

TRADITIONAL INFRASTRUCTURE, MODERN FLOWS: CULTURAL POLITICS OF
MODERNIZATION IN THE KATHMANDU VALLEY

by

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THESIS ABSTRACT

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The Kathmandu Valley's ancient stone spouts system provides a case study to understand uneven processes of urban modernization. Interviews and archival material from fieldwork in the Lalitpur District of Kathmandu provide evidence to understand the role of traditional infrastructure in modernization efforts. Rather than assuming there is something inherently traditional or modern, my research investigates ways in which people position themselves around ideas of tradition and see infrastructure as more than operational. Findings indicate that the labeling of the stone spout system as traditional through modes of use, management, valorization, and modification point to a dissatisfaction with modern development. This research provides a contemporary example of the traditional, demonstrating that despite dominant urban theorizing, urban modernization and the erasure of tradition are an impossible and incomplete process. These findings extend post-colonial urban scholarship by considering cities beyond limiting and universalizing categories of development.

This thesis includes unpublished coauthored material.

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CHAPTER I

INTRODUCTION

As the world becomes increasingly urban, cities struggle to provide residents with basic utility services through formalized and networked infrastructure systems (McFarlane & Rutherford, 2008). In the Kathmandu Valley, a region supposedly endowed with high amounts of rainfall, the formal grid provides barely 50 percent of annual water demands (KUKL, 2013). Households have to wait one week for half an hour of tap water and must work around rolling blackouts, gas shortages, and other interruptions. Globally, cities like Lagos, Mumbai, Tijuana, Los Angeles, or Sao Paulo, face similar issues of patchy “archipelagos” (Bakker, 2010) of service provision (Gandy, 2006; McFarlane, 2012; Meehan, 2013; Ranganathan & Balazs, 2015). For the livability of urban areas, experts and officials will have to look beyond the usual methods of replicating, expanding, and patching the formal water grid (McDonald et al., 2014).

Most cities today rely on kilometers of tunnels and channels that tap into distant water sources. Yet, “if one ignores this urban water infrastructure and just assumes urban dwellers obtain water near where they live, as previous hydrologic modeling efforts have” around 39% of urban dwellers will be water stressed (Mc Donald et al., 2014, p. 100). On the other hand, if cities allocate political and economic powers to “construct infrastructure” only around 25% will face urban water stress (Mc Donald et al., 2014, p. 100). While these estimates are disheartening, such projections and models assume cities only function through the modern infrastructure ideal.

This ideal is manifested through the installation of a uniform, integrated, and subterranean grid, managed by a public or private entity to grant urban households

sanitary faucet water (Kaika, 2005). From the industrializing cities of Europe to their colonies to today's developing cities, the modern infrastructure ideal has proliferated and remained the dominant model for urban water supply (Meehan 2013, Bakker, 2013; Furlong, 2014; Banister & Widdifield, 2014; Kaika, 2005). Here the modern water grid has become a development priority through "political investment" in policies and economic programs that seek to better the lives of the poor, through new and efficient infrastructure (Robinson, 2006, p. 4).

Part of the success of the water grid, and by extension modern state, comes from comparison with non-grid technologies and practices, categorized as informal, illegal, temporary, or outdated (Kooy, 2014). In many cities, beyond Europe and the United States, access to these "illegitimate" sources, like private wells, water tankers, or rainwater harvesting, is greater than those who rely solely on the grid (Kooy, 2014; Kooy & Bakker, 2008; Meehan, 2014). As the grid constantly leaks, breaks down, or falls short of demand, anxiety rises between governments, development groups, and citizens over the efficiency and operation of this top-down network. Moreover, as non-modern water practices and technologies remain visible, worries grow over the status of political and economic progress in developing cities (Kaika, 2005; Kooy, 2014). Such hydrological anxieties provide insights into the power geometries and uneven trajectories of urban development (Kooy & Bakker, 2008).

While water woes in Kathmandu Valley and elsewhere tend to revolve around failure of the main water grid, my research focuses on the antithesis of the modern -- the anxieties of the traditional. My research examines the role of traditional infrastructure in modernization through a case study of Kathmandu's ancient stone spout system, a

widespread water system that serves 10% of the Valley's 2.5 inhabitants. The labelling of spout infrastructure as traditional raises questions about the role of culture, religion, and community in infrastructure development and urban modernization.

