Water History

Human Eddies and Flows: The Mid-Century Floods of Albuquerque

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Corresponding Author:	Michael Agar, Ph.D. Ethknoworks LLC Santa Fe, New Mexico UNITED STATES
Corresponding Author Secondary Information:	
Corresponding Author's Institution:	Ethknoworks LLC
Corresponding Author's Secondary Institution:	
First Author:	Michael Agar, Ph.D.
First Author Secondary Information:	
Order of Authors:	Michael Agar, Ph.D.
	Ellen Taylor, M.A.
Order of Authors Secondary Information:	
Abstract:	Recent work suggests that local water governance is in part a function of histories of human responses to water crises. In this article, a specific example is described to develop that argument, namely, the effort to control flooding caused by urban development in Albuquerque, New Mexico, in the 1950s and 60s. The description of this single case will show contingencies in the production of conflict, the importance of population worldview in that conflict, and the way that different levels of governance scale collapse into a single local event. Authors outline a dynamic crisis-driven model to generalize the New Mexico case for future comparative analysis.
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Michael Agar is emeritus in anthropology from the University of Maryland, currently working as an adjunct in biology at the University of New Mexico and writing and consulting independently under the name of Ethknoworks (www.ethknoworks.com). With support from a National Science Foundation supplement from the Anthropology Program and the Long Term Ecological Research Network, he worked on New Mexico water governance with a particular focus on the use of history to explain the current dysfunctional policy and develop possible alternatives. His most recent book is the 2013 *Lively Science: Remodeling Human Social Research* by Hillcrest Press.

Ellen Taylor has a Masters in Political Science and worked as a paralegal with the Diné and later as policy analyst with the nonprofit Office of Management and Budget watchdog OMB Watch in Washington DC and legislative analyst and reporter in Santa Fe New Mexico. She has published articles and working papers on the impact of budgets on specific human situations, notably in a “Faces on the Numbers” project. Currently she runs her own business managing qualitative research data in Northern New Mexico (www.alcaldeellen.com).

In her recent article in *Water Matters*, Michele-Lee Moore observes that many water professionals assert that water governance is "complex," but then they add that they really do not need to explain what they mean since it is so obvious (2013). But is it, she asks? The rest of her article lays out what "complexity" means. A key part of the explanation, according to Moore, is the disjunction between macro and micro levels of water governance, and a key reason for that disjunction is, on the local level water governance dynamics develop from environmental events that the local population perceived as unexpected and negative.

In her book *Gardening the World*, Veronica Strang concludes her anthropological research on water use in Australia with a similar point. For most of the book she describes the irreconcilable differences between a pro-growth economically rational view of water and a goal of sustainability premised on a society in balance with its environment. She has difficulty in the conclusion suggesting a way out of this contradiction. At the very end, though, she writes the following lines:

> Ironically, it may be that water itself provides the key to solving the problem. In setting a clear limit to growth and expansion, water shortages may force the Australian population to lead the way in undertaking a much deeper reform, not just of water, but of its whole engagement with a social and physical environment. This may necessitate far more radical changes in conceptual approaches; in social, economic and political arrangements and in forms of governance. Some courageous choices will have to be made (Strang 2013:292)

Here again we see a water governance dynamic linked to a specific place and specific problems, driven by changes in how water itself acts, as perceived by the humans who *interact* with it.

This is more than just saying that water has agency (See Campbell 2010 for example). Drawing from Actor-Network Theory (Latour 2005), we mean that water and humans are both nodes in local task-oriented networks whose members, including water, interact through time. Moore and Strang suggest that, in a particular network where water and humans are doing things together, water can disrupt the tasks in which they both take part, perhaps in unexpected and dramatic ways. For Moore this is a key difference between local and distant levels of water governance. For Strang such events represent the hope that water itself might force incompatible human interests to reconcile.

Figure One Here

To summarize in a way that we will develop with a case study in this article, we generalize their argument as shown in Figure 1, the best we could do with Omnigraffle software. In the diagram, "TASK" is the initial condition. Notice that it is not a question of correlating water and humans; rather, the two are inseparable parts of the same unit of analysis. The circle contains the starting point, people linked with water in an action-network with some purpose. The task lies at the end of a "HISTORICAL TRAJECTORY" that explains how it came about. Next, a "CRISIS" occurs, represented in the diagram when the network link turns into a lightening bolt. "Crisis" means a change in the connection between water and humans that disrupts a task, usually unexpected, usually producing uncertainty about how to respond. Humans then attempt to "REPAIR" the crisis, the next circle in the diagram. Here the "HUMAN" node decomposes into several social networks consisting of people and organizations, suggested in the diagram with just a few nodes. The networks represent local configurations of power and interests that respond to the crisis. Notice the loop at the bottom of the repair circle labeled "ITERATION." As we will see in the specific case to come, the repair involves conflict among different network segments such that several repairs are proposed and disputed until one finally emerges. It, in turn, fails and leads to a new repair configuration. In the end, repair becomes the new leading edge of the historical trajectory, as indicated in the diagram by the exit arrow that intersects with the historical trajectory. A different task, a different pattern of human/water interaction, is now in place, awaiting the next crisis.

This outline of a "water crisis" model is worth developing. It rings generally true for many cases in the history of New Mexico. In this article we examine one historical case to challenge and develop it. A full evaluation of the model will require many fine-grained analyses and comparisons among them. But, as Moore notes in her article, research is less developed in the area of case analyses, partly because each "data point" is a complicated narrative that a researcher has to assemble, and partly because comparative analysis across such narratives is no simple task.

As our example, we will use the story of a flooding crisis in Albuquerque, New Mexico, (see readable backgrounds on the city in Simmons 1982 and Price 2003). A quick summary of the case is this: In the Albuquerque metropolitan area in the 1950s, rapid development created a flooding problem. A special district called the Sandia Conservancy District (SCD) was established as the local conduit for a federally supported flood control project. SCD quickly became a center of political turmoil, first between

itself and area citizens, then internally among its own board of directors. Ultimately, in the early 1960s, the court dissolved it and ended its short life, which in turn enabled resources to be used to form a new entity that arose from the wreckage. That new entity repaired the initial crisis and still exists today.

