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The Consciousness of Water: Narrative Flows, Environmental Change, and the Voice of Yemen

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ABSTRACT

Icebergs are melting in the Arctic. The Gulf of Mexico is warming and producing hurricanes such as Katrina. The delta of the southern United States is drying. And, Yemen will be the first country in modern history to experience a complete lack of accessible ground water, as soon as 2017 possibly. Yemen's situation has been tracked by scholars and governments since the 1960s. Despite this fact, cities have expanded in Yemen and the population has increased its use of water while little has been invested in desalination or infrastructure to offset growth. Climate change has affected humans for thousands of years; but, in an age of rapid information flow, the conflicting narratives regarding water have stymied preparations for the impending crisis in Yemen. Although many analysts have predicted the failure of the state of Yemen based on civil unrest and increasing poverty, it is the change within the environment that promises to alter this historic culture which has survived numerous state entities. The growing presence of Al-Qaeda, a 40% unemployment rate, and a possible civil war between north and south all provide impetus for destabilization, yet the loss of ground water will alter this sedentary tribal area regardless of these other issues and ultimately change the society's structure. The entire globe will face climate change in the years to come and increasing tension regarding water resources. The narratives from Yemen provide insight into the dynamics of a society facing significant climate change, and the outside forces with which the society interacts.

This dissertation is approved for recommendation
to the Graduate Council.

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DEDICATION

This dissertation is dedicated to the people of Yemen who shared their time, their homes, and their stories with me. *Inshallah,* we will share tea again in a peaceful Yemen, free of conflict.

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I. INTRODUCTION

I awoke with dread. I had been sick yesterday. I fell asleep without going for more water. I stumbled out of bed and glanced around my room. The empty clear plastic bottles littered my desk and windowsill. I searched for a drop of water, picking up empty containers and tossing them aside. My head ached. My vision was blurry. I knew that I was dehydrated from my illness the day before. There was no water in my room. I thought to my home in America. There, I would have simply walked to the kitchen and filled a glass from the tap at the sink. Here, that water was not suitable to drink. Although the water truck brought a tank every couple of days, the water which flowed from it was contaminated with bacteria and other things which I preferred not to think of, as I had to use the water for showering.

I felt dizzy as I pulled my long black abaya (robe) over my head. Going downstairs into the main part of the house required dressing modestly. I made my way to the main living room, but everyone else had already left for the day's activities. I looked in the kitchen, aching to turn the tap on and simply fill my cup. But the tanker truck had not come, and it would be dry even if I was willing to boil the water and brave the heavy metals and pesticides that inevitably existed in it. My tongue was dry and my lips felt parched after my illness. I finally found a partially drunk bottle of water on a high shelf. I wasn't sure how long it had been there, but I was desperate. My body was not ready to seek water from the market. My illness had sapped my strength. I gulped down the water and made my way back upstairs. As I lay in my bed, preparing myself to go for water later in the afternoon, I contemplated the intense feeling of desperation which my thirst had inspired.

~ Field Notes July 8, 2009

Yemen on the Arabian Peninsula

Source: FAO 2011

It was my second year visiting Yemen. I had become ill, ironically, from contaminated water. Despite my strict rule to only drink boiled or bottled water, I had sipped on a frothy glass of *laymoon* (a lemonade-like drink) when a friend had offered it to me. It was one of those awkward moments where etiquette over-ruled logic, and I paid for it. Yemen's water supply is contaminated with human waste, pesticides, fertilizer, and industrial pollutants (IDRC 2009). It is preferable to drink bottled water or to boil the water before drinking from the tanks, but occasionally there is no other option when one is thirsty. Although locals also became ill at times from the bacteria in the water, my American stomach was even more sensitive. I recorded the instance of illness in my field notes; and the feeling of desperation as I searched for that bottle of water to alleviate my dehydration remains solid in my memory. A day or two later, when I had fully recovered, I sat down with my computer and dug through my old writings. Finally, I came to a conversation I'd had in June, 2008, with a friend in Sana'a, Yemen's capital city.

"This place is going to be so different in the future," Nazar shook his head.

"What do you mean?" I asked naively. I had only been in Yemen a few weeks. I was in Sana'a to study Arabic, and I was slowly learning about Yemeni culture. Nazar was a botanist I'd met in the city.

"You can't see it yet, but I can. The plants feel the drought. This place will become another Sahara and no one is paying attention. Most people here think it's just the usual type of drought you get in a desert. They think the water will return."

"Won't it?" I sipped my tea and glanced at the pink blossoms of the bougainvillea vines hanging over the nearby stone wall. We were sitting in a café in the Old City of Sana'a, surrounded by gypsum decorated buildings that were hundreds of years old.

"No," Nazar smiled wistfully as a parent does with a child who can't comprehend the gravity of the situation. "Yemen will have a total lack of ground water soon. It will take time, but someday—in our lifetime—it will all be different here. The groundwater will be gone. The plants in the countryside will die, except those that can live off of the rains which will be less and less as well due to the warming of Europe and the changes in monsoon patterns. The animals will slowly adapt and move or die, and humans will move to urban centers as the wells go dry. This land is becoming the Sahara because people have abused it. If I had one suggestion for you, I'd tell you to open your eyes to what's going on with the environment. If you want to research Yemen; you should research water."

As I contemplated this conversation, I began to realize the depth of Nazar's comments. When I had arrived in Yemen for the first time in 2008, I was pleasantly preoccupied, as most visitors are, by the numerous historic buildings and rich cultural identity. I spent my initial weeks walking the narrow paths and learning the customs. The Romans referred to Yemen as

Arabia Felix which means "Happy Arabia" because of the wealth which Yemen generated. For centuries, various Yemeni kingdoms controlled the spice trade. To this day, the slogan for the region is Yemen Al-Sayeed or "Happy Yemen", although civil unrest and unemployment have stifled the atmosphere in recent decades. Over a cup of tea that summer, it was Nazar who first brought Yemen's water issue to my attention. I learned that experts had been tracking water issues in Yemen for decades, yet the knowledge did not spread beyond a handful of academics and a few in the Yemeni public. The narrative of water kept surfacing as I traveled the country, even when I was not pursuing it. Stories abounded as I witnessed low levels in ancient cisterns; heard jokes about the rich and their pools; purchased water to drink; and endured days without bathing when the tanker trucks from outlying areas still containing water were late to fill the tanks of the buildings. The narratives continued to emerge before me and I could no longer ignore Nazar's suggestion, particularly after my own episode of thirst. I began my research in earnest and I slowly learned that water is the ghost that haunts this land and the quiet force that ultimately will drastically alter this ancient space.

What the World Sees as Yemen's Major Problems

When I began my studies of Yemen a few years ago, the nation was rarely mentioned in the Western press. Most of the world didn't know where the tiny country was, much less the challenges facing its people. Within the Middle East, Yemen was viewed as the land of origin for the Arab tribes, a land hosting a variety of environments including temperate highlands, a mountainous interior, coastal plains near the Arabian Sea, and desert to the north. Yemen's geographic territory was inhabited by sedentary tribes long before Islam; tribes that adapted to Yemen's various landscapes. Tension between northern and southern Yemen dated back as far

as the 16th century when the Ottoman Empire controlled northern Yemen and attempted to maintain the south. In 1839, the British East India Company captured the port of Aden to the south of Yemen and established British control, renaming the region as the Colony of Aden. In years to follow, nationalist groups fought against British control and eventually gained independence in 1967, becoming the People's Republic of South Yemen. Just two years later, the National Front Party's radical Marxist branch gained power and changed the name to the People's Democratic Republic of Yemen (PDRY). In the 1970s, the PDRY established close relations with the Soviet Union, China, and Palestine. The Soviet Union supplied weapons and funding in return for use of the ports on the Gulf of Aden.

The north of Yemen remained friendly with the south, despite often strained relations due to the South's association with the Soviet Union. North Yemen separated from the Ottoman Empire in 1918 and became a republic in 1962. In 1978, Ali Abdullah Saleh became the president of North Yemen. The two previous presidents had both been assassinated. Saleh was a young officer who many thought could be easily manipulated considering his relatively humble background (Worth 2008). Instead, he proved to be an astute leader who negotiated the many power relationships deftly and managed to remain in power while also increasing his personal wealth significantly. After South Yemen lost its Soviet patron with the fall of the USSR, the two halves agreed on a unity constitution in 1990 and formed the Republic of Yemen with Saleh assuming the role of leader of a unified Yemen. In 1993, parliamentary elections were held. Clashes between factions brought the country to civil war in 1994, with the South declaring secession. The rebellion was eventually crushed and, in late 1994, President Saleh was selected to continue his role. "'Ruling Yemen is difficult…I always say, it is like dancing with snakes,'" Saleh stated when asked about his presidency (Worth 2008). One can speculate the "dancing"

included Saleh's balance of Western interests, terrorist factions, tribal relations, and secessionist movements. Although the USS Cole bombing of 2000 brought Yemen to the attention of the world at the beginning of the millennium, the spotlight wore off and the nation was all but forgotten by the West. Now, however, Yemen is constantly in the news. The 2009 attempted bombing of an American aircraft by Umar Farouk Abdulmutallab, a Nigerian born man who had studied in Yemen, reignited Western interest in the country.

I returned from Yemen in late 2009, and many of my friends were unaware that I was back in the U.S. when the attempted attack hit the media near Christmas. I had not turned on my television that day, and I had not had my phone near me. When I finally did check my phone, I had dozens of messages and I wondered why. As I listened to voice after voice, friends were checking to see if I had been on that flight. American friends quipped "Well, now I know where Yemen is!" And, Yemeni friends posted their concern on social networking sites that this attempted attack by a Nigerian (they were very quick to note that fact) who happened to travel through Yemen would further hurt their economy and image. "Please, God, don't let the U.S. invade us like Iraq because of these idiots," said one informant.

Al-Qaeda of the Arabian Peninsula quickly claimed the attacker as one of their own, and soon American Anwar al-Awlaki was identified as a new Al-Qaeda leader in Yemen. Al-Awlaki's involvement with Al-Qaeda kept Yemen in the media as the ethics of lethally targeting an American citizen in a foreign country sparked debate amongst commentators. Analysts began to look for causes of terror and the West continued to pursue methods of funding in order to stabilize the nation. Foreign Policy Magazine rated Yemen as number 15 on the 2010 Failed States Index, ranking it in the "red" critical phase (2011). Notable problems included factionalized elites, security, and an increasingly delegitimized state. The economy and security

are commonly referred to as causes for concern regarding the future of Yemen. The declining water table is also mentioned occasionally, but usually as a side note to other factors or as a strategic problem which can simply wait until later to address.

The Economy

Yemen is the poorest nation in the Middle East. The country is weak after years of political struggle and economic challenge. Yemeni official sources estimate unemployment "between 17 to 35 percent, according to whom you ask" (Al-Sakkaf 2011). The true unemployment rate is difficult to define. The large number of Somali refugees is usually left out of the equation, although they constitute an increasing number of those in extreme poverty within the borders of Yemen. The number of Yemenis who are unemployed is also difficult to gauge as women are often not included and men may not answer the question honestly because it is an embarrassment to admit that one is without a job. Simply getting any number at all regarding unemployment is difficult in rural areas. As I traveled in Yemen, I often asked what people thought about unemployment and most estimated that 40% of the country was unemployed. The decline of tourism and the worsening security situation has caused many to lose their jobs. Of those in Yemen who do still have employment, the average income is roughly $900 per year which, despite the exchange rate, is little to live on while supporting a family and often an extended family (Raddaz 2010).

"I cried all last night after learning the news. My job was my dignity," Samia told me. A twenty-seven year old widowed mother of two, she worked as a secretary at a local business. The night before, five female employees had been told that they would be let go at the end of the week. The economy was getting worse, and the business had to cut back. The women were the

first to lose their jobs because it was assumed that they could move in with male relatives if necessary.

"What will you do?" I asked. We stood to the side of a small group drinking tea and eating cake. The business had put together an impromptu goodbye party for the women. It was oddly surreal in its happiness.

"My husband is dead, and I have my babies to feed. I will do what everyone does. I will move out of my rooms and I will return to my uncle's house. It is crowded, but he will take us in. He's already taken in my cousin's family. I doubt that I can find another job in this economy. I will have to wait until things get better." Samia faced this challenge with the resolute attitude that I had seen in many Yemenis.

"How does your uncle support everyone?" I asked.

"He works in Qatar. He comes home when he can, but he earns much better money there," she answered.

Yemen's economy is not diversified and relies on remittances from Yemenis working abroad, oil production, and foreign aid. After Yemen politically supported Iraq in the First Gulf War of 1990-1991, Saudi Arabia expelled almost one million Yemeni workers and other Gulf countries also tightened their restrictions (Sorenson 2007). This caused many Yemenis to return home, straining the economy. By 2008, remittances rose to $1.3 billion; and Yemen ranked tenth on the Middle East North Africa (MENA) list of top emigration countries that benefitted from remittances, but the decade of limited income after the expulsion hurt many families and the overall economy (World Bank 2008). Kuwait and Saudi Arabia also severely reduced their economic aid to Yemen after the First Iraq war and although some of this aid has been reinstated, the decade of harsh restrictions continues to plague Yemen's economy.

Yemen committed to implement economic reforms in order to receive funds from the International Monetary Fund (IMF), but a lack of progress led the IMF to suspend the program between 1999 and 2001. Since then, the IMF has been active in Yemen and approved an injection of $370 million for the Yemeni economy to offset the sudden decline of the riyal, (Yemen's currency) which fell 3% in 2009 and 16% in 2010 (Reuters 2010). The World Bank, the International Development Association, and other international organizations are also active in Yemen.

The oil industry in Yemen is declining rapidly as oil wells are projected to be completely dry as soon as 2017 (Plaut 2008). The IMF states: "Because of the hydrocarbon sector's dominance of the economy, the loss of oil revenue and continued large energy subsidies had a strong negative impact on public finances and the balance of payments. This has contributed to a record fiscal deficit of about 10 percent of GDP and has put the balance of payments under considerable strain" (2011). As Yemen's oil industry has declined, its ability to repay its debt has significantly increased. Although natural gas has recently been tapped, the developmental progress is slow and future earnings are not projected to be significant enough to make up for the loss of oil revenue. The World Bank projects that:

> Fiscal sustainability is the foremost macroeconomic issue, as the reduction of oil revenues is not sufficiently compensated by increased revenues from other sources. Yemen's economy is dominated by the oil sector (27 per cent of GDP and 90 percent of merchandise exports). The recent steep decline in oil revenues associated with the gradual depletion of reserves and the decline of oil prices after the peak in 2008 is causing severe fiscal difficulties. The budget deficit in 2009 reached about 10 percent of GDP. Solutions to the economic challenge necessitate diversification of economic activity away from oil (2011).

The IMF, World Bank, and others are pushing to diversify Yemen's economy and decrease the deficit, but worsening security stifles investment and efforts are slow to stagnant.

Christopher Boucek with the Carnegie Endowment suggests that a post-oil economy and efforts to build state legitimacy are essential to the state of Yemen's continued survival as its population grows and demands employment, increasing tension as youths remain without jobs and oil threatens to run out (2010b). Yemen has one of the world's highest population growth rates with the population increasing at a rate of 3% and each woman having an average of 5.4 children. The Middle East North Africa (MENA) region has experienced the highest population growth of any region in the world during the past century (Roudi 2001). The MENA regions population growth rate peaked at 3% in 1980 and has declined to approximately 2.5%, varying depending upon nation, in recent years. Access to medical care has extended the average lifespan and lowered infant mortality, while the average birthrate has also remained high.

In Yemen, a woman's status is judged by the number of sons she gives her husband; and a man gains status by having numerous sons. Birth control is against the law in Yemen and is strictly prohibited, although it is offered on the black market but is often not reliable. In many cases, this creates extremely large families including many daughters who were birthed in the pursuit of sons. An informant surprised me over tea one day by bringing up an interesting idea for birth control in Yemen.

"Have you heard about in vitro fertilization?" A Yemeni neighbor asked.

"Yes. It's fairly common where I come from." I responded, not sure where the conversation was going.

"I read an article recently that said that doctors can now select the sex of the baby when they do that. Can you imagine? I had to have three daughters before I finally had a son for my husband. When he said he wanted a second son, I thought about telling him to get a second wife! Two more daughters later, I finally had another son. That technology would have saved

my body from so much." My neighbor looked tired, and I realized how stressful the pressure of providing sons for the family was on the female.

"I don't mean to be blunt, but don't men here understand that it's the male that's responsible for the sex of the baby and if he's not having sons then he's the one that isn't providing the right component." I wondered if I'd overstepped my bounds by that comment as my neighbor was fairly conservative in her views.

"Some understand that now. I mean, it's in movies and such. But, it doesn't matter. We still have to birth them. I have friends who never could have a son. One dear friend had nine girls—can you imagine? Nine in a row…Finally, her husband had no choice but to get a second wife because her body was so tired they had to stop trying. It broke her heart. No, if that science came here, a woman could select to have a son right off and then her obligation would be done. Her husband's family would be pleased, and she could move on with her life. If she wanted more she could have them, but only if she wanted." We both knew that even if the technology was prevalent in Yemen, most women could never afford such a procedure. Still, she smiled quietly. I thought of how different our lives were. I was thirty with no children. She was twenty-seven with six. Most women still have their children at home with a midwife, and the numerous pregnancies with little medical care are hard on women's bodies.

Yemen's high birth rate has led to a population surge often referred to as the "youth bulge" which further fuels unemployment. Youth between the ages of 18 to 28 have an estimated 50% unemployment rate. The youth bulge is contributing to unemployment and it is estimated that over two million jobs will need to be created by 2020 just to keep unemployment rates close to their current status and somewhat manageable (IRIN 2010). Foreign investment is unlikely due to the current security situation in Yemen, and with oil production declining the

likelihood of major job creation is low. This situation only further increases the chance for disgruntled youth to turn to violence, and the vicious cycle of declining security and unemployment will continue.

Declining Security

When I traveled to Hadramawt in the summer of 2008, numerous individuals sought to distinguish themselves from Osama Bin Laden and Al-Qaeda. Bin Laden's father was from a small village named Hajarayn where I spent a day, and the Bin-Laden has family ties to the Hadrami tribe for which the province is named. The Hadrami have been travelers for over 500 years; but, unlike their European counterparts, the Hadrami did not seek to colonize or alter the local communities where they settled. Instead, they married locally and formed a vast diaspora which continued to pass down stories of the homeland throughout the years and track their lineages back to this space carefully. In the diaspora, Hadramawt became the mystical homeland, a place remembered fondly. As Eng Sen Ho describes, though, the Hadramis remaining at home in Hadramawt formed a deep mistrust of the outside world and ambivalence for the travelers who married foreign women and chose to remain abroad, even though these communities maintained elaborate genealogies reaffirming their connection to the homeland (2006).

Hadramawt is a beautiful, sandy landscape dotted with date trees and the occasional camel running free. The town of Hajarayn rises above the desert floor, a quaint village with gypsum covered mud brick buildings busy with everyday life. It was easy to imagine that this same scene had been acted out hundreds of years ago. Children tended goats; women hung out the laundry; and men carried bundles of goods along the cobblestone paths. Choruses of "Hello" and "Welcome" rang out in English everywhere I walked. I wore the hijab out of respect as I

had heard this was a conservative area, and I roamed the town for hours. People were incredibly friendly and as I would speak with them about the village, they would add "we're more than just *men osl* (the origin) for Bin Laden's family" without prompting.

"Do people ask a lot about Bin Laden when they visit?" I asked as I stopped at a *sooq* (market) to purchase some incense and spices. I spoke with the owner for a while as I tried the tiny dried fish that one can find in large sacks and sampled the many herbs.

He laughed and sighed all at once. "He's the star we can't get rid of. He's not from here, but he's Hadrami. Some people understand the difference. But, there are ties. I mean, we have codes of conduct and we do take care of tribal members. But, it's awkward when there's such a group. We are a conservative people here in Hadramawt. But, that doesn't mean that we want a jihad."

As I traveled the rest of the province, I would occasionally hear jokes about Al-Qaeda and I would sometimes catch the deep stares of those who knew more than they were willing to tell. Hadramawt is a beautiful place that draws to mind the famous sandy, palm filled scenes of Arabian Nights. The Hadramis are known for their intellect and lack of qat chewing in a country where the substance is well known. A few days after visiting Hajarayn, I traveled to another town in Hadramawt named Tarim. I had a letter from an academic in Sana'a which allowed me to access the library of Tarim where historic texts full of genealogies, medicinal knowledge, and Islamic writings are stored. I spent that night at a local hotel. The next morning, I walked down the wooden staircase of the hotel to join the other visitors in the dining room for breakfast. As I sat sharing a table with several others eating yogurt, bread, and *fool* (stewed beans with spices), the server kept looking nervously at the door. Slowly, the rumor floated to me.

The Yemeni security forces had found an Al-Qaeda cell in the building next to us and had apprehended them that morning. They had been planning to strike the hotel. I had a sudden appreciation for the Yemeni security forces at that moment and, in 2009, I was in Sana'a when those same men were sentenced to death by the Yemeni court. By the spring of 2009, Hadramawt was off limits to foreigners after four Koreans and one Yemeni were killed in a suicide attack attributed to Al-Qaeda. I later heard through sources that the Koreans had stopped in a local café before climbing the high hill across from Shibam to view the area. They had spoken of their plan in the café, and someone had heard. "It's not safe anymore over there for you. Some people who have really extreme ideas have come into the area and you just never know when one is near," a friend told me.

After the USS Cole bombing in 2000 at the southern port of Aden, Yemen allowed the FBI to conduct an investigation confirming that the attack was precipitated by Al-Qaeda but did not offer significant support to fight the terrorists. After September 11, 2001, President Saleh recognized that his nation would become a front for the upcoming War on Terror. He flew to Washington DC to pledge his support and to allow US Forces whatever access it required (Soussi 2010). Yemeni counter-terrorism forces began to seek out Al-Qaeda elements within the nation and coordination with the US developed. Despite these efforts, Al-Qaeda grew in Yemen. Between 2008 and 2009, Saudi Arabian forces drove much of the group out of Saudi Arabia and across the border into Yemen. In January of 2009, Al-Qaeda groups in Yemen and Saudi Arabia announced that they were merging to form Al-Qaeda of the Arabian Peninsula otherwise known as AQAP (Al-Jazeera 2009b). AQAP found it easier to operate in the poorer country of Yemen where much of the countryside was difficult to access by security forces and where the extremely poor populous was more likely to remain passive to their activities. The ties to the Hadrami tribe

also presented a unique link, albeit one that many Hadramis would like to forget. Yemenis traveled to Iraq and elsewhere to attack US and Western targets. Of the people detained at Guantanamo Bay during the Global War on Terror, Yemenis represented the single largest national contingency, greater than Iraqis or Afghans (Boucek 2008). Recruitment of young men in Yemen was easier due to the high unemployment rate and desperate youth seeking someone or something to blame for their lot in life. Al-Qaeda became adept at exploiting this. "Young people with no hope can be very volatile," warned Maeen al-Eryani, director of the Yemen Education for Employment Foundation, when asked about the future of Yemen's growing youth population (IRIN 2010).

As the Yemeni counterterrorism forces continue to confront AQAP, the Yemeni military is also used to contain the Houthis and to monitor secessionist protests. For over a thousand years, the area of Yemen was ruled by Zaiydi Hashimites. This era ended in 1962 when the Imamate fell after a series of domestic conflicts. The Houthis began as a historically strong Zaiydi Shi'a[1] group centered in Sada'a, a city in northern Yemen near the Saudi Arabian border, and adapted to include political supporters regardless of tribal affiliation after Saleh's removal from office. The Houthis opposed Saleh's rule and expressed concern that Wahabi Sunni views were being given too strong a voice in Yemen after the 1994 civil war in which Wahabis assisted the government in suppressing the southern secessionist movement. Wahabism is associated with Saudi Arabia, and the Houthis also worried that this was an added influence infiltrating the country (Al-Jazeera 2009a). The conflict is monitored by many in the Middle East because it places the Sunnis of Yemen against the Shi'a Houthis. Yemen has repeatedly accused Iran of assisting the Houthis in an attempt to empower the Shi'a group (Al-Jazeera 2009a). The conflict

[1] Zaiydi Shia'ism is named so for Zayd ibn 'Ali, the grandson of Husayn ibn 'Ali. Zaiydi Islamic jurisprudence is similar to Sunni Islam in many ways.

ebbs and flows with periods of intense fighting followed by the occasional truce. When I was in Yemen in 2008, the fighting reached the airport of Sana'a before Yemeni security forces pushed the front back to Sada'a. Years of intermittent conflict have left thousands dead and created a humanitarian crisis for those whose homes were destroyed (Worth 2009). Houthis participated in protests to remove Saleh from power in 2011, and in 2013 the Houthis agreed to participate in a national dialogue with the new administration of President Abd Mansur Rabuh Hadi in order to air past grievances.

Yemeni security forces also face secessionist protests and the Southern Movement. The South is perceived as receiving less aid and fewer economic and educational opportunities than the North (Oweis 2011). Saleh was the leader of the North when the sides were separate and he was seen as favoring his former constituents throughout his reign. The oil fields, refineries, and major ports such as Aden are in the South, yet the North consistently receives better services and profits from the resources of the South (Horton 2009). After the USSR's fall, Southern Yemen lost its patron and joined with the North in order to seek financial stability. Instead, its resources have continued to be depleted while improvements are viewed to occur in Northern areas instead of in the South. There are also cultural differences. People of the South tend to be more liberal socially after years of exposure to other cultures through the port of Aden.

"Less education, fewer jobs, less, less, less…That is what we've gotten since unification," stated Fadthil as we stood chatting in his shop. "In order to take care of my family, I have to come to Sana'a. I can make more money here with my store and send it home, but in the South there's just not the support. I want my son to be the first to attend university and now he will have to move here too since the Southern schools don't have the connections. Everything

is in the North. It's not fair. It's not what our parents thought would happen when they supported the unification."

Fadthil was from a port city in the South. He traveled home regularly, but had to work in Sana'a to support them. Fadthil had married at twenty-five. Now, at thirty, he had three children at home; a four year old and twin two year olds. His wife's family was from the South and she didn't want to move away from them with three little ones at home. Fadthil's father had also become ill and was disabled, so Fadthil supported his father and his mother too. In order to care for them, he had to do business in the North because the economy of the South was even weaker.

"I've thought about trying to work abroad, but that would be even harder on my family. With my father ill, at least now I can visit home regularly. It's not right, though, that so many of us can't find jobs anywhere near our homes. Things were better when the North and South were separate," Fadthil lamented.

Many other Yemenis agree with Fadthil, or at least feel that a change in political leadership is necessary to improve daily life as unemployment remains high, especially in the South. Protests surged as a part of the 2011 Arab Spring, but President Saleh used the regional unrest as an excuse to delegitimize his own citizen's complaints. President Saleh asserted: "This [protests as a part of the Arab Spring] is a virus and is not part of our heritage or the culture of the Yemeni people…It's a virus that came from Tunisia to Egypt. And to some regions, the scent of the fever is like influenza. As soon as you sit with someone who is infected, you'll be infected" (Jamjoom & Theodorou, 2011). Saleh used the regional media coverage to delegitimize the protests in his nation which had, actually, been going on for years and had simply escalated. Protests culminated with his injury in an attack on his complex in 2011, and he fled to Saudi Arabia for medical care. Calls for him to step down continued, and the Southern

Movement used this momentum to increase protests and push for secession. Other groups used the energy to push for reform. The many conversations about Yemen's future escalated, and the one narrative that remained constant was that change was needed. The Gulf Cooperation Council moved to intervene and in 2012 Abd Rabuh Mansour Hadi, Saleh's vice president, became president of Yemen.

The Problem That Will Prevail, Lack of Water

Regardless of what government is in power or what internal political conflict exists, Yemen continues to approach a massive water crisis caused primarily by man without preparation to support its population. While the neighboring states of Oman and Saudi Arabia have invested heavily in desalinization plants and water infrastructure, Yemen's investment has been minimal. The state will be unable to provide water to the population within a decade. Although high unemployment and civil unrest may inspire regime change, this new government will inherit the same ecological problem and the potential for failure will be high for this state entity as well. And, the period of conflict leading up to the formation of a new state government will only distract from the water issue even more. The question is not will the state of Yemen fail, but how will the people of Yemen continue to exist in this area without significant outside assistance to rapidly build water infrastructure and to differentiate the economy in order to enable agricultural importation in preparation for a lack of irrigation water. How will this society reinvent itself as the lack of water transforms the Arabian Peninsula into an arid region similar to the Sahara in Africa? How will the people react as sources of water dry up? Where will people go when the wells run dry?

Where's the Water Going?

After spending the summer of 2008 in Yemen, I returned to my university. I was curious as to the science behind Nazar's comments and the conversations I'd had while there. I called upon a geologist friend of mine who happened to specialize in sustainability studies. Yemen was not his usual field site, but he graciously said he'd review the data and meet me for coffee the next day. We met on the lawn of one of the historic buildings on campus and he pulled out a notebook. He began to draw the peninsula as he shook his head. "You want my opinion as to what will happen to Yemen? It's all here in the data. That little country is becoming the Sahara." His comment reminded me of Nazar's comparison to the famously harsh desert; "It's like wringing out a sponge, they're on the end of the peninsula and the water is draining out." I asked him to explain further, and we spoke for an hour. The conclusion was disconcerting.

After my visit, I spoke with other hydrologists who specialized in the region, and I learned the gloomy truth. Regardless of intervention, Yemen is going to go dry. Some estimates say by 2025, others as soon as 2017, but the process is underway. The aquifers have been punctured by unregulated wells and the water has been severely mismanaged. Plus, climate change has altered the environment. Although rain will still fall, and although the changes in the ecosystem will evolve over a period of years, this land will become dryer and dryer. The Arabian Peninsula, as a whole, is slowly losing groundwater due to a myriad of causes including upwelling off the coast of the Red Sea, poorly managed use of water resources by humans, and climate change which has shifted rain patterns from Europe (Abdel-Rahman 2006). "Almost every country in the Middle East is facing a water crisis of historic proportions. In the Arabian Peninsula, groundwater use is nearly three times greater than its recharge," warned Barlow &

Clarke (2002). Saudi Arabia is projected to have no groundwater within less than fifty years, and Yemen will run dry in approximately a decade.

The rise in oceanic temperature due to global warming has caused the cooler groundwater held within the aquifers of the Arabian Peninsula to be pulled out of the land mass and incorporated into the sea as wind patterns shift. Although up-welling causes a temporary increase in fish production near the coastline where nutrient rich groundwater mixes with ocean water, the long term effect will be the draining of the peninsula as the rains which could replenish the aquifers move. Warming temperatures in Europe have shifted the rains which used to fall over the Arabian Peninsula to Pakistan and Asia. Thus, while ground water is being removed from the Arabian Peninsula via up-welling, the rains which used to replenish the groundwater are also shifting to another location. The Arabian Peninsula as a whole is facing significant present and future water shortage.

Although the entire Arabian Peninsula will be affected by the decreasing groundwater and changing rain patterns, Yemen will face the harshest consequences. Rapid urban development during the 1990s without enforced environmental protection measures created large paved areas which caused massive run-off of rain water that would previously have entered the underground aquifers. Wells in Yemen are also poorly regulated. Any individual with the appropriate tools may drill a well or a sewer line into an aquifer. "There are about 32 regulated wells in New York City. Compare that to the 13,000 known wells in Sana'a, and to say they are regulated would be a joke," one government engineer told me. Oil rigs are also notorious for drilling through aquifer layers without regard to the stability of the water table. Although the Ministry of Oil has regulations in place, they are often not enforced.

I visited the office which monitors the location of oil rigs in 2009, and I spoke with the man on duty that day at length. At first, he proudly told me of the new ways that they monitored the rigs and the electronic tags used to note their locations. The technology was obviously appreciated, and he felt pride in his position. But, when I asked if the regulations applied to oil drilling were really being enforced, he became reticent.

"I really wish I could say they were. I should say they were," he said. I felt that if I had been a journalist or a more important figure, I would have received a different answer. I was just a student, and he opened up to me.

"We really try to keep up with the drilling, but we just don't have the resources. Other countries' companies come in here and they don't care as much about our land so they drill and try to cover up what they've done. But, we need the oil revenue, so we just try to do the best we can," he stated.

Aquifers have been damaged by illegal drilling and recharge area capping, but they have also been utilized to a greater extent in recent decades than in the past which further speeds their deterioration. Across the Arabian Peninsula, the farming of non-native, water intensive crops increased dramatically as nations sought to provide popular goods to their people. Agriculture in the region uses almost three times the previous level of water in irrigation, whereas many forms of produce where either unavailable or imported in the past (Barlow & Clarke 2002). Although *qat* (a narcotic plant primarily used for recreation) has been grown in the area for centuries, it has never been produced in such massive quantities. Aside from agriculture, the population growth in Yemen has also depleted the water supply and, as noted in the chart below, water use in all sectors is rapidly increasing in Yemen while the supply is dwindling.

Currently, water is provided via truck to water scarce areas of Yemen such as Taiz and Sana'a. As aquifers and wells go dry, water will have to be imported from farther and farther and finally from other countries. But, this imported bottle water will become expensive as demand rises, and Yemen's economy is not robust. Imported water will not be convenient for irrigation and plant life will die as the climate shifts. Imported water might be used for irrigation of certain crops if it could be made financially viable, but the overall environment of Yemen is still going to change as rainfall lessens and groundwater depletes causing botanical life to die.

An already arid land will become more arid and water will become terribly valuable. Despite these serious concerns, little is being done by the government regarding preparation for this reality. In fact, political narratives regarding water often shift depending upon audience and often reflect the many distractions which overpower the water narrative. The National Water Resource Authority and other parts of the bureaucracy call for change, but their efforts are tempered by a government distracted with rising terrorism and a declining economy. If nothing is done, the water shortage will create conflict in the near future which will eclipse the other threats in Yemen and create instability along the oil corridor of the Red Sea. Yemen, however, is not alone in its exploitation of groundwater. Nations around the globe are facing freshwater shortages and over exploitation of resources. Yemen provides an excellent example of the complex dynamics a society faces as it deals with environmental change.

The Anthropology of Water

Water has long been included in anthropological literature, but the anthropology *of* water is an emerging field. Water has been frequently used as a factor in agricultural ethnographies or as a perceived border space between societies. Water has been studied as a tool of ritual; and water has been referenced when attempting to understand cultural perceptions or historic

management techniques. Many classic studies have included water. In *Argonauts of the Western Pacific,* Malinowski asked his reader to "imagine yourself suddenly set down surrounded by all your gear, alone on a tropical beach close to a native village, while the launch or dinghy which has brought you sails away out of sight" (1922). Malinowski used the vast expanse of the ocean to define the border between the familiar and the exotic. Franz Boas wrote his dissertation in physics on the colors of water and later studied how culture influenced the Eskimo's perceptions of sea water's shade (1881). Water was a tool in his study which exemplified the various ways different people could view the same physical substance. Geertz inquired into the complexities of water management of the rice fields in Bali, focusing on supply and control issues and exploring water governance and politics (1969). As the Western world became concerned with global warming and climate change, anthropologists answered the call by offering ethnographic accounts of watersheds and the challenges faced by local populations. Lansing described the delicate balance between the water temples governing the rice fields of Bali and the shifting power structures created with the implementation of Western technology (2006, 2007). Strang explored water's various and changing meanings through her work in New Guinea and Australia, suggesting that water is essential to most all facets of society from economics to politics to gender relations to ritual and beyond (2004, 2009).

In recent years, water has become a critical subject for anthropologists as accessing this vital resource becomes more challenging for populations across the globe. The physical sciences recognize water as a unique compound because it is capable of existing as either vapor, liquid, or solid in the form of ice. In its liquid form it hosts entire ecosystems in oceans, rivers, and lakes. Even human and animal life on land requires large amounts of water to exist. Anthropologists view water as much more than simply a chemical compound needed for physical life. Water is

vital to social life and influences everything from human health to economics to politics and religion. Orlove and Caton rightly argue that water fits Mauss's definition of a "total social fact," because it "connects many realms of social life" in a way which no other resource is capable of doing (2010). As climate change and growing demand place stress on water supplies, societies have no replacement for this vital resource. There is no second choice; there is only the need for water.

In response to water's rising status in the field, anthropologists are developing a new lexicon to address water's significance. Hastrup uses the term "waterworld" to emphasize the importance of water in the many landscapes and populations of the globe (2009). The term "waterworld" suggests a more fluid content than a land based term. Waterworlds are not strictly segmented territories of solid land which may be cut into neat pieces to be divided by nations and managed independently from each other. Instead, waterworlds are fluid and intertwined, reacting both individually and communally to climate change. Crate calls for anthropologists to use new methods to address the "unprecedented urgency and the new level of reflexiveness" that is demanded by climate change research (2011). She asserts that the complex, multi-dimensional nature of climate change requires collaborative, multi-sited ethnography using interdisciplinary means to address this all-encompassing global phenomenon.

