed, and all beings living within its boundaries, including humans. Community-based stream and river revitalization represents a relatively recent and novel grassroots approach to achieving healthy ecosystems and healthy relationships between humans and nature. Community-based stream and river revitalization is also the epitome of a partnership between the public and professionals (e.g., ecologists and environmental educators). The technoscientific experts provide site specific knowledge that can be utilized by the public to revitalize a component of the watershed. The practice of revitalizing local streams and rivers has many benefits. According to Peter Leigh, a renowned climate researcher at the National Oceanic and Atmospheric Administration (NOAA), "The practice brings communities together, promotes a conservation ethic, and develops a sense of place. By this action, humanity reconnects with the environment, often in meaningful ways, to heal a segment of an impaired

earth. The exercise fosters an emotional commitment to a particular part of the landscape or seascape, which often, inadvertently, fosters a sense of ownership of the commons" (2005, 3). As a more embodied experience, it is more effective than passive environmental activities such as visiting a nature center, hiking, and wildlife viewing. Stream and river revitalization provides the participants with a visceral and lasting connection to nature, as well as enhanced ethical sensibilities. Through actively revitalizing a degraded and impaired river or stream, participants gain a working knowledge of ecological concepts and principles by understanding how they apply to a real-world environmental problem in their own community.

All Watershed Community Action Networks, centralized, decentralized, and emergent, would provide opportunities for people to engage in much needed watershed revitalization projects. WE CAN projects could include any number of activities that support reimagining the "city as a sponge" and inviting water to safely linger in a bioregion rather than rushing it out of the watershed for fear of flooding. Such projects as restoration of native plant communities, redesigning landscaping resonant with a native regional landscape ethic, conversion of nonnative turf yards to native turf yards, replacing impermeable surfaces with permeable surfaces, creating rain gardens and bioswales, and harvesting rainwater are examples of projects that could be demonstrated on neighborhood school ground properties and replicated on private residential properties or scaled up to include larger components of the watershed like parks, creeks, streams, segments of riverbanks, etc. The Fort Worth Open Space Conservation Program represents a viable option to invite "pop-up" emergent WE CANs for professionals and the public to work together to study, restore, protect, and manage parts of the Trinity River watershed that lie within the city.

The two "R's" of rereading and reimagining align with the reconvergence of the humanities and science through the arts and revitalization of urban watersheds. Science, particularly the field of ecology, contributes site-specific knowledge of natural history and ecosystem functioning and the humanities, especially literature and the creative arts, offer not only knowledge of the cultural history of each unique bioregion but also, as explained by Lynch, Glotfelty, and Armbruster (2012), "function as vital expressions of cultural values that can ignite emotion, change minds, and inspire action.... reflect, develop, celebrate, and protect the unique character of the bioregions that produce them.... play a crucial role in renewing a sense of place [and] enable residents of a place to recognize their bioregions as culturally and ecologically distinct and value them as such" (12-13). Together, humanities and science can ignite the cultural imagination creating the fertile ground out of which pregnant possibilities can emerge to transform the human-water relationship and the urban water narrative. The central and decentralized four regional WE CANs can host various events, rituals, ceremonies, festivals, etc. that intertwine the humanities and science to celebrate and honor the intricate intertwinement of all components of the watershed, thus encouraging the human-water relationship to be redefined and revitalized. For example, as part of a ceremony the river can be celebrated through photos, paintings, essays, sculptures, poetry, music, and song created by local residents to reflect a certain cultural river theme. The watershed revitalization projects conducted by community "pop-up" WE CANs can be highlighted and shared at ceremonies to serve as models for what can be replicated or adapted upstream and downstream in the Trinity River watershed. Ceremonies, rituals, and festivals are crucial portals to bridge the gap between the public and private domains, transcend the unnecessary barrier between the

humanities and science, and to dissolve the illusory and artificial boundary between nature and culture (i.e., water and humans).

Indigenous cultures regard ceremony as a sacred expression of spirituality, a critical way to honor the connection between nature and culture. As Kimmerer, in Braiding Sweetgrass (2013), relates, "Our elders say that ceremony is the way we can remember to remember" (383). Ceremony is the way to remember the earth is a gift, and that gift can be celebrated and honored through dance, music, song, plays, poetry, literature, photography, painting, revitalization of natural areas, etc. WE CANs can be viewed as sites of remembering and celebrating earth and its watersheds. For Native Americans and other indigenous people, revering and celebrating the living earth is a daily practice. Unfortunately, in Western cultures, the earth is officially celebrated one day of the year, Earth Day. Earth Day was established on April 22, 1970, to mark the anniversary of the birth of the modern environmental movement, but I question whether Earth Day celebrations have become yet another capitalist opportunity and thus, negate their very purpose. The Earth Day celebrations I have attended in the Dallas-Fort Worth area are primarily comprised of convention style booths and exhibits of environmentally related organizations handing out free corporate and organizational "bling" and promotional materials. It begs the question, "What is the cost of Earth Day to the Earth itself?" The purpose of the DFW Earth Day celebration appears to be geared toward the passive dissemination of information in an attempt to increase awareness, the first two stages on the EPA environmental education continuum, and not about creating an engaged community of land and water stewards. As such, these Earth Day celebrations function in the same capacity as the education and outreach efforts of local water utilities and agencies. As the results of our

North Central Texas water engagement survey results indicate, to truly engage people as stewards of the earth and watershed requires the additional stages of critical thinking, problem solving, decision making, and action. Earth Day events could be redesigned to showcase the actions of local communities to reinhabit their watershed and to increase the "capacity to aspire" and create new ripples in the local watershed community. The mission of WE CANs is to engage people as stewards by offering and supporting activities and projects that incorporate all process attributes on the EPA environmental education continuum throughout the year, not just one day of the year. The narratives expressed in ancient and traditional myths and rituals are models of the cultural story told to reflect the values in a particular place and at a particular time. They are expressions of what Merleau-Ponty refers to a historicity, as such they are fluid, not static. The narrative of a region, for this reason, always should be critically analyzed and renewed. But critical analysis of narrative should go beyond the level of stories and rituals. This view is also held by Lynch, Glotfelty, and Armbruster (2012), who state: "most people need more than the stories and rituals of those who inhabited their places (or perhaps other places) before them, under way different cultural and physical conditions. Reinhabitation requires the development of new approaches to living in a specific place" (12). New approaches require place-based education that incorporates Freire's problem-posing method of education to raise critical consciousness, Dewey's philosophy of experience, and Arendt's theory of action.

The last "R," renewing, is a process achieved through bioregional pedagogy, place-based education. I agree with Kimmerer's conjecture that all forms of environmental education should teach students to "recognize and respond to the world as a gift" (2013, 221). The ability to see the world as a "gift" is achieved through wonder and reciprocity. "The moral covenant of

reciprocity," according to Kimmerer, "calls us to honor our responsibilities for all we have been given, for all we have taken.... Gifts of mind, hands, heart, voice, and vision all offered up on behalf of the earth. Whatever our gift, we are called to give it and to dance for the renewal of the world." (384). As residents of the Trinity River watershed in North Central Texas, how do we honor our responsibility of reciprocity? How can we be responsible when we give control to experts? When we hand over our connection to water to experts and technology? Our responsibility of reciprocity can be honored through the processes of the four "R's," reinhabiting, rereading, reimagining, and renewing. WE CANs provide the physical, mental, and social space for engaging in community-based watershed education and the revitalization of urban watersheds through activities that incorporate the four "R's."

Seeing something as a gift entails a shift in consciousness from perceiving the land as a "standing reserve" to viewing the land as a revered commons of which humans are a part, and shift in relationship from being a conqueror of the land to being a citizen of the land. This transition is what Thomas Berry, 20th century cultural historian, refers to as the "Great Work" in his book *The Great Work: Our Way into the Future* (1999). To achieve a shift in consciousness and relationship requires action. Kimmerer states, "Action on behalf of life transforms. Because the relationship between self and the world is reciprocal, it is not a question of first getting enlightened or saved and *then* acting. As we work to heal the earth, the earth heals us" (2013, 340). As the urban watershed is revitalized, the urban watershed revitalizes us. WE CAN activities function to invite humans to regain respect for the intertwining of nature and culture. WE CANs are analogous to *mingas* in the Quechua language of the Peruvian Andes. In her book *Belonging: Remembering Ourselves Home* (2017), Toko-pa Turner uses *mingas* to illustrate the

concept of reciprocity, or *anyi* in the Quechuan language. According to Turner, the meaning of *minga* is the "collective work for the common good.... [A] *minga* is the reunion of friends and neighbours to collaborate in the shared work that will benefit the whole village" (216). Turner relates that a day of community work is followed by celebration. Community watershed organizations and partnerships (e.g., WE CANs) are examples of *mingas* in that they function to engage residents in collaborative community work to achieve the common good for all components of the watershed. WE CANs, like GANs, are essentially community action research programs led by "entrepreneurial action learners" with a mission to transform the human-water relationship and to reframe the urban water narrative.