The plot line of the story might have been guessed from a Pueblo name for the Sandia Mountains, the mountains to the east of the city that gave the new district its name, *posu gai hoooo* as Pearce wrote it, "where water slides down the arroyo" (Pearce 1965). What is striking here is the volatility of the crisis and the way it interacted with simultaneous changes in population and city governance, all of this interacting in turn with national policy enabled by a strategically placed U.S. senator. The rise and decline of the SCD is part of a major transition in the history of the city, a transition described in the next section.

Today many water professionals in New Mexico are unaware of the history of the SCD. To bring this history to light, we relied on a combination of methods. Firstly, our analysis is based on our experience as participants in conferences on water governance in New Mexico. Secondly, this experience is augmented by the analysis of written sources on the history of Albuquerque. For example, R.T. Wood's 1980 dissertation tracks the changes in the city after World War II, while T.A. Townsend's 1964 dissertation focuses specifically on post-war issues of flood control in the city. With the exception of scattered media references and reports, which we also consulted, these two dissertations were the only sources with the detailed materials we needed for the SCD story. We draw upon their data to reanalyze and conceptualize the history of water governance in the city. Lastly, we consulted documents available at The Center for Southwest Research Archives at the University of New Mexico Zimmerman Library, the Albuquerque city planning office, and the Sandia National Laboratories archives. Together these sources allow us to provide a more complete history of the SCD.

This article will follow the water crisis model outlined in Figure One. First we describe the historical trajectory that led to a "flooding," followed by a consideration of the concept of "flood." Next we show how the proposed repair, the SCD, emerged and how it was developed in the context of multiple human and organizational networks. Next, the second iteration of the SCD occurs with a popular rejection of its plan. The new repair that follows, in turn, self-destructs through internal conflict and leads to a third iteration, the agency that continues to this day. In the conclusion we revisit the water crisis model in Figure One to flesh it out in more detail and consider its further application to new cases in the future.

THE DYNAMICS OF A CRISIS

The historical trajectory that preceded the SCD story begins with dramatic growth in the post-World War II Albuquerque population. Housing construction stripped away and paved the ground cover on the mesa between the Sandia Mountains to the east of the city and the river valley that runs through it. Snowmelt and monsoon rains streamed into the valley more rapidly and in greater quantity than before the construction (Logan 1995). This population increase was afforded for the most part by the development of nuclear weapons at the Los Alamos laboratories, the birthplace of the atomic bomb. A quick overview of the magnitude of the change is visible in the following population chart, based on U.S. Census historical records:

Year	City Pop	Growth Rate	County Pop
1930	26,570	n.a.	45,430
1940	35,499	2.9%	69,631
1950	96,815	10.6%	145,673
1960	201,189	7.6%	262,199
1970	244,501	2%	315.774

At a general level, there is no doubt that the post-World War II increase marks a time period that changed the city. Popular, academic, and oral histories all show that Albuquerque in 1970 was a very different place from what it had been in 1940. Many U.S. locations changed after World War II, in particular with the so-called Sunbelt migration to the South and West of the country. But one thing that distinguished Albuquerque was the particular impetus for the growth. During World War II, the U.S. picked New Mexico as the location to build its first nuclear bomb. Albuquerque grew as the transportation and logistics center for the effort.

Batty (2007), among others, points out that urban growth is best approached as a nonlinear dynamic system, a "complex system," to use the more popular term. In Batty's model, a population surge in a city usually begins with a random event that is then shaped by a historical accident. Though it feels strange to call it random, the event that began Albuquerque's rapid growth was the connection between physics and the U.S. war effort, specifically the decision to produce nuclear weapons. The moment is often dated to Einstein's famous letter advocating the Manhattan Project to President Roosevelt on August 2nd, 1939.

The lead physicist was J. Robert Oppenheimer. He provided the historical accident, namely, his previous New Mexico vacations and his suggestion that the Manhattan Project locate on the Pajarito Plateau, the site that would become present-day Los Alamos. The nearby city of Albuquerque was already a railroad transportation hub with a U.S. Air Force Base. And south of the city was White Sands, the future weapons testing site. To the west was the town of Grants that would become a center for uranium mining, though not until the 1950s. With the founding of Los Alamos, nearby Albuquerque became a center for nuclear weapons development. Then, in July of 1945, the Los Alamos division responsible for weapons production was moved to the city, an organization that would become the Sandia National Laboratories.

With Sandia, the city's population growth accelerated. In a city planning report, the author called Sandia "the most important single event in the history of Albuquerque" (Oppenheimer, 1962). According to documents in their own archives, "Sandia Base" started in the autumn of 1945, completing the move from Los Alamos by 1947. Many indicators of its impact remain. For example, the credit union, founded in 1948, became by the 1990s the largest locally owned financial institution in Albuquerque with $388 million in assets. As another indication of impact, a 1989 company report claims that Sandia provided 7,605 jobs directly with a total impact statewide of 29,606 jobs, that being 4.5 percent of all employment in New Mexico, resulting in 6.5 percent of total economic activity for the state[1].

There were other in-migration streams as well—rural Hispanics seeking work in the new economy, returning servicemen who liked the place and came back as civilians, and the development of "Indian culture" tourism. But it is clear that the nuclear weapons industry was the main draw. And that

[1] Information culled from newsletters and reports made available for review on site courtesy of the archivist at Sandia National Laboratories, Albuquerque NM.

draw meant a booming human population, mostly from other areas of the country, who were unfamiliar with an arid desert/grassland biome, people by and large oriented to science and technology and impersonal models of bureaucratic organization. Those people needed houses to live in and places to shop, houses and shops that many expected to match a previous life in the humid climates east of the 100th meridian.

Population growth was not just a matter of more people. It also changed the political and economic context of the city. As part of this growth, a shift occurred in the structure of local real estate development because of increasing demand. Right after the war, new housing construction was a dispersed market with many small-scale participants. But as the population grew, the market concentrated to one dominated by three--some say four--major figures. They all had previous ties to the Southwest, and they all founded and developed their own privately owned companies. They exemplify the influence of land development interests in the repair part of the water crisis model described in Figure Two.