I draw upon Crate's proposal to offer an ethnography placing water at the heart of the research. As a total social fact, water both affects all aspects of society *and* is affected by them. Humans are in a dialectic relationship with water, and water acts with agency in response to the pressures placed upon it. When overused, water may relocate to another area which is more congenial to its existence leaving its previous homeland dry. When "managed," water continuously attempts to prove that is it free of these bonds and will not be tamed by overflowing

dams and changing its rain patterns. It is these "zones of friction", to borrow from Tsing, between water and the many humans attempting to manage, understand, or consume it which offer the basis for my research (2004).

Chapter Overview

The first chapter looks at the bureaucracies of the state which address water including the National Water Resource Authority (NWRA), the Ministry of Water and Environment (MWE), and the Ministry of Agriculture and Irrigation (MAI). Each bureaucracy functions in a slightly different way to regulate water resources, but NWRA directly coordinates the public service campaign and coordinates the programs. These three branches are embedded in the state structure and constantly vie for resources and funding as well as political capital all the while attempting to function together (although often at odds) with each other and larger state politics.

Chapter Two discusses the current operations and upcoming plans of international organizations such as the World Bank, USAID, and others. Although billions have been poured into the Yemeni economy to "stabilize" the situation in the country, the money has yet to be used efficiently because the state lacks the capacity to absorb the funds and the international donors lack the will to push for change. Many of the project plans include water sector reforms, but they are not sustainable and address short term problems which will soon be overcome by the greater water crisis. This chapter looks at the dynamics between the people, the international organizations and NGOs, and the politicians guiding grant writing and the distribution of funds.

Chapter Three explores the methods being used by the water bureaucracies to educate the Yemeni people about the water situation and the varying narratives being projected by bureaucracy and government officials. This chapter tracks the story of Rowyan, the cartoon raindrop, used in the water conservation campaign launched by NWRA along with the World

Bank and GTZ in an attempt to educate the population regarding the impending crisis. Rowyan's origin, message, and message reception are explored in this chapter.

Chapter Four explores the understanding of the Yemeni public regarding the water shortage and the ways in which they acquire knowledge regarding their environment. Yemeni tribes embrace a long tradition of environmental knowledge and trust in this cultural memory is much greater than the trust people have in "modern" (often Western) science and politics. The state of Yemen is viewed as fleeting, while tribal knowledge of the land has been accumulated over a thousand or more years. Messages regarding the looming water crisis are not often seen or discussed, and more concern is given to the secessionist movement. Few acknowledge the gloomy prospect for Yemen's water supply and future resource acquisition. "God will provide" is the common slogan given when asked what people will do when the water runs out.

Chapter Five provides a regional and global comparison, placing Yemen's water crisis in context. Other nations on the Arabian Peninsula are also experiencing depleting groundwater supplies, but their governments have invested strongly in desalination and water infrastructure. Consumption, however, remains high and public understanding of the Arabian Peninsula's water situation is low. This chapter explores the responses of Yemen's neighbors to the changing water environment and offers analysis as compared to the larger MENA region and to global water needs.

Yemen's plight with water brings to light a growing, cross-cultural and international concern regarding the resource. Waterworlds are intertwined and the problems in Yemen cannot be ignored or believed to be isolated. The world has used ground water at an alarming rate in many areas and climate change will create more landscapes with altered water levels. Some areas will see rising water levels while others dry. The Amazon suffered has suffered two major

draughts in the past decade which threaten the continued existence of the rain forests. The Cape Verde Islands off the coast of Africa are becoming more arid as rainfall changes in pattern, and the majority of the population has moved to other areas. Islands in the Pacific are threatened by rising sea levels and may cease if the oceans continue to expand. Yemen is not alone in confronting climate change. In a world of strongly enforced state borders, what options will people have and how will societies reinvent themselves as their environments change? This ethnography offers one example of how a particular society is addressing and ignoring the changes in its waterworld.

II. A STATE OF DISTRACTION

Nothing in the world is more flexible and yielding than water. Yet when it attacks the firm and the strong, none can withstand it, because they have no way to change it. So the flexible overcome the adamant, the yielding overcome the forceful. Everyone knows this, but no one can do it.

~ Lao-Tzu, Chinese philosopher (6th century B.C.)

"Who's in charge of water here?" I asked one of my neighbors, Nabil. He and his family lived in the building across from mine. I often would look out from my window and see the children waving at me from across the way. Sometimes Nabil would bring the baby and have her wave through the pink painted iron grill. Most of the windows in our area had no glass and were simply openings in the stone walls covered by wide shutters. Having the iron grill was prudent, particularly because the children always wanted to lean out. It was a sunny day, and I stopped to chat with him as I walked down our shared cobblestone driveway. Nabil was standing in front of his blue door, attempting to fix the hinge.

"Well, I suppose I'd say NWRA but it's kind of confusing. I read the paper and I know the Ministry of Water and Environment is active and so is the Ministry of Agriculture and Irrigation," he replied. "You know, I lived in this same building before the civil war.[2] I can't keep track of all the government changes and new branches since then. But, NWRA does a lot."

[2] In May of 1994, after only four years of unification, civil war erupted in Yemen. Most of the violence occurred in the south, but the north experienced air and missile attacks in urban areas such as Sana'a. Southern leaders declared secession and established the Democratic Republic of Yemen (DRY), although the government was not acknowledged by the international community. The United States supported a unified Yemen and encouraged the parties to return to negotiations. Saudi Arabia provided financial assistance to the southern secessionists. Aden was captured by Yemeni government forces in July, and the civil war essentially ended. President Saleh announced amnesty for all but 16, and many who had fled the country returned. In October of 1994, President Saleh was elected to a five year term. He won each of the following elections. In 2012, Saleh stepped down as president following mass protests and his vice president, Abd Mansur Rabuh Hadi assumed power.

"What kind of things?" I asked.

"Oh, I don't know. I've seen their name in the paper, though." He turned to see his three oldest children coming down the walkway. They'd been sent to gather a few things from the corner grocery shop where Ali sold vegetables in open baskets, boxes of milk, and tuna on shelves in the back.

"Do you think the government is worried about the water here?" I smiled as his ten year old son handed me a piece of candy. As poor as the family was, they always shared everything and the children enjoyed seeing my expression as I tried foods and sweets that were new to me.

"About water? No. They're too busy being worried about building their own big mansions or dealing with the unemployment or the oil. There're so many problems." Nabil took a piece of candy and we stood sucking the sugary confections in the street with the children. "I wonder if I'll be living in this house to see another civil war in the next few years."

As I learned more about the water sector, I discovered that Nabil was correct to an extent. Tension existed between the water management agencies, and NWRA was, in fact, one of three main bureaucracies attempting to control the natural resource. Because of its unique position in society, water is a terribly difficult resource to control. Not only is its physical containment complicated as water flow defies boundaries and borders while also literally falling from the sky, but competing individuals and states have interests in the resource as well—interests which have intensified as water has, especially in neo-liberal times, become a profitable and powerful commodity. As groundwater depletes and becomes polluted, international corporations operate across state borders to sell water for profit to those who can afford it. Local elites benefit from corporate contracts while states juggle the geo-politics of providing water to their people in a world where fresh water supplies are being depleted.

Human consumption of water is doubling every twenty years according to Barlow and Clarke, a rate that far exceeds the world's population growth rate, while fresh water supplies are shrinking (2003). Agricultural irrigation consumes more than 65-70% of fresh water globally. Industry uses 20-25%, while household consumption accounts for a mere 10% (Barlow & Clarke 2003). The water used in agriculture and in industry is often returned to the environment severely polluted by pesticides, fertilizers, and other industrial wastes. It is no surprise that international organizations are interceding in an attempt to control this resource and to influence its usage. In 2000, the World Water Forum at The Hague declared water a "need" not a "right." At the next World Water Forum in Kyoto in 2003, civil society groups re-petitioned for water to be considered a "right" but, once again, the international community declared water a "need". If water is considered a "right" then governments would have to provide it to their populations and would be required to pursue policies and treaties which support this process. If, however, water is a "need" then private corporations can seek to provide the resource as a commodity and water becomes a vital part of global capitalism.[3] With decreasing freshwater supply, the price of water globally is assured to rise in a capitalistic system, financially restricting poorer populations' ability to access it and poorer state's means to secure it for their citizens.

My research into the management of water in Yemen led me to interview members of the

[3]The Blue Planet Project is one of several civil society groups actively working to change the status of water in international law. Maude Barlow, a Canadian author and activist, works with the Blue Planet Project and has written several books supporting international water rights. She has received 10 honorary doctorates from respected Canadian universities for her work on the environment and social justice issues. Maude Barlow serves as the senior advisor to the president of the UN on water issues. The Blue Planet Project and other civil society groups across the world are petitioning the UN to change the status of water to a "right" so that as water scarcity grows, states will have a responsibility to ensure adequate access to this vital resource instead of allowing corporations to collect increased profits while poorer populations are unable to afford water. Other groups from countries such as Bolivia, England, Brazil, Chile, Honduras, Indonesia, Morocco, the Philippines, and others have joined the cause.

water bureaucracies in an effort to understand the dynamics regarding the resource's management. Informants noted that the many changes in bureaucratic structure in recent years had created multiple branches tasked with managing a single resource within a fragile state with limited finances. Informants complained that implementation and formation of policy was difficult given this organizational tangle and they expressed anxieties about the upcoming water crisis as well as a fatalistic assessment that their actions within the bureaucracies would, in the end, do little to stop the impending catastrophe. Employees expressed frustration over the lack of appropriate preparation for the depleting water table and themes of inadequacy and inefficiency emerged in the interviews. Informants believed that the state, overall, was too distracted by other issues such as security, unemployment, and possible civil war. The staffs of the water bureaucracies were fairly unanimous in their assertions that there would be a water crisis within the next decade, and that Yemen would not be prepared to provide water to its population at a reasonable cost. This, in turn, is likely to cause population migration, dehydration, and water borne illnesses. The majority of Yemen's population is currently located in the Western highlands near urban areas and away from alternative water sources such as smaller aquifers in Hadramawt (Ward 2001). As people seek to secure water, conflict over the resource will rise.

In this chapter, I introduce the main water bureaucracies in Yemen and their functions in managing the resource. I then describe my discussions with the staff of the National Water Resource Authority (NWRA) and I summarize the narratives which emerged after numerous interviews. I focused on NWRA because it is the chief governmental agency charged with two of the most difficult duties in water management: the tasks of implementing/enforcing water policy and creating public awareness of the impending crisis. I was surprised to find the

members of the Yemeni bureaucracies were very open in interviews and with information sharing—more open, in fact, than I might have expected from similar organizations in the West. The men of the water bureaucracies proved to be highly educated individuals operating in a fractured governmental structure which prevented comprehensive action.

An Overview of the Water Landscape

The fragile state of Yemen has focused on immediate concerns for years and has deferred to global organizations such as the World Bank to guide actions in the water sector. Many highly educated and well trained individuals in the state bureaucracies are tasked with supervising water policies and coordinating actions with global aid organizations. Many of these Yemeni employees have years of experience and participated in water bureaucracies pre-dating Saleh's regime. Bureaucracies tend to maintain stability of state policies when regimes change, as Weber notes. The names of the water bureaucracies in Yemen may have changed, but the staffs remain the same and the knowledge of Yemen's severe water depletion been retained through the numerous political shifts. A good understanding of the problem of Yemen's water supply does not, however, translate into adequate action. The various Yemeni bureaucracies responsible for water exist in a state of competition with each other as they vie for funding and power within a larger political system fraught with corruption and cronyism. Feldman explains that although bureaucracies and their knowledge may transcend regime change and shifts in power, these bureaucracies nevertheless have to function within the new administrations and adjust to the associated changes in policy. She states that "even as bureaucratic practice can continue across regimes, it is also dramatically reshaped by changing conditions and circumstances of rule" (Feldman 2008: 67).

The unification of Yemen and subsequent civil war in the 1990s led to a proliferation of

bureaucracies throughout the government as Saleh's administration assumed control. Some new bureaucracies were formed while many old bureaucracies remained and often functioned with duplicate counterparts left over from the defunct state in the south. The Ministry of Agriculture and Irrigation emerged as the primary governmental entity after unification and controlled agricultural water usage. The government, however, recognized that water issues involved more than irrigation and that another entity was needed to manage broader water issues. In 1995, the Dutch government conducted a series of collective water resource studies and based on those studies the Yemeni government determined that a single agency was required to manage water resources effectively (Al-Asbahi 2005). The National Water Resources Authority (NWRA) was formed in 1996, absorbing offices from both northern and southern bureaucracies and assuming control of the water sector. NWRA, however, did not establish the kind of dominant control and effective policy implementation that the Dutch studies suggested. Feldman notes that "authority is enacted through practice, not established once and for all" (2008: 239). Although the Yemeni government's intention was that NWRA would be the supreme authority for water issues, smaller bureaucracies that were absorbed into it resisted change. Implementation of policy was therefore slow and in some areas non-existent. It was difficult for NWRA to implement plans in many rural areas because of the terrain, lack of infrastructure, and deficit of government offices and staff. Policy enforcement proved to be a challenge in both urban and rural areas because the government lacked the funds to hire a large enough staff to pursue infractions of water policy.

Reform of the water sector and the creation of NWRA also created friction with the MAI which served agricultural voters and retained responsibility for irrigation resources. Despite Yemen's semi-arid climate, agriculture was, and is, a primary source of revenue for the struggling economy. Approximately 90% of Yemen's water resources are used in the agricultural

sector (Caton 2007). This is considerably higher than the 60% of freshwater used globally for irrigation purposes (USGS 2011). Of the water used in Yemen's agricultural sector, the majority (about 60%) is used to cultivate *qat*, a narcotic plant used for recreational purposes and which has little export value but holds tremendous cultural value and is a steady source of profit for farmers. The MAI sought to satisfy irrigation needs of farmers (a significant voting bloc) while NWRA attempted to encourage water conservation and policies that were often in conflict with demands for agricultural expansion and the imperatives of short-term economic growth. By allowing the MAI to operate separately from NWRA, the government reinforced factionalism between bureaucracies and tried to appease constituencies whose immediate interests were in agricultural profits. The ability to balance multiple players (tribes, bureaucracies, political parties, elites, and foreign interests) was the secret to Saleh's success and the structure of Yemeni bureaucracies supported his method of control. The creation of NWRA appeased the international development community and Yemeni urban voters while the continued existence of the MAI satisfied the interests of farmers and ensured that NWRA's authority was curbed.

Then, in April of 2003, the Republic of Yemen held its third national parliamentary elections. President Saleh's General People's Congress Party won the elections taking 238 of 301 parliament seats. In an attempt to assuage agricultural voters who feared restrictive water policies and urban voters who complained of dwindling water in the taps, Saleh's government formed the Ministry of Water and Environment (MWE) which took over responsibility for supply and sanitation from the old Ministry of Energy and Water. The MWE took charge of NWRA as well. Meanwhile the MAI remained a separate actor. The responsibility for water management now involved three primary actors: the MAI, NWRA, and the newly formed MWE. Although the creation of the MWE undermined NWRA's fragile authority, NWRA

retained policy implementation and enforcement duties.

The MWE developed a four year National Water Sector Strategy and Investment Plan (NWSSIP) for 2005 – 2009 which required annual reviews of the water ministries including the MAI, MWE, and NWRA in order to gauge progress in water sustainability policies and agricultural practices such as irrigation techniques. The stated purpose of NWSSIP was to align the goals and practices of all of the water agencies. Dr. Muhammad al-Eriyani and Dr. Muhammad al-Hamdi assumed the roles of director and deputy director of the MWE respectively and were charged with refining NWSSIP policy. Both had solid academic and organizational credentials, and both hailed from established Yemeni elite families. Dr. Muhammad al-Eriyani was a graduate of the University of Arizona and a relative of Abdul Rahman Yahya al-Eryani, president of the Yemen Arab Republic from 1967 to 1974 (Caton 2007; New York Times 1998). Dr. Muhammad al-Hamdi was a graduate of Delft University of Technology in the Netherlands and wrote his dissertation, "Competition for Scarce Groundwater in the Sana'a Plain", on the decreasing water supply of the Sana'a aquifer. Al-Hamdi was also a relative of Lieutenant-Colonel Ibrahim al-Hamdi[4] who led a military coup in 1974 in the Yemen Arab Republic which overthrew, ironically, Abdul Rahman Yahya al-Eriyani. LTC al-Hamdi headed the Military Council which ruled the country after the coup until his assassination in

[4] After Al-Hamdi's assassination, Ahmed bin Hussein al-Ghashmi assumed the presidency. Al-Ghasmi appointed Saleh, then a young Army officer, as military governor of the city of Taiz. Al-Ghashmi was assassinated eight months after assuming office by a bomb placed in a briefcase during a meeting with an envoy from the People's Democratic of Yemen. Abdul Karim Abdullah al-Arashi took control of the country briefly between June and July of 1978 until the Parliament selected Saleh to take over as president. Some informants suggested to me that Saleh was chosen because of his lack of formal education (he never attended university) and his humble background. Politicians and tribal leaders believed that he would be easily manipulated, particularly after a string of assassinated presidents. Instead, Saleh proved to be talented at balancing the many forces within Yemen and retaining power.

1977. Both the al-Eryani and al-Hamdi families remain prominent in Yemeni politics.

The appointment of two PhD's from well-known families to positions of leadership in the water sector provided a boost of authority to the positions and to the new ministry. The stated goals of the newly formed MWE and NWSSIP were to strengthen sustainability practices while encouraging improved community water management and increased water return in agriculture. In order to achieve these goals, the MWE sought to utilize grants and loans from the World Bank (primarily provided by the Dutch, Germans, and British[5]) to fund education projects and equipment purchases. This proved to be difficult, however, in a country where government forces rarely reached rural areas; corruption allowed for exceptions to policy; and citizens disregarded laws when they feel these detract from their communal water rights or infringed upon agricultural productivity.

NWRA remained powerful even after the creation of the MWE and continued to be the branch responsible for Water Law implementation and licensing (a challenging task) as well as water resource analysis. In order to improve coordination across the entire nation, NWRA based its headquarters in Sana'a and established offices responsible for Aden, Al-Hudaidah, Dhamar, Hadramawt, Sada'a, Sana'a, and Taiz. NWRA also began publishing project updates and reports on water statistics regularly on both their Arabic and English websites and worked with local and international NGOs to increase public awareness in the region (NWRA 2011). NWRA designed sustainability projects and coordinated projects with donors and water institutions. And, the government assigned NWRA the task of educating the population regarding the water shortage, a daunting task considering that a 2002 poll conducted by the Sana'a Basin Water Management Project found that most Yemenis believed that decreasing water levels were a "punishment from

[5] USAID left Yemen after Yemen's support of Iraq in the First Gulf War and returned in 2012 after years without support.

God because Muslims were not paying the zakat (yearly contributions to charity to be made by all Muslims according to Islam)" and did not acknowledge human factors or climate change as causes for the water shortage (IRIN 2004).

My Introduction to NWRA

As I read numerous documents about NWRA and the water resource programs in Yemen, I tried to figure out how I might interview some of the employees. I preferred to make contact through an intermediary who could introduce me so as to establish a closer relationship as opposed to simply dropping by their offices. While sitting in my room in Sana'a one summer morning, I received a phone call from an acquaintance of mine visiting from America who happened to be a Yemeni-American hydrologist who worked in New York City but maintained interest in his homeland. Khaled had presented numerous papers at Arab water seminars, and he had consulted with the Yemeni water authorities in the past.

"I fly out tomorrow, but I wanted to see if you'd like to go by the NWRA offices today. I thought I'd introduce you and then we could head to the Ministry of Water," Khaled suggested. I was thoroughly surprised. I recognized that this was a perfect opportunity to meet the staff. I rushed to put on a plain black skirt and long sleeved top. Negotiating my identity in Yemen was always a challenge. As a female, I often found that I was more comfortable embracing the *abaya* while roaming the countryside speaking to people because I could blend and not stand out in a crowd. I had not come to Yemen with the intention of speaking with policymakers, and I had few Western clothes with me as I usually wore an *abaya* like the Yemeni women. I hurriedly reached to the back of my closet and found appropriate attire.

My friend, Khaled, met me at the gate to my building in Sana'a about a half hour later. He had borrowed a beaten up Toyota pick-up from a friend. It blended perfectly with the many

Toyotas on the roads of Sana'a and the numerous cabs and cars. Vehicles rarely had air conditioning that worked, and this Toyota was not an exception. Traffic was heavy at that hour in the morning, and the trip ended up taking about forty-five minutes as we negotiated the busy streets. We pulled up to a group of government buildings surrounded by a high fence and two gates. By the time we arrived, we were sweaty from the heat. It was a condition that I was used to because climate control (air conditioning or heating) was rarely added to the buildings or vehicles of Yemen, except in rich or Western areas. The truck turned into a gate near the *Majlis al-Shura* (Consultative Council), a tall building holding the council of advisors for the Yemeni government. The car in front of us stopped for the guards and handed over their passports. I became alarmed for a moment as I had not received my passport back from the visa office yet. Khaled recognized my nervousness and told me not to worry as we pulled up to take the car's place in front of the guards.

"They'll just let you pass without asking for a passport or papers because you're white. They don't know who you are, but if you're white and entering a government office looking official then you probably are important. If I were alone, because of my skin color, they'd ask me for my identification and hold it until I left the compound," he explained. I was shocked at this idea and I wondered if he was right. The main guard looked into the car and saw Khaled in his business suit with me sitting next to him. The guard just nodded pleasantly and waved us through just as Khaled said he would. I glanced in the rear view mirror and saw the truck behind us stop as the driver collected i.d.'s and passed them to the guard. We drove past a parking lot and around a field of slightly brown grass to a red brick building with bougainvillea vines hanging over the edges near the windows. The Ministry's display of extravagant water use (grass is a strong consumer of moisture) surprised me given Yemen's water scarcity, but the complex

also included other ministries and grassy areas were symbols of wealth and state power.

NWRA, in the back of the complex, reminded me of an old English estate tucked amongst the concrete buildings with Middle Eastern decorations. The area contained a few scraggly plants and a half-green field, indicating some form of irrigation. My colleague said that the red brick building had been used by USAID before they left Yemen during the first Gulf War. The building was empty and there were few cars in the parking lot. It was Ramadan, and work hours were less strict during this period of fasting. We waited for the staff to arrive. Compact cars and Toyota pick-ups began to pull into the parking lot carrying multiple men per vehicle. Carpooling was common in Yemen because vehicles were expensive, so neighbors or friends often shared transportation. The workers were dressed in brown, grey, or blue slacks with white shirts and ties. I was used to seeing men in Yemen wearing the white *thobe* (long robe) with the *jambia* (curved knife) attached to their waists in my neighborhood, closer to the Old City.

A man in his early thirties walked up to Khaled and greeted him in perfect English. They had known each other for years. Khaled explained that I was studying water in Yemen. The young engineer said that he'd be glad to help if we obtained permission from the director first. The director was not there yet, and we stood chatting in the entryway as employees arrived. Most greeted us in Arabic, but quickly switched to fluent English when they learned I was American. I was impressed with their language skills, and I joked about my slowly developing Arabic. I asked them where they had learned English, and I was surprised to find that the majority of scientists and engineers with NWRA had graduate degrees from the United States. I, naively, had expected the employees to have been educated primarily in the Middle East. Instead, they were graduates of the University of Arizona, the University of Ohio, and other U.S. schools. Some were even Americans who had married Yemenis and decided to stay in the

country to be near their wives' families. Except for a secretary or two, all of the employees were male and ranged in age from late twenties to sixties. Most all of the men had at least traveled to the U.S. or Europe, if not lived overseas for a period of time.

Some men (like al-Hamdi and al-Eryani) came from prominent Yemeni families who paid for their educations; others had earned scholarships to travel. Until the 1960s, education in northern Yemen (Yemen Arab Republic) was inaccessible to the masses and usually only available through a few Islamic schools. In the late 1960s, secular schools began to spread across the nation as the post-revolutionary government encouraged intellectualism and secularization. School attendance was 12% in 1971 and rose to 50% by 1981 (State University 2011). In 1970, Sana'a University was founded with Kuwaiti aid. Numerous libraries and other educational facilities spread across the country in the years that followed. Government scholarships were established in order to send students overseas to study subjects not provided at Sana'a University.

Education in southern Yemen lagged behind the north as the British invested little in educational facilities for the Aden protectorate. World War II saw a population boom near the port of Aden, but much of this population was foreigners. English became essential for Adeni elites to function in the British protectorate, and the British established English lesson instruction for Adeni elites. Many southern Yemeni elites attended British universities, usually focusing on public administration so that they could return to Yemen and use their skills in the protectorate. The ties between southern Yemenis and British grew over the years, and many families still send their children overseas for university and graduate degrees in Europe. Most of the Yemenis I met in Sana'a were from northern families and had taken advantage of the government scholarships to study in the U.S., but I did meet several officials who had studied in Europe as well and had

southern ties. The men at NWRA were well versed in water science as well as international politics and had a variety of scientific interests and specialties. I was amazed by the breadth of knowledge as I learned more of the employees. I explained to them that I wanted to learn more about the water situation in Yemen, specifically the discrepancy between the looming crisis and the lack of preparation by the society.

"Are you with the World Bank?" A program manager asked in English as we stood in a small group near the entrance of the NWRA building.

"No, I'm just trying to finish my doctorate. I'm a graduate student," I replied, confused by the question.

"We get a lot of UN and World Bank people who drop by and inquire about progress in the water sector." He stated wearily. I would learn the deeper meaning of this statement later after I had spent more time with the staff. The World Bank and other outside interests such as the UN or NGOs from European nations were there to get results and "check a box" for a project completed. They often arrived with set goals and did not respond well to Yemeni suggestions. Although Yemenis appreciated the chance for funding and support, locals were wary of "outside" projects that often were implemented without any real local assistance, input, or expertise. James Ferguson noted that development projects are often "forced down the throats" of the recipient governments in the developing world (2006). With so many foreigners coming to Yemen to aid in "development", Yemeni officials sought to clarify the identity and purpose of those entering their offices quickly. I found that almost every worker I encountered asked me if I was with a development organization. As soon as I explained that I was a graduate student studying for my doctorate, the demeanor of government employees relaxed and conversations flowed more smoothly. I was therefore left with the impression that Yemeni officials were wary

of aid organizations and spoke carefully when in the presence of their members. I also learned that Yemenis staff appreciated the difficulties of conducting academic research in the country.

"We had another foreigner come by a year ago or so with some university wanting to do some research, but he never came back," said one engineer, indicating the worsening security situation.

"I understand. I had a hard time getting any funding to be able to do research here. I ended up paying for things myself," I empathized. In fact, I had been advised not to enter Yemen since the U.S. State Department classified the country as a "red" security zone (the highest threat level applicable). I began chatting with the engineer about these financial challenges, and he responded that most Yemeni researchers interested in water issues also had to fund their own research because the government provided very little in the way of financial support.

"We buy our own equipment a lot. Professors at Sana'a University end up paying for their own research too. I'd say probably less than 1% of the [government] budget has anything to do with water research although I think they claim higher [when speaking with international donors]. But, water's going to be such a problem in the future," he exclaimed. "We see the problems coming, but nothing gets funded to do anything about it. Outsiders [World Bank] fund projects but they're never implemented well." He went on to say that morale was very low with Yemeni professionals who studied and worked on water related issues.

Another NWRA employee in his forties walked up to join us. Hearing his colleague's comments about the impending water crisis, he jokingly added "take your pictures now and then book your ticket out." The man introduced himself as one of the NWRA managers. He smiled and greeted Khaled and I. The mood was light, and yet his statement held such a somber note. I

asked him what he meant. “I mean that this nation is so screwed up that nothing is going to get done no matter how much money pours in. This place is going to be drastically different in a couple of decades.” Five or six NWRA employees had joined our group by this point. I was surprised at the openness of their conversation as we stood in the parking lot. I followed Khaled and the men into the red brick building and down a long, grey hallway with doors on either side. We were informed that the director was actually away that day, but the deputy director, Abdullah Al-Thary, could see us. We entered a medium sized office with a large desk piled high with papers and files. A small couch and a couple of chairs sat in front of the desk with a small table. Al-Thary smiled as we entered and invited us for a quick cup of tea. He, like the others, spoke impeccable English. Al-Thary was a graduate of the University of Arizona and we quickly began comparing stories of our travels in the southwestern United States. As we spoke, office workers constantly walked in to get him to sign a document or to ask a question. He was obviously a very busy man, and I knew that my time with him would be short.

Al-Thary appeared to be frustrated with the many challenges he dealt with every day. He expressed his opinions publicly in press interviews and on NWRA’s website, in a “Note from the Deputy Director” which read:

> Water is life. Yemen is a country which is on the threshold of development process. Water is essential for all spheres of development. There is unequal distribution of this essential resource throughout the world. Yemen receives marginal rainfall in major parts of the country causing water scarcity. Groundwater is the major source for drinking and irrigation purposes…Water Scarcity is the key constraint to development .The rural livelihoods cannot be improved without improving access to water and sanitation. This is a basic necessity for human life…Water is everybody’s business. There is illegal drilling, over exploitation and pollution. To tackle these issues, the cooperation and participation of all the stakeholders is essential. Water law implementation requires dedicated approach for different authorities. NWRA is making all out efforts to take care of the precious resource (2010).

Al-Thary's statement pointedly noted that human actions such as illegal drilling and over-exploitation of water resources were exacerbating the crisis and were the "key constraint" impeding development. Al-Thary immediately followed the statement "Water is everybody's business" with references to illegal drilling and over-exploitation. Other informants said that these actions are often taken by oil corporations in disregard for local policies and by Yemeni citizens who want deeper wells in their own backyards regardless of the impact on the community. Al-Thary's comment that cooperation of "all" stakeholders was necessary alludes to the fact that too many individuals chose to ignore policies and exploit water for their own gain. *Qat* growers use pumps to drain as much water as possible to increase crop size and profits while politicians block the import of fruits in order to raise locally grown produce prices and gain farmer's votes. Water is used with disregard for future consequence. Without the participation and observation of the law by "all stake holders", water law is irrelevant.

I asked Al-Thary his thoughts on the current water situation in Yemen, water law implementation, and the course for the future. He said that many people were trying to improve the situation, including investors such as the World Bank, but that policies were difficult to enforce and awareness amongst the population of the level of the crisis was not adequate. He asked if I had seen Al-Hamdi's dramatic comment in the press. I knew which one he was referring to, as it had particularly struck me. In 2007, Dr Mohammed Al-Hamdi, Yemen's Deputy Minister of Water and Environment, told reporters that the capital city of Sana'a would "become a ghost town" in the not so distant future. "You can't imagine life without water, and without water, people will just have to leave and migrate somewhere else," Al-Hamdi predicted (Yemen Times 2007). Al-Thary indicated that he agreed with Al-Hamdi and his prediction. I asked Al-Thary why this quote had not sent shock waves through Yemeni society. I wondered

how American society would have reacted if the director of the Environmental Protection Agency had announced that Washington D.C. would be a "ghost town" in a decade. He responded that there were too many other issues affecting day to day life and that the message was lost amidst the other narratives threatening civil war and economic collapse. I would have liked to ask more questions, but our interview came to an abrupt end as he was pulled into a meeting. But, Al-Thary graciously said that I could visit with the employees and offered the use of their library to me should I require reference materials.

The library was a small room filled with shelves from ceiling to floor including past contracts, manuals, statistics, and various documents which pre-dated digitalization. The NWRA building had not been renovated in many years, and the furnishings showed their age. Although the chairs had once been plush and the tables polished, now they were scuffed and used. The florescent lighting shone through the halls when we first entered, but soon the power went out (as happened regularly) and we moved to a room with windows open to the sunshine. The walls displayed NWRA- produced posters encouraging water conservation. A few of the men gathered in an office to answer my questions, and I was surprised that they took time out of their work day to help me. The group included a program manager, a couple of engineers, and a few office workers who oversaw various aspects of different projects. We visited for about an hour. Thanks to my introduction to NWRA via Khaled, I was able to get to know many of the people who worked there. I was referred to individuals at the Ministry of Water and Environment and the Ministry of Agriculture and Irrigation. Although I conducted interviews occasionally in government offices, many people preferred to call, email, or meet me in a local café or library.

I was surprised at how forthcoming people were regarding the many influences in the water sector of Yemen. People constantly offered me documents, articles, and information;

some of it not normally available for public circulation. Officials always answered my questions, and often took time out of their day to direct me to the correct person if I'd asked something with which they were unfamiliar. The image I'd had in my mind of a closed-off, heavy handed regime faded as I met with the NWRA employees and the staffs of the other government bureaucracies. The staffs of these bureaucracies sought to present a professional image to foreigners such as myself and I sensed their embarrassment and frustration as the power went off during meetings and attendees moved down the hall to a room with windows. I felt a kinship with them as I empathized and remembered my own upbringing in the southern U.S. and times of poverty. Although my previous experiences could not compare to the daily difficulties in Yemen, I recalled the feeling of trying to rise above the circumstance to show people my value beyond the economic challenge. These highly educated, knowledgeable men in the bureaucracies of Yemen constantly attempted to share information and rise beyond the restrictive environment of their bureaucracy.

After numerous discussions and visits with the NWRA employees as well as employees of the MAI and MWE, I recognized that common themes were emerging in their narratives. Informants realized the seriousness of the water situation and the future implications of the limited infrastructure and poor preparation. It is difficult to put into words the extreme frustration I sensed from my informants as they complained about negotiating the Yemeni political system, seeking funds from the international community, and attempting to educate the Yemeni people. The Yemeni bureaucrats recognized the inadequacy of their infrastructure and feared the consequences for the future. They understood that poor security created fear with investors and continuously distracted the current ruling regime as the nation teetered on civil war. The Yemenis I spoke with at these bureaucracies were well educated and well informed,

but most of all they were tired. They were tired of telling local politicians, international politicians, development agencies, and media outlets that a water crisis was coming and getting only a response of brief interest followed by an attitude of "we'll deal with it later."

Concerns about Inadequacy

As I conducted interviews and grew to know the members of NWRA, I often asked for examples of their projects. The Sana'a Basin Project and Water Sector Support Grants were constantly mentioned, but I soon realized that their accounts of these projects were hedged with qualifiers such as "at least we achieved this" or "something is better than nothing" or "it may not be enough, but…" Projects were considered inadequate in the face of the looming water crisis. Informants felt that the actions of NWRA and the other water bureaucracies were not capable of stemming the looming water crisis. The Sana'a Basin Project and Water Sector Support Grants were used as examples of their attempts to do something beneficial for the population. Informants said that they "wished for more" but knew that ultimately their actions would "not be enough". When asked why, they responded that there was not enough money to truly solve the problem and that the population did not see the water shortage as being as serious as it was, therefore the government did not have the pressure to produce results that it might have otherwise. The government was constantly distracted by other more immediate concerns, and strategic issues like water were addressed with temporary fixes.

Informants in the water bureaucracies spoke of the Sana'a Basin Project with a mixture of criticism and pride. It is an important example of NWRA's work and also of its collaboration with the World Bank. The aim of the Sana'a Basin Project was to provide additional water supply to Yemen's capital city, officially projected to run dry in 2017 dry by the government. Informants at multiple Yemeni water bureaucracies indicated that the aquifer was actually

depleting faster than the government stated and would be basically dry by 2015 if not sooner, in part due to the many unregulated wells. "In a place like New York City there are about 35 regulated wells, in Sana'a there are 13,000[6]—and that's just what we know of. Of course, we can't regulate all of those efficiently," said a program manager. "Sana'a is going dry faster than people think."

In an effort to help the Sana'a area, the World Bank funded the Sana'a Basin Project through a series of loans in order to encourage better irrigation practices and conservation as well as the harvesting of rainwater which would be fed into lakes to hold before usage (SABA 2009). Stated goals of the project were to: "both increase the volume and lengthen the useful life of the available water resources within the Sana'a Basin, where the country's capital city is located" (SABA 2009). To reach its goals, the project sought to: "increase the efficiency of agricultural water use, accelerate the rate at which the aquifer refills itself, and to buy time for a gradual shift to a less water-based economy" (al-Tahiry 2007). The Sana'a Basin Project was meant to conserve the remaining water while creating means to contain future rainwater since the recharge areas of the aquifer had been paved over during the rush of urbanization. NWRA officials stated

[6] New York City's water supply includes 19 regulated reservoirs and three controlled lakes with a storage capacity of about 580 billion gallons. Approximately 95% of this water is delivered to the population by gravity, with only 5% needing to be pumped to maintain pressure (NYC.gov 2011). The 2010 Federal census recorded NYC's population as 8,175,133. True estimates of Sana'a's population are difficult to find as the thousands of Somalis who have entered the country are not recorded and official numbers are usually incorrect. The official population estimate of Sana'a is 1,748,000 (Hestler & Spilling 2010, p. 16). The actual population is probably more, and the population growth rate in Sana'a is estimated to be 7% per year (Yemen Online 2010). Several informants repeated that there were 13,000 wells in Sana'a. The *Yemen Post* reported that there were 13, 425 wells in Sana'a as of 2002, but this number was given through an interview with a hydrologist and did not reference an official document. Official numbers are difficult to find, but it is reasonable to believe that there are at least 13,000 wells in Sana'a, if not more.

that the goals of the project promised to be "helpful" to Sana'a but would not provide enough water in the future to offset the population growth and increasing usage.