Reframing the Urban Water Narrative

Storytelling, either in oral or written form, is a universal human experience dating back over 30,000 years ago to the paintings discovered in the Lascaux and Chauvet caves of France. Humans are inherently storytellers. This is not surprising. What may be surprising is the power story has in shaping our beliefs, values, and worldviews which in turn determine how we perceive and relate to the world around us. In so doing, the stories humans tell also determine how humans dwell or live in a particular place and time. There are personal stories and cultural stories. Aldo Leopold's personal story explains how he developed an ecological worldview when his personal experiences changed his mindset from that of a conqueror to that of a citizen of the land community. In Chapter 3, I illustrated how stories, narratives, take different form in different cultures by using the examples of the shift from *mythos* to *logos* in ancient Greece and the difference of the "Leaver" and "Taker" cultures in Daniel Quinn's novel *Ishmael*. Cultural

narratives can not only reflect change, but also, they can create change. In Chapter 3, I questioned if the narrative that has provided the foundation for science and technology is the answer or the problem underlying urban water supply issues. In Chapter 4, I argued the 20th century technoscientific mindset, which I characterize as "thinking inside the pipe," that is still dominating water policy, supply, and management in North Central Texas is inadequate to meet the challenges of the 21st century. As depicted in Figure 5.3, reliance on expertise and a



Figure 5.3. Thinking inside the pipe.

technoscience mediated relationship with water and the local watershed yields disengagement and alienation of the public. Residents do not consider urban water issues to be a concern of the public as long as faucets continue to deliver potable water on demand. Urban water issues are seen as the domain of the "experts," the municipalities, water utilities, regional water districts, Texas State Water Board, etc.

To solve the wicked problem of urban water issues, earlier in this dissertation I therefore proposed that another way of being in the world needed to be explored. In other words, another cultural story needs to be enacted other than the one typified by the technoscientific worldview, a narrative that gives birth to a different water mindset, one I have been calling "thinking outside the pipe." Figure 5.4 illustrates that a new urban water cultural narrative that incorporates a holistic systems worldview would encourage engagement and water and watershed stewardship. Unlike the 20th century narrative that views humans as



Figure 5.4. Thinking outside the pipe.

separate and superior to the natural world and enables humans to enact the story that humans were placed on this earth to conquer and control nature and to consider natural resources solely as commodities to meet human need and desires, a new 21st century narrative that views humans as citizens, one of many members of the natural community, intertwined in a web of reciprocal relationships, each dependent on the other to maintain the integrity, stability, and beauty of the land community (i.e., Leopold's land ethic) would give rise to an enacted story that would change the human relationship to water from one of a commodity to one of a revered commons. As I stated before, cultural narratives are powerful because they influence what questions are being asked, and these questions in turn facilitate the shaping of policy and management of water supply. So, the pressing question is how to create a new cultural
narrative so that a different story can be enacted in relation to water in North Central Texas? Before delineating how WE CANs function to create a new urban water narrative, I want to briefly discuss the concept of revolution or cultural change as seen from the perspectives of engineering, ecology, and philosophy. Although the perspectives appear to differ, at their core, they all acknowledge the same two ingredients essential to effecting transformation, public participation and a shift in consciousness, both of which are critical to the foundational functioning of WE CANs.

In the book Water 4.0: The Past, Present, and Future of the World's Most Vital Resource (2014), David Sedlak, Professor of Civil and Environmental Engineering at the University of California at Berkeley and co-director of the Berkeley Water Center, asserts, "The repeated cycle of growth, failure, and reinvention that has occurred over the past 2,500 years of urban water systems can be likened to a series of revolutions" (x). He delineates the three revolutions that have already occurred and postulates that a fourth revolution is approaching. The first revolution, Water 1.0, occurred when European cities implemented the Roman innovation of piping potable water in and wastewater out of population centers. The next revolution, Water 2.0, involved treating drinking water to kill infectious microbes responsible for waterborne diseases. Water 3.0, the third revolution, occurred with the widespread adoption of sewage treatment plants. As I, too, have argued in this dissertation, Sedlak contends that the current urban water system in our cities is not up to the challenge of the 21st century. Thus, he proclaims there is a need for a fourth revolution, Water 4.0. The urban water problems facing cities are complex and vary from city to city; some have too much water, some have too little water, others are plagued with outdated and failing infrastructure and increasing maintenance

costs. Although the technologies to make urban water systems that can handle the challenges of the 21st century already exist, what will comprise Water 4.0 has not yet solidified out of the myriad paths that can lead to a more secure water system. One thing is clear for Sedlak, however, "there is no need to make a single choice among the options of conservation, improved centralized systems..., or decentralized systems. Instead, each city must navigate a series of decisions about which path best fits its local situation" (244). Herein lies the crux of the problem. Most cities are on a path of least resistance, water utility managers and city officials have not prioritized the impending water shortages above economic growth and the public awareness of the need for water policy changes is virtually nonexistent. Acknowledging this situation, Sedlak stresses, "Decisions about the future of urban water systems are best made by an informed public" (xi). To build a successful new water system capable of overcoming 21st century challenges requires balance, a balance of approaches and a balance of who participates in the decision making. All stakeholders, including water utilities and the public, first need to undergo changes in beliefs, values, and worldviews about the value of water and their role in water policy, supply, and management to successively change their behaviors and actions as they pertain to urban water issues. Rather than defining their relationship to water as sellers and/or users of water, all entities need to accept the idea that they are stewards of a limited and vital natural resource. These changes in consciousness or mindset will not occur unless a new urban water narrative is created. Of critical importance is Sedlak's contention that no one approach is enough – not conservation, not centralized systems, and not decentralized systems. All three are important and their appropriate balance will vary based on the needs of the city and the engagement of all stakeholders.

Sedlak is not alone in holding that the time has come for a revolution in the way humans relate to the natural world. Joanna Macy, environmental activist, author, and systems theory and deep ecology scholar, maintains that we are amid a transformation similar in scope and magnitude to the Agricultural Revolution that took place centuries ago and the Industrial Revolution that began 200 years ago. She refers to this ecological and sustainable revolution as "The Great Turning."¹³⁸ The industrial growth society, according to Macy, is based on economic growth. The success of the industrial growth society is measured in terms of profit. According to systems theory, maximizing a system based solely on one part (i.e., profit) throws the entire system out of balance, and the resulting society is not sustainable. To create a life sustaining society, all parts of the system must be in balance. As illustrated in Figure 5.5, Macy identifies the three components she deems necessary for achieving "The Great Turning," the transition from an industrial growth society to a life sustaining society: holding actions, Gaian structures, and shift in consciousness. Each component is vital to sustaining the integrity of the life sustaining society, each component is mutually supportive of the other components. The first component, referred to by Macy as "holding actions," encompasses all actions that decelerate the destruction wrought by the industrial growth society (i.e., protests, boycotts, conservation, legislative campaigns, etc.). "Gaian structures," the second component of a life sustaining society, consists of all the alternative patterns of organizing a society (i.e., new ways of relating to the land and its natural resources, new ways of measuring success, new ways of educating

¹³⁸ To learn more about the current societal shift from an industrial growth society to a life sustaining society see Landry, Christopher, director. 2014. *The Great Turning: What Do We Do When Everything is at Stake?* IMDb, 2022.
27 minutes. Documentary. For a shorter introduction to Joanna Macy's "The Great Turning," see her video on YouTube. Joanna Macy, "Joanna Macy on The Great Turning," https://www.youtube.com/watch?v=LwIXTAT8rLk.



Figure 5.5. Joanna Macy's the great turning¹³⁹

and waking up the community, etc.). Macy calls the third component "shift in consciousness," derived from new and remembered knowledge from science and the humanities (i.e., systems theory, quantum theory, chaos theory, ancient wisdom traditions of philosophy and religion). Each component in and of itself is not enough, asserts Macy, because each depends on another component to sustain itself and the transformation as a whole. For example, holding actions need the structure of new ways of doing things, new structures will deteriorate unless they are firmly grounded in our beliefs, values, and worldviews, and a shift in consciousness is necessary for changing behaviors and actions and engaging with issues in a new way, affirming the

¹³⁹ Adapted from Joanna Macy. August 18, 2007. "Joanna Macy on The Great Turning," Accessed May 19, 2022. https://www.youtube.com/watch?v=LwIXTAT8rLk.

sustenance of life rather than industrial growth. A life sustaining society is one that not only perceives and understands the intertwining of all parts of the natural world, but also experiences a sense of wonder and enchantment. Wonder and enchantment do not arise from a mechanical and reductionist view of the world, they arise from a deeper, sacred way of relating to nature. For this reason, Macy identifies "The Great Turning" as a scientific and a spiritual revolution.