These ancient waterways make visible uneven power relations across the Valley and, simultaneously, ways in which groups are forging their own urban systems. Although there are many spout advocates, from the carpet weaver to engineer, the promotion, and use of, the spout system is not signaling a return to pre-modern life or demonstrative of how the traditional is superior to the modern. Rather, recognizing that tradition is a creation of Western modernization, the diverse celebrations of the traditional in Kathmandu provide insights into how residents are unsatisfied with the uneven promise of modernization and development. Moving beyond categories of development (Robinson, 2006), which label Kathmandu as an impoverished city of failure, this thesis and journal article (Chapter III) use the stone spout system as a vehicle to understand Kathmandu's development trajectories through its myriad cultural practices, technological innovations, and micro governance systems. This thesis includes unpublished coauthored material in Chapter III.

CHAPTER II

METHODS

My research draws on three months (June - September 2015) of fieldwork in Kathmandu, including interviews, observations, and archival methods. I focused my study on the jurisdictional area of Lalitpur District and at a smaller scale the Lalitpur Sub Metropolitan area as I had greatest access to information and participants here (Figures 1 and 2). This thesis will focus on the role of traditional infrastructure in urban modernization, and look into who interacts with the system, how, and why. Table 1 presents my research questions, which guided my methods and modes of analysis.

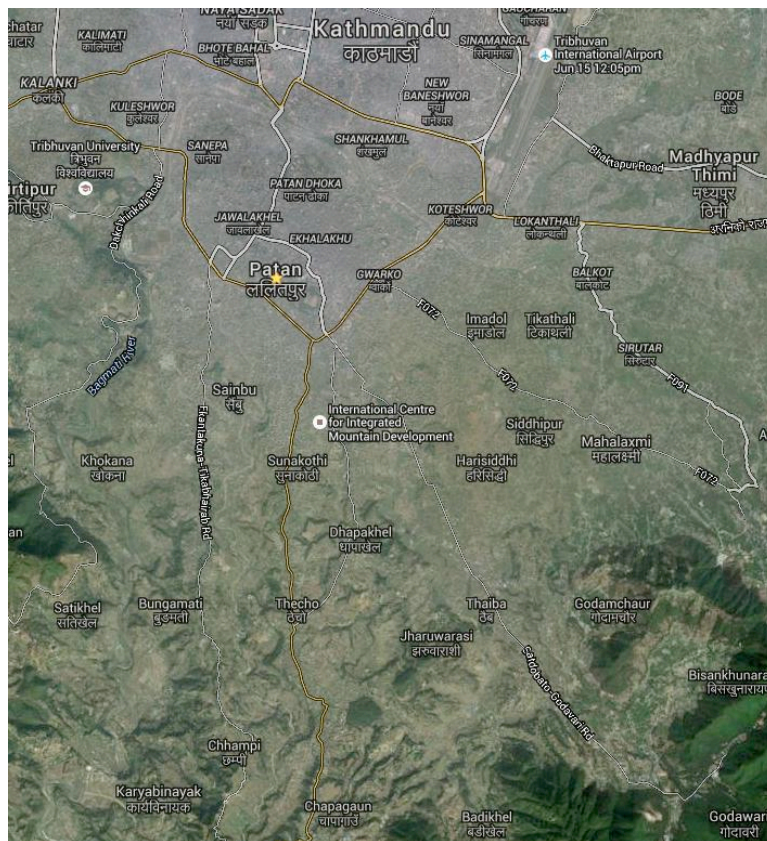


Figure 1: Satellite image from Google Maps of Lalitpur (Patan) Metropolitan Area, and several study areas including Godavari (Godawari), Harisiddhi, Patan Dhoka (UNESCO World Heritage Site), Jawalakhel, and Sanepa.



Figure 2: Political boundary of Lalitpur Metropolitan Area with major roads and towns (source: Google Maps).