Figure Two Here

New housing spread out from old pre-World War II Albuquerque, primarily centered in the river valley. Before the war, the city center consisted of Hispanic "Old Town," from the Spanish Colonial and later Mexican era, and "downtown," the latter based on the coming of the railroad in 1880 after the American conquest of Northern Mexico in 1848. On the map of modern Albuquerque reprinted in Figure Two, Old Town and Downtown are just to the southwest of the intersection of the two major interstate highways, I-40 running east and west and I-25 running north and south[2]. The Rio Grande River roughly parallels I-25 to the west. Details for the other areas of the city on the map and their development go beyond the scope of this article. However, we want to point out that many of the missing details involve areas to the west of the river that are heavily Nuevomexicano, Hispanics who trace ancestry to families from the Spanish/Mexican times (Trujillo 2009). Their voices are absent from the documented SCD story, as are those of the Pueblos that surround the city on three sides. The archives we consulted present the case as an Anglo story, perhaps reflecting the primarily Anglo composition of the population surge and the economic elites already in place.

The main point for present purposes is this: Right after the war, new housing developments spread, mainly to the east of the river valley along the mesa--the "East Mesa"--between the Rio Grande and

[2] http://www.itsatrip.org/travel-tools/maps/albuquerque-city-maps/

the Sandia Mountains. This corresponds roughly to the area labeled "Eastside" on the map. Land on the East Mesa was comparatively easy to develop because it was unoccupied and not as complicated by land grants from the Spanish/Mexican era as was land in most other parts of the metropolitan area (Sanchez 2008). So rapid was the growth that one of the new dominant development companies became, for a while, the 6th largest building firm in the world (Wood 1980:183). The mesa turned into large clusters of housing developments containing their own shopping facilities, connected with each other by major transportation arteries.

The newcomers, most of them living in the new housing on the East Mesa, produced a second major change--they took over the political structure of the city. It is inevitable that a massive population influx will have some impact on local government. But in this case, it wasn't just an increase in numbers. Unlike animal migration, human migrations can include people who share among themselves mental models very different from those of a population already in place. Numbers of course matter as far as brute impact on an environment goes, but a "cultural" invasion can make even more of a difference if the newcomers arrive with power.

Before the post-war population deluge, the city had a charismatic political boss named Clyde Tingley (Lucero-Sachs 2013). Tingley had come to Albuquerque, like many other Anglos in the early twentieth century, because of the city's reputation as a treatment center for tuberculosis, in this case for the benefit of his wife (Lewis 2010). He started as an alderman in 1916. Though the city was run by a Commission for much of his political career, he was considered the unofficial "mayor," and he served as governor of the state from 1935 to 1939. He was, by most accounts, a folksy character, a populist in the sense of improving the city for ordinary people, and an honest politician. Interestingly he was a good friend with President Franklin Delano Roosevelt and, in partnership with Senator Dennis Chavez, he brought several federal projects to Albuquerque and to New Mexico. There are still many places named for him in the city. He died in 1960.

His style was based on an Anglo version of the old Spanish *caudillo*, featuring an authoritarian style, patriarchal concern for "his" people, personal loyalty as a primary qualification for patronage, and a flamboyant public persona. As the city exploded, though, this style failed to deliver on the rapidly increasing needs growing around him. He and his constituents became a minority as the new population

grew. Sometimes he was the lone dissenter on infrastructure development votes. With his informal style and concern for budget, he alienated the new breed of professional planners and engineers who worried about pressing growth-driven issues of water, traffic, sewage, streets, and the like.

More to the point, the technology and science newcomers did not respect Tingley's style. The new arrivals exemplified James Scott's category of "high modernism," a fundamental belief that science and technology were the solutions to the world's problems, something that he describes as particularly prevalent during the Cold War period under discussion in this article (Scott 1999:4). The Albuquerque political conflict could be described as high modernism meets old Southwest, a juxtaposition still visible in the state today.

According to Wood's dissertation, the turning point was the April 1954 election. A Citizens' Committee had formed. It started with about twenty members though soon it became several hundred. As Wood summarized it:

> A large proportion of the membership worked at the defense-related complex on and around the military bases, and the overwhelming majority lived on the eastern side of the city. More than any previous political organization, the Citizen's Committee represented the rational and disciplined impulse which had been surging into Albuquerque ever since the end of World War II (Wood 1980:144).

The Citizen's Committee put three City Commission candidates forward. One candidate summarized the newcomers' view of traditional city government by calling it a "three ring circus" (Wood 1980:146). Tingley was less exuberant than usual in the campaign. Wood speculates that his ongoing medical problems had worsened, that he had a sense that the majority was no longer with him, and that maybe he just felt old and tired. At any rate, the Citizens' Committee candidates won on a record turnout, each of the three receiving around 12,000 votes, their nearest competitors getting more on the order of 4,000 to 4,500. It was an overwhelming defeat of the old order.

As Wood describes them, the next five years were "orderly and efficient" (Wood 1980:147). The city administrators developed conflict of interest prohibitions, organizational discipline, and centralization of authority. The new commissioners aspired to run the city like an efficient business. Expansion of services ran full steam, with new fire stations, libraries, parking, a community center, street paving, more

water facilities, police and fire personnel. Wood describes the period as dull in comparison to the old days but good for the city as it continued to grow. The Commission would later turn turbulent again with reactions against growth, but for the time being city government worked in harmony with the growth surge in the city.

The city became a politically and economically coordinated growth machine for the next few years, years that include the rise and fall of the SCD. Like-minded recent arrivals, representatives of late modernism, had replaced the old guard in the government of the growing city, and an efficient real estate industry mass-produced homes for those same people as fast as they could move in. The problem was, water responded by rushing down the mountain and across the stripped and paved East Mesa more rapidly and in greater quantity than ever before. Floods became more severe and more frequent than they had in the recent past. In the eyes of a critical mass of the city, this newly perceived water crisis called for a local effort to repair it. That effort would produce the SCD.