In 2019 Philosophy Now published an article titled, "How Can Anybody Change Culture?" The article, written by Kevin Brinkmann, a leadership development consultant used by Fortune 500 companies and the United Nations, elucidates how the ideas of three 20th century philosophers, Louis Althusser, Antonio Gramsci, and Karl Mannheim, can be used to transform culture (18-20). Their concepts of ideology, cultural hegemony, and the sociology of knowledge, respectively, are particularly relevant to understand how a cultural narrative comes to be the way it is and more importantly, what can be done to change the cultural narrative. The ideology of a society's power structure establishes cultural values, and these values become unconsciously absorbed because they are not questioned, they are part of the accepted cultural narrative, the story being enacted by a culture. These values are then used as decision making criteria. Without intervention, these cultural values remain dominant, but they can be changed by those who Gramsci calls the "organic intellectuals:" individuals who challenge the status quo maintained by the "ruling intellectuals." Accordingly, anyone can be an agent of change if they are able to disseminate their ideas to other like-minded "organic individuals." Brinkmann asserts, "Cultural values are reformed in three stages: get people thinking, get people together, and get institutional change" (20). This is exactly the function of

WE CANs in facilitating the creation of a new urban water narrative. First, to "get people thinking," an epistemological rupture needs to occur to unveil what Mannheim refers to as "false consciousness." As discussed earlier, an event such as a drought can be a powerful catalyst for raising awareness and questioning the efficacy of the status quo. The second stage of "getting people together" allows for the transmission of the new awareness to others through the activities of a network of "organic intellectuals." This stage is the fertile ground for envisioning and expressing the pregnant possibilities made possible by embracing a new cultural narrative, a new way of being in relationship to water and the local watershed. The third and last stage of getting "institutional change," is achieved through creating policy change. It is simply not enough to have a new idea, the new idea has to change behavior and actions; as Brinkmann clearly elucidates, "An idea must re-align the behavior, policy, and laws of institutions in order to have a widespread and lasting effect on culture. Once embodied in institutions, the institutions themselves start doing the work of socialising individuals" (20). This brings us full circle to Althusser's concept of ideology. The cultural transformation process is thus cyclical and continuous over time.

Watershed Education Community Action Networks (WE CANs) embody all aspects of the revolutionary components described by Sedlak, Macy, and Brinkmann. Sedlak argues all water revolutions occur as a result of societal growth, system failure, and reinvention of system to accommodate problems created by growth. "The Great Turning" revolution posed by Macy is comprised of holding actions, Gaian structures, and shift in consciousness. To effect cultural change, Brinkmann contends getting people thinking, getting people together, and getting institutional change is necessary. All three, Sedlak, Macy, and Brinkmann, underscore the

cyclicity inherent in transforming a cultural narrative. A revolution first requires an epistemological rupture to get people thinking. Next, opposing an inherent cultural hegemony demands getting reflective and critically thinking people together to engage in dialogue and action regarding the failure of the current cultural narrative. Finally, this network of people is able to evoke a shift in consciousness that is embodied in institutional change that leads to the creation of a new cultural narrative. WE CANs function to bridge the gap between experts and the public and to remove the "senseless barrier between science and art" by creating the space to engage in a broad base of direct purposeful conservation experiences that promote changes in mindset, values, and behaviors that can transform the human relationship from conqueror to plain citizen of watershed community. The goal of WE CANs is to prepare the soil in which the seed of a new urban water narrative can take root to produce the fruit of watershed stewardship. As such, WE CANs, like Global Action Networks (GANs), provide a public good by creating value for society.

The mindset "thinking inside the pipe" came into being with the advent of the Industrial Revolution. The time is ripe for a new revolution, the creation of a new urban water narrative. The 20th century mindset no longer works midst the challenges of the 21st century of increasing population, decreasing water supply, global climate change, etc. Table 5.1 summarizes the characteristics of what I have described as the 20th century mindset of "thinking inside the pipe" as compared to what I have expressed as the 21st century mindset of "thinking outside the pipe." The two mindsets appear to be polar opposites. However, they are united in the tension of opposites, like yin and yang, day and night, light and dark, good and bad, etc. The Western technoscientific narrative has artificially separated these two ways of thinking.

Table 5.1

Comparison of Two Different Urban Water Policy, Supply, and Management Mindsets

20 th Century Mindset "Thinking Inside the Pipe"	21 st Century Mindset "Thinking Outside the Pipe"
Utilitarian, "There it is. Take it."	Ecological, Leopold's Land Ethic
Commodity	Commons
Feats of engineering (reservoirs & pipelines)	Conservation/Stewardship
Importation of water from other regions	Local solutions
Decisions relegated to domain of experts	Community-based decisions and public participation
Science and technology	Humanities and art
Logos	Mythos
Domination mode of cultural transformation	Partnership mode of cultural transformation
Taker	Leaver
Conqueror	Citizen
I-It, object	I-Thou, subject
Disengagement	Engagement
Disenchantment	Enchantment

However, they are not separate, together they constitute a holistic mode of thinking. Currently, the 20th century mindset prevails and is foregrounded, however, the characteristics that comprise the 21st century mindset are not new, they were intentionally eclipsed, backgrounded, by the ideology of the Industrial Revolution. These characteristics offer a different way of thinking and being in the world and are lurking in the shadow of the old technoscientific mindset and need to be re-membered, excavated, and resurrected. Although the characteristics of the two different mindsets are the antithesis of the other, I am not arguing that we throw out the old and replace it with the new. That would be succumbing to dualistic thinking and would not be conducive to solving the wicked problem of urban water supply. Rather, I am proposing the new urban water narrative be composed of a balance of these two mindsets, a hybrid of the characteristics of both the 20th century and the 21st century mindsets. Such a new urban water narrative can facilitate re-imagining the relationship between humanity and water, and rethinking urban water policy, supply, and management in North Central Texas.

Rethinking Urban Water Policy, Supply, and Management

In this chapter, I described how participatory water ethics and Watershed Education Community Action Networks (WE CANs) can facilitate the creation a new urban water narrative, a narrative derived by excavating the mindset of "thinking outside the pipe," to rethink urban water policy, supply, and management. I have argued that this reimagining can be achieved by recovering public space, reconverging the humanities and science, revitalizing the urban watershed, and reframing the urban water narrative. Living Waters Park (LWP), a new nonprofit, represents a potential emerging WE CAN in North Central Texas. Hazel Wiltz, founder, developer, and trustee of Living Waters Park,¹⁴⁰ obtained a piece of property on the northwestern side of Lake Arlington and envisioned how the land and water could be used as a

¹⁴⁰ For more information on Living Waters Park, visit their website at https://www.livingwaterspark.com.

community space to foster water and land stewardship through "arts, recreation, and science." I was introduced to Hazel Wiltz and this project by Aaron Hoff, a watershed coordinator then working for the Trinity River Authority, who attended a presentation Megann Harlow, a UNT Ph.D. candidate researching freshwater ecology, and I gave at the 2019 Urban Riparian Symposium in Grapevine, Texas. Hoff recognized the resonance between my presentation and dissertation research on WE CANs and Wiltz' vision and mission for Living Waters Park. After meeting Wiltz and touring LWP, I agreed to participate in giving several community presentations to raise awareness of the new nonprofit and eventually to serve as a member of LWP's Advisory Council. By pulling together a diverse group of individuals, groups, organizations, businesses, industries, and governments, Wiltz is recovering common space and resurrecting the agora in the Lake Arlington subwatershed of the greater Trinity River watershed. Living Waters Park is an example of a nascent Global Action Network and manifests all seven of the definitional characteristics of a GAN: 1) combination of formal and informal relationships; 2) multistakeholder; 3) community action research; 4) multilevel; 5) public good providers; 6) systemic change agents, and 7) voluntary leaders. All seven of these characteristics were delineated in the first section of this chapter. The network Wiltz is building consists of the Trinity River Authority, University of Texas at Arlington Landscape Architecture Program, Tarrant County College, the mayors of the cities of Arlington and Fort Worth, the Artist Outreach Group, realtor groups, banking and finance professionals, local businesses, and neighborhood associations, community residents, Boy Scouts, and others. The network is interdisciplinary and interorganizational, diverse, and collaborative. LWP is comprised of "entrepreneurial action leaders," voluntary leaders who are committed to not only developing

new community knowledge of land and water stewardship and capacity through action, but also in challenging the barriers to achieving environmental, social, and economic outcomes.

The events and programs offered at LWP are transdisciplinary, including the humanities and science. The goal is to develop land and water stewardship through activities and programs that utilize arts, recreation, and science. This new non-profit has hosted many different events and programs, including a luau, fishing, boating, kayaking, Earth Day events to cleanup land and water by removing tires, trash, and brush, planting native plants, etc. Art, recreation, and science are ways to dissolve boundaries, intrapersonal, interpersonal, intraorganizational, and interorganizational, because by offering an embodied experience they can change the way we view the world. Although each one provides a different way of seeing and understanding the world and our local watershed, which influences our being in relationship to the world and our local watershed, they all can open the door to the creation of wonder, engagement, and enchantment; they have the ability to evoke the capacity to aspire to reframe the urban water narrative.