In February of 2007, the government fired twenty-six members of the original Yemeni team assigned to work with the World Bank for not meeting project deadlines. The people I spoke to at NWRA were happy to give me the phone numbers of those who were fired, and I was able to interview a few of them over tea.

"There was so much pressure to just spend money and get projects done that no long term thinking took place," complained one of the workers. "There are a lot of good people both with the World Bank and in Yemen that understand the gravity of the situation, but somehow these projects became business ventures and the good intentions become convoluted."

"We all knew that parts of the project would fail or that parts weren't getting done right, but the World Bank people never wanted to hear it," said another former employee. "Even our own government just wants us to keep the World Bank happy so we can collect money—even if the projects aren't necessarily the best way to spend money."

"When we tried to explain that something won't work in Yemen because the people will react differently than the people in whatever other country did the project before, the World Bank workers acted as if they'll just pull the money and take it somewhere else," a high level manager complained.

"They [WB officials] wanted clean reports written showing accomplishments so they could get promotions back in Europe. So, at least the way I figure it, it was better to take the money and get something done in the short term than nothing at all. No one wants to *really* listen to us," said another. "But, then again, it's not as if there's clarity on the part of the government's future plans either. I don't think Saleh's bad or that parliament is bad, corrupt

maybe, but not truly bad. It's just that there's so much wrong with this country that no one can keep up with it all."

"But, with the Basin Project, they replaced your team and the job got done. Why do you think this was?" I asked.

"Of course the job got done then. We should have seen it coming. We really didn't think they'd let all of us go if we expressed our concerns together as one, but they did anyway. Jobs are so hard to come by here in Yemen that no one will dare to report a failure now. We are examples to the others, and they will not argue because they know that they will lose their jobs if they do." he responded.

Some of the staff that worked on the Sana'a Basin Project said they resigned because they didn't think the goals were beneficial in the long term. They claimed that changing traditional means of irrigation rapidly was unrealistic and would not improve the water supply significantly. Informants also said that while containing rainwater in Sana'a was helpful, it was not a long term solution which would actually provide enough water to the citizens. Some of the informants I spoke with said that the water bureaucracies supported the Sana'a Basin Project because "at the very least some small amount of good would be achieved" and money would be contributed to the flailing economy. Workers felt that the project was a positive step forward, but that it was too small a step in the face of a huge crisis and would not be enough to aid the surging population in future years. Workers were concerned that water was running out, and that the actions being taken to supply Sana'a were not enough and that the population did not understand this. In November of 2009, President Saleh visited the site of some of the work in progress near al-Rawdha in Sana'a (SABA 2009). Although this was a momentary distraction, the majority of headlines still focused on security concerns and terrorist attacks. Citizens were

reassured that the government was addressing the water issue, and the seriousness of future shortages was undermined as the media continued to cover other topics.

Among the many water projects, informants viewed the World Bank's Water Sector Support Grants most positively, but informants still considered them inadequate in light of the gravity of the impending water shortage. The fact that these were grants and did not have to be repaid was seen positively. "At least these are grants, not loans. Even if some people waste the money, at least we're not stuck paying it back," said a water resource manager. NWRA employees were wary of loans because of the instability of the Yemeni economy. Debt in Yemen is rapidly rising as oil revenues decrease, and many informants were concerned that Yemen's fragile economy could not sustain continued debt accumulation.

A large deficit is forecast for 2012 and Yemen continues to spend its foreign currency reserves rapidly, causing alarm in the financial sector[7]. The expected boom in population in upcoming years will require increased food supplies, and increased water usage thus depleting the water table and encouraging further deficit spending[8]. The oil based economy is losing revenue as the oil depletes, and Yemen is not prepared to shift to another type of economic system. Agriculture will not be sustainable because of the water shortage, and a surplus of unskilled labor has little value to foreign investors. Currently, unemployment is comparable to the United States during the Great Depression, if not worse (Boucek 2010). In such an economic

[7]In February of 2011, the *Yemen Observer* reported that the Central Bank of Yemen recorded the national debt as $6,080,000,000, up $57 million from the previous year, with over half of the deficit owed to international financial institutions (Darem 2011).

[8] The population, most of which is under the age of thirty, is expected to double in the next twenty years as prohibition of birth control and ideological emphasis on large families encourages this growth.

environment, it is understandable that many government officials dislike accepting the idea of the state incurring further debt.

But the lack of implementation supervision was seen negatively. "We don't have enough manpower to really watch over these [grant approved projects or improvements]. When the World Bank people check on them, they *want* a positive outcome so that's what they see," said a NWRA official. The water sector support grants are funded through the World Bank and coordinated through the MWE and NWRA and are used to "(i) strengthen institutions for sustainable water resources management; (ii) improve community-based water resource management; (iii) increase access to water supply and sanitation services; (iv) increase returns to water use in agriculture; and (v) stabilize and reduce groundwater abstraction for agricultural use in critical water basins" (World Bank 2009). Total planned investment is $340 million with most of the funds supplied by the Dutch, British, and Germans. Again, there was an attitude of "at least it's something" regarding these grants. The grants were seen as benefiting the Yemeni economy without incurring further debt, but the improvements they funded were not viewed as substantial enough to avert serious water problems in the future. Informants stated that desalination plants and water pipelines would have to be built to supply the population with water, but that these projects would be extremely expensive and that the lack of public pressure and current civil unrest prevented such huge projects from being considered. Instead, numerous smaller projects were being done, although none of the informants thought they would be "good enough" to prevent a future crisis.

Fears of Shifting Power

In order to regulate and educate water users, the World Bank in conjunction with the MWE and NWRA developed water user associations. These are in the process of being

combined into regional water federations across Yemen, encouraging coordination beyond smaller community borders. Yemeni government employees showed me internal documents which suggested that there was growing concern that most Yemenis did not see NWSSIP, the National Water Sector Strategic Improvement Program, as beneficial or equitable to most Yemenis, especially rural/poorer Yemenis. The government officials and their international partners realized that the NWSSIP goals would not be met unless the public supported water sector reforms and increased their participation in and ownership of the plan.

When I first heard about this idea from my NWRA contacts, I expressed hope that this was a positive step. Some NWRA employees agreed and said that it was only through local, community based involvement that any change would occur—if the community and locals actually became involved and were not, instead, represented by an empowered group of local elites. The problem of elite capture of 'local' development projects is a frequent theme in the critique of development literature. Lewis and Hossain note in their study of institutional change and NGO activity in Bangladesh that local elites arose "as barriers to development, through the control of land and tenancy relationships, the 'capture' of external resources flowing into the village for use in pursuit of their own interests and by the construction of patronage networks for personal gain" (2008). As in other areas of the world, "local" projects in Yemen often resulted in empowering a limited number of (elite) individuals instead of growing wider community organizations.

"Are the water users associations not organized to help the community?" I asked the NWRA officials.

"As for this idea of water federations from the associations, I'd call them cartels," said one water engineer. He told me that he had traveled across the nation visiting the water user

associations. "When a World Bank employee comes in, he travels with prestige and shows up for an inspection. The locals in charge [local elites] will tell him that everything is going well and that water is being shared, and then he'll leave. When I traveled to these areas and sat chatting with the average locals [non-local elites], I heard complaints. Some say that the user associations are a means to gain control of water by a select few. They already know that wells have run dry, and they see water as a commodity with increasing value. People who have connections to the government, or have better access to control the resource are using it to gain power."

This theme of local elites and shifting power structures re-emerged when a NWRA employee stopped me as I was walking down the grayish blue hallway of the NWRA offices. "Take this. Read it. If you want to know what's really going on here with the projects, read this article. I came across it and I couldn't believe how accurate it is," he slipped a zip drive in my hand and walked away. When I arrived back at my tiny room near the Old City, I found that he had given me a scanned copy of "Hung Out to Dry" by Richard Milton from the December 2001/January 2002 *Ecologist.* It appeared that he must have copied his own well-read, worn copy of the article as the pages on the digital image were yellowed and had ear marks and notes on the side. The first line hooked me: "One object lesson from the Arab world that the WTO would have done well to study carefully is the case of Yemen". I read the article with interest. Milton summarized and critiqued thirty years of Western involvement in Yemen beginning in the 1970s. He criticized the World Bank who he said had "rushed in" to Yemen to modernize the society in the 1970s and 1980s after regime change opened the borders to foreign aid. Until then, Yemen had been isolated. Once Yemen opened its borders, the World Bank initiated

development projects which encouraged "modernization" and movement away from traditional spate irrigation.

Milton noted/emphasized the skill of average/typical Yemeni farmers who had worked the arid land for hundreds of years using traditional flooding irrigation techniques. Milton said that millions of dollars had been poured into Yemen to "promote modern, Western-style, irrigated agriculture", but most of this aid he said went to the limited number of farmers who were willing to set aside traditional ways for diesel pumps and irrigation equipment. Those who did this received funding and soon began to grow non-native plants which required even more water because they were finally able to supply this water through the pumps. Milton asserted that it was Western aid agencies that encouraged drilling into the aquifers and created local elites whose power grew from leaving traditional methods behind and profiting off of the diesel pumps. "Rather than the successful, traditional, conservation methods, the approach favored by aid agencies is to drill and keep on drilling, looking for new water sources. But, the overall effect of this is to plunder existing aquifers, depleting the water table further", he stated (2002). According to Milton, the Western aid agencies had finally begun to recognize the error of their ways in the 1990s, and he suggested that later projects by the World Bank were attempting to re-energize community water management while off-setting damage done to the aquifers.

In fact, new technologies introduced in the 1970s revolutionized water usage across the Yemen. Pumping and drilling equipment allowed farmers to drain water previously below the reach of their wells. Farmers planted beyond their usual crop levels and began to cultivate non-native, water intensive plants. The traditional water management system of Yemen was characterized by cisterns, spate irrigation, canals, shallow wells, and drought resistant crops (Caripico 2007). This system functioned successfully for hundreds of years, but suddenly fell

victim to development frenzy in the 1970s. "Private and community water rights, with minute provisions for drinking and irrigation, were a central feature of both Islamic and tribal law; water management was a crucial part of the agrarian order," states Sheila Caripico (2007). But, use of new technologies altered this order. Farmers and communities exploited the newly accessible water to gain agricultural profits and wasteful usage occurred. Water which was previously used only within the region where it naturally existed was now able to be pumped over a distance and "when the concept of eminent domain applied by foreign donors to water resources enabled national agencies to pump farm water to the cities, this wreaked havoc with a critical feature of indigenous Islamic or tribal law" (Caripico 2007). New power structures formed based on who had access to more water and who could coordinate the flow. Water became a lucrative commodity for those able access it and instead of being used for the community, water became a means to personal gain for individuals with access to the resource.

Informants at NWRA and the MWE viewed the water user associations as an attempt to reactivate past community management of water. But, water was no longer just used sparingly to supply the community. Since implementation of drilling techniques, water had become a means to profit and individuals did not want to give that up. Informants stated that water user associations were actually empowering local elites who already had access to water and creating "cartels" across regions which they worried could use their control of water in the future to influence the population. What was meant to be a positive step, was viewed as a cheap replacement for the traditional Islamic and tribal community system.

Narratives of Resignation

On one of my visits to the NWRA office, a senior engineer saw me reading over papers in the library and asked if I had any questions. I knew him fairly well by this point. His degrees

were from prominent American universities, and he supervised a number of NWRA employees. He had already informed me that his children were being educated in the West and that one day he hoped to move them to a nearby Middle Eastern country such as Jordan. When he said this, sadness showed in his eyes. He did not want to leave, but he felt that the future water problems were going to cause war in Yemen and he didn't want his children to experience it. As we walked to his office to share tea, I asked him about the Sana'a aquifer and possible sources for water in the future.

"Sana'a is dry. There's a little in the bottom of the aquifer, but for all real purposes it is dry now," he said. "The city really only has three options for water. One: get water from the Marib dam, which is not viable because of the tension there not to mention that there's not enough to be sustainable but only to defer a crisis. Two: get water from Shibam Sana'a (an area just outside the city), but the tribe there is hostile to those in Sana'a and they'd fight for the water. Plus, there's not enough there to be sustainable in the long run at the rate that Sana'a's population is growing. Three: get water from desalinization plants that are built on the coastline of Yemen."

"Why hasn't Yemen built more desalinization plants then?" I asked.

"There is one in Mocha, but desalination plants are terribly expensive. Even if they were magically granted for free and placed on the coast, the pipelines needed to pump the water up the mountain to Sana'a would be cost too much," he responded. "Besides, any money the government does get ends up being split between corruption and the military." He lowered his voice and glanced towards the door with a bit of nervousness. I sensed that some of those "corrupt" people might be in the building.

As he spoke, he opened a file on his computer. "Now, this is confidential, so I can't give you the data but I want to show it to you. You can use it when you write, though, just don't name the exact document. Look at this map." The screen showed a map of Yemen with graphics showing recent population migration. With a few clicks of the mouse, he showed me how the Yemeni government was tracking movement from rural areas into urban, and more specifically shifts from Hadramawt and other areas to Sana'a.

"Why are so many people flooding into Sana'a?" I asked.

"Because the farms are running dry, and there are no alternatives for employment. So, people move to the capital or at least to a city where odd jobs are easier to find," he stated as I continued to stare at the map. "Look at the fringes. Even in areas where people are still rural, they are moving as water runs out in one well and families consolidate near other water sources. Pipelines to these areas would have to be built at great expense across vast areas, and in many places Al-Qaeda is present."

"What will happen?" I asked.

"Well, I don't know about anyone else, but I'm planning on buying a nice home in Syria," he laughed, although his eyes were wary.

This discussion brought to light several points which were repeated to me by various government scientists and officials. First, that Sana'a was going dry at a faster rate than publicized and that there were no functional plans in place to offset the impending disaster. Second, that unlike Oman and Saudi Arabia, Yemen had yet to build any desalination plants and even if it did, pipelines would be required and the current security situation would make that difficult. The only option in place for the future crisis was to continue to truck in water from other sources—sources which would slowly run dry one by one until populations consolidated in

urban areas. Finally, Yemen would be left importing large quantities of water from outside the country in order to sustain the rapidly growing population.

"The prices will be enormous. I mean, currently we pay what—about 40 or 50 riyal per bottle of water? In a few years, from what I'm getting from other scholars and scientists here, we will pay upwards of $9 per bottle. Nine *dollars* not *riyal*, when people make $100 a month if they're lucky enough to have a job, $9 will be impossible to pay," said a NWRA official. I had already noted the increasing prices of water. In 2008, an average plastic bottle containing about a liter of water cost 40 riyal in my neighborhood store. By 2009, the price had raised to 50 riyal. At the time, the exchange rate was $100 to 20,000 riyal, and 50 riyal was 25 cents in USD. I usually lived very comfortably for $100 a month in Yemen, and the idea of my neighbors paying $9 a bottle was shocking. In an area where people walked everywhere and the climate could become very warm depending on what area of Yemen one was in, it was easy for one person to consume at least one bottle of water in a day or more.

"Black markets will have to form and people will be vulnerable to bad water being sold cheap. I've already heard of some places saying that their water is distilled when they actually fill the bottles at the tap and just seal them. I've also heard of some store keepers using the bottled water for their own families and then filling the bottles and resealing them to sell as clean water," said the official. In many places in Yemen, trucks brought water to fill the tanks that supplied the taps since most wells had run dry. When he referred to people filling bottles from the "tap" he meant that they were filling the bottles with trucked in water that was unsuitable to drink and was filled with bacteria and pollutants. This water is only considered good for cleaning or bathing. Drinking such water usually causes illness fairly quickly reword because

bacteria such as *e coli* is often present. Consumption of unfit water as prices continue to rise in Yemen will no doubt cause water borne illness to rise.

The educated individuals who understood the scope of the looming crisis and the effects of the lack of preparation were already planning their escape. The education which these men had received in Europe and the United States had also provided familiarity with other nations and a skill set which was marketable in other areas. Many men told me of their plans to leave Yemen for other Arab states or to move to the coast where water would last longer and hopefully retire later out of the country. The men capable of addressing the issue had accepted that the lack of preparation and lack of action was going to lead to crisis, there was no question or doubt of that when they discussed the issue with me, although they continued to work diligently to provide water to their fellow Yemenis as best as they could under the circumstances. The decision to leave was not an easy one because all of these men had extended families in Yemen who they could not afford to move.

The employees of the water bureaucracies of Yemen understand the impending crisis, but the larger state is distracted by issues such as security and unemployment and lacks the will and the means to prepare adequately for the looming shortage. The Yemeni state pacified urban voters by creating NWRA and then the MWE in order to form the illusion of action in response to concerns over urban water supply. But, NWRA and the MWE often function at odds with the MAI which oversees agricultural water and irrigation. Farmers, supported by the MAI, pump more and more water to grow lucrative crops, draining the aquifers. City dwellers wait for water trucks to deliver supplies while being calmed by the news of small water projects promising to provide more supply in the short term, but little relief in years to come as groundwater in

outlying lands runs out. Money meant for projects often lines the pockets of corrupt politicians, and progress in the water sector is slow.

In order to educate the population and to build community support for comprehensive water conservation, the government encouraged the formation of water user associations but these associations cannot replace the traditional community run water systems. Informants at the water bureaucracies thought that the water user associations were actually empowering a limited number of local elites and creating new power structures, particularly in rural areas where water equals larger crops and profit for farmers. The associations were also seen as cheap replacements for the traditional Islamic/tribal management system. The staffs at the water bureaucracies worried that the projects funded by the World Bank would not be enough to support the growing population of Yemen once the groundwater completely ran out, and that water user associations would do little good to helping poorer residents. Informants felt the public didn't understand the situation, and that government focus was spread across numerous issues distracting from building the infrastructure needed to support Yemen in the future.

III. DEVELOPMENT AND DISILLUSION

I am very pessimistic for the next two or three years. Nature and man are squeezing Yemen. And I think this alarm bell should ring in various corners around us and in the United States as well.

~Abdul Kareem al-Eryani, Yemeni Presidential Advisor
(NPR Interview, Kenyon 2008)

When I hear the word "development" applied to Yemen it always seems to give the false impression that the society was "undeveloped" or "underdeveloped" prior to Western technological intervention. The word "development" as applied to Western defined Third World nations such as Yemen often characterizes an area in need of some "thing" distinguishing the impoverished nations from the First World not need this "thing." Ferguson notes:

> Like "civilization" in the nineteenth century, "development" is the name not only for a value, but also for a dominant problematic or interpretive grid though which the impoverished regions of the world are known to us…Within this problematic, it appears self-evident that debtor Third-World nation-states and starving peasants share a common "problem", that both lack a single "thing": "development" (1994: xiii).

Within this contextualization, a Third World nation such as Yemen is lacking "development" and this problematic suggests that there must be a solution if "development" is implemented in the region. Escobar argues that "Development was and continues to be—although less convincingly so as the years go by and its promises go unfulfilled—the magic formula" (1995: vii). This "magic formula" was applied to Yemen beginning in the 1970s and drastically altered the management of the water sector.

The practices of the Yemeni people regarding agriculture, in particular, were actually highly developed and evolved over thousands of years in adaptation to the environmental requirements of the region. Climatologists believe that the people inhabiting the lands of Yemen began using spate irrigation when the wet conditions of the Neolithic became more arid approximately five thousand years ago (Spate Irrigation Network 2011). Spate irrigation uses a

system of dams and canals or earthen channels to spread water from the mountains and collect rainwater across large areas of land in a flooding manner. This method works well in semi-arid and arid climates receiving monsoon rains, and archaeological evidence suggests that Yemen's spate irrigation techniques were refined and continuously for thousands of years. Milroy states that:

> For over four thousand years Yemen's population wholly depended on its rural environment and economy. This, in turn, depended on a carefully-balanced, highly-evolved relationship between farmers' need to secure an immediate livelihood in a very hot and extremely low-rainfall environment in rugged terrain, balanced against the imperative to conserve soil, water and vegetation for future generations. Catchment management involved a network of non-formal relationships between households, groups of farmers and villages which depend on the same spate floods. The necessary soil, water and vegetation conservation traditions and techniques were handed down from father to son by practical 'learning by doing' and expressed in seasonal agricultural songs (1998).

Spate irrigation in Yemen was complemented by the use of terracing and cultivation of drought resistant crop varieties and indigenous plants resistant to local pests. Varisco notes that the tribes of Yemen combined their knowledge of irrigation and cultivation techniques with astronomical observation to create star calendars, further enhancing the agricultural system by providing guidance to farmers across the region on times to plant, open canals, and otherwise tend the land (1997). Using these star calendars for reference, farmers cultivated drought resistant plants such as sorghum which formed wide root systems that chased water deep into the soil after flooding and flourished in semi-arid climates with irregular rainfall. Farmers considered water intensive plants (such as many of the fruits grown in Yemen today) to be potentially harmful to the system, and they were imported from other areas, which enhanced trade in the region. "Traditionally, the Yemeni farmer practiced the dual strategy of risk aversion and subsistence production," states Wenner (1991: 62). He suggests that farmers grew limited surpluses that ensured the survival of their families and communities without over producing and straining the land. The agricultural

products created by such sustainable practices allowed tribes to settle and formed environments supporting trade, labor specialization, and urbanization. Life was not easy, but it was in balance with the environment and the agricultural practices were sophisticated enough so that the society endured climate fluctuations over thousands of years.

The Kingdom of Saba'a (as referred to in Arabic) or Sheba (as referred to in the East) was centered in Yemen (8th Century BCE – 275 CE). The wealth of resources and the prosperity of the region earned it the name *Arabian Felix* by the Romans, meaning "Happy Arabia". The Greek historian, Ptolemy, referred to the area with a similar Greek translation, *Eudaimon Arabia,* meaning "Fortunate/Happy Arabia". Saba'a's riches stemmed mainly from the production of two agricultural products, frankincense and myrrh. Both of these were used by ancient Egyptians in the embalming process. Romans and Persians used the substances in medical cures and for perfume. Residents of *Arabian Felix* told traders horrible tales about the challenges and dangers of harvesting frankincense and myrrh to in order to deter competitors and to drive up the price of the products (Talley Stewart 1978). Farmers and traders guarded the trees which provided frankincense and myrrh were guarded and held in high regard.

The complex Yemeni spate irrigation system "witnessed its zenith during the Shebean [Saba'aean] period…The great Marib Dam, constructed on Wadi Dhana, irrigated two oases on either [of the] banks, estimated to cover 9600 ha" (Spate Irrigation 2011). A "ha" or hectare is an area of 10,000 square meters. One acre is approximately .4047 hectare. Therefore, during its prime, the Marib dam and the Saba'aen or Shebean Kingdom and its spate irrigation system provided water to about 23,721 acres and thousands of inhabitants. The Marib dam is upstream from the city of Marib in northern Yemen, the ancient capital of the Kingdom of Saba'a or

Sheba, home to the legendary Queen of Sheba.[9] The dam continued to be used into the Himyarite period, after the fall of the Saba'aens in 115 BC (Chanson 2007). Archaeological evidence shows that the simple earthen dams and canals existed at the site as far back as 2000 BC, predating the larger Marib dam which was built around 750 BC (Chanson 2007). During its prime, the Marib dam reached a crest length of 700m at 14m high (Wieland, et al. 2004). The damn was used primarily to divert water into a system of canals, thus harnessing the resource and directing it to agricultural fields. The Marib dam served the residents of the area with minimal repair until it fell between 550 and 570 AD after a period of disrepair (Rogers, et al. 2004). The fall of the Marib dam was so significant that the event was recorded in the Koran. The land around the ruins of the dam was not as fertile after its fall, but the remaining canals continued to be used by local farmers and smaller spate irrigation techniques were utilized in following years.

The legend of the Marib dam still resonates with locals today. "You know why our government likes to build dams," asked a Yemeni friend of mine as we traveled across a desert area of Yemen, cramped on miniature bus seats wilting in the heat on the road. "Because it reminds people of Marib and brings back memories of the greatness of our culture. When dams get built people get hope that someday we can harness the waters like we did years ago and regain the wealth of the past." We were driving down a long stretch of road towards Marib to view the site of the dam, but we ended up diverting that day after a checkpoint informed us that a suicide bombing had just occurred at an oil facility in Marib.

[9] The Queen of Sheba is referred to in the Bible, the Torah, the Koran, and by the historian Josephus as well as other sources. Her kingdom is believed to have been in the region of what is now Yemen and Ethiopia. Tradition states that she ruled from the city of Sheba, also known as Marib, in Yemen.

Remnants of the dam and the temples of Saba'a litter the landscape in Marib, although the extensive agricultural fields and gardens which used to exist were replaced by smaller patches of farming supported by local wells and smaller scale irrigation. German archaeologists have explored the remnants of the temples and continue to attempt to excavate the site as security allows. Regular bombings of oil pipelines there often make it more difficult for Westerners to travel to Marib. My own memories of the area include hearing a local news report of a bombing there the day before as we drove towards the site.

The Marib dam and the opulence of the Saba'aean era are an example of the rich history of Yemen and the complexities of its agricultural sector. This is not to say that there were not years of lesser rainfall or times of ecological challenge, but rather that the balance between human and nature had reached an equilibrium that offered sensible sustainability for long periods of time. NWRA and the UNDP (2006) note that spate irrigation and traditional water management processes "allowed a reasonable balance maintaining between the limited quantity of annually renewable water resources and modest water demands." Yemenis experienced years of plenty and years of drought, but the irrigation and water harvesting techniques remained essentially the same. Wells could only be drilled as far as their limited technology allowed, and women often walked two hours to collect buckets of water from communal wells to supplement collected rainwater. Water was precious and limited, and it was rationed accordingly.

Spate fed wadis (similar to river valleys) in Hadramawt produced date-palms. Lahj, Marib, and other areas near the Red Sea produced sorghum and millet (Dresch 2000). Highland areas farmed wheat and barley. Grains provided the majority of the diet, and crops not grown in one area could be obtained through trade of coffee, incense, and an assortment of products. Vegetables, tobacco, sesame, and indigo for dye were grown in various parts of the country.

Regional markets were held on different days so that people could attend more than one in a week depending on their needs. Dresch recalls an informant recounting these market days, "al-Akwa [the informant] remembers one [market] near his own village where thousands of people would gather each market day: 'the road was like a village of ants'" (2000: 18). People traveled to these markets to supplement their own production, and trade linked rural areas and bridged tribal boundaries. Trade routes which had flourished by supplying incense around the world in Pre-Islamic times hosted traders carrying salt, dates, and other agricultural products. These market spaces functioned as zones of neutrality where members from different tribes could meet to exchange goods, news, and arbitrate issues of concern (Dresch 2000). Neutral spaces such as these encouraged contact between tribes and offered an environment fostering relationship building and networking amongst traders, scholars, and consumers.

In 2008, I traveled northwest of Sana'a to Thula to visit its historic market and view the city's architecture. Thula was a well-known theological and intellectual center in ancient Yemen, hosting 25 mosques. It is an impressive site, rising above the desert floor and surrounded by a high gated wall. The city dates to the Himyarite[10] Kingdom (110 BC – 300 AD) and sits 2350 km above sea level atop Al-Ghurab Mountain. The *suq* or market hosts numerous stalls situated in mud brick buildings rising 5 to 7 stories high. As I walked through the main gate, local children ran to greet me as goats were herded past. The children asked me what I did, and I said that I was studying for my doctorate in anthropology. Despite answering in Arabic, the children only heard "doctor" and I was forevermore the "female doctor" visiting the city. I walked up the stone covered street towards the market. The children ran forward and introduced me as "doctor". Vendors stepped forward to greet me. A young woman introduced herself as

[10] The Himyarite Kingdom eventually conquered the Kingdom of Saba and assumed control of the Marib dam.

Hannah and asked if I'd like a tour of the city. For the rest of the afternoon, she and I walked the streets of Thula as she told me of its history. Of course, I bought several scarves from her shop.

Hannah's family had lived in Thula for as long as anyone could remember. The buildings were many stories high and the paths between were so narrow in some places that I could easily turn and touch a building on one side while keeping a hand on the building on the other side. The construction had obviously occurred long before motor vehicles. She pointed to thick metal strips hanging from rings on the heavy wooden doors of the homes.

"The writing has worn off over the years, but most of us still know what they used to say. They used to mark the homes of Jews, Christians, and Muslims. We all lived here together at peace for generations. Thula was a center of trade and intellect and people came from all over the world to visit our market and learn from our scholars," Hannah explained with nostalgia. We toured the fort that used to protect the city and still stands nearby. We passed a series of reservoirs. Hannah said that Thula was built to sustain itself and not be dependent on any other city or government.

"Even the Ottomans couldn't control us," she said with pride. I asked her about the main cistern in the city which was about half full with murky water.

"That cistern has been maintained for generations and generations, back to the Old Kingdom [Himyarite]. We collect rainwater at different points in and funnel it into the cistern. Canals can be opened as needed for irrigation or drinking," Hannah pointed to the many features of the reservoir. Although ancient, it had been maintained throughout the years and continued to support the population. The technology was hundreds of years old and yet continued to function efficiently.

Suddenly, a vibrating noise broke the mystic of our stroll through history. "Excuse me," Hannah said. She pulled a cell phone from her pocket and began speaking with a friend in English. She returned to our walk and smiled sheepishly. "I study in Sana'a and return home when I can. I am studying English so I speak with my friends to practice when they call." I laughed and thanked her for letting me practice my Arabic for so long. The mystique of Thula now included a touch of the outside world, and I asked her what she thought the future of her home might be.

"The young people try to leave. I love my city, and I love all of the history—obviously, you've heard me tell all of the tales! But, I don't know how we will continue to exist in today's world. People want electricity and television and the internet. The old ways don't get us that. Many people have already left," Hannah sighed. I asked her about the water in the region.

"Same thing, people have used the traditional ways for hundreds of years. But, you can look at the cistern and see that the level is low. The rains have been less lately. People get tired of the old ways when they can see movies with indoor plumbing in apartments and plates full of food." Hannah looked out over the city as we stood near the cistern, "Our country is not solid [referring to recent political upset] and who knows what will happen. But, I do know that people have seen modern things now and they want them. Can you blame us?"

Hannah's story sounds like that of many young people across the developing world as they seek an easier life through advanced technology and change, hoping to join the global community which they view through television and media. Hannah's desire for modernity in the form of Westernized lifestyle exemplifies the societal push towards modernity in the form of computers, cars, and other forms of technology which allow entrance into the new global community. To say that Yemen was not "developed" previous to Western technology would be

to ignore thousands of years of human innovation which endured climate conditions successfully, yet Yemen's development had stagnated. While neighboring nations entered the global marketplace and embraced new technologies, Yemen remained a land frozen in time for generations as isolationist political decisions and economic restrictions left the tiny nation lagging behind. While other nations enjoyed air conditioning, refrigeration, and modern transportation systems, Yemenis continued to live without. When Yemenis finally could afford some of these conveniences thanks to the supplemental income from the oil sector labor migration, there was a sudden rush to modernize. Unfortunately, this rush in development often occurred with disregard to long term environmental effects. Construction boomed, agriculture expanded, and industry grew—all sectors which required greater water usage—and the nation entered a thirty year period of rapid urban development and increased agricultural production. Unfortunately, little was done to assess the long term effects and thirty or more years of water sector over exploitation combined with unchecked population growth has altered thousands of years of sustainable practice.

1970s and 1980s: A Rush to "Modernize"

In the 1970s, the Yemeni population which suffered years of unstable governance, corruption, and political mismanagement, sought to better itself through overseas work and access to new technology. Exposure to the outside world had been limited in previous regimes, and the experiences of Yemenis abroad translated to a newfound interest in all things "modern". Yemenis wanted better medical care, improved transportation, industry, and new farming equipment. In many ways, Yemen had been standing still in time until this period, particularly in regard to agriculture. "Modernization" struck the Yemeni agricultural sector and the Yemeni society as a whole in a rapid and dramatic fashion. Labor migration exposed Yemenis abroad to

new pumping technologies, and they brought this knowledge and the machinery back home. A lack of strong central authority in Yemen permitted farmers to exploit water resources using new pumping and drilling technology without regulation or consideration of long term effects. Increased access to water and improved healthcare accelerated a sudden population increase, and this stimulated even more pumping of water resources. What might have been a period of positive technological advancement providing cleaner drinking water and managed water access for urban and rural residents alike instead turned out to be the catalyst for Yemen's water crisis.

During the Cold War, the Arab oil states and the West recognized that the Yemen Arab Republic (North Yemen) was strategically positioned between feudalist and US-allied Saudi Arabia and the Marxist and USSR-allied regime of South Yemen. The leaders of North Yemen exploited this fact and solicited funds from Russia, America, China and other superpower allies to such an extent that Morris refers to the Cold War years as an "aid circus" (1991). Aid also flowed into the People's Democratic Republic of Yemen (South Yemen) which, with its Marxist ideology, built a strategic relationship with the USSR which provided approximately one fourth of the PDRY's aid (Dresch 2000). The South also enjoyed contributions from many of the same nations which contributed to the North. Both North and South Yemen became heavily dependent on this influx of foreign aid and the numerous loans offered through the World Bank. At the same time, Yemeni migrant workers, mainly from the north, traveled overseas to other oil rich Gulf States and remittances increased greatly, offering relief and a rise in living standards to struggling families back home.

The average income and standard of living grew across Yemen during the 1970s and 1980s and both rural and urban populations gained access to electricity, education, and better

medical care.[11] With this sudden increase in personal income and influx of aid money, came the belief that "modern" (usually equated to Western or foreign) was better and that status was gained through the ability to obtain these modern goods. Gerholm recorded the changes he observed in his local Yemeni *suq* during this rush to modernize where "very little that changes hands in the hundred and fifty shops and stalls is of local or Yemeni origin" (1984: 90). Some things did, in fact, improve such as the ability to obtain medical care which extended the average life expectancy and lowered infant mortality (Tabutin, et al. 2002). Wider access to electricity allowed people to purchase conveniences such as refrigerators and fans or even air conditioners. But, this rush to embrace modernity was also accompanied by sudden and drastic shifts away from some important traditional practices without heed for the long term consequences.

Access to irrigation pumps, diesel subsidies, and new drilling technology encouraged farmers across the semi-arid land to drill deeper wells and to forgo traditional techniques of accessing water for the sake of the pursuit of greater crop yields and higher profit margins. Deep wells supplemented with diesel pumps provided reliable irrigation water and removed the instabilities and uncertainties inherent to systems depending on seasonal rains. Western aid agencies encouraged this "modernization" of the water sector under the belief that increased production and distribution of the resource would improve the economy, healthcare, drinking water access, and overall living condition. Chaudry states that "exploitation of groundwater resources has stimulated economic development, but has not taken account of the fact that many of the resources thus used are not renewable" (2001: 129). Long term environmental effects were not fully assessed during the whirlwind of abundant development funds and attendant enthusiasms.

[11] See Robert D. Burrowes's "Republic of Yemen" in *Government and Politics of the Middle East and North Africa,* edited by Long, et al.

Innovations in Domestic Supply

New drilling technology allowed deeper wells to be dug in areas where shallow wells could not reach the underground water. In rural places where women and children often walked hours to reach the local well, new technology offered access to underground water and shortened the distance of travel, thus easing living conditions. Instead of walking three to four hours for water, children might only walk one hour. Even in urban areas, deeper wells temporarily alleviated water stress caused by sudden population increases. These technologies, however, were not centrally regulated and therefore deep wells were dug across Yemen without regard for hydrological consequence. Anyone with a drill could put a well anywhere he wanted. Deep wells tapped into fossil water and punched into aquifers and water was pumped from aquifers as if the supply was endless. "Fossil supplies are being used for both human consumption and irrigation, as well as for more frivolous purposes such as endless car washings," Wenner recalled from his experience in Yemen (1991: 88). Although access to water improved overall, regard for the source of this water and the conservation of the aquifers was not considered. The Yemeni government along with development agencies pursued, and is pursuing, strategies to reach economic development objectives which aim to reduce agricultural imports by producing more food, expand industry to reduce reliance on foreign goods, and to expand the water supply networks for consumers to attempt to keep up with the rapidly growing population in both urban and rural communities (Chaudhry 2001). Unfortunately, these policies have encouraged the expansion of agriculture (requiring further irrigation water); new drilling and exploitation of water resources for industry; and pumping of aquifer waters to conveniently supply urban and rural areas thus exhausting non-renewable supplies.