WHEN IS A FLOOD NOT A FLOOD?

"Flooding" is an English language word for one kind of water crisis. "Flood" is a biogeophysical event and at the same time a human interpretation of it. Obviously, at one extreme, there can be no “flood” if there is no water. On the other hand, there might be a lot of water without anyone thinking that it is a “flood.” What made the 1950s situation a “flood” and, therefore, a water crisis?

The crisis that initiates governance change is not only an objective natural event. It is a mix of that and its interpretation by humans in the network that includes them all. In *What is Water?* Linton reviews several academic streams of this kind of thinking. His concept of "hydrosocial" from critical geography best serves our purposes here. As Linton summarizes it, it "offers an approach to studying and managing flows of water as phenomena that necessarily involve a mix of hydrological and social processes (Linton 2010:229).”

Linton's argument is "water is what we make of it." For example, as a Pueblo colleague jokingly put it, "We never had any floods." He was joking about how his ancestors, who first settled the Albuquerque area around 1100 BCE, worked in harmony with weather rather than seeing it as a "problem."

The usual pattern is that precipitation is heavy during the summer monsoons, and then later as the spring snowmelt runs down from the mountains. Otherwise it is fairly dry, averaging less than ten inches per year, though with significant variation from one year to another. Our colleague meant that a sudden increase in waterflow during heavy monsoon rains and melt from the mountains wasn't a "flood." It was how nature worked. The Pueblos farmed in collaboration with water, using flood irrigation in the river basin and along the arroyos. The feared crisis in ancient times wasn't "flood;" it was "drought."

With Spanish, and later American, occupation the water story gets more complicated in ways that go well beyond the scope of this article, though histories are available (Horgan 1984, Philips, Hall and Black 2011). After American annexation at the close of the Mexican-American War in 1848, the rise of irrigated agriculture along the Rio Grande, together with the growth of lumber and grazing activities in the mountains, changed river flow, sediment levels, and vegetation such that "flooding" became a more frequent topic in public discourse. On the other hand, a retired city water professional who worked through the SCD period talked about how, as a child in Albuquerque, people knew that when a monsoon thunderstorm struck, you stayed home because water was about to rush down the street for a brief period of time. But then, as he described it from an older Albuquerquian's point of view, the newcomers moving into the city after the war saw that same water as "flooding."[3]

The newcomers weren't the only ones who saw the inundations as negative. The business community in the downtown area near the river didn't like the inconvenience of a flood either, nor did the city boosters luring the new post-war defense industry to the city, nor did the agricultural interests, nor did the old Nuevomexicano communities in the valley. There were plenty of motives from different perspectives for seeing a "flooding" problem, in the sense of water disrupting tasks. Still, the moral of the story is that the water crisis that initiates governance change is not only an objective natural event, though it certainly is that as well. It is also a *semiotic* event, an event whose "significance" is open to many interpretations, implications and associations. The repair that the water crisis provokes, as we will see in the SCD case, depends on the human interpretation of what water is doing.

[3] Presentation to the Albuquerque Historical Society, August 18, 2013, by Larry Blair, former director of AMAFCA, "Rain and arroyos: The history of flood control in Albuquerque."

THE RISE OF THE SCD

When was the Sandia Conservancy District actually born? Two of the clearest dates are July of 1953, when the New Mexico State Supreme Court upheld the decision to form the SCD after appeal from the lower courts, or 1954, when the U.S. Congress officially authorized funding for the flood control project that the SCD was to oversee (Townsend 1964).

Flooding was not a new public topic, as we described in the previous section. Floods had inundated the city in 1941 and 1942 before post-war growth took off, to the point where existing canals and drains in the river basin plugged up with silt. That flooding occurred, in part, because of the variation in precipitation characteristic of the area over the centuries, not because of any population increase or real estate development. In a letter to New Mexico U.S. Senator Dennis Chavez from Charles C. Broome, President of the Albuquerque Chamber of Commerce, dated March 22, 1947, Mr. Broome described the city's plight quite eloquently[4].

> Thus the long, weary effort to harness the Rio Grande river and save Albuquerque, and other New Mexico cities from destruction appears to be just where it started several years ago--in the lap of Congress. Have you no word of encouragement for us--or is another Congressional session going to pass by with nothing accomplished in this vital manner?

Senator Chavez, who served in the Senate from 1935 until his death in 1962, was chair of the Committee on Public Works from 1949 to 1953 and 1955 to 1962. He was one of the, if not the, main reasons that federal funds for the SCD eventually came to the city. He replied to Broome,

> I was wondering how many of those who are now yelling that Congress is doing nothing with reference to flood control did not participate, unconsciously perhaps, in bringing the present state of affairs about.

Frustration continued to build as the city and the East Mesa grew, but no organized response emerged, and no local funding was available to do anything even if a course of action could have been agreed upon. Finally, in June, 1950, an ad hoc group made up of influential representatives from the city,

[4] Papers of Senator Dennis Chavez. Center for Southwest Research Archive 394, Box 193, Folder 4. University of New Mexico Zimmerman Library, Albuquerque NM.

the county and the agricultural district came up with a proposal and sent it to Washington. While awaiting a response, Mother Nature added her vote by providing three days of severe flooding to dramatize the request.[5]

That 1950 proposal began an extraordinarily compressed and intense series of conversations, meetings, disputes, recommendations, and counterproposals, all during the early 1950s. Their description alone could fill a book. They represent the complicated and lengthy labor of SCD's birth. Already we see that the repair part of the water crisis model is not a simple bounded event where a group of like-minded people take some direct action. Different networks emerge and dispute the nature of the crisis and the best way to repair it. For the moment, we can summarize a few outcomes of this contentious process as described by Townsend:

1. The flooding is defined as a mesa problem, not a valley problem, caused by uncontrolled real-estate development. The arroyos that run from the mountains across the mesa down into the river valley will be the location of flood control.

2. The Army Corps of Engineers comes up with a plan for two diversion channels that will capture the runoff as it comes down the mountain, route it around to the north and south side of the mesa, and then send it directly into the river.