All these events and activities have yielded local and national media attention. As a new non-profit, there is much remaining to be done, but the trajectory of Living Waters Park aligns with my vision of how a WE CAN functions. Living Waters Park is pregnant with possibilities of what can be achieved by a network of individuals working together to transform a piece of lakefront property into a community space devoted to land and water stewardship. As an emerging Watershed Education Community Action Network, LWP has the potential to play a key role in revitalizing the Trinity River watershed, reframing the urban water narrative in North Central Texas, and rethinking urban water policy, supply, and management. The Trinity River

renewal projects in Dallas and Fort Worth also can be adapted to serve in the capacity of WE CANs as well. As noted earlier, care must be taken to assure that these are not simply gentrification and real estate development projects, they must invite community-based conservation, environmental, and watershed education opportunities that encourage embodied, relevant, and problem-based experience with local water issues. Living Waters Park, the two Trinity River urban river renewal projects, and other more official and formal entities can best serve as regional WE CANs as described at the beginning of this chapter. Regional WE CANs function to catalyze, support, and recognize the emergence of ephemeral springs of WE CANs, pop-up sites of community-based watershed networks throughout their municipal region.

WE CANs, as GANs, can more effectively tackle the wicked problem of urban water policy, supply, and management than the "traditional hierarchical organizational approaches" (Waddell et al 2013, 24) because they incorporate combinations of formal and informal relationships, embrace diversity (i.e., multi-stakeholder and multi-sectoral), and function as community action research nodes. WE CANs are systemic change agents working to transform the human-water relationship and create a new urban water narrative. An important feature of the WE CAN structure is that it mirrors the intertwining character of a river system or watershed. Just as watersheds are composed of a river, including its upstream headwaters and downstream mouth, all its tributaries, and any groundwater resources, the WE CAN model can be scaled up or down and address multilevel urban water issues on a local, regional, state, national, and international scale. Just as dropping a stone into a pond creates an initial disturbance, the disturbance to the pond system ripples outward in ever increasing circles

affecting larger portions of the pond system, an individual ephemeral and emergent WE CAN is analogous to a stone being dropped into one component of the Trinity River watershed creating a ripple effect that reverberates throughout the watershed. Although the individual WE CANs emerge to address a local water problem, each WE CAN is part of an interconnected system and serves to embed the local problem into the greater whole so that upstream and downstream relationships can be reimagined, from the headwater to the mouth.

CHAPTER 6

FROM HEADWATER TO MOUTH: REIMAGINING UPSTREAM & DOWNSTREAM RELATIONSHIPS

Instead of looking into the sky, I look into the placid reflecting water for signs and promise of the morrow.

-Henry David Thoreau

The world is...the natural milieu and the field of all my thoughts and all of my explicit perceptions. Truth does not merely "dwell" in the "inner man;" or rather, there is no "inner man," man is in and toward the world, and it is in the world that he knows himself.

-Maurice Merleau-Ponty

Conclusion

In the first chapter, I stated that the goal of my dissertation was to identify and critique the salient features of the narrative that drives contemporary urban water decisions and practices and to provide a meta-narrative about the role of narratives as invisible lenses through which individuals see, interpret, and interact with the world, often without realizing the existence of those frames. The first part of this goal, in essence, is a postmodern deconstruction of the 20th century urban water narrative, whereas the second part of this goal entails a postmodern construction of an alternative narrative to "enframe" urban water policy, supply, and management for the 21st century. In *The Wisdom Pattern* (2020), Rohr states that transformation most frequently "happens not when something new begins, but when something old falls apart" (84). The 20th century narrative of "thinking inside the pipe" is falling apart and is no longer tenable to guide water policy, supply, and management in the 21st century; a time inundated with the complexities of increasing population, decreasing water supply, changes in precipitation patterns due to global climate change, disengagement of the public, inadequacies of disciplinarity, etc. Against the challenges of the wicked water supply

problem of this century, the words of Rohr reverberate, "Most of us either become paralyzed or think we are enlightened because we know about the problems...the essentially tragic nature of human existence. We go through the deconstructive stage without the reconstructive gift of vision and hope" (98-99). My alternative urban water narrative of "thinking outside the pipe" facilitated by participatory water ethics and Watershed Education Community Action Networks (WE CANs) is my "reconstructive gift of vision and hope." In the next section of this chapter, I will discuss the inherent limitations of my "gift" and identify future paths to explore.

Today's global water crisis underscores the need for a transformation in the relationship of humans with water. In short, I have argued that the relationship of respect and reverence that ancient societies had with water needs to resurface and permanently suffuse contemporary society's utilitarian relationship with water. The re-meandering of utilitarian mindsets to watershed stewardship mindsets will take place not through our intellect, but through our experience. To this end, by creating a common public space that embodies and celebrates the intertwinement of humans and water, as well as science and the humanities, WE CANs function to foreground the background of riverine landscapes and enable residents to reexperience their innate wild being. By rediscovering and reconnecting with their local streams, rivers, and reservoirs, humans can recover their primordial relationship with water and reimagine how to live with it. The resultant new mentality "would represent a historic philosophical shift away from the strictly utilitarian, divide-and-conquer approach to water management and toward an integrated, holistic approach that views people and water as related parts of a greater whole" (Postel 1997, p. 185). Rivers are not barriers; rather they are bridges to rediscovering the primordial intertwining relationships of humans and water. As

such, riverian watersheds can mediate the development of a new cultural narrative of urban water and the reimagination of upstream and downstream relationships from headwater to mouth.

Before moving on, I want to return to the Los Angeles River vignette in Chapter 3, where I illustrated how the California management of water supply was the epitome of what I described as a mindset of "thinking inside the pipe," driven by the narrative of water as a utilitarian commodity. During the past two years there has been a proliferation of news stories about water shortages in California.¹⁴¹ Beginning in 2020, California has been experiencing drought conditions. Droughts typically draw attention solely to the lack of precipitation, as a result they are often considered a short-term consequence of a weather pattern. However, the unprecedented dryness across the American Southwest has led some scientists to use the term aridification, signifying a significant and potentially permanent shift in the regional hydrologic regime due to anthropogenic climate change (Overpeck and Udall 2020). Impacts of aridification include higher extreme temperatures, decreasing soil moisture, increase in number of severe droughts, and reduced flow in rivers. Changes in the hydrologic regime in the southwest caused Lake Mead and Lake Powell, the two largest reservoirs supplying water to California, to reach critically low levels in May 2022. Deliveries of water from the California State Water Project have been severely reduced, leaving many communities faced with emergency water shortages. To combat the dwindling water supplies, the governor of

¹⁴¹ See the following news stories. Salahieh. Nouran. 2022. "California's 2 Largest Reservoirs are at 'Critically Low'Levels." KTLA, May 10. Accessed June 10. https://ktla.com/news/california/californias-2-largest-reservoirsare-at-critically-low-levels. Ding, Jaimie. 2022. "California Urban Water Use Rose !9% in March Despite Worsening Dorught." Los Angeles Times, May 10. Accessed May 11. https://www.latimes.com/environment/story/2022-05-10/california-water-use-rose-19-percent-in-march.

California, Gavon Newsom, has urged residents and businesses to reduce their consumption of water by 15%. However, his call has been unheeded and water use has increased, almost 19% compared to March of 2020 when the drought began. In fact, according to the State Water Resources Control Board, the consumption of water in March 2022 is the highest March water consumption since 2015.¹⁴² The water crisis in California has dredged up many problems that are exacerbating attempts to address the water shortages.

Why hasn't the water conservation message reached the people of California? First, the messaging stops at the awareness and knowledge stage on the EPA's environmental education continuum. It is passive and involves only indirect transmission of information and knowledge. Second, the seriousness of the messaging and the water crisis is taken to heart differentially in urban versus rural areas due to differences in lived experience and the human relationship with water. Urban areas receive their water from reservoirs whereas rural areas receive their water from groundwater wells. The urban areas, therefore, have an indirect tap-mediated relationship with water and rural areas have a direct embodied experience with water. Conservation of water messaging consequently is more pertinent to the rural residents because they have a better understanding of the ramifications of the prolonged drought. They realize that if their well runs dry, their taps will no longer provide water. Urban residents lack this direct embodied connection to water supply. Every time they turn on the tap, water is expected to appear on demand. Some external entity will ensure that the magical appearance of water continues unabated. Messaging has also failed because of the inconsistency of communication

¹⁴² Ramirez, Rachel. 2022. "California is in a Water Crisis, Yet Usage is Way Up. Officials are Focused on the Wrong Problems, Advocates Say." CNN, May 15. Accessed May 21. https://www.cnn.com/2022/05/15/us/california-water-usage-increase-drought-climate/index.html.