Quantitative Methods and Analysis

Prior to conducting fieldwork, I analyzed a structured survey done by the International Center for Integrated Mountain Development (ICIMOD) in 2013. Dr. Aditi Mukherji designed the survey and Valerie Gamao, Manzari Singh, Mira Khadka, and Nabina Lamichanne collected data from 350 households in the Lalitpur Municipality. They selected households randomly based on the population of each ward across the Lalitpur Metropolitan Area. The survey asked questions about household demographics, government pipeline use, tanker use, well use, spout use, rainwater harvesting, other sources, perceptions of water quality, quantity, and coping mechanisms. In order to understand indicators of water stress and how spout use compared to other water sources I analyzed survey data using descriptive statistics, frequencies and means, and tests for correlation, Pearson's chi square, and t-test with SPSS software. However, for this thesis

I will focus on my findings from my qualitative research as these fit the scope of the research question I am answering (see Table 1 research question 1). In Chapter III, I will cite ICIMOD survey findings as a reference instead of a method.

Table 1: Research questions, methods, and modes of analysis

Research Question	Methods	Analysis
<i>1. What is the role of traditional technology in modernization and development?</i>		
1a. How has the role of stone spouts changed since the installation of water pipelines?	Semi-structured interviews (community leaders and households) Archival research and legal research (community, community, government, inter-governmental (IGO) and non-governmental organization (NGO), policy documents)	Discourse and content analysis
1b. How do different institutional domains (household, community, NGO, state) interact with stone spouts?	Archival and legal research (community, government and NGO/IGO documents, policy documents) Semi-structured and informal interviews with (households, community leaders/organizations, NGO/IGOs, municipalities/officials)	Discourse and content analysis
<i>2. Why do households access water from traditional infrastructure systems?</i>		
2a. Who uses stone spouts? and why?	ICIMOD survey analysis Semi-structured and informal interviews (households, community organizations/leaders, and municipalities/officials)	Bivariate analysis (Chi square and t-test), univariate analysis (SPSS for all quantitative analyses) Discourse and content analysis
2b. How does stone spout use compare with access to other water sources?	ICIMOD survey analysis Semi-structured interviews (households and community leaders)	Bivariate analysis - Chi square and t-test, univariate analysis Discourse and content analysis
2c. How and why do different households use stone spouts?	Semi structured and informal interviews (households, community leaders, municipalities, and organizations) Archival analysis (community, government and NGO/IGO documents, policy documents)	Discourse and content analysis

Qualitative Methods

I employed qualitative methods to balance survey findings and enumeration reports with a more nuanced approach to interpret decision-making, feelings, and behaviors important to water across a variety of stakeholders. Instead of taking for granted ‘facts’ from quantitative analyses or official reports, I drew upon a variety of methods to gain multiple understandings how groups reference traditional infrastructure and urban modernity. I used interviews and observations to gather data on how individuals think about, and interact with, the spout system relative to larger social, ecological, cultural, and political situations.

Rather than differentiate groups of people or cities by the myth of being truly ‘South Asian,’ or representative of the global South or the global poor (Robinson, 2013; McLees, 2012), this research seeks to understand how there is so much diversity and unevenness within and between urban areas. Qualitative methods like interviews or archival work are well suited to understanding how such categories of difference are produced. As Secor (2010) explains, “the goal of interview or focus group research is usually not to generalize to a population, but instead to answer questions about the ways in which certain events, practices, or knowledges are constructed and enacted within particular contexts” (p. 199).

Interview Sampling and Procedures

I conducted semi-structured interviews with spout users and community leaders, working around a set of basic questions on demographics, water sources, and management strategies. For managers and officials working at different organizations I conducted semi-structured informal interviews built around several key questions on the

status of spouts and municipal grid. Table 2 outlines the distribution of participants and methods used while interviewing and for recruitment. All interviews took place with permission of participants in their workplace, home, or spout courtyard.