3. The U.S. Government will pay for the project and provide technical assistance. But the city of Albuquerque and Bernalillo County must create an organization to handle rights of way and guarantee maintenance for the future.

4. To take care of these local responsibilities, a new "flood control district" is proposed in January of 1952, to be called the "Sandia Conservancy District."[6] Many different local organizations already have something to do with flooding and the river. Nevertheless, the proposal asserts that a new organization will be the best way to avoid conflict among them, an ironic conclusion as things turned out.

With hindsight, it's easy to see the problems that will be described in the rest of this article. Competing interests, multiple jurisdictions, new arrivals/previous residents, and, of course, money was involved. The proposed new local organization needed to raise its own funds to obtain rights of way,

[5] Albuquerque Journal. Runoff in Sandias from heavy rain damages streets. 22 August 1951.

[6] Albuquerque Journal. City group asks for special flood control district. 12 January 1952.

construct infrastructure like road bridges over the diversion channels, and then maintain the system after it was functioning. The SCD, being a "special district," would have to support itself by issuing bonds and developing a taxation scheme separate from ordinary property tax assessments.

The first protest against the proposed SCD was filed in October of 1952 by existing entities like the Middle Rio Grande Conservancy District and the Bernallillo-Sandoval Farm and Livestock Bureau. They argued that the new district would overlap and conflict with their authority. These and other protests would eventually reach the state supreme court, where approval for the establishment of the new district would finally be granted in July of 1953. Under the leadership of Senator Chavez, congressional approval of funds came in 1954. The new Sandia Conservancy District took its first steps into its short-lived future.

HOW IT STARTS

The SCD came to life in 1954 with five court-appointed directors. Recall that this was the same year that newcomers took over city government, as described earlier. Two directors were realtors, two were bank executives from the First National Bank of Albuquerque, and one was a dairy farmer who, in contrast to the agricultural interests who had opposed the SCD in court, thought it was a good idea. The Army Corps of Engineers had presented their plan to the working group in June of 1953. The centerpiece of the Corps plan were two large drainage channels along the "bluff line"—roughly where the mountain leveled off into the mesa—that would run parallel to the river valley. Water would run off the mountain, into the ditches, around the East Mesa housing, and directly into the river.

A recent photograph showing the longer northern path of the channel is reproduced below in Figure Three. The city is larger at the time of the photograph, but a reader can coordinate with the map shown earlier by noting the crossing of the two major interstates (Martinez 2013)[7].

Figure Three Here

First the SCD needed money, both for purchasing rights of way and for developing their own supplemental engineering plan for supporting infrastructure. In order to get started, they operated with a loan of $100,000 from the First National Bank. They were authorized to levy up to a six mil assessment on

[7] www.unm.edu/~aalexam/finalreport.pdf.

property in the SCD district. A six mil levy on a ten thousand dollar property would be $60, ten thousand being the approximate unadjusted median cost of a house in New Mexico according to the 1960 U.S. Census. The levy was to be enforced with liens on individual property, a decision that would eventually anger homeowners and fuel the revolt to come.

The SCD board then appointed a separate Board of Appraisers. The appraisers decided that the levy would be adjusted depending on the degree to which a particular property benefited from the flood control project. But what about the degree to which a property was responsible for the flooding, like all those houses on the East Mesa? Shouldn't that be a factor in setting taxes? The Appraisal Board's charge was far from clear.

The appraisers came up with a zone classification system. A property was placed in a classification depending on its direct and indirect benefits from a reduction in flooding. Everyone benefited somewhat from living in a flood free metropolitan area. But a downtown merchant in the river valley benefited more than an East Mesa homeowner. Zone category was then used to determine the percentage of property value that would be subject to the tax.

East Mesa dwellers didn't suffer much from the flooding, except to watch all that water roar by. So they weren't in line for much in the way of direct benefits to their own property. On the other hand, there was the question of responsibility (Townsend 1964:131). The Appraisal Board concluded that indirect benefits accrued to the East Mesa, and that the extensive buildup had aggravated the flood problem in the lower areas. Therefore, those property owners should pay at a relatively high level of the assessment to assist in solving an overall city problem. This decision would also be part of the revolt against the SCD to come.

The SCD directors and appraisers had worked away from the public eye. Press coverage during the period dealt more with efforts to get federal money, along with the usual dramatic photos of downtown flooding, rather than with the tedious details of the appraisers' work. The final roster specifying who would pay how much was presented more or less as a *fait accompli*. The anti-SCD movement that later emerged claimed that the government was pulling a fast one without a chance for citizens to comment. We want to emphasize here that, in our own research, we found no evidence for this on the part of the SCD planners.

The SCD directors notified the public of the assessments and the budget via newspapers in September of 1957. Hearings were held, some protests were filed and responded to, but by and large there wasn't any great initial outcry against the plan. For a very brief period of time, it appeared that a successful repair was in view. But then popular protests exploded and caused an iteration out of the ongoing repair into another very different version of the SCD.

THE PEOPLE'S (AND REALTOR'S) REVOLT

On October 15, 1957, 400 people attended a meeting at the Inez School in the Heights to protest the SCD assessments. Three days later, on October 18, another meeting was held at Monroe Junior High in Paradise Hills, like the Heights a post-World War II development, but unlike the Heights located on the other side of the river on the West Mesa. This time an unbelievable five to six thousand people showed up.[8] This explosion of protest, more an avalanche than a tipping point, consisted of property owners angry with the SCD. So hostile was the emotional tone of the gathering that the leader of the second meeting, Fred Poorbaugh, refused to let representatives of the Sandia Conservancy District speak at all. The masses had come to vent their anger, not to listen to what the enemy had to say.

Poorbaugh was a founder of the Property Owner's Protective Association (POPA). He was in the real estate business with investments in future developments. A second co-founder and major power behind the revolt was Stuart Hines, an Albuquerque attorney who owned a land title company and represented various building contractors as well as a multi-acre estate on the East Mesa whose owner was unhappy about plans to run a diversion channel through his property.