between one water authority and/or jurisdiction to another. This is an example of how disciplinarity and siloism produce inefficiencies in terms of water policy, supply, and management. Residents have exhibited backlash because they believe that the burden of conservation has unduly been placed on them instead of the big water users, business and industry, who are not held equally accountable. This complaint highlights the need for participatory democracy in water policy, supply, and management decisions. Residents need to be included as active partners in policy making and overseeing accountability. All stakeholders need to have a place at the policy/regulation table. Water supply and management is a "community" problem which includes all sectors of the community. All stakeholders should have the opportunity to be involved. A May 31, 2022 Los Angeles Times article,¹⁴³ reports that the California drought has resurrected a 1950's plan that was tabled in 1980 to construct a new reservoir. The Sites Reservoir would flood a pastoral valley north of Sacramento to temporarily relieve the need for the historic water restrictions now faced by three counties in Southwest California, including Los Angeles County. Environmentalists assert that building a new reservoir would do little to solve the water shortage crisis plaguing California. Construction of a new reservoir to solve the current water crisis is a perfect example of what Whitehead referred to as "minds in a groove" and illustrates how the 20th century narrative of "thinking side the pipe" still pervades water policy, supply, and management in California. For decades, California has continued to attempt solving water supply problems with the same mindset that has created them. Case in point, even though 2021 was the driest year in California since 1924 and state

¹⁴³ Sahagun, Louis. 2022. "Old Reservoir Plan Revived, Along with a Fight." *Los Angeles Times*, May 31. Accessed June 11. https://www.latimes.com/environment/story/2022-05-31/drought-resurrects-plan-for-controversial-reservoir.

leaders are urging residents to decrease water use, these same officials are also promoting the construction of millions of new homes.¹⁴⁴ If there currently is not enough water for existing homes, how can there be enough for many new ones? State authorities are claiming there is enough water to justify building more housing since residential water use has decreased by 44% over the last four decades and because there is still so much inefficient water use that can be improved through water efficient appliances, replacing water guzzling lawns with xeriscaping, etc. At what point do the myths of unlimited growth and progress and the omnicompetence of science and technology become recognized as untenable? The argument that more water efficiency justifies more growth which justifies new reservoirs is a positive reinforcement loop that is doomed to culminate in disaster, especially given global climate change projections.

What is happening in California needs to be received as a lesson for Texas. California water woes represent the classic and famed "canary in the coal mine" for what can happen and is already beginning to happen in Texas. On April 25, 2022, a river guide of the Rio Grande River in Big Bend National Park posted a video on Instagram of a dry Rio Grande riverbed in Santa Elena Canyon.¹⁴⁵ On June 24, 2022, the *San Antonio Express-News* reported the flow of the Frio River had dropped to zero in Concan, west of San Antonio, according to measurements made by a United States Geological Survey's river gauge.¹⁴⁶ Climatologists are warning that Texas has

¹⁴⁴ The Real Deal. 2022. "California Water Report: Enough to Support New Residential Development." The Real Deal, June 2. Accessed June 11. https://therealdeal.com/la/2022/06/02/california-water-report-enough-to-support-new-residential-development.

¹⁴⁵ Karas, Sam. 2022. "Goodbye to a River: As Rio Grande Dries Up, Tourism Industry Braces for Impact." *The Big Bend Sentinel*, May 18. Accessed June 11. https://bigbendsentinel.com/2022/05/18/goodbye-to-a-river-as-rio-grande-dries-up-tourism-industry-braces-for-impact.

¹⁴⁶ Bruess, Elena. 2022. "Frio River Flow Drops to Zero as Drought Continues." *San Antonio Express-News*, June 24. Accessed June 28. https://www.expressnews.com/news/local/article/Frio-River-flow-zero-drought-17263602.php.

the potential for a prolonged drought.¹⁴⁷ Approximately 88% of the state currently is experiencing drought conditions. Spring precipitation and temperature patterns portend the increased risk of a protracted drought. As I have delineated in this dissertation, Texas state water providers have traditionally embraced the same water supply narrative as California, "There it is. Take it." In response to increasing population and the concomitant increase in water demand, constructing more reservoirs and building more pipelines to transport water away from rural areas to quench the desire of urban residents seems to be the go-to strategy in the Texas water supply playbook. This narrative and strategy are broken and are not adequate to address current and impending water shortages in the Southwestern portion of the United States, including Texas. California has been more progressive in promoting conservation than Texas. Given that residents of California have received more encouragement than residents of Texas to develop a water conservation habit of mind, it is disconcerting that amid the dire water shortages Californians are experiencing, water use has increased rather than decreased. It would be prudent for Texas water providers to make water conservation a priority and instilled as a way of life, as an everyday practice, regardless of climate conditions. I have argued that a conservation habit of mind and action only can be achieved through a change in narrative, mindset, and relationship to water. Being proactive, rather than reactive can make a significant difference in how successfully Texas can navigate current and future emergency water shortages.

¹⁴⁷ Aguilar, Julio. 2022. "Texas Climatologists Warn of Potential for Prolonged Drought." KERA. March 30. Accessed June 11. https://www.keranews.org/texas-news/2022-03-30/state-climatologists-warn-of-potential-for-prolonged-drought.

Where do we go from here? Metaphorically, we are standing at a fork in the river and are presented with the choice of navigating one of two branches. One branch represents the unsustainable way of "thinking inside a pipe" dominated by the expertise of engineering and technology. The other represents the sustainable way of "thinking outside the pipe" that involves collaboration and reciprocity, braiding together the wisdom of both science and the humanities. Our situation is reflected in the Seventh Fire Prophecy as told by Kimmerer, a member of the Potawatomi Nation, in *Braiding Sweetgrass* (2013). The Seventh Fire Prophecy, passed down through oral tradition, is a story of prophets who came to the Anishinaabe people to give them visions of the seven stages of the future. The "fires" represented eras of life events and their associated teachings. According to the prophecy:

...in the time of the seventh fire, a new people would emerge with a sacred purpose. It would not be easy for them. They would have to be strong and determined in their work for they stood at a crossroads.... The people of the Seventh Fire do not yet walk forward; rather, they are told to turn around and retrace the steps of the ones who brought us here. Their sacred purpose is to walk back along the red road of our ancestors' path and to gather up all the fragments that lay scattered along the road. Fragments of land, tatters of language, bits of songs, stories, sacred teachings – all that was dropped along the way. Our elders say that we live in the time of the seventh fire. We are the ones the ancestors spoke of, the ones who will bend to the task of putting things back together to rekindle the flames of the sacred fire, to begin the rebirth of a nation (368).

The Anishinaabe people are doing their part to "rekindle the flames of the scared fire,"

restoring native landscapes, planting old seed varieties, revitalizing their language and culture

through the resurrection of ceremonies and storytelling.

However, that is not enough, all of humanity needs to be engaged in carrying the

"precious seeds for change of worldview" (369) requisite for being stewards of the land and

water. Like Kimmerer, I am not suggesting a return to an ancient atavistic utopia, I am

advocating balance, an intertwining of science, technology, and the humanities, a balance

between logos and mythos, between conception and perception. Given the state of global, national, and local water quantity and quality, it is crucial for humans to remember they are citizens, a part of the natural community, and are not transcendent conquerors. Water is a natural resource that is necessary for human survival, as such it needs to be recognized as sacred and treated with reverence not as a commodity to guelch unlimited consumption. Water can exist without humans, but humans cannot exist without water. This simple truth attests to the critical need for humans to change their disconnected relationship with water and to actively be in relationship with water by owning the responsibility of caring for both water and the land – the watershed. As I have repeatedly argued, this responsibility entails a change in consciousness from "thinking inside the pipe" to "thinking outside the pipe." By recovering common public space and reconverging the humanities and science, Watershed Education Community Action Networks (WE CANs) can facilitate this change in consciousness through the development of participatory water ethics and the creation of a new urban water narrative, a re-imagining of upstream and downstream watershed relationships. The change in consciousness called for in this dissertation is not new. Indeed, in addition to the Seventh Fire Prophecy, it is mirrored in John Dewey's "Great Community," Joanna Macy's "Great Turning," and Thomas Berry's "Great Work." All entail a shift from the industrial growth mindset which has wreaked devastation on the Earth to a sustainable growth mindset characterized by shared experience, participation, dialogue, and education. In the words of Thomas Berry in The Great Work (1999), "The present is not a time for desperation but for hopeful activity" (19).

Recommendations for Future Philosophical Research

In the above section, I asked the question, "where do we go from here?" In this section, I will discuss where I go from here. I utilized the methodology of field philosophy for my dissertation research as described in Chapter 1. Although the survey that was sent to the professional and non-professional water communities was an essential first step to gain initial insight into the problem of disengagement and water education and outreach, using a survey instrument is not aligned with the sauntering and partnership concepts I developed in this dissertation and consequently the data are limited in scope. One of the limitations of the survey method included difficulty accessing contact information (i.e., names, titles, and email addresses) for the water professionals on institutional websites and by phone requests. This information was protected by certain sectors of the water industry and may represent a barrier to dialogue outside of silos. Fewer surveys were sent to water professionals than nonprofessionals and the lower water professional response rate may have been due to fear of retribution for transgressing the institutional silo boundaries. In addition, survey respondent demographics revealed gaps that limit the generalizability of the data. Since different groups of people may have different experiences with water, it is important to hear from a representative cross section of the North Central Texas population. Responses from both water professionals and non-professionals were primarily received from people who identified their ethnicity as white and who had advanced college degrees. Also, there was a mismatch in age between the two groups of respondents; of the water professionals, 70% were 25-44 years of age, whereas

63% of the water non-professionals were 55-74 years of age.¹⁴⁸ This age discrepancy raises several questions. How do age differences between water education and outreach staff and their target audience affect the efficacy of messaging and the engagement of the public?