Table 2: Interview procedures

Group	Community users*	Community leaders*	NGO	IGO	Experts	Government
N (41)	11	10	7	2	3	8
Interview Format	Semi-structured	Semi-structured	Informal	Informal	Informal	Informal
Ethnicity	(n=6) Newar, (n=3) unknown, (n=2) Chhetri	(n=8) Newar, (n=1) Chhetri	(n=7) Newar	(n=1) Newar, (n=2) Brahmin	(n=2) Newar, (n=1) Brahmin	(n=8) Newar
Area/ Organization	(n=3) Sundhara, (n=2) Aalko/NagBahal, (n=2) Washa/Amrit, (n=2) Harisiddhi, (n=2) Iku	Iku Hiti, Sundhara Hiti, NagBahal Hiti, Washa Hiti, Aalko Hiti, Naudhara, Harisiddhi, Baddegaurm, Nauphukupokhari, Nakabahil	UEMS*, ProPublic, CIUD*, Rotary, ISET*, NGOForum	UNHabitat, Kathmandu Preservation Trust	History expert, stone spout expert, Nepal water expert	Lalitpur Sub-Metropolitan office, Department of Archeology, KWSB*, Lalitpur Water and Sanitation, KUKL*, Ministry of Urban Development, Lalitpur Chamber of Commerce and Industry
Recruitment	Random selection of at least one local and renter from public area near spout.	Purposeful selection with advice from Lalitpur Sub-metropolitan City Office	Snowball selection from spout leaders	Purposeful selection from news sources and websites	Snowball selection from spout leaders	Purposeful selection from cited news sources and websites

* UEMS - Urban Environment Management Society, CIUD - Center for Integrated Urban Development, ISET - Institute for Social and Environmental Transition, KWSMB - Kathmandu Water Supply Management Board, KUKL - Kathmandu Upatyaka Khanepani Limited

I chose spout neighborhoods based on the recommendation of the Municipality in an attempt to represent a transect of spouts from a rural spring like Godavari, to periurban agricultural areas like Baddegaum and Harisiddhi, to urban areas like NagBahal (see Table 3 in Chapter III for more detail on spouts). Participants distinguished themselves as "locals," or Newars, compared the "renters," or migrants who identified themselves by the village they came from. Interestingly, higher caste participants were the only ones who notified me if certain areas were low caste or "backwards." Generally, the further from the ancient center of the Patan Kingdom (Lalitpur Municipality), neighborhoods would concentrically decrease in caste status outwards from the priests and astrologers, to artists, to businessmen, to street cleaners and bone millers (Washa and Amrit), clothes washers (Iku or Dhobi Ghat) and farmers (Harisiddhi and Baddegaum).

For non-community affiliated participants, I selected respondents based on names of people or organization who local newspapers and websites cited as knowledgeable of spouts. I used snowball sampling after meeting several groups who provided me with the names and phone numbers of other organizations who were pertinent to stone spouts in terms of prior or current work, or groups they thought should be involved in protecting spouts.

All interviews with spout users and leaders took place with the help of a translator. In addition, most interviews rarely took place with a single person. While I could not stop friends, family, or colleagues from chiming in, I focused on the conversation with the primary participant. I did not record any of my interviews as I thought that this would create tension and distrust, instead I took detailed notes of conversations.

I also took field notes with photos of my observations of the different spout neighborhoods we visited, including a description of the surrounding buildings, such as shops, homes, temples, public spaces, plumbing, and public activities like children going to school, waiting for water, bathing, gossip, worship, or shopping. These observations were vital to understanding how behavior and activities are a form of discourse, representing everyday patterns and relationships.

Archival Materials

I collected textual and visual data from news articles and online reports, like UNHabitat's Stone Spout Report, and images or documents from the archives of individuals and organizations by taking photographs of them or obtaining a copy. For example, the leader of NagBahal Hiti gave me copies of flyers, brochures, pamphlets and other materials about preserving stone spouts. To represent official discourses about spouts, I bought several books and maps through the Lalitpur Sub-Metropolitan Office and NGO's such as enumeration and status reports. Finally, I compiled books and journal articles on water, urbanization, culture, and politics in Kathmandu.

Qualitative Analysis

With my notes from interviews and documents, I conducted a content analysis to understand general themes regarding different types of infrastructure use, governance structures, or cultural/religious/historical significance. I annotated my notes with a code I created after reading through them several times. This code represented certain ideas, words/phrases, or issues that were repeated. I then organized the coded interview notes and field notes according to organization type, location demographics, themes, and interview questions.