Taiz, for example, drilled numerous wells in the 1970s in the al-Haimah district of the city and supplied citizens with water into the mid-1980s when al-Haimah's wells were exhausted (Ghaleb 2008). The population of Taiz grew exponentially during those years, hastening the drainage of the new wells to provide water in the taps. When the al-Haimah wells ran dry, Taiz residents entered a period of water stress even greater than before due to the higher population level. The national water system provided water only once every 20 - 45 days as the supply dwindled. The answer to this crisis was to dig deeper wells across the city (Ghaleb 2008). This provided temporary relief and pacified the citizens, but it also further destroyed the underground water system. Desalination was finally considered to aid the struggling water supply, but Taiz was not located on the coast and the closest point was the city of Mocha, 120 km away from Taiz on the coast. Taiz was also 1,200 m above sea level while Mocha was at sea level, therefore extensive infrastructure and pumping stations were required as the actual desalination plant to supply the water. The government called upon private industry to explore the options in Mocha. In 2007, the Hayel Saeed Ana 'am Group (one of the largest family run businesses in Yemen) provided an extensive assessment noting that electrical power supply would be another major challenge to building and operating a plant in Mocha (Saeed 2011a). The Yemeni government negotiated with Saudi Arabia to aid the funding of this plant, but completion was slowed by civil unrest in Yemen. In 2010, Saudi Arabia agreed to fund the supply line but as of January, 2011, no funds had yet been received (Saeed 2011a).

The plight of Taiz residents was often mentioned by other Yemenis who I met. Many Yemenis and foreign observers see Taiz an example of the seriousness of Yemen's water problems (Handley 2001). I often heard Yemeni informants reference Taiz when speaking of water issues. When our taps would occasionally run dry when a tanker truck was late delivering

water, neighbors would joke and say "At least we're not in Taiz!" or "At least it's just a few days and not a month [referring to the 20 to 40 day wait for water in Taiz]." The difference in water supply between the two cities created tension as residents of Taiz viewed Sana'a as being pampered because of the more frequent deliveries. An informant explained the difference between Sana'a and Taiz regarding water:

"In Sana'a you can get water almost every week; maybe every 10 days. Even if you don't, the mosques have spigots for the poor and the water system provides water every couple weeks to most people. In Taiz, the trucks don't come that often. If the well is dry (and they all basically are now!), then that tank has to last you at least 20 days now if not longer; sometimes my family has gone as long as 40 days" said my friend Ramsi. He was from Taiz, but had moved to Sana'a. Ramsi was a neighbor of mine and I often ran into him while walking to the store down the street. We both purchased bottles of water regularly from the store to drink. By the time I visited Yemen in 2008 and 2009, wells were running dry and dependency on tank delivered water was common. "You try taking care of 8 children, cleaning the house, and feeding everyone on one tank in a month! It's ridiculous," he complained. Although Taiz had the longest wait for water, other areas were seeing longer and longer delivery times and tension was growing, particularly among the lower economic levels who could not afford to purchase supplemental water beyond the usual tank.

The tank of water filled by either the well (in the past when they had water) or the truck was used primarily for showering, cooking, and cleaning. The water had to be boiled extensively to drink or one risked disease. Bottled water was often purchased specifically for drinking if it could be afforded. Unless one was rich, a shower was a quick affair in order to conserve precious water. Sometimes, it simply meant washing from a common bucket which multiple

family members would use. Women also attempted to conserve water when cooking and cleaning. I often witnessed older women scolding younger ones for leaving the water on while washing dishes. I soon found myself adopting these conservation techniques, and when I returned to America I felt decadent for letting the faucet flow. Occasionally, the truck providing water in Sana'a would be late by a few days or people would accidentally use more than they imagined and the tank would run dry. When it did, no one took a shower. I remember going almost a week without a shower when the truck was late once. It was an odd and unsettling feeling to turn on the tap and have nothing come out. The well on the corner where I lived had been dry for the past few years. My neighbors remembered when the well which served us all had been so full that they could reach in with a bucket and pull the water right out on a rope. Slowly, the water had gotten lower and lower. The drilling professional had been called in and it had been drilled deeper and deeper. Then, it went dry.

There are no true official numbers on how many artesian wells were dug in the 1970s and 1980s, but unofficial estimates I received from water bureaucrats put the number in the tens of thousands. Many of these wells were used for both agricultural irrigation and domestic consumption. In a 2008 Yemen Observer interview, the director of the MWE said that the Yemeni government had been unable to control "the 150 diggers working on digging random artesian wells." "Diggers" refer to men who own deep drilling equipment and make their services available at a price for particularly deep drilling. El-Eryani, the MWE director, also stated that "this is not the total number of such diggers; there are more than 950 others which dig wells in the different Yemeni governorates." This boom of deep well drilling provided a surge of domestic water allowing populations to exist with greater ease, but now many of these wells are dry after just thirty years. Although accurate and official numbers are difficult to come by,

informants estimate that domestic water consumption quadrupled in the last twenty years, and many people I spoke with thought it may have risen even more than that. Compared to agricultural demand, however, domestic use remains low. Agriculture relies on groundwater to irrigate crops, and the surge of *qat* growing and water intensive plant cultivation has placed further pressure on aquifer supplies.

Use of Water from 1990-2010 in Different Water Use Sectors of Yemen

Water Use (Million cu. Meters/Year)	**1990**	**2000**	**2005***	**2010***
Agricultural	2,600	3,145	3,235	3,328
Domestic	168	210	265	552
Industrial	31	45	65	90
TOTAL	2,799	3,400	3,565	3,970

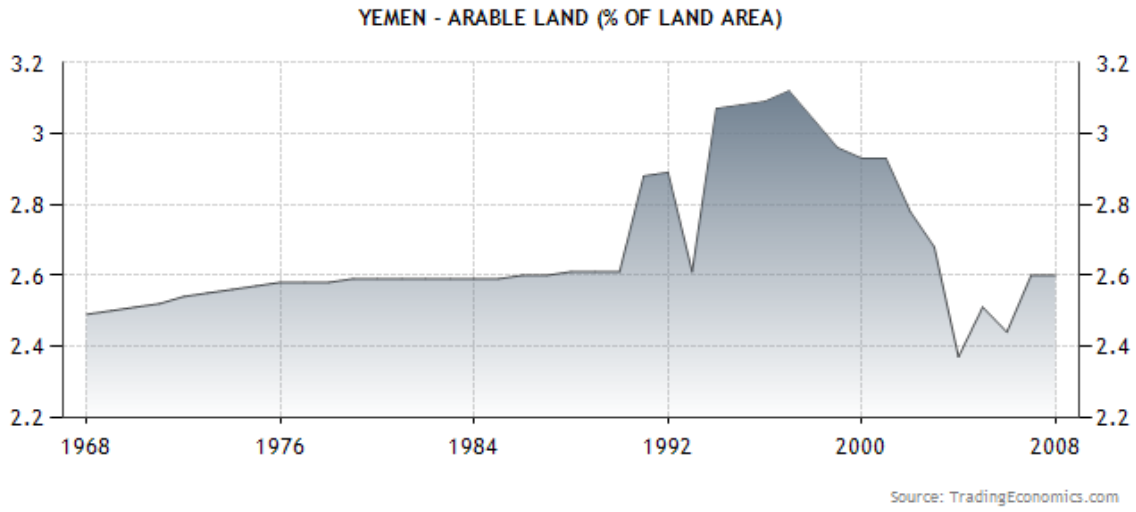
*Estimated Source: Qahtan 2005, Adapted from TNO Institute for Applied Geo-Science

Agricultural Demand and Irrigation

The implementation of new water drilling methods in the 1970s provided a sudden upsurge of agricultural production because farmers were able to irrigate larger amounts of land and they had access to deeper groundwater, previously untapped. Suddenly, due to remittances and development funds, many farmers could afford generators and other amenities they had never dreamed of having. Traditional crops were abandoned for crops which had previously been avoided because of shortages of water. Pump irrigation provided a steady supply of water whereas dependency on rainfall was always unstable and required greater risk aversion. Since agricultural usage greatly outweighs domestic use, this sudden shift to the use of underground water for irrigation significantly altered the balance of the environment.

Other factors also contributed to farmers growing alternative crops which used even more water. Labor migration provided additional funds making *qat* affordable to the masses for the first time and social stigmas limiting its usage to religious leaders and political elites shifted in

response to regime changes in the North. In the 1960s, *qat* was chewed only occasionally by the rich. But, by 2007, Rouis reported that a large section of the Yemeni population, if not the majority of the adult population, chewed and "as much as one-quarter of usable working hours [are] allocated to qat chewing." Farmers began to switch out coffee and grain crops requiring less water for *qat* as the price of the plant's leaves at market soared. Both the North and South Yemeni governments also adopted policies which were meant to curb dependence on foreign imports and encouraged farmers to grow more water-intensive crops locally that had been imported previously. Pump irrigation (possible now due to deeper wells and the ability to purchase generators) provided a stable water supply to plants and prevented plant stress, allowing farmers to grow fruits as cash crops instead of cereals (Lichtenhaler 2003).



Kopp noted that farms which had produced grains for generations shifted to fruits shortly following the introduction of pump irrigation and deeper wells (1981). Southern Yemen, which had considerably less arable land than the North, relied on heavy use of chemical fertilizer as another new development supplied through their Soviet conn exploitation of groundwater provided an upsurge in arable land which is now declining as the water cannot match demand.

During the 1970s and 1980s, imported goods flooded the Yemeni markets in both the North and South as political change opened borders and allowed products in produced in other nations on a mass scale, offering competition to local farmers. American wheat, French chicken, and other products were significantly less expensive than locally grown products because Western economies were used to producing large scale surpluses and easily sold products at a lesser price (Wenner 1991). Weir notes that the cheaper imported wheat meant that there was now little incentive for Yemenis to grow native varieties. Fields that had been used to grow wheat for generations were left fallow or were employed to grow other plants (Kennedy 1987). Farmers cultivated new types of crops which had not been sustainable with traditional spate irrigation and shallow wells. Fruits, qat, and other crops which could not be grown without pump irrigation and large amounts of reliable water now made up the majority of Yemen's agriculture.

By 1989 (just prior to unification), the average per capita income was $600 and Yemenis were on the verge of moving into the "middle-income" World Bank category (Carapico 2007). But, a range of events conspired to reverse the gains of the 70s and80s. The fall of the USSR resulted in a withdrawal of support for the south. Unification brought limited financial relief, but the government of Yemen's political support for Iraq during the First Gulf War caused thousands of workers to be expelled from countries that supported the West such as Saudi Arabia. Loss of remittance income severely hurt the economy. By the 1990s, the average per capita income had decreased by half to about $300 and families that had been able to pay for electricity and water services before found that they no longer could afford the increasing prices.

The upsurge in agricultural profits also began to reverse. The groundwater was in decline. Farmers had to dig deeper and deeper to access groundwater. Wells that previously did

not need pumps now required them. Other wells simply went dry. In the province of Amran, for example, water levels dropped over 30 meters between 1980 and 1995, and dropped another 30 meters between 1995 and 2000 (Boucek 2001). Water tables across Yemen averaged a 2 to 6 meter per year drop (GIZ 2011). By 2011, many wells ran dry while others were contaminated by salt water intrusion because of the lower water levels.

"I remember when I was a boy, I could take a bucket and lean over the edge [of the well] and just scoop water out," said Hamed, a Yemeni farmer in his forties who I interviewed while in Yemen. "Now I have a pump in that same well," he said. "At first it worked just fine, but then we had to drill the well even deeper. Now, I worry that the well will still have any water in a few years."

Hamed's concerns are valid and typical. Yemenis depend on over 45,000 wells which will go dry in the near future due to unsustainable usage and damaged basins which cannot recharge at a rate to match usage (Ghaleb 2008). In 2008, Yemen's Ministry of Planning and International Cooperation estimated that the total stored groundwater in Yemen's aquifers totaled 20 billion cubic meters and that 12 billion cubic meters would be utilized by 2010 with little recharge leaving 8 billion cubic meters to sustain the growing population (Ghaleb 2008). Soon, Hamed will see his well go dry and he will, most likely, have to relocate to an urban area where bottled water can be provided for drinking. His farm will lay fallow. The agricultural boom of the 1970s and 1980s fed by the increased access to groundwater is now over. An era which promised to improve the daily lives of Yemenis and to decrease dependency on outside markets, instead sparked a water resource management change halting years of sustainable practice.

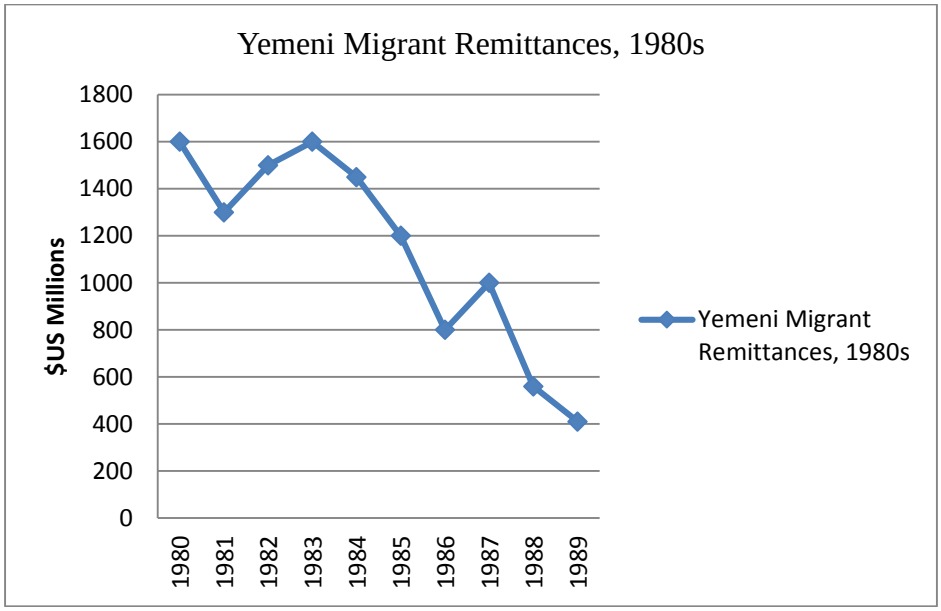
1990s: Unification and Realization

Remittances steadily fell through the 1980s as recession hit the region, and by 1990 North and South Yemen merged for a variety of political and economic reasons[12]. The new central government of the united Yemen sought to stabilize the distressed economy by encouraging industry and decreasing dependency on foreign imports of manufactured goods (Chaudhry 2001). Unfortunately, industry, like agriculture, also required water to assist production and factories. This in turn added to the decreasing water table by pumping resources from aquifers and contaminating existing water supplies with chemical waste. The Yemeni economy continued to falter as remittances dropped even further when workers were expelled from Saudi Arabia following the Gulf War. The new Yemeni government adapted to accommodate the sudden return of thousands of Yemeni workers and the loss of their incomes in numerous ways. One method included continuing diesel subsidies to keep fuel inexpensive. This cheap fuel allowed farmers to continue pumping water for very little money, and many displaced workers found employment in agriculture. Food imports of wheat and other common crops kept prices low for consumers but continued the cultivation of water intensive cash crops by Yemeni farmers. Informants in the Yemeni government said that agriculture was the best performing sector of the Yemeni economy in the 1990s with about a 5% growth rate per year in that decade while industry faltered.

Although tube wells and water pumps fueled agricultural growth in the 1990s, awareness of problems in the water sector was rising amongst scientists and some farmers. Three decades of extravagant water usage finally caught up with the groundwater system and wells began to dry

[12] See Paul Dresch's *A History of Modern Yemen* for an excellent description of the complexities of unification and the following years.

out as the water table was becoming noticeably different. Several informants recounted stories of when they first noticed the lower well water levels. A sixty year old farmer remembered: "I used the same well for decades. It would get lower when there was drought, but the level would come back eventually. This is different. I've had to drill deeper and deeper and yet when the rains come the water doesn't come back [refill the well to its old depth] and I'm probably going to have to drill [deeper] again this year." Another informant complained that "the same well that I used to put a bucket in on a rope fifteen years ago--now I have to have a pump and hose just to reach the water!" As these informants indicated, water usage continued despite this noticeable change in well water level.



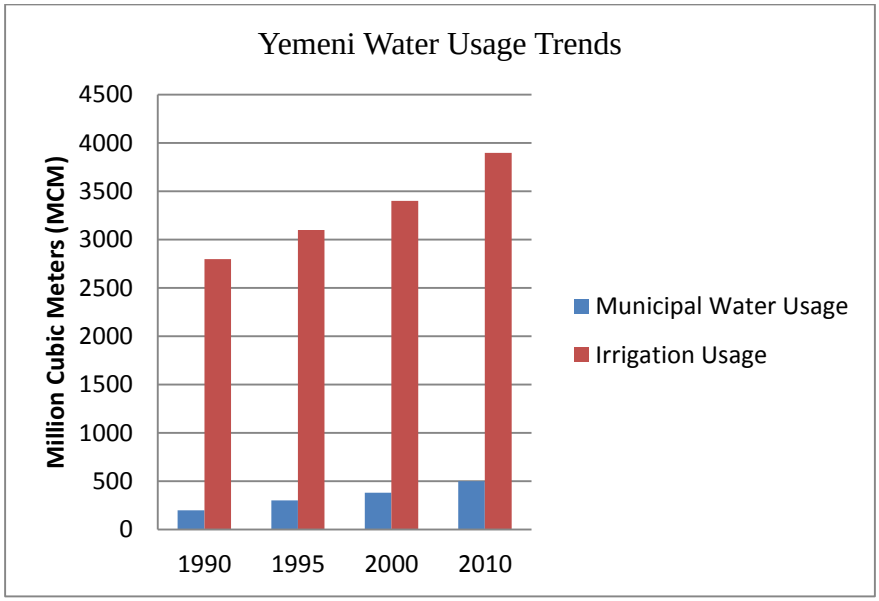
Source: Paul Dresch, A History of Modern Yemen 2000 pg. 158

As the central government attempted to establish authority in the newly unified nation, international development agencies attempted to define the exact nature of the water problem with limited extensive studies. It was no secret that wells were going dry and water resources appeared to be changing across the landscape. As farmers and urban users demanded more and more water, development agencies sought to understand Yemen's water usage patterns and the

sustainable water capacity. In 1995, the International Development Association of the World Bank (IDA), the United Nations Development Program (UNDP), and the Netherlands (a major contributor to Yemeni development projects) formed the Multi Donor Group for Yemen and began conducting a series of water resource assessments. In 1997, the results of these studies were compiled into a World Bank document entitled "Yemen: Towards a Water Strategy". The document concluded that water usage in Yemen had significantly increased in both urban and agricultural sectors, far exceeding sustainable water resource capacity. This document was distributed in Arabic and several Yemeni employees showed me copies that they still had sitting on their office shelves ten years later. Informants pointed out key passages in the report and noted that competition for groundwater between rural and urban users increased significantly over the decade, creating tension between the cities and the countryside. Agriculture used more water by far, but urban centers had grown considerably since the 1970s and were continuing to grow as people moved to the cities in pursuit of employment and education. In addition, Somali refugees landing on Yemen's shores added further strain to the already struggling infrastructure. In 2008, an estimated 50,000 Somali refugees had already landed, and Somalis continued to arrive in years to follow. In just the month of August 2011, more than 3,700 Somalis arrived in Yemen (Reuters 2011). These increases in urban population created a rising need for domestic water supply as well as increased demand for agricultural products to feed the people.

Development strategies in Yemen introduced in the 1990s by international organizations included educating water users, altering the incentive structure and lowering diesel subsidies, attempting to limit *qat* production (which consumes approximately 30% of irrigation water), and encouraging community based regulation as opposed to centralized enforcement which was deemed unlikely due to Yemen's fragile political situation. The strategies being applied to

Yemen by development organizations were nestled with the larger, global initiatives being promoted throughout the world by the United Nations. In 1990, the UN launched a new campaign with a "central goal of enlarging human choices" for the next decade and into the new millennium (Human Development Report 1990). In order to implement this goal of increasing human choice, the UNDP declared that all development strategies would follow a number of objectives which included "accelerating economic growth, reducing absolute poverty, and preventing further deterioration in the environment" (Human Development Report 1990). The 1990s proved to be a decade emphasizing the importance of the environment and its role in developing nations.



Source: Informant information, 2009

In the 1980s, development strategies tended to overlook the environmental differences between developed and developing nations while also placing little emphasis on environmental components of development. By the 1990s, the global push to recognize greenhouse gas emissions, climate change, and pollution elevated environmental issues to the forefront of global

policy making and required differentiation between the environmental needs of developed and developing nations in order to address problems accordingly. The UN deemed that pollution was the main environmental concern of developed nations who faced contaminated rivers and lakes, acid rain, greenhouse gas emissions caused by the very industries which provided the wealth fueling these societies. In contrast, the extreme poverty in developing countries was acknowledged to fuel deforestation, soil erosion, desertification, and water contamination; all of which only reinforced poverty and furthered human suffering and unsustainable environmental practices. Thus, development strategies globally began to incorporate concern for sustainable water and land management in developing nations. Community development as opposed to central state control was a strong trend during this period, particularly after the fall of the Communist Bloc and years of economic turmoil associated with state control in the 1980s (Harvey 2007).

These development strategies appeared logical, but they neglected to account for the political pressure on Yemen's new central government. *Qat* was the most financially lucrative crop for farmers, who made up a significant voting bloc, and the plant was used by a majority of Yemenis. Plus, farmers required large amounts of diesel to fuel pumps withdrawing underground water to feed *qat* crops. Therefore, policies discouraging the growth of *qat* and increasing diesel prices were doomed to be unpopular. In 1996, diesel prices rose following government policy changes which lowered diesel subsidies in an attempt to appease international donors who called for limiting qat production and lowering subsidies in an attempt to restructure the economy. Riots ensued and threatened government stability. Thereafter, the Yemeni government opted to pursue policies designed to keep citizens content.

Instead of following the World Bank's suggestion and limiting *qat* production, the Yemeni government (much of whose personnel also chews *qat* recreationally) provided further support for cultivation by banning the import of the less expensive Ethiopian variety (Ward 2001). *Qat* is a leafy plant that contains an alkaloid substance called cathinone and an amphetamine-like stimulant. The juice released by chewing the leaves creates loss of appetite, alertness, and euphoria which is referred to as the "Hour of Solomon". With increased production by farmers, qat use grew throughout the 1990s and into the new millennium. By 2008, the Al-Afif Cultural Foundation of Yemen estimated that 70 to 80% of Yemenis between the ages of 16 and 50 chewed *qat* (Yemen Observer 2008). Informants joked that "even children use qat now if they want to stay up and study for a test!" I often saw government workers and even soldiers standing guard chewing qat, not to mention the thousands of non-government workers who enjoy the plant every day. Qat chewing is incredibly prevalent, and the Yemeni government is aware that limiting production would be political suicide.

The government began offering low-interest loans to help farmers increase production by purchasing tractors and pump technology, thereby keeping prices on these technologies well below their actual economic cost (Ward 2001). Therefore, farmers who might have been restrained from pumping groundwater due to financial inability to access the technology now had access and joined the rush to drill. Wells were dug deeper and deeper, and more and more water was drawn from underground reservoirs to grow *qat* and other crops. Although greater agricultural development offered jobs to Yemenis, the future consequences to the water table were ignored.

Qat is currently the most lucrative cash crop for Yemeni farmers. Prices for barley, wheat, or other food crops fluctuate and do not provide regular profits. Qat's, however, is

consistently profitable. Qat can be harvested multiple times per growing season, while many food crops can only be harvested once or perhaps twice in a season (Al-Showthabi 2008). Plus, qat's price has been steadily rising in response to increasing demand in the marketplace while other cash crops have to compete with imported varieties and suffer regular price drops.

When I asked farmers what they would do if diesel subsidies were discontinued, they all said that they would cultivate more qat because the return on investment was highest with this crop. Lichtenthaler notes that "as an increasing number of farmers are unable to chase the declining water table and yields have dropped to half of what they were in the 1980s many now turn to qat as a way of survival. Whereas in the 1980s qat was seen as an indicator of wealth in the 1990s for many it has become indicative of poverty" (2003). Qat cultivation requires large amounts of water. Although qat's price is steadily higher than other crops in the marketplace, it is increasingly requiring more and more drilling to access lower water tables. Profits from qat are used to maintain farming equipment and keep farms going because the mostly grain crops cultivated for thousands of years hold no or little value compared to cheaper imported varieties. Farming in the 1990s and into the 2000s therefore has seen a sharp rise in qat production as farmers adjust to the strained economic conditions.

Although most of the development agencies' suggestions were effectively ignored by the government, national debate was initiated regarding water in the 1990s as the Yemeni government responded to the reports issued by the World Bank stating that water usage was becoming unsustainable. A series of debates took place within the *Majlis Ashura* (Consultative Council) and the National Assembly regarding water management strategies. The government formed a parliamentary committee on water that was briefed regularly on the status of the resource by different government experts from the different ministries, and the 2003 Water Law

passage was heavily debated by law makers prior to the passing of the Law. Government informants stated that concern rose amongst Yemeni decision makers as they began to understand the seriousness of the water crisis during the 1990s and in later years. Informants said that state understanding grew regarding the unsustainable usage patterns and fractured water management system. The Yemeni government responded by consolidating water bureaucracies and continuing work with the World Bank to develop new strategies.

One of these new strategies included the construction of dams and rainwater recharge zones. In the late 1990s, the MAI began a program that involved the building of dams across the country and the creation of several rainwater collection sites aimed at recharging cistern systems. Informants I spoke to claimed that this program was poorly managed, however, and that data was scarce regarding its success or failures. In 1999, the MAI passed a national irrigation policy that set standards to limit and manage agricultural usage, but this program relied on the voluntary compliance of farmers and established no enforcement mechanism. Many farmers simply expanded their fields (ignoring the policy) and most complied only when they received subsidies. The government's lack of enforcement made changing water usage habits nearly impossible in the absence of voluntary compliance by users. Moreover, no mechanisms were put in place other than small subsidies, so few farmers felt compelled to comply particularly when compliance would significantly lower their agricultural production. Individual profits were now the goal of most farmers and communal management had become a thing of the past. In addition, public understanding of the crisis did not match the understanding of the water bureaucracies or the development agencies. I investigate this problem regarding public perceptions in chapter four.

In 2001, World Bank consultant and Yemen expert Christopher Ward warned of the upcoming hardships facing Yemen:

> Yemen cannot continue to live off its water capital. But the country's fragmented geography and hydrology, and the predominance of dispersed rural water users makes centralized control problematic. Moreover, the mismatch between population and water resources reduces planning options; most of the population and economic activity is concentrated in the water-depleted western highlands, making it difficult to explore alternative sources of supply such as the Hadramaut aquifer, let alone desalination. Growing water shortages have led to competition between town and country for access to dwindling resources. Since all groundwater around cities is effectively harnessed and over-exploited for agricultural use, the cost of new supplies of water for cities is likely to rise sharply as water has to be brought from further afield and from greater depth."

These challenges facing Yemen are amplified by a lack of focus on the part of politicians. In 2008, I was at a political event hosted by several prominent parliament members when a constituent asked the hosts about future water concerns. They quickly responded that a newly discovered aquifer in Hadramawt would provide all the water needed in the future without providing details about how much water was actually in the aquifer or how it might be transported from its remote location. As Ward noted, this aquifer is far from the majority of the population in the Western highlands. I later attended a university engagement in Sana'a in 2009 and listened with amusement when a Yemeni student I knew asked a group of parliament members about water in Yemen.

"What is parliament doing about our depleting water resources and the upcoming water crisis in our cities," he asked.

"Crisis? There is no crisis," responded the parliament member patronizingly to the young man. "God will provide as he always has."

Another parliament member followed up with "Just look at the Hadramawt wadi [watershed]; there is new water discovered there. God will give more as it is needed."

I remained quiet in the meeting because I wanted to observe what parliament members were telling the youth without my foreign voice adding to the chatter. The student found me afterward because he studied geology and had met me through a common acquaintance. He expressed his frustration with the response. We both knew that the Hadramawt aquifer was not adequate to provide for the nation. The aquifer was located in an arid area far from Sana'a or Taiz, and would be difficult to access. As one NWRA official told me, "even if we had all the money in the world to build infrastructure to move the water from the Hadramawt aquifer to the urban areas that need it, it still would run out in just a few years. It's just ridiculous. The politicians use the discovery to distract from the impending crisis." Yemeni politicians, like all politicians, are talented at calming the fears of their constituents and guiding votes to their corner. This is not to say that improvements to the water sector have not occurred or that cooperation with development agencies has not moved forward, but rather that the political machine often functions at odds with the long term goal of providing water to the people and opts for the short term goal of a vote. As politicians maneuver to maintain power by striking deals with tribal leaders and other elites, the long term welfare of Yemen's society is set aside.

Urban voters became more and more discontented in the 1990s with water delivery, the Yemeni government shifted responsibility for urban water supply from a "duty of the state" mentality to a corporate model backed by donors, in line with conventional, neo-liberal thinking of that time. Continuous economic crises across the globe in the 1980s combined with the collapse of the Communit Bloc fostered an international movement promoting free market reform and limited state intervention (Harvey 2007). In Yemen, local, privately held utilities backed by outside donors were established to provide water to many urban centers including Zabid and Bajil, although government run utilities remained in many other areas (Ward 2001).

Informants noted that the water provided by these water utilities, both state run and corporate, is pulled from local aquifers or cisterns. As Yemen's resources deplete, water utilities have to drill deeper and purchase water from farther and farther away, moving all water utilities towards privatization. As water moves towards becoming a profit making vehicle for private industry, Yemen's majority impoverished population will be able to afford less and less water creating further economic class distinctions. Eventually, informants predicted that the majority of Yemen's urban water supply would have to be imported from Saudi Arabia or Oman at a cost of more than 500% more than Yemenis pay now unless actions are taken to mediate this cost.

While urban water in many areas privatized, development agencies and the Yemeni government encouraged rural areas to shift back to community management in hopes that this would tempter the free for all of groundwater exploitation which had been occurring since drilling technology was introduced. The Yemeni government recognized that it did not have authority or access to many rural areas and began to encourage the growth of user associations and community management. Although many communities formed these associations, thirty years of individual profit making on the part of farmers had altered the traditional management system and created new power structures and elites. Communal welfare was no longer the primary goal; rather, individual profiteering continued to reign in many areas as access to water became a method of increasing one's status.

2000s: Growing Importance in the Region

As Western concern over security increased in the years following September 11, 2001, so did foreign aid to Yemen. Following numerous incidents placing Yemen in the news in relation to terrorism, foreign donors began administering expansive aid packages. Once again, Western governments recognized Yemen's strategic importance to the region. And, once again,

aid began to flow into Yemen heavily. By 2009, the United Kingdom had increased its aid to Yemen by 400%, making the UK the single largest contributor to Yemen (Boucek 2009). Also in 2009, the United States gave $27.5 million ($21 million of which went to development; the rest towards counter-terrorism and military programs) and in September of that year USAID announced a three year $121 million commitment to Yemen (Boucek 2009; USAID 2010). The Netherlands, Germany, Japan, and other donors who had already been active in Yemen for years continued to contribute to numerous projects related to health, education, and sanitation.

Although there has been an increase in aid to Yemen recently, much of it is focused on short term economic stabilization rather than water issues. USAID states the new strategy in Yemen:

> …Will focus on increasing youth employment and other economic opportunities; improving government service delivery in education and health care; supporting transparent, decentralized governance; promoting sustainable agriculture; and empowering youth, women and other marginalized groups (2010).

Sustainable agriculture alludes to the water crisis, but does not place the resource at the forefront of the aid discussion. The question is what will be "sustainable" now that traditional practices have been abandoned and groundwater has been destroyed? The USAID plan suggests a return to traditional water conservation techniques and cultivation of traditional drought resistant plants while discouraging the use of qat, but the plan does not explain how farmers will suddenly be encouraged to move away from qat after three decades of abandonment of tradition. Nor does the plan note that water is vital to health care and is also vital to economic opportunities as the major employer at the moment is agriculture. USAID does note that half of Yemenis do not have access to clean water and that waterborne illness contributes to 70% of infant mortality, but water itself is still just a small part of the overall strategy and there is no mention of alternative

water development strategies to replace the groundwater which will soon be non-existent regardless of being clean or unclean.

The World Bank Country Assistance Strategy for 2010-2012 aligned its goals with several plans offered by the Yemeni government regarding stabilization of the nation, primarily focusing on the economy and placing water lower on the list of priorities. Primary issues of the World Bank CAS included:

> i. Help accelerate and diversify economic growth (macroeconomic stability; private sector development; infrastructure; support to non-oil drivers of growth);
>
> ii. Help enhance governance (transparency; public finance management; civil service);
>
> iii. Help foster human and social development (cross-sectoral issues such as gender, youth, and qat; education and health; community development and social protection);
>
> iv. Help manage national resource scarcity and natural risks (water resources; natural disasters and climate change) (2009).

Again water was lower on the list of priorities because development agencies opted to apply funds to the economy to stimulate growth instead exploring alternative water sources. It is understandable that the variety of complex economic and social issues provide ample fodder for development agencies to tackle, but the point is rather moot if lack of groundwater and lack of preparation for the crisis cause water prices to sky rocket causing the entire economy to react as the cost of the resource affects everything from industry to agriculture to healthcare to security.

Concerns of Development Workers

Despite donor funding and international intervention, development projects in Yemen were difficult to implement. In 2005, the UNDP's Common Country Assessment (CCA) of Yemen suggested that there were four primary causes for the failure or slow progression of development interventions. These reasons included "lack of transparency and participation,

disempowerment of women and children, inequitable and unsustainable use of water resources; and jobless growth" (UNDP 2011). Although my main focus while in Yemen was to record the impressions of the Yemenis, I wanted to understand the concerns of development workers in the country. I regularly encountered development workers as I roamed the halls of the government offices. Being a foreigner myself, introductions were easy. I took advantage of these brief encounters to interview these individuals regarding water resources and challenges with development project implementation.

Like the Yemeni water officials, the development agency workers I interviewed were highly educated individuals who specialized in hydrology and other related fields. They appeared to be passionate about their work, and they too expressed frustration with the situation in Yemen. There were many similarities between the development agency workers and the Yemeni bureaucrats. In private conversations, the men of the development sector voiced concern about being "unable" to do their jobs. Complaints ranged from the ineffectiveness of the Yemeni government and overall corruption of the government system to the fact that many of the development workers had been instructed by their employers that they could no longer leave the city of Sana'a to check on projects because of security concerns for their safety. Like the Yemeni bureaucrats, the development workers recognized the challenges of the Yemeni water sector and felt that the projects were inadequate in light of the impending crisis.

As I was walking the halls of the NWRA building one day in 2009, I saw three European development employees talking to each other, obviously upset about something.

"Long day?" I asked as I passed.

"Ridiculous! Just ridiculous," commented Walter, a burly German in his forties. He was an engineer who had been working in Yemen and the Arabian Peninsula for about five years. I'd

spoken to him before briefly about his work in Yemen. During the initial interview, his answers were structured and politically correct, noting the complexities of development across the world and the many positive contributions of the World Bank in Yemen. But, on this day, his frustration was obvious and he didn't mince words.

"You try doing your job when you're confined. How can I ensure that the work is being done properly if I can't get to the site or can only visit the project with a huge security entourage," Walter complained. "I came here to do something good, but it's just getting harder and harder. The [Yemeni] government is corrupt and confused; the people keep digging these damn wells in all the wrong places [unregulated drilling by Yemenis damaging aquifers]; and then right when you think you're getting something done, some terrorist decides to kidnap or blow someone up."

Walter was referring to the escalation of terrorist attacks on Europeans in Yemen. In March 2009, four Koreans were killed in Hadramawt at the city of Shibam, a UNESCO World Heritage Site, by a suicide bomber. Later that month, a Korean delegation was targeted while driving across Sana'a by another suicide bomber (BBC 2009). In June of 2009, a group of aid workers consisting of four Germans, one British citizen, and one South Korean as well as three German children were abducted and subsequently killed outside of Sada'a (CNN 2009). In response to the increased threat level, Western development agencies restricted movement across the country and required increased security for their employees. Westerners were also restricted from traveling into certain areas of Yemen and could not cross check points without special authorization.

"You know, you try to do something good and those damn people [terrorists] blow you up! I swear I don't know if it's worth it some days," Walter ranted.

"You just have to remember why you're doing this, you know," said another development worker. "I mean, there are a lot of really good people who deserve clean water. I see the kids on the street and I just have to remind myself that all this work is for them. But, I tell you, it's getting tougher and tougher not to just say 'to hell with it'," he stated. Walter was working on a sanitation project providing clean water for domestic use. His coworkers were also engaged on projects aimed at increasing the efficiency of agricultural water use. Domestic and agricultural water may have different purposes but both provided essential resources to Yemeni lives. Domestic water is needed for drinking and household use, and agricultural water is necessary to provide employment to thousands. Although qat has replaced cereals on many Yemeni farms, many food products are grown as well making agriculture necessary to employment and nutrition, particularly in rural areas.