Due to the limitations noted above, I wish to expand my field philosophy research by more fully immersing myself in the community, both professional and non-professional, by conducting multiple conversation circles (i.e., traditionally known as focus groups) to include a more diverse cross-section of participants and to follow up on the insights gleaned through the survey responses. The conversation circles would allow all stakeholders to engage in dialogue about water issues in North Central Texas. I also want to expand my research methodology design to incorporate arts-based research. In Arts Based Research (2012), Tom Barone, Professor Emeritus of Education at Arizona State University, and Elliot Eisner, Professor Emeritus of Education and Art at Stanford University, explain this form of qualitative research methodology, "Arts based research is an effort to extend beyond the limiting constraints of discursive communication in order to express meanings that otherwise would be ineffable" (1). I would like to include arts-based research in future explorations because it mirrors the strategy used in Watershed Education Community Action Networks (WE CANs) providing a level of continuity and arts-based research would augment data obtained from discursive communication because it allows for different and invisible perspectives to well-up and become visible. Another focus of investigation I believe warrants attention relates to the concept of generational intelligence and how water education and outreach can effectively engage

¹⁴⁸ The higher age range in the water non-professional group most likely can be attributed to retirement and the availability of this age group to serve in volunteer capacities.

different generations. Although this dissertation primarily focused on one aspect of water issues, quantity, there is also a corollary issue of equivalent importance, quality. There are many threats to water quality globally and nationally, microplastics, unmetabolized pharmaceuticals, and legacy pollutants to name a few. These pollutants and others jeopardize the quality of drinking water which in turn can negatively impinge on the availability of water for consumption. Participatory water ethics, WE CANs, and the creation of a new urban water narrative can also be used to address water quality issues. Although addressing both water quantity and water quality issues was beyond the scope of this dissertation, my dissertation research could be expanded in the future to investigate water quality issues.

Although expanding my research is one direction in which I will saunter, I also will pursue paths of disseminating my dissertation research in North Central Texas by networking with local water utility groups, cities, water agencies, etc. to implement my concept of WE CANs. I also wish to share the insights of my research with local water education and outreach staff to encourage these educators to embrace the entire EPA environmental education continuum from the process attribute of "awareness" to the process attribute of "stewardship." The implementation of WE CANs will require a great deal of initial work in organizing the public to overcome the barrier of community disintegration before the beginnings of community integration can be achieved. Because the public has been eclipsed for such a long time and to such a great extent, members of a community may need to learn to speak their own interest before WE CANs successfully can be augmented. Neighborhood schools (i.e., students, teachers, parent-teacher associations), libraries, churches, civic groups, and other congregations of people all represent fertile ground for conversations to create a springboard

from which members of a community can plunge into forming WE CANs to address relevant local water issues.

Recall the adage, "Think Global, Act Local." This motto was first attributed to Patrick Geedes, a 20th century Scottish urban planner, who used the word "global" to conjure the notion of environmental inclusiveness. It was not until the 1970s through the 1990s that the term "global" took on its current geopolitical dimension considering the world and its now eight billion inhabitants.¹⁴⁹ I was surprised to learn the original intent of the use "global," and it caused me to deeply ponder this oft quoted phrase. The meaning of global increased in scale from environmental inclusiveness to the geopolitical dimension of the world, representing a "turning out," a widening of scope. I am proposing that the use of the word "local" which originally was intended to invoke a sense of place, a bioregional locale, be used now to designate the critical consciousness of self. Doing so would entail a "turning in," a narrowing of scale. As can be seen in Figure 6.1, the processes of "turning out" and "turning in" taken together encompasses a sense of reflexivity and reciprocity if one visualizes the existence of a dynamic relationship between the concentric circles. This figure captures the natural flux and flow of "being in relationship" detailed in the works of Alfred North Whitehead and Maurice Merleau-Ponty. Unlike the expanding ripples seen after a stone is thrown into a pond, the ripple effect created by WE CANs continually move in both directions, inward and outward between each concentric circle, a rhythmic pulsing motion indicative of a web of

¹⁴⁹ Tarantola, Daniel. 2013. "Thinking Locally, Acting Globally." *American Journal of Public Health* 103(11):1926. Accessed June 14, 2022. doi:10.2105/AJPH.2013.301636.



Figure 6.1. Ripple effect of WE CANs. Bidirectional arrows indicate the reflexivity and reciprocity that exists between designated ripples (i.e., concentric circles).

interconnected vibrations. Placing the critical consciousness of self in the center of the concentric circles is not indicative of narcissism, rather it is symbolic of the key role of reflection in watershed stewardship, suggesting, "I might become a mirror in which others could see their own stories reflected" (Gatto 2017, 112). Similarly, the need for reflection is echoed in Thomas Moore's back-cover endorsement of Louis Lavelle's book *The Dilemma of Narcissus* (1993). Moore, a psychotherapist, author, and former Catholic monk, affirms in a world dominated by quantitative analysis and oversimplified solutions what is needed is something to lead a soul or the consciousness of self "to the pool of watery reverie where it may recover thought, reflection, and self-knowledge." It is my aspiration that my "reconstructive gift of vision and hope" of Watershed Education Community Action Networks (WE CANs) can facilitate the decision to choose the fork in the river representing the sustainable urban water narrative of

"thinking outside the pipe" devoted to collaboration and reciprocity, braiding together the

streams of wisdom of science and the humanities.

If you are on the wrong road, progress means doing an about-turn and walking back to the right road; and in that case, the man who turns back soonest is the most progressive.

-C. S. Lewis

APPENDIX A

IRB APPLICATION APPROVAL LETTER



THE OFFICE OF RESEARCH AND INNOVATION Research and Economic Development

September 25, 2018

Dr. Adam Briggle Student Investigator: Teresa Moss Department of Philosophy/Integrative Studies University of North Texas RE: Human Subjects Application No. 18-402

Dear Dr. Briggle:

In accordance with 45 CFR Part 46 Section 46.101, your study titled "Creating a Ripple Effect: Identifying Barriers, Dissolving Boundaries, and Building Bridges in the North Central Texas Water Community" has been determined to qualify for an exemption from further review by the UNT Institutional Review Board (IRB).

Enclosed are the consent documents with stamped IRB approval. Please copy and **use this** form only for your study subjects.

No changes may be made to your study's procedures or forms without prior written approval from the UNT IRB. Please contact The Office of Research Integrity and Compliance at 940-565-4643, if you wish to make any such changes. Any changes to your procedures or forms after 3 years will require completion of a new IRB application.

We wish you success with your study.

Sincerely,

Ahelley have

Shelley Riggs, Ph.D. Professor Chair, Institutional Review Board

SR:jm

UNIVERSITY OF NORTH TEXAS®

1155 Union Circle #310979 Denton, Texas 76203-5017 940.369.4643 940.369.7486 fax www.researchunt.edu PROUDLY USING ENVIRONMENTALLY FRIENDLY PAPER APPENDIX B

INFORMED CONSENT NOTICE

University of North Texas Institutional Review Board

Informed Consent Notice

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits, and risks of the study and how it will be conducted. Please indicate your decision whether or not to participate in this study by selecting the appropriate response choice provided at the end of this document.

Please print and retain a copy of this notice for your personal records.

Title of Study: Creating A Ripple Effect: Identifying Barriers, Dissolving Boundaries, and Building Bridges in the North Central Texas Water Community

Student Investigator: Teresa Moss, Ph.D. Candidate, University of North Texas (UNT) Department of Philosophy and Religion. Supervising Investigator: Dr. Adam Briggle.

Purpose of the Study: You are being asked to participate in a research study which aims to identify barriers and potential solutions to effectively engage community stakeholders in water issues in North Central Texas.

Study Procedures: Invited participants will receive an introductory e-mail from Teresa Moss, the student investigator, with a digital copy of the informed consent notice attached to review and print and a link to an electronic survey. The survey includes one open-ended question and six rank-order questions regarding your experience with community engagement related to water issues in North Central Texas and seven demographic questions. The survey will take approximately 15 minutes to complete.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: This study is not expected to be of any direct benefit to you, but the research team hopes to learn more about how to catalyze effective community stakeholder engagement regarding water issues in North Central Texas. The information gleaned from this study may contribute to the water resource professional field, especially in terms of best practices for community outreach, education, and engagement that could potentially benefit all the residents of North Central Texas.

Compensation for Participants: None.

Procedures for Maintaining Confidentiality of Research Records: Your participation in this research study is confidential. The records for this study will be kept private and stored securely. Only research personnel will have access to the records. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study. Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company being utilized for this study. Your participation in this online survey

Office of Research Integrity & Compliance University of North Texas Last Updated: July 11, 2011 APPROVED BY THE UNT IRB 9/25/2018

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involves risks to confidentiality similar to a person's everyday use of the internet. The data from this study may be published in an academic journal, presented at academic and industry professional conferences, and included in the dissertation of the student investigator.