After gaining a surface understanding of themes from the content analysis, I used a critical discourse analysis to gain a deeper comprehension. In this process, I treated words, visuals, or practices as signifiers that carry knowledge and meaning, recognizing that these signifiers form a discourse (Dixon, 2010). A discourse analysis sheds lights on power arrangements communicated by these signifiers, such as the way an expression or action aligns with certain social norms, assumptions, or structures (Dittmer, 2009). Additionally, critical discourse analysis acknowledges the 'mess' of multiple standpoints that may become normalized, or vary over space and time (Dittmer, 2009). I chose this form of critical discourse analysis to understand latent assumptions and areas of inequities between different periods or places referenced in the data I had collected. This analysis helped me understand why participants, images, or documents repeatedly raised certain themes, or why some issues were isolated to a few instances.

In addition to shaping our worldviews, discourses have material effects (Lees, 2004). Therefore, I did not limit my analysis to only images and texts, but also looked into physical interactions and phenomena, such as changing water flows or trips to the spout. Here, meaning is generated through the process of engaging with objects (Dixon, 2010). For my research, material assemblages of infrastructure and the related activities, signs, ideas, images, and stories form a discourse that shed light on power relations. Rather than take for granted certain truths, a discourse analysis helps understand how social, cultural, political, and natural elements co-produce knowledge.

Specifically, I investigate how discourses of 'tradition' or 'modern' are created and employed through infrastructure assemblages. To do this I considered, 1. the production of an object, 2. the character of that object, 3. the consumption of the object

(engagement, access, influence) (Dixon, 2010, p. 399). As meaning comes through the engagement of people and objects, I looked into how graffiti, the erosion of spout carvings, smells of sewage, side comments, distance to official buildings, historical documents, the flows from a spout, children bathing, and recommendations of leaders all matter to the everyday practices and ideological representations of spouts. Even within an object, such as a photo of graffiti, my analysis considers aesthetic qualities (is it beautiful/pleasing/evoking?); visual qualities like color, lines, shapes, symbols, or directional indicators; physical arrangements like objects in the foreground; and ideological meanings such as how it culturally and politically relates to its surrounding location and time period.

Methodological Limitations

Despite triangulating research methods, there are several important limitations of my research. In terms of the quantitative data, while the random selection of households may be representative of the larger Lalitpur Metropolitan population, there could be issues of validity and reliability in terms of inconsistencies in surveying; or forming the questionnaire; transcribing written findings into the database; and errors in analysis. These sites for error are likely to have also occurred in the interview process. I also realize that what interview respondents say is not reflective of the essence of who they are, or any group they may be affiliated with, rather what people say is likely more a reflection of their feelings and state at that time and place. Again, the purpose of interviews is not to generalize or uncover truths, but see how things become naturalized (Lees, 2004).

I recognize that the research process is extractive and embedded within its own power relations, however, I tried to do no harm and be aware of power dynamics between colleagues, respondents, and myself. For example, although I spent many years in Kathmandu and grew up in South Asia, I am culturally an outsider and a privileged Westerner. Additionally, gender dynamics became apparent as I found female respondents were more comfortable talking with me, while male respondents directed conversation to my colleague Nicholas Griffin even if I asked a question. Such dynamics influence the interview process in terms of my understandings, translations, and ways in which respondents shared information. Finally, my research and analyses are subject to my own inherent biases and perceptions.

CHAPTER III

TECHNOLOGIES OF DISCONTENT

This thesis includes unpublished coauthored material. This chapter contains material that will be submitted for publication with Dr. Katie Meehan. I did all the writing and research, and Dr. Meehan provided invaluable help throughout my research.

Popular stories of Kathmandu evoke an image of Nepal's development as the spectacle of tradition clashing with modernity. Reports of electricity and water shortages, protests, curfews, political corruption, and air pollution frame the city in a narrative of failure. Recent headlines such as, "Think Your City is Full of Trash? Ha!" (Lorch, 2015) or "The Dark Streets of Patan - Nepal Manages the Energy Deficit with Rolling Blackouts" (Riikonen, 2015) portray Kathmandu, and by extension, Nepal, as a place of crises. Tourist blogs recall how primitive, dirty, and chaotic the city appears, sharing photos of ancient monuments, street children, or the tangle of wires at electric posts. In development reports, such exotic portrayals appear as comparative statistics and descriptions of development. For example, in the World Bank's assessment of urbanization in the Kathmandu Valley an image of holy people, or *sadhus*, performing a religious *puja* near ancient temples is captioned "Modernity blends with traditions in the streets of Kathmandu Metropolitan City" (Muzzini & Aparicio, 2013, p. 34). These representations ultimately support Nepal's "noticeable place in global narratives of crisis, particularly in terms of its conditions of extreme poverty" (Rademacher, 2011, p. 22).