Development agency workers also noted that many of their Western-educated Yemeni counterparts were leaving the nation as security worsened and seeking stability elsewhere. This made coordination with Yemeni agencies even more difficult as knowledgeable employees left the country. Development workers said that projects were not meant to be "inadequate" but were, rather, the best that could be done in the current environment. These men expressed frustration similar to that of the NWRA staff and felt that Yemen would, in the not so distant future, face soaring water prices and inadequate supply.

As the security situation in Yemen worsens and government stability becomes uncertain, the ability for development agencies to function becomes harder and harder. Projects slow and progress becomes difficult as political unrest halts decision making. Development strategies turn towards quick stability fixes instead of long-term strategies. Development agency workers understand the water crisis. Yemeni water bureaucracy workers understand the water crisis.

Yemeni decision makers understand the water crisis; although many of them prefer to pander to voters and enjoy short term wins rather than face the stark reality. But, does the Yemeni public understand the water crisis? NWRA and the World Bank realized that without intensive public support, the various bureaucracies and development agencies would achieve nothing.

IV. CARTOONS AND RAINDROPS

When the well is dry, we know the worth of water.

~ Benjamin Franklin
Poor Richard's Almanac 1746

In September of 2009, I received an email from one of the senior program managers at NWRA regarding the water awareness campaign. "Come by the office soon and I'll tell you the whole back story. It's quite the tale," read the email. I had visited the NWRA offices and seen the products of the awareness campaign but no one had suggested a controversy before. I replied that I was going to stay with friends in Mahweet (a rural area) to interview farmers for a few days, but that I would come by later in the week. That Thursday, after my trip, I hailed a cab and rode across the city to the NWRA building. I walked up the concrete ramp into the red brick structure and past the NWRA-produced posters on the walls. Many of them included the raindrop cartoon image, the face of the awareness campaign. I wondered if the raindrop had had anything to do with the brouhaha. I found the program manager's office easily and sat in the padded chair across from his desk.

"So, did I pique your interest?" Marzooq smiled and asked me.

"Absolutely," I replied. "What's the controversy?" He handed me a small, room temperature bottle of water.

"Ever wonder why we used a cartoon?" Marzooq sipped his water and shuffled a few papers on his desk.

"I have. From everything I've learned from all of you at NWRA, it seems that you would have had an announcement from the president or a seriously worded message from a figure who embody authority [to the people], maybe an Imam. Why did you choose a cartoon?"

"Well, that is the controversy. We [NWRA] didn't choose it, not really. It was the idea of the Germans. They're pretty active here with the projects [development activities]—I even heard they recovered some old wreck of a German plane in the desert to take home as a souvenir of their involvement in Yemen, an old vestige of colonialism if you ask me. Anyway, GTZ and the World Bank came up with this idea that we should educate our people about the water crisis. I still remember when we [members of NWRA] first heard of it. We were all excited that there would finally be funding for a public awareness campaign. A group of us gathered in a conference room and began brainstorming about how we wanted to get the information out. We considered the campaign the Egyptians did with USAID. It was really well done. We talked about duplicating some of it and who we might use to get the information out," he continued.

A staff member who had been waiting at the door to have a few documents reviewed joined us as Marzooq paused.

"Yes, I remember the excitement about the campaign," the NWRA employee commented as Marzooq looked at the papers. "It's too bad that we didn't get to choose the message." The man walked out with the papers Marzooq had reviewed, and we continued our conversation.

"Those of us here at NWRA thought that finally we'd have a chance to coordinate a message to the people. We talked about how it needed to be a serious message to get people's attention and explain that groundwater would run dry. We knew we needed to start a national discussion so that there'd be pressure on the government to prepare. We knew that we had to distinguish the current problem from past droughts in order to convince Yemenis that this shortage was different. We discussed the best ways to get messages out—radio, Imams, reaching out to rural areas. When the planning finally began with the international organizations,

we felt we had a lot to add to the conversation." Marzooq sipped his bottle of water as I absorbed his words.

"You can imagine our surprise when we were basically informed that a plan had been put together in Europe and we could relax and just let it unfold," Marzooq said. "It had been determined that a cartoon would be the best way to proceed."

"Determined by whom?" I asked.

"Some smart people in Europe, I guess. Certainly not here," he laughed. Marzooq explained that NWRA members argued that unless a cartoon was a serious figure, it would send a false sense of safety and comfort, as opposed to an authority figure whose participation would emphasize the seriousness of the situation. In Egypt, where water is a problem but less of an immediate crisis, a cartoon character named *Meema* was developed by The Centre for Environment and Development in the Arab Region and Europe for an awareness campaign in 2005 aimed at children to encourage conservation and protection of the nation's resources under the auspices of former First Lady Suzanne Mubarak (Al-Ahram 2007; CEDARE 2011). The Egyptian adult campaign included a variety of messages provided by water professionals which educated adults about methods of conservation. Marzooq said that NWRA argued that Yemen's water crisis was just that—a crisis—and required a serious message as opposed to a light hearted campaign. He was concerned that because of a lack of awareness on the part of the public, preparations for the future were slow to come. Although many within NWRA liked the idea of using a cartoon as a part of the campaign, Marzooq said that they envisioned it as a more graphic, serious image to be complimented with statements aimed at educating adults.

"We talked about a figure of, maybe, a man who was parched and desperate for water—a cartoon that was serious and graphic, scary even. Then this image showed up. They [World

Bank] hired this famous cartoonist. He's really talented, but I think they just told him to create something with a *jambia* [curved daggar] and it'd be Yemeni. The raindrop he made was cute and friendly with a great big smile, but it was really Northern [indicating that the drawing personified a northern tribesman and emphasized a particular group within Yemen instead of reflecting a more neutral image that could be appealing across the country] and it was really *not* serious," Marzooq lamented. "How do you convince a nation that it should prepare for a humanitarian crisis with a character that's smiling and laughing?"

As Stuart Hall noted, the encoding and decoding of a message is not a linear process; instead, the audience is an active participant and applies past experience and personal perspective to the message (1973). Marzooq was sensitive to Western colonialism because of Yemen's past experience with colonialism and the Ottoman occupation. In the early 1500s, the Mamluks of Egypt pushed into Yemen and eventually annexed the territory. When the Mamluks fell to the Ottomans, the Ottoman forces moved into Yemen. Qasim the Great, a Zaidi Imam, challenged Yemen's occupation and eventually expelled the majority of Ottoman forces by the mid-1600s, although limited Ottoman representation remained and struggled to regain lands. By the late 1800s, the Ottomans were able to push forward as the Zaidi Imams' power waned. The Ottomans regained control of the majority of Yemen and established Sana'a as the district capital. The Ottoman Empire aligned with Germany in 1914 which created a tie between Germany and Yemen. The Ottomans entered WWI on the side of the Central Powers and following the loss of WWI and the collapse of the Ottoman Empire, Germany maintained ties with Yemen. Although Germany had not actually colonized Yemen, it was significant that Marzooq joked about the German plane as being a last vestige of colonialism.

I had heard off handed comments occasionally from my Yemeni neighbors in which they stressed Yemen's prestigious past and indicated feelings of frustration with Western influences which had altered the Arab landscape.

"When Europe was living in squalor during the Middle Ages, we [Yemenis] were advanced at mathematics, trade, and astronomy. Now, just because Westerners have had a couple of prosperous generations, they act like they have ruled and always will rule the world. It's ridiculous! Just because our nation is poor now doesn't mean it always will be, and it certainly doesn't mean we're stupid, particularly about what our own nation needs," exclaimed a Yemeni professor I'd met.

"Have you seen the way they [the West] disregards us as if we are less than they are? Just look at our Palestinian brothers. We [Arabs] lived in peace with Jews for generation upon generation, but now, thanks to continued meddling [by the West] the entire region is constantly in turmoil," said a young woman from my neighborhood.

"Now, I'm not saying that Americans are bad," said a Yemeni informant. "But, your government invaded Iraq and is yet again interfering in Arab politics. Do you really think your forces are going to leave? Of course not, it [the Iraq War] was a nice way for America to get a stronger presence in the Middle East. Just look at Bush's words--even he called it a Crusade!"

Many Yemenis identified the West as a colonizing entity and viewed Western actions as suspect. Marzooq and many of my Yemeni informants felt that Western nations were interested in Yemen for their own purposes rather than for the good of the nation. This belief was only further substantiated by the German development agency's disregard for Yemeni recommendations regarding the public awareness campaign in favor of foreign of German views.

After discussing the initiation of the awareness campaign with Marzooq, I was even more curious about the campaign and how others in Yemen perceived its creation and message. This water awareness campaign was one of NWRA's primary responsibilities and an excellent example of the complexities of development projects and of the problematic nature of interactions between international development agencies and the Yemeni ministries.

Creating the Campaign Message

In 2006, GTZ and the World Bank began preparing a public awareness program in Yemen aimed at educating both adults and children. The raindrop creation is attributed to Dr. Michael Klinger, director of GTZ's Integrated Water Resources Management project in Yemen, who inspired the awareness campaign (Hill 2008). Klinger was a hydrologist who was very familiar with Yemen and had lived and traveled in the country for many years as a development worker. Klinger was inspired to use a raindrop image to convey the message rather than printed words. This seems to be because of Yemen's high rate of illiteracy. UNDP estimates illiteracy in Yemen to be 45.3% overall with 29.6% of males illiterate and 61.6% of females illiterate (2011). Although rural males typically manage the application of irrigation water, rural females and children are typically charged with gathering drinking water and managing domestic water use. Informants estimated rural illiteracy to be 60% overall, much greater than in urban areas, where they estimated it to be 40%. Considering these high illiteracy rates, the World Bank employees I spoke to said that the raindrop cartoon was designed to be visually appealing to both adults and children, in order to draw their attention and to convey a message without requiring the ability to read.

GTZ commissioned Mohammed as-Shaibani, a well-known satirical cartoonist and Yemeni poet, to develop the image for a raindrop mascot. Shaibani was born in Taiz, Yemen's

third largest city, where tanker shipments of water only arrive once every 25 to 45 days, providing vital water since Taiz's wells have dried and water has become scarce locally. The residents of Taiz with whom I spoke frequently pointed out to me that they were dependent on water shipments from outside sources, and they often complained that Sana'a received water more frequently. Shipments of trucked water in Sana'a typically arrived every 20 days when I was there. Informants from Taiz felt that Sana'a was favored by the central government because it was the capital city, and therefore received more frequent shipments of water. Coming from Taiz, Shaibani would have been highly familiar with the inconvenience of waiting for supplies of water. Shaibani followed Klinger's idea and created a raindrop cartoon. His first image was of a cheerful raindrop with legs, arms, and a *jambia*. GTZ recognized that the *jambia* might be seen as representing the Northern tribes and therefore might upset some people in the South, so the cartoon figure was turned into a raindrop without the *jambia.* GTZ suggested a stylistic modification as well, removing the raindrop's legs and instead having him hover over the ground. After its initial creation, the raindrop cartoon image was loaded into a graphic art program and now images are recreated via computer without Shaibani's aid. According to informants, Shaibani's participation was no longer required after that point and the computer program was used to generate further images which, despite suggestions by local Yemenis, remained slightly Northern in interpretation because of his tribal headdress.

A few days after my interview with Mazooq, I visited the Awareness Department, a part of NWRA, located in the NWRA complex near the Majlis Ashura in Sana'a. Branches of GTZ and other organizations which supported development projects had offices in the complex as well. The director of the Awareness Department, Dr. Jamal, was unable to meet with me but said that the staff could answer my questions. The Department consisted of one medium sized

room with three desks and a few filing cabinets. The area appeared to have been a part of a large open room, but modular walls had been constructed to create separate offices which now housed other international affiliates of development organizations. The furniture was cheaply made, but newer and cleaner than that found in the main NWRA building. The walls were covered with the raindrop posters. A German man and two Yemeni women sat in the office. One of the Yemeni women wore the black *abaya* and *niqab.* The other young woman had her hair covered with a hijab, but her face was uncovered. The women were young, probably in their very early twenties. The German man appeared to be of the same age. He introduced himself in English as Tobias and said that he worked for DED (Deutscher Entwicklungsdienst), another German development service which offers support to the Yemeni water sector. Tobias then introduced me in Arabic to the women, and offered me a chair near his desk. Hadeel spoke English about as well as I spoke Arabic, with limited technical vocabulary. Muna spoke no English, but with Tobias's help I was able to ask detailed questions of both the women. Tobias spoke both English and Arabic very well and did an excellent job of translating technical questions and answers, while both Hadeel and I struggled to find specific words.

Hadeel explained that she had been with the department for over a year and was leaving her position soon. The other woman, Muna, was her replacement. Tobias said that he had only been in his position for about six months, and that positions were constantly rotating in the department staff. He said that staff members of the Awareness Department were typically young and that they took these positions in order to get experience to move on to better positions. I asked each of them what they had done previously. Tobias said that he had an Islamic Studies degree and had not worked in media or promotions before. Hadeel said she'd worked with other NGOs before but never in promotions; and Muna said that she had been a teacher. None of them

were really trained for the jobs they held, but they impressed me with their open conversation and welcoming manner. Muna got us tea and the conversation continued for the next hour. They seemed pleased to converse with someone interested in their work.

I asked each of them to tell me their specific duties. Hadeel began to answer first. She was outgoing and charismatic. I suspected that she had formal university education, although she had not mentioned it, and that she came from the kind of progressive Yemeni family that allowed its female members to take full time jobs and interact with males in professional settings. In Northern Yemen, gender segregation was common. Women and men usually did not intermingle unless they were related or they came from a status which allowed a certain level of flexibility in social roles (usually either the upper class or the lower and unrespectable classes). Hadeel said that an important part of her job was to visit local schools to educate the students about water conservation and to coordinate demonstrations and lessons regarding water for World Water Day each year. She also consulted with regional offices of NWRA over the phone and coordinated events in different provinces. This included sending pamphlets and informational material to the regional offices for local school events and also planning the construction of informational booths staffed by employees at local fairs and public gatherings. Hadeel's replacement, Muna, was fairly quiet and allowed Hadeel to represent her in the conversation. Tobias said that he assisted Hadeel in these activities and also helped to distribute awareness materials and to plan publicity events.

I did not mention Marzooq and my recent conversation with him, but I asked them to explain the awareness campaign. Although Hadeel was senior to him, Tobias did most of the talking. Hadeel added side comments while Muna nodded her head or briefly supported their statements regarding the campaign. Tobias said that GTZ had designed the majority of the

campaign and funded parts of it together with the World Bank. He said that a Yemeni cartoonist designed the original image, but that the concept was "updated" in Germany prior publication. In 2007, the awareness campaign ran a series of posters featuring *Rowyan* the raindrop. In 2008, GTZ added *Rowyan's* fully veiled wife as a character in the campaign. Her name was the feminine of his, *Rowyana.*

"Why add a female?" I asked.

"Women and children usually gather the water," Hadeel responded. "In some rural areas, women have to walk miles and miles now to get a bucket of water. Girls can't get an education if they are busy hunting for water. And, women use water the most in the house. They cook and clean with it all day." I looked at the picture of *Rowyana* on a nearby poster. She was a plump raindrop with curly eye lashes carrying a flower-covered purse. Tobias noted that Rowyana was added in an attempt to influence domestic conservation as well as the male-dominant agricultural sector. He then smiled and said that the raindrop family was soon set to expand.

"It's not official yet, but they're [World Bank and GTZ] supposed to be adding a baby to the two raindrops soon. I think it's in development back in Germany and will probably launch in 2010," Tobias said. It was summer of 2009 at the time, but no baby raindrop emerged in the subsequent years. I've been able to find no information to date about whether the baby raindrop will appear any time soon.

Hadeel and Tobias both agreed that the most successful Awareness Department branch was in the city of Aden in the South. The Sana'a branch was second in their ranking, and Taiz third. These are the three largest cities in Yemen, and each contains a branch of NWRA with an Awareness Department office. Hadeel and Tobias stated that Aden had more employees who worked on Awareness events and that the staff there had the highest level of enthusiasm about

getting the message out. When asked why that office had more staff and enthusiasm, Hadeel shrugged and smiled. She indicated that some of the workers had been inherited from previous water bureaucracy offices and that they got along well. She said many of them were young and enjoyed getting out and engaging with the public.

When I asked if the staff had any complaints, they agreed that they needed more human power to work on implementation. They said that only two staff people at NWRA regularly worked on the Awareness campaign in Sana'a (since Hadeel was soon to be replaced) and that other offices were similarly staffed. They relied on volunteers and other NWRA members to assist at events at times and noted that it was difficult for so few people to coordinate events in the major cities, much less in the rural areas. Tobias also mentioned that none of them had experience in marketing or media prior to their current positions. He said that they were hired because they were young and didn't mind performing the many required hours of travel and work in return for relatively low pay and that these positions improved their resumes. Tobias added, though, that having someone on staff with a background in media development would be helpful.

"I really try to come up with new ideas and I've been reading a lot about marketing and media strategies, but I've never done anything like that before this," he said. I understood. The more I asked about the media campaign, the more I realized that the planning occurred in Europe while the on-the-ground execution managed by these enthusiastic, but untrained, young people. This made good sense to me, given my experience as a broadcaster for eleven years with a major US media corporation.

"We have plenty of stuff, but not enough people to get it out or to travel to reach rural areas to convey the message," said Hadeel. Tobias offered to take me to the supply room for the

Awareness Campaign, and I followed him down a hall to a locked door. He went to get the key from another office, and a Yemeni man came back with him to unlock the door.

"Ironic, but it rained recently and the water ruined some of our water conservation stuff," the Yemeni man commented.

The supply room was filled with metal shelves from floor to ceiling holding posters, pamphlets, magnets, and other items ranging from toys to mugs to briefcases. I was truly surprised to see such extensive supplies of material. I had not seen any posters or other items connected to the campaign during my travels in Yemen, and yet here was a huge cache of items. All the products bore the NWRA logo and had pictures of *Rowyan* and/or *Rowyana* on them. Tobias said that the World Bank had paid for all the boxes of paraphernalia and that these were to be handed out at schools and other publicity events. The plaster roof tiles were still damp from the recent leak, and the room was musty. The men said that they were in the process of moving the items to a drier location until the roof could be mended.

"We may be short of staff, but we have plenty of things to give away," Tobias said. "Here, take some." He pulled posters from the sheaths of paper on the shelves. As Tobias gathered a mug, a cloth briefcase, and other items for me, the Yemeni staffer walked to a cardboard box sitting in a far corner.

"It looks like the balloon didn't get too wet," he said.

"Balloon?" I asked.

"Yes, we even have a big blow up mascot." The man began to pull the parachute material from the box as I reached for my camera. I asked if I could take a picture of it, and he held the material out for me.

"What do you use that for?" I snapped a photo, and he returned the raindrop balloon to its box.

"If there's a parade, we blow it up and take it. People really like the balloon," he said. "What type of parade?" I continued to browse the items in the room as Tobias stuffed a few pamphlets and key chains into the bag he'd selected for me.

"Political parades, school parades, really any type. We usually only make it to the really big parades, which are rare, but the balloon works well to get attention. Kids like it," Tobias said. He generously handed me samples of the many Awareness campaign materials and insisted that I take them when I protested. He took two tote bags and filled them with samples, then added a canvas briefcase for me to put my notebook in as I left.

"They'll help you with your work, and we can get plenty more. Like I said, we may be short of staff but we are really not hurting for products," he said. "Anything to help get awareness out there that Yemen is really getting near a crisis. Hadeel and I know it. Muna knows it and she'll really see how difficult it is to spread the message as she takes over for Hadeel. We try to get the products out, but it's like we can't get the message across."

The products were numerous and varied. All of the items appeared to be of high quality. Like so many products traveling through the global economy, many had the "Made in China" sticker on them. There were metal travel mugs inscribed with the NWRA logo and the line "The water is our life, so don't squander it" written in Arabic. Lacquered wooden boxes with professionally tooled images of the NWRA logo and Rowyan held heavy pens. An assortment of thick cotton t-shirts hosted a variety of Rowyan images in different sizes, and blue and white baseball caps carried the NWRA logo in Arabic and English. There were different styles of blue tote bags and key chains, each with the NWRA logo in both languages. Black canvas briefcases

displayed the logo, and a variety of notepads pictured Rowyan and his raindrop wife. Large stickers for car windows or for children to play with had sayings on them in Arabic such as "Save drinking water; Save your life"; "Water = life"; "Wasted drops, lost wealth".

Pink plastic canteens for little girls displayed the Rowyan character (they'd been made before Rowyana) reading a book with a miniature raindrop cartoon on the front and the caption "I am the life force affecting your life force" in Arabic on one side and the NWRA logo on the other. Paper game boards for children similar to the old game "Chutes and Ladders" were decorated with various images of Rowyan and the NWRA logo, and were housed in bags that also held plastic playing pieces in bright colors and tiny dice. Coloring books included stories in Arabic instructing children how to conserve water when washing dishes, mopping the floor, bathing, or washing a car.

There were also shelves full of posters in the storage room. Most of these were of very good quality and were on thick paper with adhesive backing, much nicer than many of the posters I'd seen as other promotional pieces at different events. Some promoted World Water Day and showed images of drops of water or flowing streams with Rowyan and Rowyana in the corner with the NWRA logo. One displayed a droplet of water inside of which was a young seedling sprouting from the earth and the headline "A drop of water is equal to life", again with the cartoon images of Rowyan and Rowyana in the corner with the NWRA logo. Unfortunately, many of the posters had been damaged by a water which had leaked through the roof during a recent rain, but Tobias seemed confident that more would be shipped.

The messaging differed depending upon whether the target audience was children or adults. Children's toys and stickers attempted to establish that water was a valuable resource, one that should be conserved in daily use in order to preserve it for the future domestic water

supply. Adult messaging equated water with the essence of life, but did not directly state that a water crisis was imminent unless Yemen undertook massive changes in practice in the agricultural sector. It did not stress that groundwater across the nation would soon be non-existent, causing many in rural areas to relocate to urban areas in order to gain access to drinking water. In light of the seriousness of the situation, the messaging aimed at adults seemed grossly inadequate. I also noticed that despite Klinger's original idea that the cartoon would convey messages without words, the majority of images seemed in need of an explanation. The only clear message I could discern from a happy smiling raindrop was one of passivity. Rowyan looked happy, fat, and content. He certainly didn't look desperate or thirsty. The image conveyed no drama, nor any indication of stress or urgency or impending crisis. Adult messaging gave the impression that water should simply be conserved in both agricultural and household use, as if that was the solution to the problem.

Awareness Implementation

The employees of the Awareness Department described the execution of the water campaign as "awareness implementation" consisting of three elements: 1) Teachers and Youth, 2) Media & Public Events, and 3) Religion. A two person team, usually consisting of Tobias and Hadeel (soon to be replaced by Muna) worked to coordinate the Awareness campaign from the central office in Sana'a. Other NWRA offices coordinated events through the central Sana'a office and Tobias or Hadeel assisted with these projects as time permitted. Sometimes they'd travel to another city to assist, but usually they coordinated via phone or email. Implementation was the core of their work for the campaign. Tobias and Hadeel said that they had nothing to do with the design of the message or ordering the goods to support it. Rather, the Awareness Department was charged with the delivery of the message. When asked who created the

messaging, they said that technically NWRA was a part of this process, but that "everyone" knew that GTZ and the World Bank actually controlled the messaging and production of supporting products. This 'delivery of a package' model seems to be typical of development policies internationally. When asked why local Yemenis seemed to have less influence over the messaging, informants from the World Bank and GTZ said that their organizations had "more" experience dealing with "such things" and that local opinions were limited in scope and experience. "We do this all the time, all over the world," said a development agency worker. "Locals may think they know what will work here, but we have decades of experience all over the place and more resources than they could dream of." As Escobar suggests, this attitude that "locals" are less in touch with "local" issues, and that universal models can easily be applied to any society sadly seems to permeate development discourse (1995).

Part One: Teachers and Youth

Hadeel went to one of the cabinets in the office and pulled out a pink purse with a picture of Barbie on one side and the cartoon raindrop on the other. She said that she regularly went to local schools to speak with school children and to hand out toys, like the purse, marked with the raindrop cartoon. Every year, NWRA sponsored World Water Day and Yemeni schools actively participated and organized events and contests. NWRA was thus able to gain access to school children in urban areas like Sana'a, Aden, and Taiz via their teachers and the classroom activities. Some other smaller urban centers had NWRA representatives who reached out to local schools, particularly on World Water Day. Employees also spoke with educators as often as they could (sometimes only once every few months) in rural areas and tried to encourage lessons on water conservation by providing pamphlets and materials for the children. Children in rural areas, however, attended school inconsistently because their parents needed their labor

on the farms. Rural schools, moreover, were often located far from households and many younger children could not walk the distance regularly. Getting the message out to rural areas, therefore, was more challenging.

"I love to speak to the children. I try to get to all of the classes that I can, but it takes time. I tell them about conserving water and valuing what Allah has given us," Hadeel said. Hadeel said she usually brought them the toys, stickers, and posters provided by the Awareness Department. When asked what she taught them specifically, she said she usually coordinated with the teachers and presented simple ways of conserving domestic water supply such as making sure the faucet was not left dripping or using less water when washing dishes. Her main focus was teaching youth that water must be respected and conserved. There was no messaging regarding the hydrology of Yemen, the draining aquifers, or the impending water crisis. No urgency was conveyed.

Of the three parts of the implementation plan, the Awareness Department staff was most positive about the Teachers and Youth aspect. It was relatively easy to reach captive audiences of urban school children. Given that they were short staffed and ill trained to reach out to larger audiences, they could at least address this target audience and hope that the children might carry the message home to their parents and siblings. Because the presentations meant a break from normal class routine, the children were typically enthusiastic. Awareness Department employees also had reservations about the school presentations, though. Tobias expressed his concern that children should not be the primary audience for the water conservation message, yet they were the primary audience because of convenience and lack of other resources. He felt that while most of their time was devoted to school presentations and World Water Day planning events for children, this target audience could not impact the immediate water problems and more emphasis

should be placed on other parts of the implementation, especially those aimed at educating adults. Even if the water conservation message did reached adults through their children, the message was light hearted and did not effectively address the seriousness of the situation.

"It's really easy for us to speak to the children, and it's easier to say that we've achieved our goal of getting the message out that way. But, what message is that? I mean, we tell the kids to conserve water, but we're not going to terrify them and tell them the land is going dry," said Hadeel. Although the Teachers and Youth part of the implementation plan was considered to be the most successful by far, all of the Awareness Department employees agreed that adults needed to understand the water crisis and that the other parts of the plan were not going as well.

"We don't have a budget to run lots of advertisements on television or to reach out to business owners or post billboards around the country," said Tobias. Muna nodded in agreement. "Kids are useful to educate for the future, but the real problem is now."

The many products and presentations given to the children might, potentially, influence future water consumption. But, if Yemen's water supplies depleted at the projected rate, the aquifers would be dry long before the children could have any effect on the resource. Schools held captive audiences that were easy to reach. Products could be handed out quickly, and reports back to development agencies always showed success with youth. But, the smiling raindrop images floating back to parents through the children only muddied the message to adults and indicated that there was no water crisis.

Part Two: Media & Public Events

The Awareness Department and NWRA organized meetings, press conferences, and workshops in order to inform the mass media about water issues. These were held infrequently because of the shortage of staff and many responsibilities of the NWRA employees. There were

no advertisements or consistent messaging in local media because there was no budget for this. Both Hadeel and Tobias said that NWRA employees "really tried" to develop interesting presentations for reporters in order to keep the water issue in the press. These press conferences often emphasized current development projects because people in the community were interested in the construction they saw locally; therefore reporters were interested in reporting about the projects. These events were low key and often simply involved arranging for a reporter to interview a senior staff member. I sensed that Hadeel and Tobias were disappointed with the media reporting. They emphasized all the hard work that the NWRA employees did to prepare for events and the work they did to "try" to get reporters to attend so that water experts could provide information to the press and therefore to the people.

"Do many reporters come usually?" I knew from my own decade of experience in the U.S. media that unless the information that the press conference or workshop promised to reveal was new or tantalizing enough to grab an audience's attention and garner the network high viewer ratings, broadcasters typically bypass press conferences and workshops in favor of dramatic stories based on the old adage 'if it bleeds it leads'. Complex issues such as environmental degradation require long interview formats to present the information to an audience coherently. Because it is so difficult to push messages out about larger issues like climate change or healthcare concerns, many organizations across the world typically use public service announcements or contracted advertisements to convey messages to the public about such issues. These issues are then often picked up as storylines in television programs or other creative shows, sparking a national conversation and even behavior change. Kamran Ali describes such an experience in Egypt where public service announcements about birth control were used to reach a wide female audience (2002). These narratives were then added as

storylines in fictional programs and a national discussion ensued, educating females and influencing behavior. Public service announcements in the media have long been used as a vital resource for reaching a large adult audience and beginning a national conversation. Considering that public service announcements are a commonly used medium to reach adults, I was surprised that NWRA's awareness implementation plan did not include a fully produced and funded media campaign on radio or television, particularly considering the obviously high budget for campaign products provided by the World Bank.

"There's not really a big attendance [at press conferences and workshops], but we have regular contact with some of the main reporters. They help us get the message into the press," said Tobias. "Occasionally someone will do a story that actually emphasizes the water crisis, but these are infrequent because attention on other issues always gets the headline. Besides, people [interviewers] ask what the solution is, and there's no easy answer. So, our [Awareness Department] messages alternate between conservation tips and the occasional serious interview with a staff member." He said that when senior MWE or NWRA staff members were interviewed, they spoke very seriously about the impending water crisis and this was reported in the press, but the coverage was mostly infrequent and the power of the message was often lost amidst other headlines that got more coverage.

When the Yemen Observer interviewed MWE deputy director Muhammad Al-Hamdi in 2007, he stated that Sana'a would be the first capital to become a "ghost town" because of the imminent water crisis (Yemen Observer 2007). Al-Hamdi also delivered the same grim message in other interviews that year, but his warning was lost amongst other stories when higher government officials (parliamentary or presedential) did not offer complimentary opinions. I asked Yemeni informants about Al-Hamdi's comments in the press in 2007, and most informants

did not even remember his statements. They remembered that parliament members stated that water projects were underway to help with domestic distribution, and they remembered that President Saleh had commented about these projects. But, no one recalled the grave warning of the MWE's deputy director.

Three years later, in 2010, Anwer Sahooly, director of several water projects in Yemen, reiterated al-Hamdi's views during an interview with Reuters stating "if we continue like this, Sanaa will be a ghost city in 20 years" (Laessing 2010). Numerous news stories also ran in Yemen stating the seriousness of Sana'a plight and the possibility of a future water crisis, but they often included comments from parliament members or other government officials suggesting that the crisis might be averted with conservation techniques or future planning. For instance, the Yemeni government-run SABA News Agency published a piece on Yemen's water shortage, but it ended with the statement "…But the general manager of the National Water Resources Authority…said there are plans to find water resources to help solve the problem in these affected areas" (2010). Comments such as these left the citizen believing that although there might be a serious shortage, simple conservation and proper government planning would make everything fine. Such claims seemed designed to make the impression that the government was, in fact, executing a coordinated and efficient plan to avert future water problems and thereby reassure the public. My interviews with senior NWRA and MWE officials, however, suggested that they were actually very alarmed at the lack of political support for a comprehensive water strategy and that they felt that their voices were going unheard.

When I asked why NWRA did not run public service announcements on radio or television, Tobias explained that in Yemen the media charged a fee for all announcements and did not offer free public service commercials as stations in the U.S. or Europe often did.

Because of this, commercial air time would have to be purchased to run any announcement. Despite the large budget provided for material products, the Awareness Department had no budget for regular media coverage. Tobias and Hadeel mentioned that the Awareness Department had created a short video with support from the World Bank/GTZ that had been broadcast on state run television in the recent past. But he couldn't tell me exactly when, where, or how often the advertisement had been broadcast or how air time had been acquired without a budget. He said that this video had been screened at World Water Day presentations as well. The video was produced in 2007, and Tobias gave me a DVD of it to view. During my time in Yemen in 2008 and 2009, I had never seen the advertisement air.

The "commercial" surprised me in its length. Commercials or advertisements aimed at television audiences are usually in 30 or 60 second increments because stations sell advertising in these segments. Although there may be slight variations, this is rather standard in broadcasting. Commercial breaks usually run for two or three minutes and do not typically go beyond that because viewers become restless waiting for their show to return. This commercial was about 4 minutes and fifteen seconds long, an odd time signature for an advertisement. This would be difficult to run on any major station in the world because it would require buying an entire commercial block as opposed to a 30 or 60 second spot. I asked the Awareness Department employees if perhaps the video was meant only for public presentation at events, and if there had been a shorter version for commercial broadcast. Tobias said the video he had given me was the only one that he'd ever seen and he truly thought that it was the one that was broadcast. Other members of NWRA agreed and said if there had been a shorter version, they didn't remember it. Some informants thought that it was broadcast in 2008, but they were unsure of exactly when. Informants also could not remember what time of day or how many times the

advertisement had run. I asked Tobias and Hadeel if the Awareness Department had the original contracts for the television time. They said they didn't know. I later attempted to contact local television stations to see if they had any record of the water commercial airing, but they could not help me. As I had anticipated, there were too many records to sort through without some sort of air date to reference.

The following is a summary of the commercial and Rowyan's narration (translated from Arabic to English) as I received it on DVD from the Awareness Department:

> [The scene opens with a cartoon image of the world spinning around to focus on Yemen. A chorus of voices sings "Rain, rain, rain" in Arabic as the view zooms in on raindrops falling on Yemen. One raindrop, Rowyan, has an umbrella and turns to the camera.]
>
> Rowyan: We rarely land as raindrops in Yemen.
>
> [The camera zooms down to the earth and shows a city street with a child drinking from a plastic bottle; two children carrying large jugs of water, and tanker trucks traveling the streets. The song shifts to a single voice which sings "Water is a blessing, saving water is wisdom. It is a blessing to our existence." Rowyan lands on the ground and looks at the tanker trucks going by. The camera follows a truck as it passes a car wash.]
>
> Rowyan: It seems that people here have no anxiety other than their concern about the groundwater.
>
> [The tanker truck moves on and fills a tank on a rooftop. The camera turns to a woman washing clothes on the roof in a bucket.]
>
> Rowyan: For a long time water was dormant in the ground before it was extracted.
>
> [The picture shifts to a drilling rig and pumping station.]
>
> Rowyan: We are needed in cities and villages. Like everywhere in the world, though, we are needed most in agriculture.
>
> [Images flash by of a man plowing a field with a donkey; a man herding goats; a man riding a motorcycle carrying yellow jugs of water.]
>
> Rowyan: Most water drops are lost without taking care of the thirst of the plant. Water is wasted because it evaporates before it can be used to nourish the plants.
>
> [A man tends a green field in the hot sun while a pipe gushing water floods the field.]

Farmer: Thirst! I am thirsty!

[An empty glass magically appears in the farmer's hand. Then a bucketful of water pours from the sky, soaking the man and only partially filling the glass. Rowyan laughs and is seen sitting on the pipe nearby.]

Rowyan: Unbelievable how those humans quench their thirst that way. That's exactly the same way plants are flooded. In this manner we are completely useless. And, we are constantly extracted from the earth and carelessly abused.

[Camera zooms behind the field to drilling rigs in the background. A cartoon image of a pipe is shown drilling below the surface. A blue pool of water is shown being pulled up the pipe until there is no more.]

Rowyan: If humans continue to waste water like this, you can be sure to encounter a drought someday.

[The pipe gushing water on the farm field slows to a trickle and Rowyan emerges, squeezing out of the pipe.]

Rowyan: But, we have a solution!

[The image appears of the farmer's hand turning the valve on the pipe.]

Rowyan: Finally, our friend the farmer understands how he can use half the water by using drip irrigation.

[Picture of farmer walking through his field; camera zooms to a single plant with a drip irrigation hose near its base.]

Rowyan: Plants receive the required quantity of water without wasting it.

[Cartoon raindrops float from the soaker hose into the earth and into the roots. Then, Rowyan is shown sitting on top of a glass of water.]

Rowyan: Please do not misuse me! Use me carefully to make me last for you as well as your descendants.

[Rowyan throws off his head scarf and jumps into the water to swim. The camera pans out to show the farmer smiling and holding the glass with ten children of various ages standing around him in the field. Everyone is smiling. The music returns with a chorus of "Rain, rain, rain." The male singer adds "We have to take care of it; we have to us it in moderation everywhere." The scene fades to black.]