Questions about the Study: If you have any questions about the study, you may contact Teresa Moss at Teresa.Moss@unt.edu or Dr. Adam Briggle at Adam.Briggle@unt.edu.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-4643 with any questions regarding the rights of research subjects. This research study's IRB protocol number is IRB-18-402.

Research Participants' Rights:

Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Teresa Moss has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- □ You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- □ You understand why the study is being conducted and how it will be performed.
- □ You understand your rights as a research participant and you voluntarily consent to participate in this study.
- □ You understand you may print a copy of this form for your records.

Please indicate your desire to participate in this study by marking an "X" in one of the two responses below.

____I have read the informed consent notice and wish to participate in the study.

____I do not wish to participate in the study.

Office of Research Integrity & Compliance University of North Texas Last Updated: July 11, 2011 APPROVED BY THE UNT IRB 9/25/2018

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APPENDIX C

COMMUNITY ENGAGEMENT SURVEY RECRUITMENT LETTERS

WATER PROFESSIONAL COMMUNITY ENGAGEMENT SURVEY RECRUITMENT LETTER

Dear Water Resource Professional,

I am an environmental philosophy Ph.D. candidate at the University of North Texas. My dissertation research focuses on water quantity and quality issues in North Central Texas (NCT). I am most interested in identifying ways to effectively engage the community to promote changes in perception and attitude that may motivate sustainable behavior regarding local water resources. Your views and the views of other water community stakeholders in NCT regarding community engagement are crucial to guide my research.

I am working with a team of water resource professionals to conduct a study to identify barriers and potential solutions to effectively engage community stakeholders in water issues in North Central Texas. Your participation in this study is very important. You are a valued community stakeholder in North Central Texas and we would like to invite you to share your views on community engagement regarding water issues to better inform our research study efforts.

Before agreeing to participate in this research study, it is important that you read and understand the attached Informed Consent Notice that explains the purpose, benefits, and risks of the study and how it will be conducted. If you agree to participate in this research study, please click on the following electronic survey link

https://unt.az1.qualtrics.com/jfe/form/SV_eyxe6aOYfcB3Nzf. You will be asked to indicate your decision whether or not to participate in this study by selecting the appropriate response choice provided at the end of the Informed Consent Notice document in the first section of the online survey.

The survey includes one open-ended and six rank-order questions regarding your experience with community engagement related to water issues in North Central Texas. Additionally, the survey includes six general demographic questions. The survey will take approximately 15 minutes to complete.

Your participation in this research study is confidential. The records for this study will be kept private and stored securely. Only research personnel will have access to the records. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study. Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company being utilized for this study. Your participation in this online survey involves risks to confidentiality similar to a person's everyday use of the internet.

To ensure the integrity of this research study, it is being supervised by Dr. Adam Briggle, Associate Professor and the Director of Graduate Studies in the Department of Philosophy and Religion at the University of North Texas. Dr. Briggle holds a Ph.D. degree in environmental studies from the University of Colorado. If you have any questions, I or Dr. Briggle would be happy to answer them. Our e-mail addresses are Teresa.Moss@unt.edu and Adam.Briggle@unt.edu.

Thank you for your assistance.

Sincerely,

Teresa Moss Ph.D. Candidate Department of Philosophy and Religion University of North Texas
WATER NON-PROFESSIONAL COMMUNITY ENGAGEMENT SURVEY RECRUITMENT LETTER

Dear Water Community Stakeholder,

I am an environmental philosophy Ph.D. candidate at the University of North Texas. My dissertation research focuses on water quantity and quality issues in North Central Texas (NCT). I am most interested in identifying ways to effectively engage the community to promote changes in perception and attitude that may motivate sustainable behavior regarding local water resources. Your views and the views of other water community stakeholders in NCT regarding community engagement are crucial to guide my research.

I am working with a team of water resource professionals to conduct a study to identify barriers and potential solutions to effectively engage community stakeholders in water issues in North Central Texas. Your participation in this study is very important. You are a valued community stakeholder in North Central Texas and we would like to invite you to share your views on community engagement regarding water issues to better inform our research study efforts.

Before agreeing to participate in this research study, it is important that you read and understand the attached Informed Consent Notice that explains the purpose, benefits, and risks of the study and how it will be conducted. If you agree to participate in this research study, please click on the following electronic survey link

<u>https://unt.az1.qualtrics.com/jfe/form/SV_1AB4m3FOm0dUFvf</u>. You will be asked to indicate your decision whether or not to participate in this study by selecting the appropriate response choice provided at the end of the Informed Consent Notice document in the first section of the online survey.

The survey includes one open-ended and six rank-order questions regarding your experience with community engagement related to water issues in North Central Texas. Additionally, the survey includes six general demographic questions. The survey will take approximately 15 minutes to complete.

Your participation in this research study is confidential. The records for this study will be kept private and stored securely. Only research personnel will have access to the records. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study. Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company being utilized for this study. Your participation in this online survey involves risks to confidentiality similar to a person's everyday use of the internet.

To ensure the integrity of this research study, it is being supervised by Dr. Adam Briggle, Associate Professor and the Director of Graduate Studies in the Department of Philosophy and Religion at the University of North Texas. Dr. Briggle holds a Ph.D. degree in environmental studies from the University of Colorado. If you have any questions, I or Dr. Briggle would be happy to answer them. Our e-mail addresses are Teresa.Moss@unt.edu and Adam.Briggle@unt.edu.

Thank you for your assistance.

Sincerely,

Teresa Moss Ph.D. Candidate Department of Philosophy and Religion University of North Texas APPENDIX D

WATER PROFESSIONAL COMMUNITY ENGAGEMENT SURVEY QUESTIONS AND SUMMARIZED

RAW DATA

WATER PROFESSIONAL COMMUNITY ENGAGEMENT SURVEY QUESTIONS¹⁵⁰

Community Engagement Questions: The following questions will give you an opportunity to tell us about your community engagement experience. Please answer as openly, truthfully, and specifically as possible.

1. From the perspective of your institution, what does it mean to "engage" the community? (i.e., what does engagement entail or look like?)



2. How does your institution promote community engagement? (Please <u>rank your top three</u> <u>choices</u> with #1 being the most preferred item.)

- _____Social media (Facebook, Twitter, Instagram, etc.)
- ____City newsletter/e-mail list
- _____Host classes/workshops/events
- _____Participate at events/festivals
- _____Water bill inserts/messages
- _____Flyers/brochures/posters
- _____School education programs
- _____Tours of facilities (i.e., water plant, etc.)
- _____Speak/present before community groups as requested
- _____Other (Please specify.) __
- _____Comments? Add here.

¹⁵⁰ Raw survey data is available upon request. To make a request, send an email to teresamoss@my.unt.edu.



3. Who is the primary target audience for your institution's community engagement? (Please **rank your top three choices** with #1 being the most preferred item.)

Customers	
Citizens/residents	
Public organizations	
Communities (i.e., cities)	
Counties	
Businesses	
Children/schools	
Other (Please specify.) _	
Comments? Add here.	



4. How does your institution measure the effectiveness of community engagement efforts? (Please **rank your top three choices** with #1 being the most preferred item.)

- _____Number of subscribers to newsletter/e-mail list
- _____Number of attendees at classes/workshops/tours
- _____Number of interactions/comments with social media
- _____Completed surveys after classes/workshops
- ____Community-wide city survey questions on programs
- _____Measurement of water use in gallons per capita per day/increase in tons of recycled material/etc.
- _____Word of mouth/repeat business (i.e., people requesting our programs)
- _____Currently do not measure effectiveness of community engagement efforts
- _____Other (Please specify.) ______
- _____Comments? Add here.



5. What are three core messages regarding water quantity and quality (e.g., drinking water, storm water, water pollution, watershed stewardship, water conservation, etc.) you wish to communicate through your institution's community engagement efforts? (Please <u>rank your top</u> <u>three choices</u> with #1 being the most preferred item.)

_____Don't flush medicines/fats/oils/grease/wipes down the drain/toilet

- _____Pick up after your dog, don't litter, don't dump anything down the storm drain
- _____Benefits of native and adaptive plants
- ____Indoor water conservation
- ____Outdoor water conservation
- _____Value of water
- _____Human-water relationship
- _____True cost of service
- _____Humanizing department
- _____Water infrastructure
- ____Other (Please specify.) _____



6. What are three community engagement challenges/barriers encountered by your institution? (Please **rank your top three choices** with #1 being the most preferred item.)

- Budget

 Support from direct supervisor

 Support from upper management

 Support from city council

 Staff size

 Lack of strategic direction/plan

 Lack of training

 Lack of public engagement with programs

 Fear/distrust of government agencies

 Lack of collaboration (i.e., disciplinary silos)
 - 322

__Other (Please specify.) _____ _Comments? Add here.



7. Based on your response to the question above, please identify what you believe may be potential solutions to overcome each of the three challenges/barriers you identified. (Please **rank your top three choices** with #1 being the most preferred item.)