It isn't difficult to imagine why major players in real estate development were worried. The SCD had produced an explicit and public classification of flood danger in the city and added a tax burden with the threat of a property lien for nonpayment. And the tax was higher than expected, since the appraisers had decided that East Mesa should pay more because their developed property was in part responsible for the floods. This probably didn't help with a sales pitch to new arrivals looking for a home.

[8] Albuquerque Journal. Flood district protest meeting draws thousands in Heights. 19 October 1957.

But, to produce the reaction that it did, POPA had to have tapped into popular anger about SCD that no one had known was so strong and so widely distributed. Ordinary property owners weren't as concerned with future development as they were with the traditional American ideology that POPA preached—the government had no right to tax without the consent of the governed. As Townsend summarized it:

> (The eruption of POPA gave the impression of) spontaneous formation by outraged citizens who had been duped by the secretive tactics of a Machiavellian governmental unit and unsuspectingly called upon to support it through enforced taxation (Townsend 1964:158).

A couple of days after that large meeting, ironically enough, the headline in the local newspaper was, "City hard hit by rain, hail: Heights dark."[9] And the day after that it was, "Year's worst flood brings big damage to streets in city."[10] A combination of saturation by previous rains, the kind of short intense cloudbursts that the Southwest is famous for, and the easy runoff across East Mesa developments struck again. Mother Nature provided a clear reminder of the problem that the SCD was supposed to solve. Several families in the river valley had to leave their homes and hundreds of cars were mired in water and mud. Officials were quoted in the latter article as saying that it was the worst damage to city streets in its history.

This reminder of urban flooding made no difference as far as anti-SCD momentum was concerned. By October 29, 6,700 property owners, seventeen percent of those in the SCD District, had contacted the District office. On November 1, Hines filed a petition in court claiming he represented 10,654 POPA members. The number of organizations in the city opposing the SCD also grew. Townsend again provides a good summary:

> (B)roadly speaking, every local major commercial interest and state or local governmental agency affected by the District were represented in the opposition forces (1964: 170-72).

The complaints of government agencies makes some sense, since the SCD was cross-cutting their jurisdictions and therefore potentially complicating their lives. Why "major commercial interests" were

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[9] Albuquerque Journal. City hard hit by rain, hail; Heights dark. 20 October 1957.

[10] Albuquerque Journal. Year's worst flood brings big damage to city streets. 21 October 1957.

uniformly unhappy, a category that supposedly would include the downtown merchants and city boosters who wanted relief from the most severe flooding, is not clear to us even after all the material we reviewed.

Hearings began in District Court on December 9, 1957. The questions before the court, the deliberations, and the conclusions reached were lengthy. But, on the whole, the court decided that the citizens had a point—many points. Citizens had been excluded from selection of the SCD board and the appraisers, the determination of assessment zones, and the imposition of liens on their homes. The old SCD made plans to go out of business on September 1, 1958, to be replaced by a new version with a revision of the engineering plan, a new assessment of benefits on which to base property taxes, no liens, and popular election of a new board of directors.[11]

The new plan had to take account of changes in fast-growing Albuquerque. Many new roads and upgraded secondary streets, some now four-lane arterials, required bridges. The New Mexico State Highway Department routed the new Coronado Freeway, Interstate 40, in ways that conflicted with the original design. And costs had increased to the point where SCD's share of the expense had risen from 2.8 to 5.2 million dollars (Townsend 1964:144-45).

The event of note was the election for the new Board of SCD. The rebellious POPA of course wanted to win it. The election was held in October, 1959. The political party of the newcomers to Albuquerque who had taken over city hall--The Citizens' Committee--formed an alternative group called Citizens for Flood Control to run against the POPA slate. The hostility between POPA and the city continued with scare tactics of earlier legislative hearings. Poorbough, the POPA founder, said he could "see families starving, pushed out of their homes and losing their property to the Conservancy Board" (Townsend 1964:214). The new arrivals—in city hall and in POPA—were now fighting amongst themselves.

The result? POPA won five seats out of five on the SCD board. They picked up a seat on the City Commission as well. The same wave of citizen anger that filled those early meetings was enough to give them complete control of the SCD.[12]

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[11] Albuquerque Journal. Flood district knocked out by court to close office September 1. August 9, 1958.

[12] Albuquerque Journal. Popa's slate sweeps positions in Sandia district. October 7, 1959.

At this point the repair part of the water crisis model has been re-configured. The new technical/scientific arrivals who had taken over city government have become the enemy of the new technical/scientific arrivals who lived on the East Mesa in a fight organized by businesspeople involved in development. It's not quite as clear cut as that, but that summary describes how the repair process in the water crisis model can implode, create another crisis, and make the initial crisis appear more difficult than anticipated. The difference here is that a crisis in the human/water link shifts to a crisis in the links among those humans. In the case of the SCD, this shift in the repair will iterate yet again as the new SCD self-destructs, a story to which we now turn.

THE DECLINE AND FALL OF THE SCD

The newly elected SCD board consisted of three of the original founders of POPA, including the ever-present Poorbaugh, plus two additional POPA members, including one Hispanic, the first time a Nuevomexicano appears in the story, with the exception of Senator Chavez in Washington. But not long after the election of the new directors, things start to fall apart. Mason, another of the POPA founders and the new SCD chair, resigned under accusations that he had given information to the media without board permission. A resolution was passed prohibiting any communication with journalists. Right from the beginning, meetings were conducted in an atmosphere of secrecy and conflict (Townsend 1964:220).

Poorbaugh took over the presidency in January, 1960. Only two years later, on January 1, 1962, a New Mexico District Court ruled that the new plan, and the new appraisal that the SCD produced, were not "suited to the needs of the District" (Townsend 1964:232). The court ordered the SCD to dissolve by March 1, 1963, just six months before the federal government deadline for support for the flood diversion project. What happened during that two year period? How did the "people's revolt" turn into an iteration of water crisis repair that didn't solve the problem? To summarize it briefly, nothing happened, in the sense of any accomplishments on the way to flood control infrastructure. Nothing was settled during the two year POPA reign, the last years of the SCD.[13]

[13] Scott, W Sandia flood district formed nine years ago, but no dirt turned yet. Albuquerque Journal June 25, 1961.