The majority of the presentation was devoted to agricultural water usage, spending little time on domestic water concerns. Controlling agricultural usage is difficult for the government because taxation and policy enforcement are practically impossible in rural areas of Yemen, and therefore behavior modification has to be inspired without formal sanction support. The message, though, was cheerful and positive as if with a simple switch to drip irrigation and a small amount of domestic conservation, the water crisis would be averted and everything would be fine. Rowyan said it himself, "We have a solution!" The solution suggested that agriculture should continue pumping groundwater and merely implement drip irrigation in order to more efficiently use the pumped water. The video neglected to note that even if all the farmers in Yemen did switch to drip irrigation (an unlikely scenario because farmers dislike the inconvenient hoses which constantly clog with sedement), the groundwater is still projected to run out by 2025 because the aquifers are too damaged from years of pumping. So, Rowyan espoused a "solution" which was actually unsustainable. The tone of the commercial offered comfort to viewers and did not provide a strong warning that the water situation was becoming critical. Even when Rowyan cautioned that "If humans continue to waste water like this, you can be sure to encounter a drought someday," the narration suggested that drought was far away and could easily be prevented. The commercial did not differentiate the current water shortage from past droughts, nor did it offer sustainable options or educate the viewers as to the seriousness of the situation. So, even if the television commercial aired in 2008 as the Awareness Department claimed, the message was not one indicating a crisis.

Messages similar to those used in the television production were also used in radio. Tobias said that the talking points for radio were drawn from the video. The Awareness Department offered domestic conservation tips on radio such as turning off the tap or washing

the car less, and suggested drip irrigation use. Hadeel said that they worked to have radio reporters cover water issues on shows such as *Rural Development* on local networks reaching outlying areas. Like television news coverage, reporting about water issues on these radio shows was inconsistent. Tobias said that he heard the talking points included on local shows occasionally and he was pleased that at least some of the information was getting out to the public. Much like television, radio coverage was dependent upon the whims of broadcasters because budgetary constraints prevented purchasing regular time to run messaging.

Other than television and radio, the Awareness Department also regularly set up booths at festivals and events held in urban areas such as the Sana'a Summer Tourist Festival. They would set up a booth and hand out the many booklets, stickers, posters, and paraphernalia from the supply room. Although these events were tiring to staff because just a couple of employees had to rotate the many hours serving at the booth, they said that they enjoyed visiting with people face to face and the crowds coming through such festivals usually approached the booth because of the free items.

While the supporters of the awareness campaign were able to provide an excess of "stuff" which filled cabinets in the office, little money was available to run regular advertisements aimed at educating the public about the water crisis on either television or radio. Given the high illiteracy rates in Yemen, I was surprised that more emphasis was not placed on the audible media and that development agencies had not provided a broadcasting budget. Satellite televisions are popular throughout Yemen, and families gather to watch musalsals (TV serials) in the evenings, especially during Ramadan. Electricity is intermittent throughout the day, but generators are prevalent and power usually resumes in the evenings for television watching. Radios are in almost all vehicles and hand held radios are found in offices and homes. In rural

areas, generators power televisions in the most remote areas and farmers often listen to radios as they work. Television and radio would reach far into the populace, particularly with selective placement of the announcement. But, media messaging requires repetition. The same message has to air repeatedly before it finally is picked up by the audience and occasional coverage with inconsistent message delivery does not create a solid media campaign. Instead, it muddles the message.

Part Three: Religion

The final part of the implementation plan was simply referred to as "religion," and they all seemed to feel that this part of the plan should be treated elevated to the primary focus of the implementation strategy. I asked them how religion played a role in implementation, and why they felt it should become primary to message transmission about water in Yemen. They said that informing the Imams of the water situation was vital to informing the public because Imams were amongst the few authority figures in Yemen who actually were trusted by the citizens.

"I wish we could reach out to the Imams even more," said Hadeel.

"It is true. The Imams could educate people and the people would believe them because they are trusted much more than politicians or television personalities," Muna added. Muna had been fairly quiet during most of our conversation. But, she appeared passionate about this topic. "I don't think that the World Bank or the Europeans feel very comfortable working with our Imams. Westerners seem to want to separate religion from the people, but it's such a part of who we are [in Yemen] and the Imams are vital to our communities. Governments come and go, tribal leaders fight and become corrupt, but the Imams remain steady and care for the people. What they [the Imams] say is listened to."

Tobias said that when he arrived to his position there was little contact between the Awareness Department and the Yemeni Imams. He said that Westerners were fearful of the Imams because Yemen was known to have an Al-Qaeda presence and many Westerners preferred to completely disconnect from anything religious in order to avoid accidentally interacting with extremists. Further, Muna said that she thought that some Westerners feared Muslim leaders and therefore disempowered them by just not including the Imams in serious dialogues.

"Other countries are not as religious as we are," she said. "In Yemen, some people watch television; some people listen to radio; some children go to school. But, *everyone* goes to Mosque. If a message needs to get out, it needs to come from the Imams. They talk to everyone and they talk to each other." Hadeel added that while the Yemeni government was viewed by the people as fractured and corrupt, the Imams had a network of contacts throughout the country and could act together to send out a message if they chose to do so. Tobias also noted that the Imams tended to be passionate about issues which affected the lives of their followers, and a water crisis was sure to do that.

Tobias said that he had reached out to the Imams in Sana'a and provided them with the same talking points that were given to television and radio stations. He said that most of them were very welcoming and agreed that provide the information to their constituents. He was even more pleased that a few of the Imams had recently added verses from the Koran regarding water to their Friday prayers and incorporated the message of water conservation into these sermons.

"The Imams are very educated and care about the people. They want to understand what's going on with the water. I mean, they see more people coming to the Mosque taps to fill jugs because their own wells are dry. They know there's something going on and if we [the

Awareness Department] can educate the Imams, then they can spread the message better than anyone," said Hadeel.

All three of the Awareness Department employees felt that the Imams were the key to getting the message out in Yemen, particularly in rural areas where it was difficult for the government bureaucracy to reach. If the Imams began educating Yemenis about the water crisis and the message matched that of the government, then the message would have more credence. But, everyone agreed that interfacing with religion too strongly was not politically correct in accordance with the sensibilities of Western development agencies. Occasional contact would be accepted, but a full partnership would be frowned upon because of Western tendencies to remain secular. Because of this, they only sent talking points to the Imams irregularly, although they all agreed that consistent contact and cooperation would be better.

The fear of accidental association with any extremist Imam and the fear of appearing too religious (or not secular enough) kept the Awareness Department from establishing strong ties with the Imams in Yemen. The Awareness Department depended on foreign support and knew its donors would not like any sort of questionable associations, accidental or otherwise, and that Western nations tended to frown upon "too much religion". But, in Yemen, the Imams have a broad social network which reaches across the country and could be utilized for message transmission. Unfortunately, the water shortage message was only given to a few Imams and was limited to conservation methods; leaving the future crisis unaddressed or explained.

There is not one, singular message regarding water being presented to Yemenis from the NWRA Awareness Department but rather multiple messages being designed by international development agencies. Water experts offer dramatic statements predicting stark outcomes such as Sana'a becoming a "ghost town" in the local media, but many of these articles end with

comforting words from other politicians suggesting that a plan from the government is imminent or that simple conservation methods will truly help. World Bank/GTZ produced cartoons presenting a happy raindrop suggesting a few tips on conservation without offering educational material to adults explaining the extent of the groundwater shortage, the true causes, or the additional effects of climate change in the region. There is a strong contrast between the opinions of the experts and the cheerful tone of the cartoon and other NWRA products. The narrative of the experts expresses a fear of severe water shortage and the consequences the population will endure as this occurs. The narrative of Rowyan, the cartoon, and his campaign offers a tale with a happy ending. If people will just turn off the tap and save water as they wash the car or use drip irrigation instead of traditional flooding techniques, then all will be well and the raindrop will continue to be happy and sing his song. The message of the experts and the message of Rowyan negate each other and leave a murky discourse in place. But, the Yemeni experts are reliant on the international aid community for funding and won't challenge aid agencies' authority and risk losing development assistance. The real question, then, is what do citizens think of the water shortage and what do they ascertain from the NWRA messaging?

V. PERCEPTIONS OF WATER

Sad are only those who understand. ~ Arab Proverb

In Yemen, the word *bahr* is colloquially used to indicate groundwater. It is also the classical Arabic word for "sea". This juxtaposition of meanings lends an impression of "limitlessness" to the concept of groundwater and suggests that the patterns of the sea are applicable to groundwater (i.e. tides, sea levels, flows). After his fieldwork in northern Yemen, Lichtenthaler noted that many locals were increasingly aware of groundwater deficits but that the concept of limitlessness persisted and the term *bahr,* along with the oceanic metaphor, continued in local discussions of water (2003). Lichtenthaler described receiving a letter in 1998 from a farmer "desperately seeking financial help to 'reach the *bahr*' in his area where the tide…had gone out fast and did not seem to come back in" (2003: 161). My own fieldwork further supported Lichtethaler's observations. I found that Yemenis often equated decreasing groundwater supplies to receding ocean tides, and this offered the assumption that the water would return just as the tide always came back in eventually. Milroy's experiences with agriculture in Yemen also support these observations. Milroy writes that:

> Believing these newly-accessed groundwater supplies to be al-bahr - the sea - and thus limitless, farmers have increasingly relied in the past decade on these pumped aquifer waters for agriculture, drinking and livestock. A seemingly free and controllable resource, which had previously been unreliable and scarce, prompted farming communities to fatally turn their back on their traditions of collective management of their natural resource base and the physical assets they had built up over millennia (1998).

If groundwater is perceived as connected to the ocean and therefore perennially replaceable and of infinite supply, Yemenis can easily rationalize drilling into aquifers and using the resource without restriction. As I carried my own jugs of bottled water and waited for the trucks to fill empty tanks, I wanted to understand what the people of Yemen knew and thought about the seriousness of groundwater situation and how they perceived the climate changes occurring in

their land. Did Yemenis believe that the monsoon rains were capable of refilling the aquifers or that the aquifers were damaged from excessive drilling? Did they view the water situation with the seriousness that the scientists suggested? What was the common perception of the water shortage?

Yemeni water bureaucracy employees showed me internal development agency reports complementing NWRA and the Awareness Department's implementation of the Rowyan campaign, suggesting that the public was embracing the messaging and that they understood that behavior change must occur to offset the depleting water supplies. Foreign media sources praised the ingenuity of using a cartoon to reach a largely illiterate Yemeni public stated that the campaign implemented across the nation educating Yemenis about water scarcity. The BBC quoted Jochen Renger of GTZ's water program: "We've already seen high demand for Rowyan products, such as spare wheel covers, posters and bags…Rowyan really seems to have captured the public's imagination. This indicates people are receptive to the message at some level. But is there a behavioural change? We don't know yet" (Hill 2008). Given such claims that suggested widespread dissemination and adoption of the campaign, I wanted to understand how the Yemeni public perceived Rowyan and how the water crisis was, in general, understood.

In the course of my research I observed water usage in urban and rural areas and spoke with hundreds of Yemenis from different economic and educational backgrounds. I experienced the scarce water conditions in both rural and urban environments and I watched as my informants adapted to the decreasing water table. As a foreigner, I did not have to follow the Yemeni gender segregation practices and I was allowed to participate in both male and female spaces, thus allowing me to observe both genders and their relationship to water resource management. Most importantly, I listened to what was said in conversations held while Yemenis

negotiated their daily lives. Briggs suggests that formal interviews alter the information given because the very structure suggests that there are rules to observe and language to avoid (1986). With this in mind, some of my most productive moments of research were simply discussions held at everyday events. I participated and I listened during qat chews, at cafes while sharing tea with friends, walking through the markets, and at various social gatherings. I drove to rural towns and spoke to locals and I hiked farther into the countryside and spent time with families living in remote conditions miles from the nearest road. I walked through urban markets and spoke with city dwellers. I monitored local newspapers, radio, and television.

It soon became apparent that the NWRA Awareness Campaign and Rowyan were not reaching the Yemeni people. It was not that the message of the campaign was being perceived differently than intended, but rather that the message itself was simply not being received at all on a large enough scale to impact the general public. Literally none of the Yemeni people with whom I spoke outside of government bureaucracies had ever seen Rowyan on television or remembered seeing the image on a poster or flier. Not a single person whom I interviewed outside of the government could tell me what the raindrop cartoon image represented. Even the few informants that thought the image "might" be slightly familiar could not recall precisely where they saw it or what message it related. A few mothers in urban areas thought that they recalled their children coming home with "something" with the raindrop on it, but they were unsure and said that these items were "children's toys" that had been given at school and that the children played with on their own. Outside of government, none of the adults I encountered had ever received one of the many products from the Awareness Department supply room, nor had they seen any of the briefcases, coffee mugs, or other items within their communities.

After reading the internal development agency reports my informants had showed me, I was surprised at my findings. My research directly contradicted the development agency reports and positive foreign press coverage. This was not what I expected after reading the positive reviews of the campaign. I had expected at least some level of consciousness of Rowyan, and I had intended to discuss impressions of the cartoon with informants. Instead, I found that the "mascot" of the Yemen water crisis was actually totally unfamiliar to the Yemeni public. I went back to my NWRA contacts and asked them about the validity of these reports. They awkwardly admitted that the reports were written to please foreign donors who did not want to "hear bad news" and preferred to present positive "results" to their supervisors in the West. Informants said that positive reviews of the campaign were based on how many items were given away (which was often exaggerated) or how many interviews were done on television (despite frequent power outages preventing actual viewing).

In my own experience, I never saw an Awareness Department booth or witnessed any items being handed out at any of the many community events I attended. I saw no posters or other images of Rowyan in the cities I visited, and when I asked people if they'd ever seen the cartoon raindrop they generally looked confused and thought that I was mistranslating what I wanted to ask in Arabic. People would kindly indicate that I rethink my sentence and try another word choice. So, I began carrying a picture of Rowyan with me wherever I traveled to ensure that there was no confusion.

"Have you ever seen this?" I asked a farmer as I pulled a folded picture of Rowyan from my pocket. We were standing on a terrace overlooking his qat crops. The farmer, Waleed, was about sixty-five years old and lived near Mahweet in a rural area known for its agriculture. All the terraces within sight belonged to his farm. Most of his terraces were now filled with qat

plants because he made more money from this crop, but he told me that when he was younger he had farmed sorghum and coffee with his father. Down the hill, Waleed still had one terrace full of coffee plants. His four wives and several children were out tending the trees in the sunshine. Near us, a black snake-like water pipe from a well was stretched to flood one of the terraces.

"No, should I have?" He asked. Waleed did not recognize the cartoon image of Rowyan at all. His house was behind us on the hill and hosted a generator and a satellite dish. I asked him if he'd ever seen anything about water on television or heard anything on the radio.

"Eh, I've heard some talk of drip irrigation on the radio and some World Bank people came and talked to me about it once. Other than that, not really," he replied. I got similar responses from others to whom I showed the Rowyan image. No one recognized the cartoon character, but they did recall hearing about water issues from discussion in the media. They did not, however, perceive the information as being coordinated or emenating from one particular source. They certainly did not perceive the media information as being a part of a single or coherent "campaign".

Finally, late one evening during Ramadan in 2009, I spied the image of Rowyan on a hubcap attached to an SUV down the street as I was wandering back to my rooms after a celebration. Excited, I reached in my pocket for my camera. I was practically giddy from seeing the image in a non-governmental setting. The Yemeni friends I was walking with laughed as I stood in the middle of the cobblestone road taking pictures. They knew that I had been seeking this image, and joked that it was a gift from Allah because it was Ramadan and I had been fasting for the first time. My flash burst like fireworks in the night and drew attention to me from the other people walking down the street.

The narrow road hosted several people walking to and from Ramadan parties, and I asked if anyone knew who owned the vehicle. A small group said that they lived nearby and that the man worked for the government. I sighed as I realized that even in this setting, Rowyan was still tied to the bureaucracy and that this hubcap cover did not belong to someone who had received it at a fair or through the implementation process of the campaign. I asked the neighbors if the raindrop signified anything to them. They looked at me uncertainly and said they thought it had something to do with the government employee's work and must be part of the logo for his office. They did not know that the cartoon figure was the mascot for a water conservation campaign; they did not know his name; and the image had no meaning for them beyond being a possible symbol for a government office. I thanked them and continued walking. That was my only sighting of Rowyan other than in a government office, and even this one was connected to the bureaucracy.

Beyond Rowyan

Realizing that Rowyan and the Awareness Campaign were not reaching Yemenis, I sought to find what people perceived of the current water situation and why. I asked people where they received local information or news. Satellite television was, by far, the most popular source supplemented by radio, the messages of the mosques, and word of mouth communication with neighbors and relatives via face to face communication or cellular phone call. Newspapers were not a main source of information because many of the people I spoke to were illiterate or lived in rural areas where distribution was limited. Those who were literate and had regular access to newspapers viewed the Yemeni press as tainted by government propaganda and not to be trusted without verification from other sources. Another written source pertaining to water was the monthly water bill that the government mailed to customers in urban areas. Informants

pointed out that at the bottom of the page of the water bill were tips for conserving water and that these were convenient and useful reminders. The tips, however, only suggested ways that individuals might practice conservation and did not address the larger, structural issues pertaining to water.

Access to television viewing in Yemen depends on economic class and geographic location. Upper economic levels enjoy greater amounts of leisure time to enjoy viewing and can afford more fuel for generators to supplement the intermittent government power supply offered in urban areas. The majority of Yemenis I encountered shared a satellite with extended family or neighbors (as we did in my building in Sana'a) and viewed programs communally with family and friends. Rural Yemenis use generators to power satellite TVs, and almost every farm I visited had one. But, for the average farmer, diesel fuel use has to be rationed and balanced between irrigation equipment and household usage. Television viewing in rural areas therefore is often limited, ranging from one or two hours per evening to one hour or less per week depending on the family income. Rural sheiks usually enjoy more viewing than other rural residents, and family members of the sheiks pass on the latest television coverage and information to locals. Even the poorest of Yemenis who cannot afford a satellite said that they relied on word of mouth communication from people who did have television to learn of news events.

In the building I lived in, we depended on the Yemeni government power supply and did not have a generator. Sometimes the power was on during the day and off at night, meaning that my neighbors and I couldn't watch television after work was done so we often sat in the garden and visited. Or, the power would be on in the evening and we would gather in around the small television eager to enjoy whatever programming we could while the power lasted. We sat on

long pillows on the floor and watch channels from Yemen, Dubai, and Iraq. Favorite programs included Al-Jazeera news and Syrian or Iraqi musalsals. My neighbors preferred Yemeni channels like Sayeeda and al-Yemen for local news or for early evening musalsals before the major (foreign) channels put on their main programming. It is important to note that while TV viewing has been dependent on intermittent power for the past decade, the power supply has been increasingly undependable in the past few years because of infrastructure failures and political unrest. In 2008, when I first visited Sana'a, power supply was fairly steady and offered plenty of time in the evenings to view television after school or work. By 2009, however, the supply was less and less reliable. My friends and I all carried small plastic lights because one never knew when the power would go out, and silver plastic bulbs were sold by street vendors as people adjusted to the lack of light at night. Power supply is increasingly problematic as diesel fuel prices rise because of current government instability, and access to television programs remains intermittent even for Yemenis in urban areas. Yet, television viewing continues to be a favorite pastime and method of obtaining information when possible.

In all the time I spent watching television with my Yemeni friends, I rarely saw an in-depth story regarding water. There was the occasional short interview with a politician or water expert encouraging conservation and stating that the aquifers were drying, but there was no consistent coverage and no suggestion of solutions to the crisis. As protests against the government grew in 2009, occasionally water was mentioned in reference to unrest in Taiz (the city experiencing the longest wait for water delivery) but this was not usually the main focus of the story. Television was widely cited by informants as a popular source for local news, but it had little messaging focusing on Yemen's water crisis on either local or international channels. Television news primarily covered political unrest, economic issues, and concerns of the region

such as the continuing war in Iraq or the latest in entertainment. People often viewed news programs in the background while they were gathering food or drink preparing for the more popular fictional evening programs. Commercials offered retail products, and I never saw a public service announcement regarding water usage. Overall, messaging regarding water on television was almost as intermittent as the power supply in Yemen.

Most of the popular entertainment programs were broadcast on international channels from Iraq or Syria and did not include water as a storyline, but one local Yemeni station did produce a musalsal in which water was featured. A female informant from Sana'a recalled seeing this program on one of the Yemeni stations, but she couldn't remember which station or exactly when it aired. She said that it told the story of a rich Yemeni man who took his life for granted until the water ran out in his area. "Slowly, he gave up all of his possessions in order to save his family by purchasing water," she said. "The land got drier and drier and he prayed to Allah to help him. He promised that he would never take his children or wife for granted again." She said that the story was quite dramatic and emphasized how quickly one's life could change. Her main impression of the program, however, was to value one's family because one never knew when family members could be taken away. Other than conserving water, the program did not leave her with any impression that the lands of Yemen were going dry.

Other Yemenis I spoke with recalled the same musalsal, but many had opted to watch different shows at that time instead. "I hate to say it, but I really don't watch Yemeni channels," said a young man sheepishly. "The Syrian programs are so much better; or the Iraqi. Egyptian shows used to be good, but I think the Syrian are the best right now. Anyway, I tune in to the Yemeni channels every now and then to see the news, but that's about it." His sentiments were common amongst those I interviewed. If there was power supply available, fictional programs

on foreign channels were the primary choice followed by local news or international news. But, the majority of informants said that they rarely saw interviews or stories about Yemen's water on television at all. Informants mentioned occasionally seeing a government official discussing water resource management or the possibility of a desalination plant in Taiz, but the lack of systematic coverage regarding water degraded the message and gave the impression that the problem was less important and immediate than other issues receiving more coverage.

"If it's [water] such a major problem, then why aren't there special sessions of parliament to solve it or statements by the President or calls from leaders to act? They'll still be talking about it twenty years from now. These experts like to upset people. We have more important things to worry about—like the economy," rationalized a Yemeni business owner.

The irregular coverage in media was complimented by a lack of conversation about water at the local mosques, important agents for relaying issues of social concern in Yemen. Informants said that the mosques did not usually address water problems other than to offer water assistance to the poor. Two informants remembered attending services which included readings from the Koran about water and suggestions that conservation of water and respect for the resource was important, but they did not recall any mention of an impending crisis or any offer of a solution for declining supplies. Informants did believe that mosques were authoritative sources, though, and many said they would trust information regarding water if it was systematically disseminated through the mosques. They stated that information from the mosques would be significantly more trusted than if it were from other sources because people viewed Imams with great respect and, unlike other figures, felt that the Imams had the best interest of the people in mind. The lack of mention of a water crisis at religious gatherings

further added to the general impression that the problem must not be as significant as other issues in Yemen.

Finally, informants cited word of mouth communication as an important source of information. Intellect tends to be judged not by literacy as much as by the ability to debate intelligently about pertinent issues of the day. Long breaks from work in the hot afternoon are filled with qat chews and vibrant discussions. Bits of information are shared from television and radio sources as well as first and second hand reports. If a person has firsthand information to offer, it is listened to with rapt attention. If there is a question about a certain event, members of the gathering may use cell phones to contact other relatives or friends who may have more information. Social gatherings such as weddings also offer opportunities to exchange information with neighbors and friends. In a place where media access depends on power supply for television, batteries for radio, or literacy for newspapers; word of mouth communication is oftentimes the most reliable, or even the only, source.

At the social events I attended, water was rarely discussed other than complaints that a tanker truck was late to deliver or the bucket had to be toted farther because the local well was dry. Farmers talked about lower water levels, but the conversations rarely evolved beyond irritation. Future elections, economic concerns, and critiques of President Saleh dominated every day dialogue. I soon realized that I had to introduce water to the conversation in order to understand what people thought of the resource. As I gathered data, I realized that the perceptions of water were not differentiated by social or economic class, education, geographic location, or gender. Three major themes emerged in my discussions with a broad range of Yemenis about water: 1) droughts are normal; 2) cultural memory is to be trusted over state information; and 3) God is the only source that can provide a solution to the water problem.

We Live In a Desert…Droughts Are Normal

Over and over again, I heard the formulaic expression: "We live in a desert, droughts are normal." Virtually any time I asked a Yemeni about water, he or she responded that periods of dryness were usual and I should not be alarmed. If anything, it was I, the Westerner, who needed to be educated about the intricacies of the environment in Yemen. At numerous qat chews over hours and hours of conversation, I was told stories of past droughts and family memories handed down from generation to generation emphasizing the cyclical nature of droughts and rains and the adaptability of the people to the changes of the land. *Bahr* [groundwater] was like the sea; and like the tides of the sea, the flows would return in time.

"We live in a desert." Jameel chuckled as he sat his sturdy form down upon the low cushions. I was attending a male qat chew which included several government officials, professors, doctors, and businessmen. "Of course there's less water now and then." He was speaking metaphorically and everyone in the room knew that Yemen's geography varied between highland temperate areas to desert to coastal plain; but his point was that the lower water levels were a natural and reoccurring phenomenon.

"Technically, we are not in a desert," added one of the professors, a historian. "But, it's true. I mean, our parents certainly remember droughts as did our grandparents. It's just the stress in the cities that makes it seem worse." He was referring to the rapid population growth and the poor infrastructure to support the growth.

"You want to talk about water problems, let's talk about generations ago! What about when the Marib dam fell? What about the challenges of that, heh? We [Yemenis] survived," Jameel noted. "We're a resilient people; we just have to get through this drought and this government!" The conversation almost immediately turned to Saleh and the Yemeni

government's corruption, a favorite topic, and any further discussion of water was forgotten as people debated the future of Yemen's political system.

I found that no matter where I traveled or with whom I spoke, the pattern of response was similar. Water was only discussed when I initiated questioning and the topic was quickly passed over for other more engaging issues such as presidential politics or whether the new law raising the marriageable age of females was correct. My questions were viewed as those of an outsider who didn't understand the climate and simply needed to be calmed and educated.

"Do not worry! We are not used to as much water as you are; you come from a place with lots and lots of water. We're used to periods like this," said Anwar, a forty year old woman. I was visiting a family in a rural area to the southwest of Yemen. Anwar's home was a small complex of single story mud brick buildings which included stalls for donkeys and goats, farm equipment, and crop storage. "Come meet the other women." She took my hand, as was common in Yemen, and guided me towards the bottom floor of the only two story building. It was about ten feet by fifteen feet. The top level could be accessed through a roughhewn wooden ladder that was leaning against the bricks. I knew that the men had gone upstairs to chew qat and relax. I stayed behind, hoping to visit with the women as they finished their chores.

Anwar led me through the open wooden door into the bottom level. There was no light except for that coming from the door and the darkness temporarily blinded me. As my eyes adjusted, I realized that an elderly woman lay on a pallet raised off the floor by a wooden frame. She appeared to be ill, and two other women who appeared to be closer to Anwar's age were tending to her. I cringed as I saw that they were bathing her forehead with murky water from a bucket, obviously used many times but too precious to throw away just yet. I understood, though, as I recalled my own experiences without sufficient water. I would have been quite

happy to bathe at all. And, I knew that water was heavy to carry and these women carried buckets long distances.

"This is my grandmother," Anwar said. The elderly woman was frail but appeared to be quite lucid. "Ask her about your water." Over the next half hour, I visited with the women in that dark room. The three younger women were wives of the man who owned the property. All of them deferred to the grandmother when answering questions. It was difficult for me to understand because they spoke with thick colloquial accents and we used pantomime and often repeated things, but the story was clear. Grandmother spoke of years of hardship tending the land with her husband and their children. She spoke of how the government "didn't exist" out here. The people lived off the land and took care of each other. She was concerned that these young women had to walk farther and farther to gather water, but she was sure that things would improve eventually.

"I tell my daughters," she squeezed the hand of the young woman near her, "trust in God and the rains will come. Some years are harder than others. Some droughts are more devastating. You have to be strong. You have to have faith."

I later ascended the ladder to the upper story of the building. As I climbed through the open portal to the top room to join the men, I turned to look out across the land. I could not see the nearest neighbor, although I knew that the land was home to many people. I truly understood what Grandmother meant. Out here, the government did not exist. This land was isolated and the people were independent and strong—yet dependent on groundwater that would soon go dry thanks to mismanagement and rains which were probably going to shift east as climate change altered their pattern, or at least that's what science had taught me. I wondered what would happen to these people.

In all of Yemen, it was only the experts at NWRA or the MWE who stated that the science was overwhelming that this period of water shortage was different and was not a common drought. But even one very high ranking official in the Yemeni government with whom I spoke related his hesitancy to accept the scientific facts.

"Sometimes I think the World Bank makes up climate change just to sell projects to countries," he said. This official held multiple graduate degrees from universities in Europe and America and had traveled outside of Yemen extensively.

"When people [World Bank] first came to me and tried to explain the water crisis in Yemen, I thought that they were exaggerating. Even now, although I've seen the data and recognize the logic of their claims, I still wonder if they won't end up being wrong or if something will happen to right the environment. We've had droughts periodically before and the climate of the Arabian Peninsula has always rebounded on its own. Science doesn't know everything."

With all of his education, his access to a broad range of data, and his ability to travel throughout Yemen and the world, this individual still felt drawn to the commonly held belief that Yemen's depleting water table was just a period of decline which would reverse itself naturally. He had an abundance of knowledge, and yet he still questioned whether the experts were incorrect.

"Just look at Al Gore and the concept of climate change in your country. Look at how the Republicans and Democrats still can't agree despite innumerable studies. Try telling your people that their wells are going dry and see how they react," he suggested. "Besides, our economically challenged government can't help or offer a solution, so what can be done?" The Yemeni people weren't privy to all the reports which this man was able to read, but even when

Yemenis heard an expert interviewed in the mass media the vast majority felt that the expert was wrong and that the crisis was, indeed, just a drought.

The "it's just a drought" theme exemplifies Bakhtin's dialogic process and the dynamic nature of interpretation (1981). While NWRA and the World Bank propagated the idea that their media campaign was reaching the Yemeni populous, Yemenis were generally not aware that the campaign even existed. Interviews and articles describing the future of Yemen's water supply were sporadic and this lack of consistency in the media or at the mosques was, actually, a factor leading Yemenis to believe that there was no water crisis and that the depleting levels were part of a natural cycle which was simply a continuation of past experience. Water also offered its own voice in the dialogic equation. Tsing notes that environmental historians first offered the theory that nature is an actor with its own agency and can influence humans just as much as humans influence nature (2000). Water in Yemen is an actor which offers a strong voice reinforcing the "it's just a drought" interpretation. Despite the novelty of recent drilling, many Yemenis viewed underground water supplies as connected to the sea and therefore *bahr* can ebb and flow like the ocean, if only at a slower rate. Water falls from the sky and provides seasonal monsoon rains, at times producing flooding. Flooding in areas such as Hadramawt, which usually does not see such run off, is not viewed as a sign of increasing dryness (as hydrologists would suggest) but rather as proof that nature is providing much needed water to correct the current drought. Water's active voice in Yemen provides support for Crumley's assertion that culture and nature do not exist in a dichotomy; rather that they interact, overlap, and mutually influence each other (1994). In the case of Yemen, water's voice appears to be stronger and more consistent than the media campaign supposedly aimed at educating Yemenis about the crisis.

Droughts Come and Go Like Governments

After hearing innumerable Yemenis tell me that this water shortage was just another drought, I asked why they didn't trust the few expert interviews that they had seen in the media. Informants said that "experts" hadn't farmed the land for generations. "Experts" didn't know every inch of the terraces as the farmers did; nor did had they observed the stars and monitored the water patterns of the Arabian Peninsula for centuries. Although many Yemenis were concerned about the drying wells and the stress on the infrastructure in the cities, most still viewed the situation as reversible. This was based on the belief that the rains would eventually refill the groundwater aquifers and this "drought" would end. As one farmer commented:

"I walk these fields every day. My family tends the plants with me. I know my trees and crops as if they were a part of my family. Before me, my father cared for the fields. My wife's father took care of his fields and taught her. Before that, our grandfathers did, and so on. Now, I ask you, what do these specialists know about the land? They've read books, but they haven't lived it." This farmer viewed himself and his fellow farmers as the true experts of the land, and he believed that the scientists offered short sited opinions about the environment based on limited knowledge and experience.

Cultural memory is particularly strong in Yemen, and it is favored over state knowledge. Yemen is unique in the Middle East and much of the globe because it has hosted the same sedentary tribes for several thousand years; the population has been quite stable; and the tribes have tended to occupy roughly the same area for this extended period. Most populations cannot claim this, nor do they possess such a depth of cultural or social memory related to one specific geographic location. Crumley explains this collective memory as:

> …the means by which knowledge is transmitted from one generation to another. Individuals, not necessarily aware that they are doing so, pass on their behaviors and attitudes to younger members of their culture. To use an analogy from physics, social memory acts like a carrier wave, delivering knowledge across generations, regardless of the degree to which participants are aware of their role in process (2000:193).

Applied to Yemen, the underlying premise passed from generation to generation is one of the limitlessness of *bahr* [groundwater] and this attitude encourages the feeling that droughts will come and go, undermining alternative theories of damaged aquifers and water crisis.

Kempton further develops Crumley's definition of social memory and notes that cultures, such as Yemen's, which have thousands of years of consecutive social memory are extremely rare and that they tend to strongly trust cultural memory and distrust the discourses and propaganda of central states (2000: 50). Kempton defines indigenous societies as:

> …societies with millinneum-scale continuity of culture, place, and resource use. That is, societies that have existed in the same region and interacted in similar ways with the same natural environment for many centuries…Under these conditions we find well-developed and sophisticated cognition of the natural world (2000: 51).

These societies are well versed in the intricacies of their environments and contain generations of adaptive knowledge allowing continual existence in that space. The perceived validity of cultural memory is amplified in societies with over a thousand years of experience with the same environment.

Cultural memory of such duration tends to reinforce the notion that state structures are temporary and that their knowledge is unreliable compared to the knowledge passed down over the generations. Yemenis' perceptions of water exemplify the contrast that Kempton draws between what he calls "indigenous knowledge" and "state knowledge." He asserts that societies such as Yemen will favor indigenous knowledge over state discourses. The latter, Kempton claims, will tend to be viewed as "young" and inexperienced. Kempton suggests that "...no state-level societies meet this definition of indigenous, as—in the current historical epoch—their

current interactions with the natural world have only shallow historical depth" (2000: 51). I would add to Kempton's theory and suggest that NGO discourse tends to be tied to state discourse, therefore development agency narratives fall under the same scrutiny as state knowledge when compared to cultural memory in societies of extended age.

Take the following interviews, for example. In 2008, I sat in the tiny café enjoying the cool of the shade and a cup of sweet Yemeni tea. My hair felt dry and crunchy beneath my black veil. Two days earlier, the water had run out in my building as I was lathering my head with shampoo. I had tried to wipe the soap from my hair, but it wasn't the same as a good rinse. A week earlier, we had gone without water on our street for five days, and the stench of the backed up sewer lingered in my room. Every day I walked to the store and bought bottles of drinking water. I could only carry two at a time, one in each hand. Water was precious, and I did not waste my drinking water on bathing. Eventually, the truck would come and fill our tank. Still, I dreamed of a long bath as I sipped my tea.

Muhammad strolled into the café and plopped himself onto a white plastic chair next to mine. He loved visiting with the Europeans and Americans from the nearby Arabic language school. Through a mixture of pantomime, colloquial dialect, and classical Arabic, he would entertain us with tales of Yemen and her history. I only ever saw Muhammad in a white robe with his jambia (tribal sword) proudly displayed in a wide gold belt across his stomach. He would tell everyone that he was seventy-five years old. He boasted of his two wives, twelve children, and his numerous grandchildren. Today, as we shared a plate of salad and bread, I asked Muhammad, "Why is there no water?"

Muhammad smiled and shook his head. "Do you see that spring?" He pointed to an ancient stone edifice in the wall across the street. It protected a small well with trickle of water

dripping from a hole towards the back of the grotto. A battered metal cup attached to a peg hung on one of the stones above the well. "That spring was here when my grandfather's grandfather lived in Sana'a! We have springs built by the Romans. Our springs ran when your followers of Jesus arrived here after his death." He beat his chest with his fist. "It will be here when I am gone, and when you are gone." He ripped off a piece of bread and dipped it into the steaming bowl of fool (beans) on the table.

"But the government says the water is running out…" I interjected.

Muhammad shook his head with wisdom and said, "Droughts are like governments. They come and go. Our springs have always been, and always will be."

Muhammad's cynical and rather skeptical view of governments was repeated by numerous interviewees. Even amongst President Saleh's supporters, there was doubt that the Yemeni government would last much longer. Most informants considered Yemen's president to be corrupt and their conversations often turned to the question of who would rule next. Many told political jokes that poked fun at Saleh and tied him to the West.

"So, President Saleh was visiting President Bush at the White House…" I rounded the corner of the garden wall and realized that I'd stumbled upon four male informants enjoying an afternoon tea and telling jokes.

"Join us," shouted my friend, Abdul. The others waited for him to finish the joke as I reached for a glass of tea and settled into a wicker chair. Abdul looked at me with a twinkle in his eye and continued.