- _____More metrics to justify increase in budget
- _____More metrics to justify increase in staff
- _____Training on tools to better communicate program value to management
- _____More training on tools to better communicate messaging and programs to target audience
- _____Transparency
- _____Increase dedication to community engagement
- _____Maintain consistency (i.e., engagement, communication, etc.)
- _____Having right people in right positions (i.e., dedication/belief in cause)
- _____Other (Please specify.) _____
- _____Comments? Add here.



Demographic Questions: Please answer as specifically as possible.

- 1. What is your age? (Drop down menu.)
 - 18-24
 - 25-34
 - 35-44
 - 45-54
 - 55-64
 - 65-74
 - 75-84
 - 85 or older



2. How do you identify your gender?

Male	
Female	
Prefer not to answer	
Comments? Add here	e.



- 3. How do you identify your ethnicity? (Please mark one or more boxes.)
 - _____White (For example, German, Irish, English, Italian, Polish, French, etc.)
- _____Hispanic, Latino, or Spanish Origin (For example, Mexican or Mexican-American, Puerto Rican, Cuban, Salvadoran, Dominican, Columbian, etc.)
- _____Black or African American (For example, African American, Jamaican, Haitian, Nigerian, Ethiopian, Somalian, etc.)
- _____Asian (For example, Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, etc.)
- _____American Indian or Alaska Native (For example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community, etc.)
- _____Middle Eastern or North African (For example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian, etc.)
- _____Native Hawaiian or Other Pacific Islander (For example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, Marshallese, etc.)
- _____Some other ethnicity. (Please specify.) _____
- _____Biracial
- ____Multiracial
- Prefer not to answer.
- _____Comments? Add here.



4. What is the highest level of education you have completed? (Drop down menu.)

_____Less than high school or some high school _____High school graduate

- ___Some college or vocational training
- ____College graduate
 - ____Advanced college or other professional degree



- 5. The population of your institution's geographic location is: (Drop down menu.)
- _____500,000 or more people _____300,000 to 499,999 people _____100,000 to 299,999 people _____80,000 to 99,999 people _____60,000 to 79,999 people _____40,000 to 59,999 people _____Less than 40,000 people



6. What is your institution's zip code?



7. What is your water-related field of expertise? (Please mark one or more boxes.)

____Drinking water Stormwater

______Wastewater

Comments? Add here.	
Other (Please specify.)	
Communication/Public information	
Community education/outreach	
Engineering	
Management	
Public health	
Water quality	
Water supply	



APPENDIX E

WATER NON-PROFESSIONAL COMMUNITY ENGAGEMENT SURVEY QUESTIONS AND

SUMMARIZED RAW DATA

WATER NON-PROFESSIONAL COMMUNITY ENGAGEMENT SURVEY QUESTIONS¹⁵¹

Community Engagement Questions: The following questions will give you an opportunity to tell us about your community engagement experience. Please answer as openly, truthfully, and specifically as possible.

1. From your individual perspective, what does it mean to be "engaged" in water-related issues in your community? (i.e., what does engagement entail or look like?)



2. In what ways are you or have you been engaged in water issues in your community? (Please **rank your top three choices** with #1 being the most preferred item.)

- _____Participated in organized local clean-up/litter pick-up
- _____Attended local meetings/workshops/events
- _____Received certification through organized agency (i.e., Master Gardener, Master Naturalist, Texas Stream Team, etc.)
- _____Involved with environmental group
- _____Engage with local water agency's website/social media/subscribed to e-mail list/newsletter
- _____Water conservation in my home (i.e. adhere to water restrictions, low-flow toilets, water efficient appliances, etc.)
- _____Water conservation outside of home (i.e., reduce non-native turf yard, rainwater harvesting, drip irrigation, etc.)
- _____Contribute to community (i.e., pick up trash on street, pick up pet waste, etc.)
- _____Volunteering
- _____I'm not currently engaged
- ____Other (Please specify.) _____
- ____Comments? Add here.

¹⁵¹ Raw survey data is available upon request. To make a request, send an email to teresamoss@my.unt.edu.



3. How have water-related institutions/organizations attempted to engage you and/or your community in local water issues? (Please **rank your top three choices** with #1 being the most preferred item.)

- _____Presence at local events/meetings
- _____Presentations at HOA/group meetings
- _____Water bill communications
- _____Digital media (i.e., social media, websites, apps, video, e-mails, etc.)
- _____Traditional media (i.e., television/radio/print ads, etc.)
- _____Offering workshops/seminars/events
- _____Other (Please specify.) __
- _____Comments? Add here.



4. How do you know if a water-related institution/organization has effectively engaged you and/or your community in local water issues? (Please **rank your top three choices** with #1 being the most preferred item.)

- _____I am aware of the issue
- _____Change in value/attitude
- _____I take action on the issue
- _____I change behavior to address issue
- ____I tell others about the issue
- _____Desire for more information on issue
- _____Other (Please specify.) _
- _____Comments? Add here.



5. What are three core messages regarding water quantity and quality that water-related institutions/organizations have used in their efforts to engage you and/or your community in water issues? (Please <u>rank your top three choices</u> with #1 being the most preferred item.)

_____Don't flush medicines/fats/oils/grease/wipes down the drain/toilet

_____Pick up after your dog, don't litter, don't dump anything down the storm drain

- _____Benefits of native and adaptive plants
- _____Value of water
- _____Water rates/sewer billing process
- _____Water infrastructure (i.e., pipes, treatment plants, etc.)
- _____Water quality report
- _____Watering days/irrigation restrictions
- ____Offer free classes/workshops
- ____Other (Please specify.) _____
- ____Comments. Add here.



6. What do you consider to be the top three challenges to engaging you and/or your community in local water-related issues? (Please <u>rank your top three choices</u> with #1 being the most preferred item.)

____Conflicting information

- ____Lack of awareness or relevance of water issues to self and family
- _____Denial to avoid making a change
- ____Lack of time to become invested (too many competing interests)
- _____Assume that my awareness/actions don't make a difference
- _____Belief that the "experts" will take care of the issue
- _____Belief that science/technology innovations will take care of the issue
- ____Lack of awareness/knowledge of urban water cycle/water issues
- _____Hard to connect with people these days

_____I'm not interested in water issues ____Other (Please specify.) ____Comments? Add here.



7. Based on your response to the question above, please identify what you believe may be potential solutions to overcome each of the three challenges you identified. (Please <u>rank your</u> <u>top three choices</u> with #1 being the most preferred item.)

- _____Reframe the message/tell a story that matters to me
- _____Hands-on, experiential activities with water (water sampling & testing, stream restoration, photography, art, etc.)
 - _____Pilot projects/demonstration sites for native landscaping, drip irrigation, rain gardens,
 - etc. (especially at neighborhood schools)
- _____Incentivize rainwater harvesting
- _____Incentivize attendance at water related workshops/seminars
- ____Incentivize water conservation
- _____More enforcement for current regulations (i.e., pet waste pick-up, watering days and times, etc.)
- _____More community input for water issue solutions (i.e., stakeholder groups)
- _____Mass communications/advertising plans/local news outreach
- _____Other (Please specify.) _
- _____Comments? Add here.



Demographic Questions: Please answer as specifically as possible.

1. What is your age? (Drop down menu.)

18-24 25-34 35-44 45-54 55-64 65-74 75-84 85 or older



2. How do you identify your gender?

Male
Female
Prefer not to answer.
Comments? Add here.



- 3. How do you identify your ethnicity? (Please mark one or more boxes.)
 - _____White (For example, German, Irish, English, Italian, Polish, French, etc.)
- _____Hispanic, Latino, or Spanish Origin (For example, Mexican or Mexican-American, Puerto Rican, Cuban, Salvadoran, Dominican, Columbian, etc.)
- _____Black or African American (For example, African American, Jamaican, Haitian, Nigerian, Ethiopian, Somalian, etc.)
- _____Asian (For example, Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, etc.)
- American Indian or Alaska Native (For example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community, etc.)
- _____Middle Eastern or North African (For example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian, etc.)
- _____Native Hawaiian or Other Pacific Islander (For example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, Marshallese, etc.)
- _____Some other ethnicity. (Please specify.) ______
- _____Biracial
- ____Multiracial
- _____Prefer not to answer.
- ____Comments? Add here.



4. What is the highest level of education you have completed? (Drop down menu.)

Less than high school or some high school High school graduate

- ___Some college or vocational training
- ____College graduate
 - ____Advanced college or other professional degree



- 5. The population of the city in which you primarily live is: (Drop down menu.)
- _____500,000 or more people _____300,000 to 499,999 people _____100,000 to 299,999 people _____80,000 to 99,999 people _____60,000 to 79,999 people _____40,000 to 59,999 people _____Less than 40,000 people



6. What is the zip code of your primary residence? ____



7. In which of these community groups are you a member? (Please mark one or more boxes.)

- _____Texas Watershed Steward
- _____Texas Stream Team
- _____Master Gardener
- _____Master Naturalist
- _____Native Plant Society of Texas
- _____Streams & Valleys
- _____Trinity River Audubon Center
- _____Water-Related Volunteer (please specify.) ______
- ____Other (Please specify.) _____
- ____Comments? Add here.



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