The Albuquerque City Commission finally asked the SCD to hold a public hearing. Ironically, the board was now demanding an additional tax assessment on individual property owners, one of the policies that POPA had originally used to foment their revolt. Edward Kubiak, a POPA founder and the chair at that time, responded that the SCD was entitled to an additional assessment according to the original authorization and that he would hold an after-the-fact meeting to "enlighten" citizens, but that was all. The meeting that followed was described by the newspaper as an "oral slugfest that seldom got below the shouting level," with Kubiak and Poorbaugh supporting a new tax levy and the other directors opposing it.[14]

The Court set hearings for August 4, 1961. Announcements were published in a low-circulation legal newspaper and notices were not sent out until July 20, only two weeks before the big event. About one thousand protests were filed with the court, so it postponed the hearing until January 1962. By then the thousand protests had grown to over ten thousand.

And that was the end of that.[15] After almost ten years, half a million dollars, and not a single improvement in flood control, the life of the Sandia Conservancy District ended. An op ed piece in the *Albuquerque Journal* in December 1962, stated that, "[t]he decision of the Sandia Conservancy District directors to reverse its earlier decision and not appeal the district attorney's dissolution order will be hailed as at least one constructive action by the feuding and wrangling board."[16]

THE ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

After the stormy end of the Sandia Conservancy District in 1962, the Chair of the Albuquerque City Commission noted that "It had been apparent for some time the district would never carry out its flood control plans." He called for "an immediate start of planning for a new approach to the arroyo flood problem."[17]That call initiated the third and final iteration of water crisis repair.

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[14] Albuquerque Journal. Popa directors debate levy for flood district. June 25, 1960.

[15] Scott, W. Court rules end to SCD stormy life. Albuquerque Journal, January 6, 1962.

[16] Albuquerque Journal. SCD finally quits. December 20, 1962.

[17] Scott, W. Court rules end to SCD stormy life. Albuquerque Journal, January 6, 1962.

A new special district, the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) was provisionally established. An election was called for August 27, 1963 to approve the Authority and the property tax assessments—general assessments this time, not special assessments tied to location—to raise the 9.5 million dollars for the local contribution to the project. Media coverage was favorable and it was explicitly noted that AMAFCA could not place a lien on anyone's property, a major complaint against the original SCD plan.

It was the highest turnout for a special election in the city's history as of that date. Voters approved the provisionally appointed board and the tax by a vote of almost two to one, just in time to start the project before the November deadline on funding that the Corps of Engineers had set five years earlier.[18]

AMAFCA successfully completed the drainage ditches, which still function today A former director of the Authority and his administrative assistant told the authors about how AMAFCA worked in part because of what they had learned from the mistakes of the SCD (see footnote 3). Their description of "mistakes" corresponded to the description of conflicts in the two earlier stages of attempted repair reported in this article. The former director added a story about the savvy political advice of an unnamed colleague who suggested an August date for the vote when monsoon rains would likely bring a flood. Neither of them mentioned what we think must have been a city-wide sense of pressure to get the organization on the books before the rapidly approaching deadline for federal funding.

With AMAFCA we close the loop of the water crisis model in Figure One and end the SCD story. As the diagram shows, AMAFCA now merges into the long historical trajectory of humans and water in the Albuquerque metropolitan area. The cycle of course didn't stop in 1963. As we write this article, for example, there is a new local crisis brewing involving quality of the runoff from the diversion channels.[19] During the dry parts of the year, urban refuse produced by the half a million residents of Albuquerque accumulates in the ditches that make up the diversion system. When the storms or runoff come, they wash some of it into the Rio Grande. The report sets out strategies to raise the quality of the runoff that enters the river.

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[18] Albuquerque Journal. Voters approve twin ditch flood project. August 28, 1963.

[19] See the December, 2011, AMAFCA report, 2011-2012 Storm Water Management Program, http://www.amafca.org/documents/AMAFCA%20SWMP2011.pdf.

For the present, we stay with the case of the SCD and the recent concept in the literature of local water crises as major drivers of water governance change. By applying the model to the case we see both a reasonable fit at the general level as well as additional details required to flesh it out. Clearly more case analyses are now in order to test the adequacy and generality of the model in a research sense, but not only that. For us the model is a step—even if only a useful mistake—towards clearer understanding and more adaptive behavior on the part of the humans in the diagram in Figure One as they become aware of the macro-crisis of the times, the limits to sustainability that the planet is forcing them to learn.

CONCLUSION

This article began by presenting, in Figure One, a model of water crises changing local water governance. Grounded in LaTour's Actor-Network Theory, this model represented humans and water as parts of a larger network of interconnections and influences in a task environment. Humans and water interact to get something done. People can do things to and with water, but water can do things to and with people as well. The intriguing suggestion made by Moore and Strang, described in the introduction, is that humans change water governance as a result of what water makes them do. And what water makes them do is, in part, a result of some historical trajectory where they did something to water. The model could be viewed as a more detailed proposal for one version of a "relational-dialectic" kind of hydrosocial cycle (Linton and Budds 2013).

The story of the Sandia Conservancy District shows some of the details needed to flesh out the model. First of all, what counts as a crisis? How do humans conclude that water disrupts tasks and how does that interpretation scale up from personal experience into public discourse. Discussion of the "flooding" concept showed the importance of this interpretive aspect of human/water interactions. For example, the anecdote about a conversation with a Pueblo colleague demonstrated that, for his ancestors, heavy water flow enabled crop production. It was part of a cooperative actor-network. On the other hand, filling up downtown Albuquerque with runoff interfered with business as well as with city boosters' desire to attract defense industries to the city. A certain water action—flooding—was perceived and valued by different actors in very different ways.