"President Saleh and his wife were invited by President Bush and Barbara to join them in the White House pool. They put on their bathing suits and relaxed in the cool waters. But, Barbara Bush couldn't help but keep looking at President Saleh's, well, swimming suit," Abdul

looked at me mischievously. He leaned towards me, "I know this isn't a joke for women, but you walked in on it! Anyway, Saleh appeared to be very well endowed and Barbara kept looking back and forth between her husband and Saleh. Finally, she had to ask Saleh's wife about his condition." The men sipping tea chuckled.

"Saleh's wife answered, 'while your husband is busy only screwing you, mine is busy screwing a whole nation,'" Abdul laughed with the other men as I giggled.

"A pool would be nice now," said one man as he leaned back in his chair. Once again, water was in low supply in Sana'a and we all lingered for a moment and imagined the decadent and luxurious joys of relaxing in a pool. Only the rich in Yemen could ever afford such a thing, and so swimming pools were viewed with jealousy and disdain by those who could barely afford a semi-normal water supply. The men sipping tea all knew that I was researching water and they shared their opinions frankly with me. They all worked in establishments on the street where I lived and we often ran into each other at the market or at the café. The joke Abdul told emphasized Saleh's corrupt image, but it also tied him to his Western allies and, to those of us with no access to the benefits of a pool, it called attention to the wealth and status Saleh enjoyed while his people struggled.

Informants usually lumped Western governments into the same category as "governments", in general, and viewed them as temporary and acting for their own interests. Yemenis pointed out the youth of America's government and the instability of the borders of European countries. They appreciated Western technology, but considered foreign development agencies' knowledge of the Arabian Peninsula as limited compared with indigenous memory going back thousands of years. Informants questioned the motives of the Yemeni government and the reasons why Western governments aided the remote nation.

"They [World Bank] wanted me to use those hoses for irrigation." Waleed leaned towards me with a conspiratorial grin as we surveyed his terraces. "Of course, I told them I'd be happy to help. They always offer some sort of compensation or benefit, but they rarely return to see if we [farmers] are actually doing what they ask. Those hoses clog up and they are heavy to drag across all of my fields. The old way works better. It's worked for generations, so why would I change? " Waleed glanced towards the pump and the single large hose flooding the terrace. He walked to a beautiful qat tree and pulled off some of the best leaves, placing some in his cheek and offering me the best of his selection as three of his sons came to join us out of curiosity.

"Are you worried the well will go dry?" I pressed him as we sat down on part of the stone terrace. "Didn't the World Bank people explain that the water levels are dropping?"

"I've seen a thing or two on television about how they say the wells are going dry and those World Bank people certainly brought it up. They had a nice young Yemeni man with them too; I can't remember who he was with. I told them that my well has been good for a long time, but it is lower now. The thing is, we've had droughts before. Politicians just want to upset the citizens and get more votes to stay in office so they tell people the water will dry up to scare them and make people think that the government has the solution. Those World Bank people like to say they know about our water, but they don't really take the time to visit with us and besides, they're all foreigners anyway. They don't know what they're talking about and they play politics too. We live in a desert. There are droughts," he observed pragmatically. "The water will return, as will the rains. Our land has been blessed by Allah for thousands of years. Allah will provide." His sons nodded in agreement and looked pleased with their father's wisdom.

"What will you do if the well gets lower and lower?" I asked.

"The well may get lower, but the rains will return and it will fill back eventually. You'll see. Technology allowed us to get deeper into our groundwater, and this was a blessing. Allah knows when to bestow blessings, and He will take care of those who respect Him. We've had years with less water before, and it has always returned just like the sea. As I said, the government is trying to scare people to stay in power." Waleed's sons followed up with a chorus of comments recalling that their family had farmed in the same area for several generations.

Although many Yemenis acknowledged that their wells were dry or low, they attributed this to a natural process which was cyclical and clearly would right itself in time. To suggest that groundwater was quantifiable was to suggest that the sea would go dry; the concept was unbelievable and irrational. The majority of people I spoke with believed that the water table lowered (as it had done in the past) and then it replenished itself as the rains returned and dispelled the drought. This belief was based on thousands of years of societal memory which instructed that periods of drought were a part of the environmental cycle and that they would eventually pass as the rains returned. The government and the scientists, by contrast, presented a linear narrative, suggesting that damage to the aquifers was leading to a permanent drought, not a temporary one. Yemenis that I spoke with viewed the linear projection as based on incomplete state knowledge and preferred the cyclical view which was supported by cultural memory. Yemenis did not think that drilling damaged aquifers, but that it allowed access to previously inaccessible groundwater. This water was seen as limitless like the sea, and although it had declined in recent years it was sure to return eventually just as the tides always did on the seashore.

I asked Yemenis what, if anything, they could do to improve the current water conditions and the majority responded that God could correct the situation. Societal memory suggested that the drought would improve eventually, and whenever I asked Yemenis what could be done to improve the current situation, their answers reflected mistrust of the government and they typically responded that only God could offer a solution. The government was temporary and fragile, lacking the knowledge and the know-how to execute a comprehensive plan and therefore incapable of helping the populous. God, however, was authoritative and capable. God had cared for the Yemeni people for thousands of years, providing ample water to survive in the same environment for century upon century and He certainly would not turn His back on the Yemeni people in this time of need. God was the only actor who could improve the water situation.

Allah Will Provide

As mentioned in the first chapter, the Sana'a Basin Water Management Project, a government initiative, polled Yemenis in 2002 to evaluate public awareness of water depletion and the perceived cause for the lower water table. Yemenis overwhelmingly responded that lower levels of groundwater were God's response to fewer Yemenis paying proper *zakat* (yearly contributions by Muslims to charity). Yemenis also expressed mistrust of government regulatory agencies and stated that public water distribution was unfair and influenced by politics (IRIN 2004). The poll did not follow up and ask why people answered this way, nor did it ask why alternative means of acquiring water were ruled out. My experiences in Yemen supported the study's conclusion which was that the commonly held local perception was that God could alter the situation and that the government's actions were viewed suspiciously by the public. The poll influenced the formation of the Awareness Campaign which was later implemented by NWRA and its partners.

My research also offered broader answers about why Yemenis felt that God was the only answer. Yemenis viewed God as the most credible solution to Yemen's water crisis because they perceived the Yemeni government or foreign organizations as inept, self-serving, and inefficient. The government was regarded as corrupt and incapable of effectively executing a massive plan to provide water across the country. Informants said that money for projects was often pocketed by high level officials or funneled to sheiks to purchase loyalty. Yemenis felt that any project launched by the government would be subject to significant corruption and therefore be improperly executed. They were skeptical about foreign organizations as well because these had to work through the Yemeni government, and so their project planning capabilities would be constrained by the disorganized and corrupt Yemeni regime. Further, government knowledge was doubted in light of contradictory cultural memory. The Awareness Campaign had not reached the majority of Yemenis, and the views of most remained based on cultural memory with very little influence from other messaging.

A series of interviews that I conducted with a group of servants offers insight into why God is believed to be the best source of change. I worked to establish a relationship with a group of maids who worked in various upper class homes and also served at a local public school. To do so, I joined them at lunch as they took a break. I opened the door to the room off the kitchen and waved for the five women to sit back down as they scrambled up from their chairs, grabbing their veils as they stood. They looked at each other awkwardly, wondering why the American woman was visiting them. It was the first time that I had ever seen them without the *niqab* covering their faces. I took a deep breath and entered the small space, pulling out one of the rickety chairs and sitting. The table was filled with scraps of food left over from the school

lunch. Brown spotted bananas, chicken taken from discarded plates, and a large bowl of rice mixed with a combination of leftover vegetables sat on the table.

"May I join you?" I asked. The women looked completely surprised and then began looking for the best pieces of food to place on a chipped plate for me. They obviously wondered why the crazy American woman would want to eat leftovers with them instead of the better food offered at nearby restaurants or during the school's regular meal. The eldest woman, I assumed in her forties, passed me the plate which held a sample of each of the items. I reached for my piece of chicken and realized that they had given me the piece with the most meat but that it had been half eaten by someone during the institution's meal. I smiled at the women and began eating my chicken. I poured myself a cup of tea from the old blackened tin pot on the table and refused to let them serve me anymore.

Over the next months, I visited the women at the school during their lunch or tea. Occasionally, I would see them walking down the street from the market and, unlike many proper Yemeni women who would not acknowledge me on the street for fear of social sanction if they were from conservative families who viewed Western women with concern for their modesty, these working women would cross the street and smile as they came to chat with me. It took some time to convince them that I was doing research and actually wanted to record their opinions. Yemeni society often dismisses the opinions of lower class working women and men as meaningless. I learned that the oldest woman, who I had thought was in her late forties, was actually only thirty and named Amal. Her life of hard labor had aged her. She was the mother of four boys and a girl, and her husband had died when a car hit him three years earlier. She lived with her brother, who worked for the city as a trash collector, and his family.

The other women in the group were all in their twenties. One was a second wife who lived with her husband and his first wife. I later learned that she was in the early stages of her first pregnancy, yet she worked each day as hard as the rest of the women, scrubbing the floors on her hands and knees and hauling heavy buckets of water up flights and flights of stairs. The youngest woman, who was twenty-one, joked that I might hide her in my suitcase and take her to America for an easier life. The hands of the women were hardened with calluses and they were all thin and muscular from hard work. These women had little formal education. Three of them had enjoyed a few years of elementary school before being forced to go to work full time while still children to help support their families. They also had little access to television or radio except when they were exposed to it at their employer's. Over many cups of tea and plates of rice, they told me about their lives and their perspectives of the water shortage. I was never invited to their homes because, I am fairly sure, they didn't want me to see their living conditions. But, they did tell me their stories.

They all said that water deliveries by the government were more and more infrequent in Sana'a and that it was even worse elsewhere in Yemen, where many of them had relatives. The many wells in Sana'a were dry. They could hardly afford to pay their bills and purchase food each month and therefore buying supplementary water was out of the question. So, they were dependent on city delivery or charity from local mosques. They said that some servants they knew took bottles of juice or water from their rich employers, but they didn't do this because it was dishonorable. I asked them what they thought was the source of the water shortage.

"The cities are growing and growing. When I was a child, my father worked on a farm and there was better water from a well there. Then, we moved to the city and we depend on the city for water," said Amal.

"But, I've heard that the countryside is getting drier too. What do you think is causing this," I asked.

"Allah only knows," said the youngest.

"There have been droughts before. It's another drought. Some of them have lasted decades. My father and grandfather used to tell me about times like this in the past, but Allah has always provided in the end," said Amal. Like Muhammad from the café, the women considered the water shortage to be just another drought to be endured. They believed that the shortages would end in time through natural processes and that God would provide more water for the people of Yemen, regardless of what the government did or did not do.

I asked the women how the water shortage had affected their lives. They all complained that they could not bathe as often as they used to and they all suffered from skin rashes, particularly in the summer. Amal told me that she owned only two abayas and that she now reserved one to wear to mosque and one to work each day because she never knew if they'd run out of water early and she certainly would not wear a dusty abaya to the mosque.

"What could be done to help the water situation?" I asked.

"People need to pray more," responded one of the younger women.

"The government can't do anything. I was here [in Sana'a] when the unification happened and I believe I will be here to witness the fall of the government too. She's right, people need to pray. Only God can help us," she said.

"What about desalination plants or building infrastructure?" I wanted to understand her reasoning.

"Do you think our government is that coordinated?" Amal responded pragmatically. "Besides, why not go straight to the one who can actually solve the problem. It's smarter. It has worked in the past. Allah [God] will provide."

Why this trust in God? To understand this process, I turn to psychology and the theories of bargaining and defense mechanisms. Yemenis understand that the groundwater levels are decreasing, but they continually refer to previous experiences in which groundwater returned in years past. When confronted with the fact that recent drilling may have actually irrevocably damaged the aquifers which have supported society for generations, cultural memory is offered as a form of denial and rationalization for recent actions. The government is offered up as fragile and weak, therefore it cannot be responsible for the consequences of recent drilling or for future solutions. Humans are, thus, eliminated from the water equation and only God, an actor free of political or economic motive, can solve the situation. God, of course, will provide water because the Yemenis are devout and therefore a solution the crisis is imminent.

This form of devotion and definite solution is actually a manifestation of denial. Freud suggested that denial was a defense mechanism used to offset factual information which was unable to be processed by the conscious mind thus offering the conscious mind relief from stressful circumstance (Davidhizar 1998). Yemenis disregard governmental knowledge suggesting that the water shortage will become permanent and that it is a direct result of aquifer drilling. Although the information being provided to the Yemeni people is dependent on television and intermittent power supplies, the information that is received is rapidly countered by cultural memory and the unconscious Yemeni desire to believe that the water supply will right itself. It is too devastating to believe that recent drilling has destroyed the ancient

ecosystem, and therefore Yemenis prefer to rationalize the situation offering cultural memory as support for the defense mechanism they embrace denying the looming catastrophe.

Somali Refugee Perceptions

Thousands of Somalis have fled their country to attempt a better life in Yemen's coastal cities, and many have also migrated inland to Sana'a to find work. Official numbers on refugees are hard to come by, but informants' estimates were conservatively in the tens of thousands. Somali refugees are amongst the poorest people in Yemen, and they are not considered on local censuses or viewed as a fully legitimate part of the society, yet they do utilize public utilities and add to the extreme population growth of urban areas. As I walked the streets of the cities, I frequently saw Somali refugees working at day labor jobs or begging on the streets. Informants who knew that I was interested in the plight of the Somali population said that cab drivers had offered them Somali women for $5 and that prostitution was rampant due to the fact that women were desperate to feed their children. An acquaintance that coordinated aid for Somalis in Aden was able to put me in touch with some Somali refugees to record their viewpoints on water in Yemen.

The Somalis who I interviewed usually agreed with general Yemeni opinion on water and said that God was the only one capable of fixing the water problem facing Yemen, or even Somalia for that matter. Drought was rampant in Somalia and many of the refugees I spoke with in Yemen recalled the "water war-lords" who used violence to protect their monopolies on water resources. Conflict over water had become commonplace in Somalia, and the Somalis I met predicted the same fate for Yemen. The suffering and violence in Somalia that had pushed thousands to flee to Yemen, where conditions were better, had in fact worsened Yemen's own water crisis.

"Every day I wake up and I want to die, but I don't and instead I seek to find food and water for my babies. You don't want to know how I am able to do this," said a young woman in a torn dress living on the streets. Her small children lingered at her feet in filthy clothing many sizes too small. "I left Somalia with my husband, but then he died. I can't bathe my babies and we never have enough to eat or drink. How can I do this? Only God can help me." My conversation with this woman was brief, for she appeared uncomfortable speaking with me.

Somali men are often found carrying heavy barrels of goods near the markets, and I once stopped to chat with a couple of them. They were friendly and wanted to share their opinions, but they kept looking over their shoulders to make sure that their Yemeni employer didn't see them taking a short break.

"Yemenis think their water will go on forever. They should visit my homeland. I came here for something better, but I'm waiting to see if this government lasts. At least right now it's more stable than it could be. What more can I do? What more can anyone do? Only God can take care of us now," the young man hoisted a heavy sack over his back and grinned at me. "You do that research and tell people that we're out here." He took off down the road with his load. His colleague reached for another sack.

"People think that being without food is bad. Try being without water. My father brought our family here for a better life. It is better than what we had, but even I can see things getting worse. God is the only one in charge," he followed his friend.

Somali refugees were resolute in their belief that only God could provide a solution to Yemen's water problems, primarily because they did not consider the government to be capable of staying in power, much less of organizing water infrastructure construction. Somalis that I

spoke with expressed thankfulness for Yemeni hospitality, but concern for the future as they recognized the warning signs of a failing state.

The majority of Yemenis I spoke with did not remember seeing NWRA's awareness campaign materials aimed at adults. A few recalled some of the items for children, but these were believed to be benign ways to teach Yemeni children the value of water in an arid or semi-arid land. Informants who had witnessed interviews from water experts or politicians on television or radio said that the messages constantly conflicted with politicians suggesting quick solutions to water problems or arguing amongst themselves while water experts offered more stark diagnosis of the problem. "After all, if they can't even agree about the [water] problem amongst themselves, then why would I trust any government explanation," asked an informant. Instead, impressions of the water situation in Yemen were drawn from hundreds of years of trusted cultural memory which insisted that groundwater was a part of *bahr*, destined to recede and come back like the tide. Therefore, the water shortage was viewed as temporary, albeit serious, and similar to previous droughts which were temporarily endured in Yemen.

VI. A DROP IN THE BUCKET

The water crisis is knocking on Arab doors; the time to act is now.

~ Arab Forum for Environment and Development
2010 Annual Report

In this study, I trace the various narratives of Yemen's water crisis in an attempt to explore the anthropology of water, placing this unique substance at the heart of my ethnography and probing the socio-cultural dynamics at work in Yemen's waterworld. Yemen's environment is shaped not only by natural acts but also through the decisions of the humans inhabiting the land and the water, and these decisions are informed by both culture and tangible experience with the natural elements around them. The decision making processes used by Yemen's farmers, politicians, and international donors are as important to decipher as the geologic systems that they inhabit, particularly in spaces such as Yemen where human mismanagement of water is expanding the effects of climate change. Anthropology offers participatory methods and thick ethnographic descriptions that, as Roncoli points out, provide insight into the "cognitive and cultural landscape" inhabited by these decision makers (2006). Yemen's decision makers include politicians whose attention is distracted by a failing state challenged by economic instability and insurgency; development agencies who initiate projects in areas of poor security while trying to please corporate boards, and citizens who try to manage daily life in an increasingly food scarce area. The friction created through these dialogic interactions exemplifies Tsing's zones of awkward engagement. Tsing suggests that “awkward engagements” occur in areas or zones where words mean something different across a divide (2005). She notes that these zones are transient and stem from encounters between different actors at different times, creating friction. These zones reach beyond Yemen's state borders, just

as water flows beyond human imposed boundaries, as Yemenis interact with media and international actors.

State borders reflect colonial narratives that create grounded, terrestrial spaces defined by maps that designate what is "ours" and what belongs to the "other", separating what we should care about and what we can easily ignore as someone else's responsibility. Strathern observes that nature-culture constructs often concentrate on the idea that "one domain is open to control or colonization by another" and that such constructs ignore the connections between landscapes and the constant flows of atmosphere and water through unbounded natural geographies (1980:181). Man-made borders give the false impression that nature and environment are isolated from one another, and that they can be controlled and contained within culturally constructed boundaries. In an age when human actions are fueling rapid global climate change, it seems antiquated to restrict environmental analysis to artificially bounded space.

Yemen's environmental problems are intertwined with the cultures and environments surrounding it. Yemen is not the only nation on the Arabian Peninsula facing climate change and decreasing freshwater resources, nor is it the only state that has over-exploited limited groundwater. Yemen, however, is marginalized by its wealthy neighbors in an attempt to ignore and isolate an undesirable society which has, at this point in time, nothing deemed valuable to the global capital markets and a poverty stricken population that is viewed as backward compared to its nouveau riche neighbors. Whereas Yemen's frankincense and myrrh created vast wealth generations ago, now oil is the key global commodity and Yemen has a limited supply and no market alternative other than an excess of unskilled labor. Yemen is a stark example of the inequality of global capitalism combined with the uneven distribution of climate change. Although other nations in the Gulf face similar water challenges, these states are far richer and

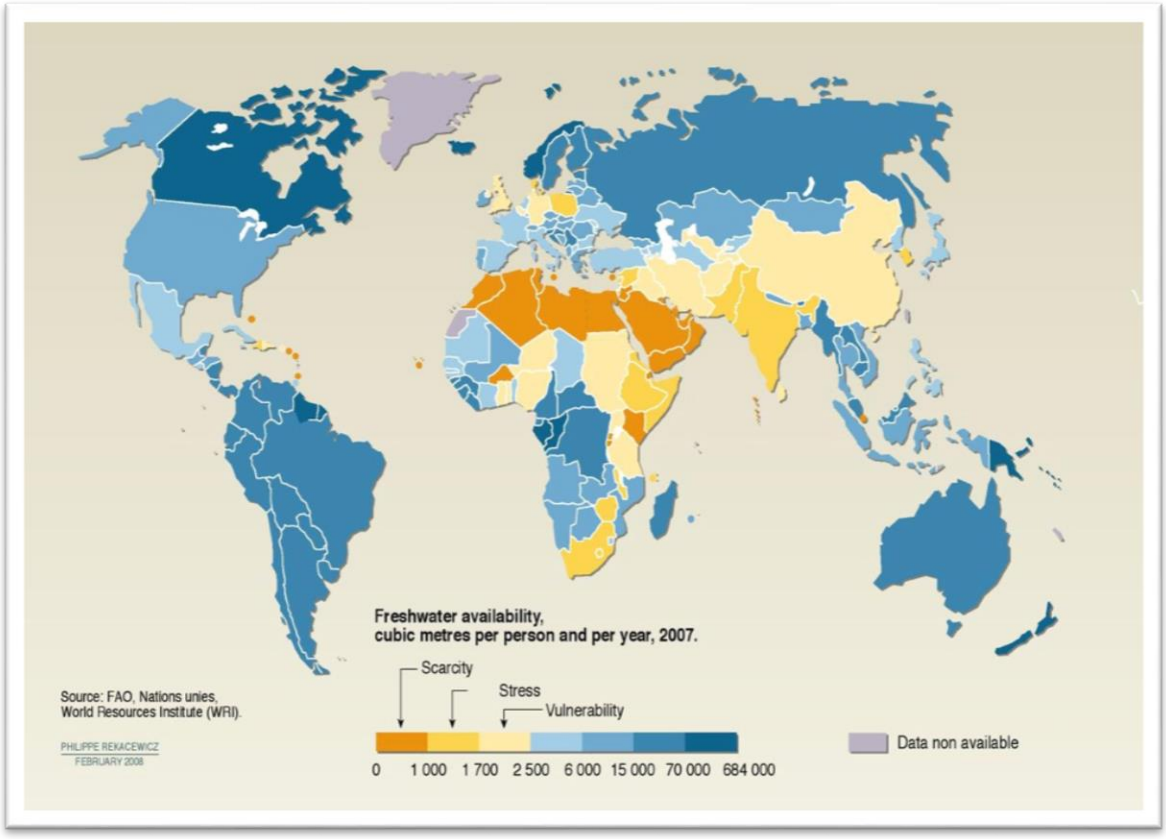
can, at least for now, offset environmental changes with technological solutions and expansive infrastructure projects funded by oil revenues--and conveniently forget that their waterworlds and Yemen's are inescapably linked. In this chapter, I will place Yemen's waterworld within the context of its Arabian Peninsula neighbors. The nations of the Arabian Peninsula have experienced many of the same processes as Yemen, and they too are trying to deal with the larger water shortage. The resources in the peninsula overlap, and Yemen is not the only society facing climate change and mismanagement of water resources.

Yemen's Environmental Neighborhood

Seven nations occupy the Arabian Peninsula--the world's largest peninsula spanning 3,237,500 km^2 (1,250,000 mi^2) to the north east of the African continent -- including Yemen, Saudi Arabia, Kuwait, Bahrain, Oman, Qatar, and the United Arab Emirates (UAE). The peninsula has a primarily arid climate with scarce and infrequent rainfall, producing a geomorphology that is typically a desert. A desert climate is characterized by rainfall under 250mm per year; average rainfall on the peninsula ranges from 70 to 140mm per year (Rashid and Serif 2000). For comparison, average global over land rainfall is about 715mm per year with Europe ranging between 800 to 2500mm per year (NCDC 2004). The waterworlds of each nation on the Arabian Peninsula are tied together through shared aquifer systems and runoff from seasonal rains (FAO 2011). Bahrain, for example, draws groundwater from the Damman aquifer that is a part of the larger Eastern Arabia Aquifer System supplying Saudi Arabia (FAO 2011). The Asir Mountains in southwest Saudi Arabia and the Oman Mountain Range in the east of Oman receive higher amounts of rain than other areas and runoff flows to benefit the lands of the UAE (Rashid & Sherif 2000). And, although there are no perennial rivers on the Arabian Peninsula, seasonal monsoon rains create temporary rivers that cross state borders and create shared water resources.

Infrequent and limited rainfall also constrains overall freshwater supply as aquifers receive less recharge than wetter areas of the world. The map below shows current global freshwater supplies, combining average rainfall with available groundwater in aquifers and above-ground sources such as lakes or rivers.

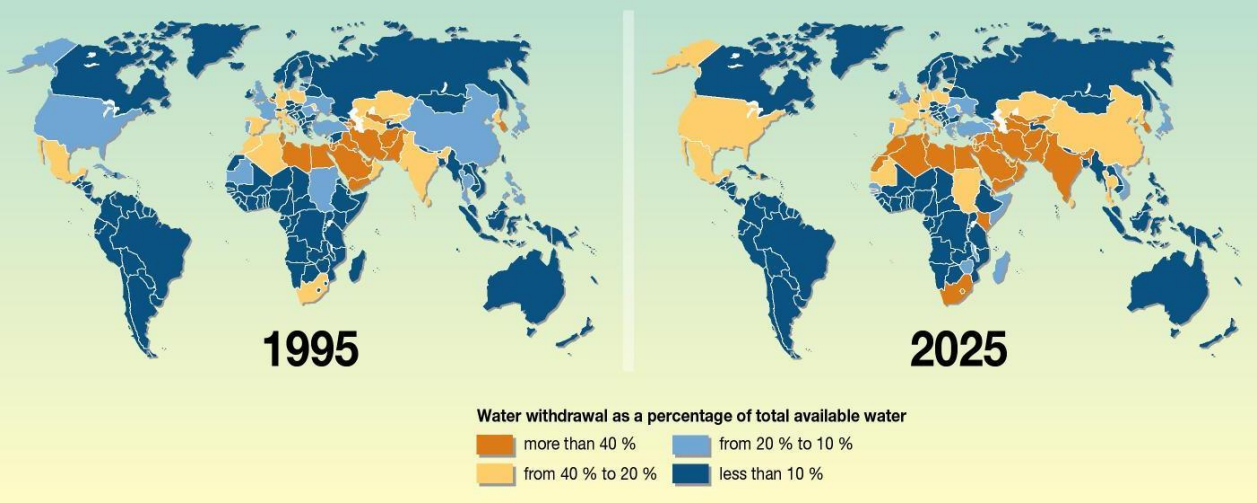
Freshwater Availability



The UN classifies the entire Arabian Peninsula as a water scare area, ranking it far beyond simple water stress (UNEP 2011). Furthermore, the UN Panel on Climate Change warns that the region can expect lower levels of precipitation in coming years and reduced groundwater recharge together with rising temperatures that will increase evaporation rates and elevate water stress levels even further by 2025 (World Bank 2011b). A 2011 study organized by the League of Arab States and the World Bank predicts that as much as 70,000 square miles of agricultural

land on the peninsula will turn fallow due to climate change within the next fifty years (Friedman 2011). So, Yemen is not alone in the region in confronting this problem of water scarcity. Yemen is also not alone in over using groundwater. The Arab Forum for Environment and Development--a think tank of regional scientists and environmental experts--cautions that high water consumption well beyond international standards, unregulated drilling, and unsustainable irrigation practices threaten to compound the effects of climate change in the Arab World in years to come (2009).

Projected Increases in Water Stress

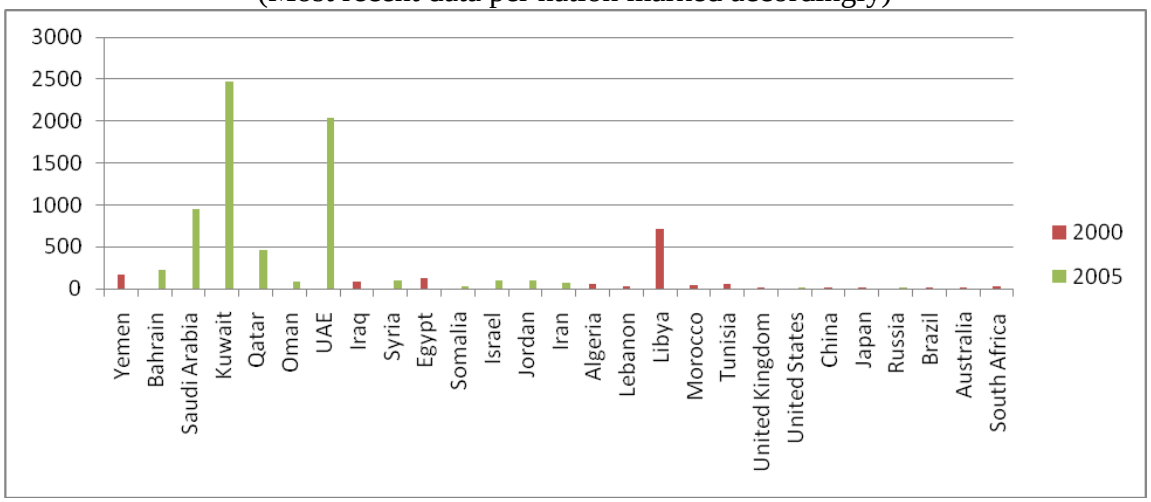


Source: United Nations Environment Program (UNEP) 2011

Compared to its oil rich neighbors, Yemen's proportional water usage is actually much lower than every other nation on the peninsula, except Oman--an anomaly that I will explore later in this chapter. Proportional water usage tracks the groundwater and surface water resources used to meet a country's agricultural and domestic demands. Water rich nations typically have low proportional usage because they consume water resources at a rate less than natural recharge and do not tap into fossil water because of high resource availability. A high

proportional usage rate indicates that local water resources are being used at a faster pace than recharge. [13] The graph below emphasizes the high proportional usage on the Arabian Peninsula compared to a sampling of other nations across the globe.

Proportion of Total Water Resources Used
(Most recent data per nation marked accordingly)

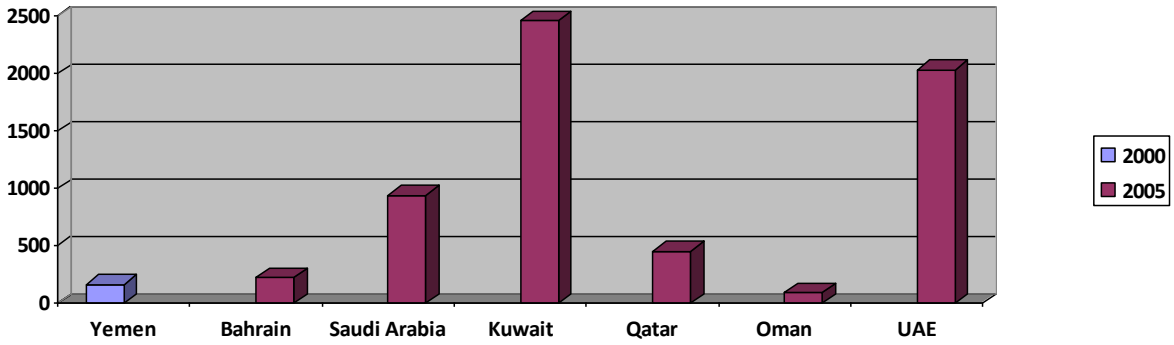


Source: UNdata 2011

It is striking that the Arabian Peninsula—a water scare area—has significantly higher consumption rates than international averages. The graph below provides a closer view of usage on the Arabian Peninsula. Yemen uses 161% of its water resources per year, compared to far higher usage by most of its neighbors. Richer nations such as the UAE consume over 2000% of available water, Kuwait almost 2,500%, Saudi Arabia close to 1000%, Qatar almost 500% and Bahrain over 200%. Oman uses 86% of its water supply, making it the only nation on the Arabian Peninsula that uses under 100% of its water resources.

[13]The United Nations Food and Agriculture Organization (FAO) uses this indicator to compare usage rates to renewable water recharge and predict areas that are vulnerable to future water shortages (UNFAO 2011). It is important to note that usage with this indicator is not limited to only citizens of a country--this becomes important when considering nations such as Qatar where there is a significant segment of the population that does not hold citizenship--and includes the entire population's requirements.

Arabian Peninsula: Proportion of Total Water Resources Used



Source: UNdata 2011

Until about thirty to forty years ago (depending on location) it was not possible to drill into fossil waters in deep aquifers, so proportional usage could not exceed the available water reached by shallow drilling and above ground resources. Drilling technology, however, has enabled the tapping of deep aquifers and huge supplies of ancient fossil water on the peninsula. This permitted the regional proportional usage rates to soar above 100%, but this is a temporary spike in supply because fossil waters are finite (Rashid & Sherif 2000). Over-extraction of groundwater on the peninsula has led to an unprecedented drop in groundwater levels because ancient fossil waters are pumped out at a rate far beyond any possible natural recharge to feed rising human demand. Yemen's exploitation of its groundwater is therefore not an isolated cultural phenomenon, but a reflection of the more general policies on the Arabian Peninsula that are motivated by notions that modernity is symbolized by elevated water use. Yemen, however, faces the harshest consequences of over-exploitation of water resources as a result of its economic isolation and its structural inability to rapidly build infrastructure to offset the effects of poor water management compounded by climate change. [14]

[14] Current data is difficult to acquire systematically so years collected vary slightly. The UN estimates consumption rates will increase over the next ten years by as much as 18% for developed nations such as Saudi Arabia and up to 50% for developing nations like Yemen.

Oil and Water on the Arabian Peninsula

In the 1930s, vast reserves of oil and natural gas were discovered across the peninsula, significantly increasing the geopolitical power of the states with the most oil and gas within their borders--states like name them The oil boom fueled rapid economic and technological change across the landscape in the following/subsequent decades. Extraction and refinement of oil and natural gas became the largest industries in the area, followed by construction and service sector jobs, primarily concentrated in technical or financial support of the oil and gas based growth. Six of the seven nations on the peninsula (Saudi Arabia, Qatar, UAE, Kuwait, Bahrain, and Oman) formed the Gulf Cooperation Council (GCC), but Yemen--with little to offer in oil supply--was left out. The societies and economies of GCC nations have changed dramatically, as oil production fueled mobilization of human capital, providing a huge increase in personal wealth and funding rapid urbanization and technological change. Yemen remained economically underdeveloped in comparison, benefiting indirectly through labor remittances. Modernity for the newly oil rich GCC nations included a variety of achievements such as massive infrastructure projects to support the oil industry, housing developments, and the growth of hotels and tourism—all of which required additional water supplies. Societies that had lived with limited water supply for generations now had both the wealth and the technology to tap into previously impenetrable/inaccessible groundwater to support these expansions. Before the oil boom, water's identity in this desert region was defined by its scarcity and the amount of labor required collecting it. Women and children often traveled miles to carry buckets of water from rural wells managed by specially selected tribal sheiks. Agricultural crops were carefully selected based on their water requirements and water for farming was doled out through a system of canals managed by local communities. Because it took a large amount of human effort to collect and

manage this resource and because it was vital to life, water was highly valued. This high value in turn reinforced its position as a status symbol for a limited number of elites in the arid environment that used fountains and green plants to symbolically express their higher status in society. The homes of influential sheiks or religious leaders often included a variety of plants requiring regular watering and fountains using precious water, but the number of elites that could afford such luxuries was quite limited because of the costs associated with acquiring the resource. After the oil boom, the need to express wealth and status spread to a new and larger class of elites and water usage spiked considerably. Water came easily through pipes thanks to investments in technology, oftentimes at very little or no monetary cost to consumers because governments subsidized costs. Pools, fountains, exotic plants, and golf courses all helped to establish the status of the newly rich, and the ease of acquiring water through freshly constructed infrastructure permitted expanded irrigation that turned desert into farmland and forests.

Across the peninsula, deep drilling spread like a plague during the oil boom because water became a substance vital to constructs of modernity and prosperity in a region that historically had suffered from drought and constant water stress that required human vigilance to ensure an existence in balance with the ecosystem. Mahdi asserts that, after the oil boom:

> Like every other sector of the economy, the water sector grew inexorably. Technological solutions were sought and frequently found, almost regardless of economic or environmental costs. These arid countries share a historical memory, cultural heritage, and economic relations with communities of less arid climates...Drought has historically been a factor in migrations in this region and water has been a unique symbol in association with affluence. It is therefore not surprising that the affluence of the oil boom has been reflected in sharp increases in water consumption (2001: 2).

Instead of strictly regulating the extraction process and moderating personal consumption to improve the average quality of life in a sustainable way, the newly rich GCC nations spent their groundwater resources almost as quickly as they spent cash. The sudden easy availability of the resource caused a shift in the meaning of water which, as Strang proposes, is constructed by

culture and can be as flexible as water itself in its variations (2005). Water's historic relevance as a symbol of status and wealth was reinforced while its monetary price dropped tremendously thanks to ease of availability and low market cost.

A Wave of Agriculture

Modernity narratives for the Arabian Peninsula during the 1970s and 1980s also included a push to become agriculturally independent from the rest of the world and create net exports through rapid expansion of irrigated lands, transforming traditional spate irrigated horticulturalist communities into large scale producers. Local governments argued that other "modern" nations such as those in Europe and North America were food self-sufficient, and now the Arabian Peninsula had the technology to do the same, reinforcing the link between modernity and higher water use. Saudi Arabia, for example, provided massive subsidies during these decades to farmers in an attempt to diversify its economy and become a net exporter of food products (Woertz, Lippman, Wilcox, & Boucek 2012). By the early 1990s the country was in fact achieved its aims, and the Kingdom's farmers produced enough wheat, dates, eggs, fish, poultry, fruits, vegetables, flowers, and dairy products to export to neighboring countries and beyond (Lee 2010). Saudi Arabian dairy farms became some of the leading exporters of milk products in the region. Yet, to produce one liter of milk in Saudi Arabia—the largest country on the Arabian Peninsula—required the pumping of 1,000 liters of groundwater. Such demands consumed approximately 70% of the Kingdom's groundwater by the turn of the millineum and stressed aquifers beyond their natural recovery capability (Lee 2010). By 2000, approximately 90% of the nation's water supply (most of which was for irrigation) was drawn from Saudi Arabia's aquifers, and this rapidly depleted ancient fossil waters across huge sections of the peninsula (Ahmad 2001). The same new pumping technologies that allowed Yemen to drill into

fossil water also permitted drilling for water across the entirety of the Arabian Peninsula and punctured most of the deep aquifers.

Besides Saudi Arabia, other GCC nations with viable agricultural lands also pursued expansion during these decades. By 2000, Oman and Bahrain were exporting fruits and vegetables throughout the Gulf, Europe, and Asia. Kuwait established a highly developed dairy sector which, prior to Iraq's invasion in 1994, exported milk products across the Gulf (IMES 2010). The UAE converted over 723,738ha (1,787,633 acres) of previously barren desert land into productive farms and planted over 300,000ha (741,000 acres) with forests supported by man-made irrigation systems (Salloum 2001). The GCC invested in agriculture for the purpose of food security and also to develop what leaders deemed a modern economy. Al-Zubari, however, notes that the countries of the Arabian Peninsula primarily used non-renewable fossil water for this venture and promoted irrigation as if it were a "wet country" which in turn has created an unsustainable environment and an economic sector that is sure to collapse (Trade Arabia 2010).

A Flood of People, a Trickle of Water

Domestic water use also rose because populations expanded and demanded even more access to water as an expression of their new economic status. The rising standards of living afforded by the oil boom translated to better nutrition and health care as well as incentives for immigrant labor to travel to the region. Infant mortality rates dropped across the peninsula, child and maternal health improved, and life expectancy rose. Thousands of migrant laborers rushed in to support growing industry. Between 1950 and 2007, the Arabian Peninsula's population grew over 750%, from 8.32 million to 60.48 million, according to the UN population division (2006). Between 2000 and 2030, the population is expected to double and the UN projects that

continued population growth will result in a rise to almost 125 million by 2050, increasing water demand exponentially on the peninsula (UN Population Division 2006, Woertz, Lippman, Wilcox, & Boucek 2012). If the Arabian Peninsula's population continues to expand at these rates, it will surpass its many neighbors in the Arab world who have implemented family planning strategies and offered public education aimed at slowing population growth while supporting local ideologies.

Increased population size in the GCC nations combined with relatively low water bills subsidized by rich governments attempting to please their citizens with inexpensive services has caused domestic usage to soar. Kuwaitis, for instance, used 1.5 million cubic meters of water per day by 2010, making their nation the highest proportional user in the world as citizens cultivated non-native green environments and expanded industrial water usage under the rays of the desert sun (Moulana 2010). Kuwait was not alone, and nations across the peninsula encouraged the growth of parks, golf greens, and urban planting in order to create man-made oases and agricultural prosperity with the certainty that human technology would be able to supplement precious fossil water when it finally ran out (Salloum 2001).

The UAE pushed policies that expanded water usage in order to beautify urban areas, or make green, the natural desert environment. The UAE cities of Abu Dhabi and Dubai became known worldwide for business and tourism as well as world class golf courses, botanical gardens, and water parks—all of which were dependent on man-made water from desalination plants and continued fossil water extraction (FAO 2011). Referred to by horticulturalist Bernard Lavery as "the man who tamed the desert", the UAE's Sheikh Zayed invested aggressively in solar energy, desalination, and new irrigation technologies in order to provide alternative water sources and increased efficiency for his growing nation, but groundwater remained the primary source for irrigation and domestic use. Water utility bills for UAE

residents were subsidized by the government up to 60%, lessening the value of water and encouraging locals to enjoy vast flower beds and pools at their homes (Solomon 2010).

Qatar also encouraged urban landscapes including green grass and non-native plants. Studies done in 2011 by the government show that while expatriates, a large part of Qatar's population boom, consumed 150 liters of water per day Qatari nationals use 1,200 liters per person per day for watering their lawns, car washes, fountains, pools, and a variety of domestic uses (Peninsula 2011). Qatar's high proportional usage rate therefore cannot be blamed on the non-native workers from wet countries who, one would have thought, should be used to more water. When I asked a Qatari informant why he thought this was the case, he commented that "technology kept providing water" and "God provided the great oil wealth and He gave the technology to drill into the aquifers so why not enjoy water to its fullest," reflecting a narrative similar to that in Yemen of relying on God to provide water in the face of a man-made disaster. The natural beauty of the desert was set aside, and the desert—a viable ecosystem in its own right—was sacrificed to an altered interpretation of what should be "natural" in a modern world. Modernity for most GCC nations meant not the native landscape of the arid region and the animals and plants that thrived in the desert, but the lush greenness that Western powers enjoyed in wet regions. So, these societies created the farm fields, gardens, and forests that they craved and trusted that technology or God, or a combination of the two, would quench their insatiable thirst in the future when fossil waters were spent.

An Exception to the Flow

In the heart of downtown Muscat, Oman's capital, sits a sculpture of two hands holding up a flask with a stream of water trickling from the top. The landscape around the sculpture hosts buildings made of traditional white stucco, new roadways, and bustling businesses. It does

not, however, include forests or expansive lawns. Locals say that the sculpture is a constant reminder that water is precious and they proudly tell stories of how generations of Omanis have successfully lived in this region. The UN Environmental Program praises Oman for having one of the world's best environmental conservation records (2013). Oman benefits from having several aquifers within its borders, like Saudi Arabia, as well as slightly higher rainfall than other countries on the peninsula. But, in contrast to other GCC nations, the symbolic value of water in Oman remains relatively high despite advances in technology. This is reflected in Oman's usage. Oman is the only nation on the Arabian Peninsula that uses under 100% of its proportional water resources. Although Oman participated in the oil boom, here discourses of the necessity of cultural and environmental preservation have tempered the rush to drill into the aquifers and have maintained community norms focused on sustainable growth. These discourses stem from Oman's cultural memory, valuing stability and conservation of nature, and have been encouraged by Sultan Qaboos's government. Omanis have promoted their country as an eco-tourism site in an increasingly industrialized world, and have established a diversified economy that includes a large tourism sector based on environmental preservation and highlighting unique and indigenous features. The hotel industry rooted itself in this eco-tourism climate with programs inviting tourists to participate in nature tours, caravans across desert lands, cliff diving, and a variety of activities based on Oman's biodiversity. Of course, efforts at preservation were various and Oman has faltered occasionally on its path to environmental preservation, but the overall plan discouraged the sort of drastic changes seen in other nations.

Oman's agriculture expanded during the 1970s and 1980s, but not on the scale of its GCC neighbors. Oman emphasized efficient agricultural practices and Sultan Qaboos created a fund to support agricultural innovations, including advanced irrigation methods, environmentally

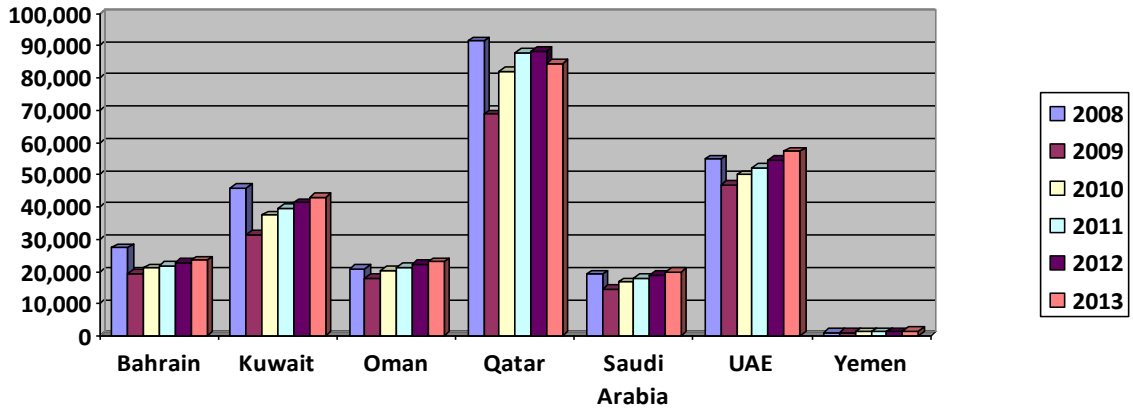
friendly pest control, and hydroponic research (King2008). Unlike Yemen, Oman's central government launched an environmental education campaign that actually reached the population via mass media and community organizations. Therefore, public enthusiasm to drill deeper into aquifers was offset by an awareness of the potential risks as well as strict government controls. Oman, unlike Yemen, had the wealth and structural capability to implement and enforce environmentally friendly agriculture policies that limited groundwater extraction, and Oman has pursued forward thinking strategies to preserve its resources. Oman's water usage did rise during these decades, like that of its neighbors, but Omani consumers did not require nearly the same levels of water that citizens of other nations demanded, because socio- cultural norms promoting the value of environmental preservation made excessively high usage a socially sanctioned activity.

Finding New Supplies

By the turn of the new millennium, local scientists and governments had acknowledged that the enormous water usage on the Arabian Peninsula was unsustainable through fossil water (Lee 2010). The GCC countries, however, had the funds and capacity to adapt and seek alternatives while Yemen struggled with structural weakness and an economic decline. The graph below emphasizes Yemen's financial limitations in the face of this crisis. GCC nations easily reallocated funds to address water stress, but the policy focus revolved around development--continuing the narrative of modernity--instead of true management (Abdulrazzak (1997). Solutions to the declining water table and increasing demand primarily focused on finding new water supply with limited attention to efforts to decrease demand (Rashid & Sherif 2000).

Every nation on the Arabian Peninsula has, starting as early as the 1970s and continuing to the present day, invested in desalination (Yemen barely and very belatedly), but desalination comes at a high price both economically and environmentally. The GCC nations began research and investment in desalination as early as the 1970s when water demands first started to escalate, using their profits from oil production to pay for the technology. Investment in desalination grew rapidly in the face of an effort to accommodate high demand. Yemen's struggling economy and fragile government did not invest in desalination until 2006 when a plant was finally built in the coastal town of Mocha with Saudi Arabian assistance. While other GCC nations continuously built desalination plants for decades, Yemen's projects have been regularly interrupted by unstable security, lack of funds, and political unrest.

GDP Per Capita in US Dollars & Projected GDP



Source: IMF

Desalinization is a process by which saline water is turned into fresh water, or more broadly, it is the process by which minerals are removed to create pure water that humans can consume and use for irrigation. Once desalinated water is produced from ocean water, transportation cost depends on local geography and infrastructure. Coastlines are typically much lower topographically than inland areas, and greater energy is required to move water to higher

elevations where cities often sit. The concentrated salt produced as a byproduct of the desalinization process must also be disposed of, and this further increases production costs and the environmental footprint of creating freshwater. In 2010, the average market cost to desalinate one cubic foot of ocean water was estimated at $3-$4 and the primary factor was the energy required to perform the desalination process, compared to the relatively free cost of regular water in many countries (Gonn 2010). By 2009, there were 14,451 desalinization plants worldwide producing 15.8 billion gallon of water per day and many new desalinization plants were in planning or construction phases, particularly on the Arabian Peninsula (International Desalinization Association 2009).

The desalination process requires the extraction of large amounts of ocean water, water which is full of organic life. Intake pipes suck up a variety of fish, plankton, fish eggs, fish larvae and microbial organisms which make up an important part of the oceanic food chain. Beach wells offer an alternative method of intake which preserves the majority of marine life, but these are more expensive and collect water more slowly. In addition to construction costs, the desalination process itself requires high levels of energy, most of which comes from fossil fuels, thus contributing to global warming and leading to greater water shortfalls. The GCC nations found it convenient to trade their oil and gas surpluses for water by fueling desalination plants. The UAE, for instance, was a net gas exporter before 2008, but it became a net gas importer because of the huge amount of gas needed to power the nation's desalination plants (Solomon 2010).

Solar energy and wind power can curb the energy cost and carbon footprint through renewable means, but these technologies raise the price of initial production and are not main stream yet. In 2010, IBM and King Abdulaziz City for Science & Technology announced that

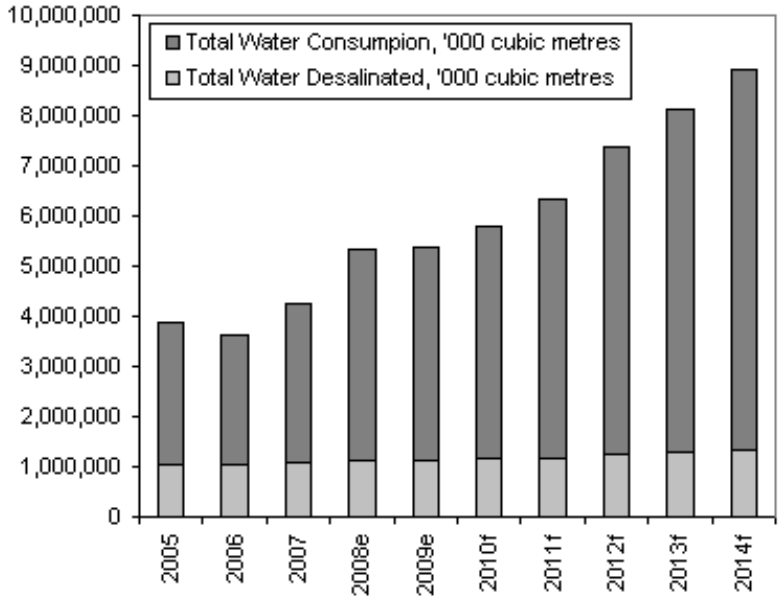
they would be collaborating to build a new type of energy efficient solar powered desalination plant in Saudi Arabia to serve 100,000 people operating off of a system with the equivalent of 1500 suns (International Desalination & Water Reuse Quarterly 2010). The UAE also tried solar powered desalination in Abu Dhabi, hoping to reduce the carbon footprint of the desalination process (Picow 2011). Researchers are racing to find effective alternative energy sources for these plants, but the majority of desalination facilities continue to use fossil fuels and create a significant greenhouse gas footprint. So, the detrimental effects of groundwater exploitation on the Arabian Peninsula are now compounded by growing fossil fuel use.

Aside from the energy required to complete the desalination process, byproducts are a concern as well. Desalinated water produces a concentrated salt residue. The salty brine waste is typically released into the ocean with the belief that the vast waters of the ocean will eventually disperse the salt. Jeffery Graham of Scripps Institute of Oceanography warns that the salty discharge has the ability to seriously harm biodiversity near byproduct discharge areas (Scientific American 2009). In order to dilute the salt byproduct, many desalination plants collocate with power plants or wastewater treatment plants and mix the freshwater discharge from these plants with the brine from desalination. Another method uses a system of pipes to release the brine across a larger area. Other chemicals are also released back into the ocean from the desalination process including industrial cleaning products. In 2009, environmental researchers estimated that 24 tons of chlorine, 65 tons of anti-scalants (chemicals used to clean pipes), and 300 kg of copper were pumped into the Persian Gulf per day (Landais 2009). Producers assume that these chemicals will be diluted by the ocean water, but the discharge sites remain a concern for marine researchers and long term effects on ocean life are undetermined.

Despite environmental concerns, GCC nations expanded desalination production rapidly in the response to high water demand and they continue to build new facilities. By 2011, the

Arabian Peninsula produced almost 70% of the globe's desalinated water (USGS 2011). Saudi Arabia is the world's leading producer of desalinated water; accounting for half of global desalinated water production (Business Monitor International 2010). Yet, even for the world's leading producer, desalinated water is only approximately 10% of the overall water market (Circle of Blue 2010). The demand for groundwater in Saudi Arabia continues to far outweigh the production capabilities of desalinization plants. The other GCC nations face similar challenges and continue to mainly rely on groundwater to support supply while looking for new alternative to quench their populations' insatiable thirst.

Saudi Arabia Water Forecasts



e=Estimate, f=Forecast Source: Ministry of Economy and Planning 2010

The GCC has also invested in dams, recycled water facilities, and a wide variety of environmental innovations aimed at increasing supply and more efficiently using water in addition to desalinization. By 2003, the UAE, for example, built 114 dams and wells specifically designed to assist in aquifer recharge by collecting sparse rainwater and directly funneling it back into the underground system (FAO 2011). Oman, Bahrain, Kuwait and Saudi Arabia funded recharge projects that aimed to replace extracted fossil water in deep aquifers with

precious rain water. But, unless fossil water extraction is stopped completely, the comparatively small amounts of rain gathered at these facilities cannot make up for the high rates of pumping that continuously stress the aquifer systems on the peninsula.

Agricultural Colonization

The sudden expansion of agriculture on the peninsula during the oil boom years claimed huge amounts of water, and desalinated supply did little to help with the amount of irrigation water required to maintain large farms and feed the rising population. GCC nations realized that this sector of the economy would have to shrink in relation to available domestic water supply, but the governments still had populations to feed. Not only was food independence unsustainable, but food dependence was actually going to have to become the new norm. People who spent their lives building successful farms, however, were reluctant to embrace this new water restrictive narrative and so governments faced public discontent. By 2000, GCC nations lifted import restrictions and began dropping agricultural subsidies. By 2012, the same countries on the Arabian Peninsula that had been net exporters in the late 1990s were now importing 60% of their agricultural products through force of government authority and strong enforcement (Woertz, Lippman, Wilcox, & Boucek 2012). Importation of agricultural products provides virtual water to this waterworld, using the water resources of other nations to provide needed food through trade.

In 2008, the Saudi Arabian government escalated the shift away from agriculture by rapidly decreasing subsidies to farmers by 12.5% a year, with the intention of ending all subsidies by as soon as 2015 (Lee 2010). As can be imagined, farmers did not embrace these cuts willingly, but the regime had the authority to enforce the change of policy and offer financial benefits in other sectors of the economy to help laborers relocate. Bahrain, heavily influenced by its protectorate neighbor, also began to discourage farming and pursued policies encouraging farmers to transition to less water intensive crops. Oman already promoted water

conservation, but the Sultanate further invested in new technologies like hydroponic farming to make its agricultural production more efficient. Kuwait's agricultural sector was damaged from the first Gulf war, so rebuilding with tighter restrictions and greenhouse technology was somewhat less difficult than in other GCC countries. But, transitioning away from agriculture after decades of promotion is not easy. National sentiment in all of these countries included pride in agriculture and decades of narratives advocating food independence as an essential element in the creation of a modern state. Saudi Arabia's farming, for example, accounted for 5% of GDP and 12% of the country's labor sector, making agriculture big business (Woertz, et al 2012). Now, national pride and big business are butting heads with the environmentalist community and government leaders who recognize water limitations but have to juggle keeping their people fed and content in order to retain their legitimacy.

While cutting agricultural investment within their own borders, the oil rich GCC nations are trying to stimulate agriculture in countries where water is readily available but states lack funds to invest in it themselves. Pakistan, Kazakstan, Thailand, Tanzania, Brazil, Argentina, Kenya and the Philippines are all examples of countries where the GCC has bought land and invested in agriculture. Woertz et. al. note that this creates "classical colonial agro-export and food import dependencies" (2012). But, the GCC faces discontent both at home and abroad with these purchases. GCC farmers are angered to see their farms turning back to desert, and citizens of wet countries where the GCC is investing fear quiet colonization. Thailand became so concerned that it was losing control of its own agricultural lands that the legislature passed laws to prohibit the sale of land to any Gulf business or government (Woertz et al, Lippman, Wilcox, & Boucek 2012). Other nations like Kenya and Pakistan have seen significant political opposition and may, potentially, pass laws similar to Thailand's in the future because there is growing concern that the GCC is making a land grab instead of an investment. Nonetheless,

business arrangements are growing between the GCC and developing nations as many countries, like Tanzania, sign deals essentially trading water (through agriculture) for the oil money of the Arabian Peninsula. Even so, such arrangements rely on continued oil wealth to feed the peninsula, creating an ecosystem that is dependent on other wet environments to survive instead of encouraging conservation of indigenous environments on the peninsula.

Demand and Entitlement

Consumers across the Arabian Peninsula have become accustomed to higher water use levels and this puts pressures on governments to acquiesce when corporations and individuals propose water intensive projects or reject policies cutting usage. Water continues to be pumped so as to grow non-native plants, to create golf courses in the desert, and to form oases where there were none before despite shifts in agricultural policy and investment technology (AFED 2008). Waleed Al-Zubari from Arabian Gulf University's Water Resources Management Department in Bahrain estimates that usage amongst GCC countries will continue to escalate, regardless of efforts to encourage conservation because of a new sense of water entitlement in this arid land. The current generation has grown accustomed to living with more water and does not want to change its behavior (Moulana 2010). Blaming the individual, of course, removes culpability from the politicians and the international community. Instead of launching a global water awareness campaign—a venture that would surely require significant investment and put several nations' water policies under scrutiny—the global political community acts as if water scarcity is a locally isolated issue, relevant only to certain areas and without connection to the larger global community.

Citizens across the peninsula do not literally feel that their waterworld is drying under their feet, as Yemenis do, because the riches of the GCC continue to support buying additional

supply; feeding the individual user's addiction and permitting industry to flourish while sucking dry the precious aquifers. Although the amount of fossil water is finite and many rechargeable aquifers cannot keep up with the rate of pumping, GCC nations attempt to increase supply through virtual water importation, recycled water facilities, and desalination. This supply comes at a price which is conveniently paid by oil revenues and it is based upon an assumption that oil income will remain high. The price of production is not reflected in local water bills, and cheap water is used to keep the population happy. But, the population of the Arabian Peninsula is growing quickly and oil, like much of the groundwater, is finite in supply. If oil prices suddenly drop or the world shifts to another energy source, the governments of the GCC could not afford to keep up with the current water demand. Al- Barak suggests that people on the peninsula should "start reducing their individual water consumption rates immediately…Any emergency water plan should be based on self-awareness rather than just storing water supplies" (Toumi 2011). A reduction in individual consumption will not solve the problem, however, and industrial and agricultural usage must also be curbed. The state must also reduce consumption while simultaneously developing alternative strategies of supply. Further, the international community must begin to review water policies globally and seriously consider implementing strategies to preserve resources and protect humanity's most precious natural resource.

But, countries prefer to focus on demand and continue to build water parks, ice skating rinks, lakes, golf courses, and luxurious hotels with fountains and pools that rely on a combination of desalinated water, recycled wastewater, and—most importantly—groundwater. Technological advancements have added to supply but the rapid growth of demand offsets these advances. Even the UAE, which has invested so heavily in water technology, still draws about

60% of its overall supply from groundwater (Solomon 2010). Justin Francis of ResponsibleTravel.com commented:

> Golf courses are being constructed in Dubai at breakneck speed. My biggest concern about this rate of construction is the amount of water required. In general, a golf course needs about a million cubic meters of water per hectare [2.5 acres] per year - equivalent to the water consumption of a city of 12,000 inhabitants (Shearing 2008).

Although the UAE is a leader in terms of environmental technology and the implementation of such technologies including the use of solar powered desalination plants and highly efficient irrigation systems, it continues to build water intensive projects which are dependent on man-made water supplies. Phil Dickie, author of the 2007 World Wide Fund for Nature Report, warned that "They do very little to manage water in Dubai…If a supply shortage looms, they look for ways to increase the amount of water available rather than conserve it" (Shearing 2008).

Kuwait's excessive proportional usage also receives criticism as its water policies primarily support increased supply with limited decreases in agriculture as the government, like its GCC neighbors, hesitates to anger farmers and cause public upset. Khaled Al Barak, director of the Water Science Department at the Kuwait Institute for Scientific Research, suggests that:

> A reduction of five per cent in overall consumption levels would help save a huge amount of water, around 18 million gallons per annum, equal to the amount processed annually by the Shuwaikh Desalination Plant [a major plant in Kuwait]…Kuwaitis have a huge responsibility to reduce water consumption rates" (Toumi 2011).

Water policies across the peninsula are varied and disjointed with no strategic, coordinated management at the GCC level. Zhou and Tol suggest that simply increasing supply in areas of high water demand such as the Arabian Peninsula just encourages another unsustainable system based on desalination and increased energy consumption (2005). A study by the Pacific Institute concluded that "the potential benefits of ocean desalination are great, but the economic, cultural, and environmental costs of wide commercialization remain high" (Cooley, Gleik, & Wolff

2006). Desalination leaves its own environmental footprint, and the supply provided cannot fully replace the groundwater that feeds the indigenous plants and animals of the desert.

Yemen in Context

Yemen, the poorest nation in the Middle East, has only one desalination plant while nations supporting golf courses purchase their way out of thirst through desalination and imported food while destroying native desert habitats and potentially harming ocean life. Barlow notes that "…water and water infrastructure-from drinking water and sanitation utilities services to bottled water, cleanup technologies and nuclear powered desalination plants will flow where the money is, not where it is needed. No corporation is in business to deliver water to the poor" (2009). Green grass, flower boxes, and artificial oases have had a high price for the water resources of the Arabian Peninsula. Meanwhile, Yemen is left behind because it is lacks status in the global capital marketplace and doesn't have the structural ability to combat climate change through technological advancement or to influence behavior by enforced policy change. The waterworlds of the Arabian Peninsula are interconnected, and the Arab Forum for Environment and Development warns the precarious situation "is perhaps the most serious challenge facing the region in coming decades and without concerted efforts at improving water management and institutions, the situation will only further deteriorate" (2010). Strang argues that "while expressing genuine concern about environmental degradation, water users refuse to limit their usage, and continue to increase it with every opportunity" (2006: 45). The cultural dynamics of the Arabian Peninsula support her point and emphasize an unwillingness to decrease usage despite warnings of drastic environmental consequences.

Yemen will be the first country on the Arabian Peninsula to face the harsh effects of water mismanagement and fossil water depletion because of its position on the

geopolitical/economic periphery, but the waterworlds of the Arabian Peninsula are intertwined and a drier Yemen will impact the broader environment. Fagan suggests that this trend of ignoring climate change and its larger effects reaches beyond the Arabian Peninsula to the rest of the world as politicians and populations hesitate to look at the long term consequences of over exploitation of freshwater supplies because the solutions would require actions that could be viewed as unpopular--actions such as curbing per capita usage, telling tourist destinations to limit their extravagant pools and fountains, and ordering industry to maintain higher standards of conservation and water management (2011). Water management, I would add, cannot be isolated and bounded by man-made borders, but must include strategic planning that encompasses the flowing natural borders of constantly evolving ecosystems.

Drier conditions on the Arabian Peninsula will harm plant and animal life as well as cause human stress, and larger global weather patterns will potentially be affected over time. Maude Barlow, the co-founder of the Blue Planet Project and the UN's 2008/2009 Senior Advisor on Water stresses that:

> …Average people do not know that the world is facing a comet called the global water crisis. And they are not being served by their political leaders, who are in some king of inexplicable denial. The crisis is not reported enough in the mainstream media, and when it is, it is usually reported as a regional or local problem, not an international one. Water policy is raised as a major issue in very few national elections, even in water-stressed countries. In fact, in many countries, denial is the political response to the global water crisis (2009: 29).

Just as most Yemenis do not understand the complexities of their water crisis, most people do not realize that the entire globe faces a future where freshwater is more and more scarce due to unprecedented drilling and exploitation without regard to consequence. When media sources do cover water issues, they tend to be presented as short term events in isolated areas with easy

solutions, giving politicians an excuse to gloss over a complicated issue and ignore vulnerable populations who are "outside" of their constituency.

The experiences of the GCC present opportunities for the international community to learn from and to implement in Yemen, but only if international political actors find the will to shift their focus to from making financial profit to planning for responsible development. The GCC mismanaged its water resources and drilled into fossil aquifers, just as Yemen did. And, the GCC is confronting the same changes in climate as Yemen. But, Yemen's neighbors have strong central governments, the economic capacity to distribute funds and initiate projects, and vast wealth to implement change. The central governments of the GCC restructured their water policies to acknowledge and plan for declining water tables and they have begun to enforce these water policies strictly, investing heavily in alternative water sources such as virtual supply through importation and production via desalination. Asking Yemen's fragile government and starving population to do the same is like asking a drowning man if he could swim a hundred miles to the life raft. Yemen does not have the economic capacity to execute these large scale projects; nor does it have a strong government to force policy implementation. Yemen needs its neighbors and the international community to work with its water experts to develop a reasonable plan of action to increase economic capacity and cut corruption; fund sustainable projects that employ and benefit local communities; and secure the projects to provide clean water for the future. Yemen, and other nations, can benefit from Oman's example of respectful conservation. Industry and society can balance conserving natural environments along with developing sustainable projects. Perhaps not every corner of the world needs to be filled with grass and fountains to be beautiful; perhaps the indigenous plants and animals that enjoy arid landscapes deserve to have their ecosystems maintained and respected as well.

VII. CONCLUSION

There's an old adage in the Middle East that "the desert cleans itself," and I'm afraid that that seems to be what is going to happen in Yemen. The desert may end up claiming the lands of Yemen and turning them into the Sahara, because no one—no local group, no political actor, no international aid organization—seems to be willing or able to address the looming crisis. The international community is only interested intermittently and appears to lack the political will to define a long term strategy for water sector reform, much less overall humanitarian aid and development. NGO workers on the ground are limited by far away bureaucrats who demand finished projects—regardless of effectiveness—and who listen to politicians that remain riveted on killing Al-Qaeda instead of on calming the socio-cultural dynamics creating a space of such discontent. Local citizens have the best understanding of their own waterworld, but they too have a range of interests from mere survival to producing the greatest agricultural crop to provide for their families.

When I see Yemen in the news now, my heart constricts and I find myself shaking my head in sadness. The images almost always are tied to the Western world's war on terror. Most television shows and movies depict Yemenis as vicious assassins and even films that attempt lightheartedness end with uneducated men blowing up new infrastructure projects. A good Yemeni becomes a mythical other; an exotic figure from the past that history programs link to the spice trade while today's Yemeni lacks dimension and is portrayed similarly to post-World War II Germans or Cold War Russians, the stock villains of previous decades. These images reinforce the narratives that receive attention in the news. Commentators interview experts about Yemen's counterterrorism fight against Al-Qaeda, pausing only briefly to mention the water shortage as if the pending humanitarian crisis (one that will affect millions) cannot compare to a

group of rogue men hiding in the hills. Interviewers perch on the rooftops of splendidly decorated buildings in Bab al-Yemen, emphasizing the exotic and avoiding the Western looking quarters of the city that would detract from their other-ish portrayal.

Foreign dignitaries move through the cities in armed caravans, pushing aside locals and chatting only with a select few, limiting their exposure to the majority of the population which consists of women, children, and self-respecting men who want nothing more than to feed their families and have nothing to do with Al-Qaida. I too was shoved out of the way once, although I'm certain that the security detail didn't realize my nationality. I was walking in Bab al-Yemen one evening, dressed in my abaya and niqab in order to blend in while I did a bit of shopping alone. Suddenly, a group of black SUVs charged down the cobbled path were several of us were strolling with our bags and packages. We scurried to get out of the way and shouted to those further down the street to beware of the oncoming vehicles, their headlights blinding in the darkness. The SUVs roared forward and stopped at a nearby restaurant. I knew the owner and his son well, and I saw them standing at attention in front of the door. A group of security guards jumped out from the SUVs, and I suppose they thought that I and a few others were lingering too long because they shooed us off rather gruffly. As I turned and walked the opposite direction, I asked another bystander who those people were. He explained, with a wry smile, that those had been diplomats. It didn't matter what country they represented; all diplomats in Yemen behaved the same. Neither of us could figure out what had been diplomatic about that experience. Several of us commiserated as we walked away from the scene, and people noted that countries treated Yemenis with less respect than they would have other nationalities. A woman joked that I should have pulled out my American passport and dared the security detail to shove me aside, highlighting the difference in perceived status between my citizenship and hers.

Sadly, that one incident exemplifies much of the backward diplomacy that occurs in Yemen as those that could help Yemenis overcome their many problems hide behind layers of security to stay safe from terrorist groups who exploit Yemen's poverty.

When I think of Yemen, I don't think of terrorists, instead I recall a small boy of five or six carrying a white plastic jug to the mosque near my apartment to fill it with water. I remember watching him, by himself, turning the metal faucet with all of his might and carefully angling the jug to catch every drop. He filled it to the top and fastened it shut. Then, looking very determined, he hefted the heavy container only an inch or so off of the ground and began shuffling along home under the vast weight of his treasure. I think of my friend, Nazar, who looked so lovingly at the bougainvillea in the courtyard and lamented that the rains brought them less water every year, recalling his resolute acceptance that the world would let the botanical jewels of this space quietly die from lack of water. I think back to how it felt to be thirsty on the day that I was ill and ran out of bottled water; the day that I stole to quench my thirst. I think of the educated and compassionate men in the water ministries who live trapped between international donors' expectations and political players who prefer filling their swimming pools to helping the poverty stricken communities throughout the nation.

Sadly, I find myself becoming more pessimistic about Yemen's water situation as time goes by. The international community is focused on its counterterrorism efforts and prefers to act as if Yemen is a naughty child who should take care of itself, ignoring the reality that decades of mismanagement cannot be undone by a sudden rush of donor cash or a quick pat on the head. A sudden rush of donor money doesn't help without significant capacity building measures and extensive structural changes to the economy, and it certainly can't reverse the changes in the larger ecosystem. Yemen needs a sustainable development strategy that is integrated with a

regional plan for water conservation, a complete economic overhaul, and security assistance to protect new and existing infrastructure. But, in addition to having a weak economy, Yemen has a weak central government with a new president who is focused on maintaining national unity, much less addressing longer term problems like resource management. Yemen can only address its water crisis if its international neighbors find the political will to invest as heavily in resource management as they do in counterterrorism. And, they must be willing to do this under the guise of the central government to build its strength and reliability in the eyes of the populace.

Yemen's water problems stem both from human mismanagement and global indifference towards populations that have nothing to offer of capitalistic value. Oil, at the moment, is marketable and therefore GCC nations that produce massive amounts of oil have high revenues. In the coming decades, water will become the new oil—or the new gold standard—as declining freshwater supplies increase its price as a commodity. But, unlike gold or oil, water is not just another commodity to be traded; instead it is essential to life and irreplaceable. If poor nations cannot afford to purchase the technology needed to provide water to their thirsty populations or if mismanaged governments are not pushed to make water a priority in their policies, societies will suffer and humanitarian crises will spread. Anthropology, I hope, will play a significant role in exposing these important dynamics and offering complex analysis of what will be one of the globe's most challenging human experiences, climate change in a capitalistic world where people cannot migrate to find resources as easily as they would have a thousand years ago.

Anthropology is vital to future studies of environmental change because anthropologists are uniquely equipped to provide the rich descriptions needed to understand the numerous localities that inhabit larger environmental landscapes and the cultural constructs at play. Crate calls for climate ethnographies exploring culture and climate change, and I would further call for

ethnographies focusing on water as a total social fact and acknowledging the friction between local and global factions negotiating the many aspects of this unique resource. Tsing's zones of awkward engagement reach from the local to the global and there is room for significant research combining social science with a variety of climate related sciences. As local communities deal with the realities of climate change, they both react to and simultaneously affect the larger ecosystem processes, creating a dynamic space for comprehensive research. Global capitalist forces isolate communities on the periphery and then stumble forward to offer erratic funding to poorer nations, often only causing further economic and societal harm. States allow their water resources to be bought and sold, damaged and destroyed by the highest bidder while their people dig deeper and walk farther for a drink.

I hope that this study has added, if only a little, to the climate discourse and the emerging conversations regarding water management. My research is just a drop in the bucket—that pun is fully intended—and much more research is needed to explore the ways in which various societies are adapting or not adapting to the wide range of climate changes occurring at an ever increasing rate globally. But, more than just research, anthropological literature must also offer recommendations based from our experiences within these cultures. Although freshwater conservation may be the overall goal, the right action to meet that goal in one community may differ greatly from another. Environmental studies must include vigorous anthropological debate; preferably before delicate ecosystems are destroyed by human behavior in conjunction with climate change.

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