And what about the historical trajectory that preceded the flooding crisis? In the SCD case, the historical accident of the selection of Los Alamos as the site for nuclear weapons development during World War II set the stage. A population boom led to development of an area, East Mesa, where thunderstorms and snowmelt ran down a mountain on its way to the river valley. And it wasn't just more people clearing and paving the mesa. The new population differed from those already in place in terms of the basic premises of their mental models. They were "high modern," the term we used from Scott's work, people oriented to science, technology and rational bureaucracy. Once the newcomers took power over city government, their mentality and power dominated just as a proposal to repair the flooding crisis was under development. The case study presented here backlights the fact that population growth is much more than just a matter of increasing numbers. New mental models interacted with both interpretation of "crisis" and formulation of "repair."

The repair started off well from the point of view of the new scientific and technically oriented arrivals to Albuquerque. Commissions were formed and plans were developed and implemented in a straightforward way. In retrospect, though, it is easy to see several problems foreshadowed by the way the SCD was developed in its first iteration, and those problems led to two subsequent iterations. The first was the revolt of POPA and the collapse of the SCD. The second was the creation of AMAFCA just in time to meet the federal funding deadline and complete the project. The SCD case illustrates how crisis-based discourse fragments local networks, suggested in the "repair" part of Figure One by a change in the diagram from one to multiple human nodes. In a crisis situation—by definition a threat with uncertainty in how to respond—it is probably normal that the crisis forces conflict among a local population as a repair is formulated. Repair shifts the focus from human/water interaction to the conflicting interests among the humans. The final iteration, the AMAFCA story, holds that the iterations were a trial-and-error resolution of the initial uncertainty that, in the end, led to an effective repair. Another part of the conclusion might be that a funding deadline interacted with organizational incompetence on the part of the POPA board, and this finally motivated a consensus among the local population to support the repair.

This mapping of the SCD story onto the arguments in Moore's and Strang's work raises many research questions for the future. The project is worth the effort as the frequency and severity of water crises worldwide increase. A crisis driven actor/network model based on past cases to help with new ones

would be useful for adaptive water management. Water management from a distance inevitably generates problems because it misses local contextual interactions that describe, explain and help resolve water problems. Successful management would benefit by more focus on local dynamic actor/network models. At the same time, “local” does not mean “ungeneralizable.” It does mean learning more about the variety of shapes a water crisis can take, the contingencies and contexts under which humans interact as they formulate a repair, and especially how the dynamics might help those humans who listen to what water is telling them clarify the moment to build an answer that water can make sense of.

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Figure One
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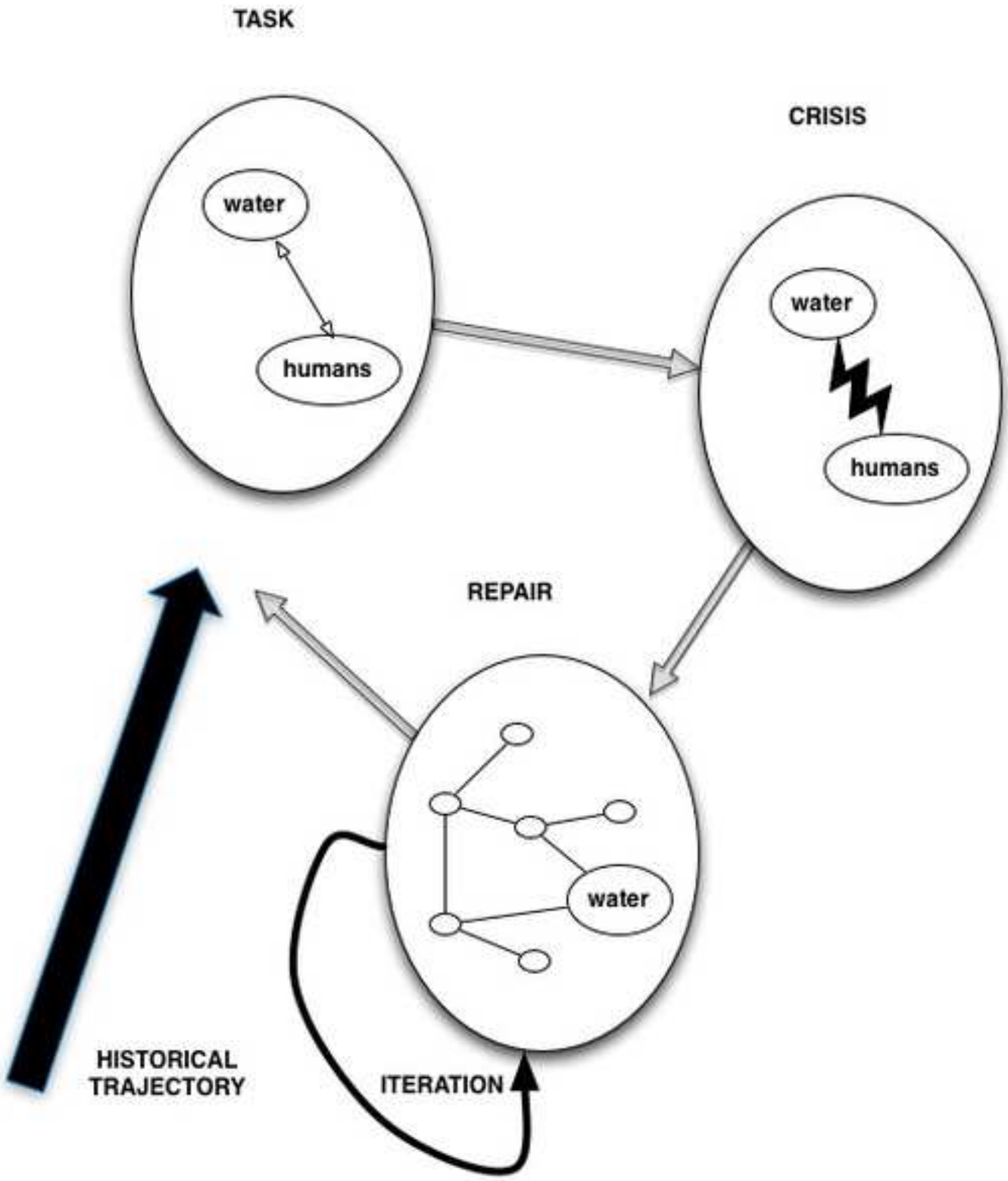

Figure Two

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Figure Three
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