Such depictions of Kathmandu support dominant narratives of development like Rostow's ladder or the demographic transition model, which assume that societies progress teleologically, as they advance from 'traditional' or 'pre-modern' to 'modern.'

The rise of global cities, like London, Tokyo, or New York, set the standards for maturity and contemporary life through their visible role in global economic competition and level of mass consumption (Kong, 2006; Sheppard, Leitner, & Maringanti, 2013). Importantly, these images of the modern nation or city are built through comparison with the traditional, primitive, stagnant, rudimentary, or rural (Robinson, 2013). The traditional is a creation of the modern that enables the transformation of places and people to become globally productive and modern (Robinson, 2006). More often, the label of underdeveloped and traditional works to uplift the image of already developed cities (Robinson 2013; Roy 2002).

While the sight of empty plastic buckets queued in front of a 1,500 year-old carved stone waterspout in Kathmandu's ancient Patan Kingdom may align with this traditional-modern binary, there is arguably nothing inherently modern or traditional about this assemblage. Spouts are part of an interconnected system of ponds, wells, canals, and temples, which have been a defining cultural and technological feature of urban life in the Valley for around 2,000 years. This system, like many ancient or traditional networks (Boelens, 2013), is not just some inert representation of life 'back-then,' nor a sign that people are returning to pre-modern life. The spout system is a site of dynamic social organizing and source of deep spiritual and cultural meaning. As communities and rulers have modified this system over time, spouts and their practices are not a living museum piece of the past. Thus, current uses, management strategies, and sentiments tied into the spout system reflect contemporary urban trends and struggles.

This research builds on postcolonial urbanism (Robinson, 2013; Roy, 2005; McFarlane & Rutherford, 2008; Sheppard et al. 2013; Ranganathan & Balazs, 2015) by

providing an empirical account of ‘the traditional’ in contemporary urban life. Findings from interviews, archival sources, and observations point to the diverse ways people use, manage, and advocate for spouts in Kathmandu. The creativity, innovation, and possibility sourced from spouts represent how Kathmandu is not a city of crisis and failure. Kathmandu is a “distinctive” and “ordinary city,” with the capacity to shape its own future, even “in a world of (power-laden) connections and circulations” (Robinson, 2010, p. 170). From the streets of Kathmandu to government offices to development agency websites, ideas of traditional and modern have unfolded in ways that do not necessarily fall in line with usual assumptions of the traditional modern binary. Instead, many research participants evoked this binary to valorize spouts as a useful, spiritual, beautiful, or social technology in contemporary urban life. Moreover, the social organizing and re-engineering of spouts signals how groups are forging their own development trajectories. Thus, I argue that technologies like spouts act as signifiers of discontent with the developmental state and its failed modernization projects.

The article proceeds with a literature review of how tradition is important to the construction of modern cities. In the next section, I elaborate on my research methods, fieldwork, and modes of analysis. I have treated infrastructure as a discourse of practice, or assemblage of material things, activities, and representations that embeds culture, politics, religion, nature, and utility. I then provide a brief history of Kathmandu’s stone spout system prior to the introduction of modern networked infrastructure. Following the installation of ‘modern’ water networks in Kathmandu’s during the 1950s, I describe the changing physical and cultural role of the stone spout system in Kathmandu, drawing on discourses of nostalgia and sustainability. Geographic and urban scholarship frequently

consider the built environment as a kind of truth, however seeing it as a discourse troubles assumptions that something, and by extension place or person, is inherently traditional, modern, developed, or poor. In my discussion, I elaborate on how the physical arrangements and cultural meanings of stone spouts work to create new urban possibilities, and make visible areas of inequities that are neither inherently modern or traditional. I conclude by placing my argument into the world beyond the anxieties of Kathmandu.

The Myth of Tradition

Tradition is defined as customs that are passed down between generations (Oxford English Dictionary), overlapping with concepts like the pre-modern (Latour, 1993), ancient (DeWaal, 2013), or indigenous (Bebbington, 1993). While the idea of tradition may link with archaeological or anthropological evidence, there is nothing inherently traditional about a physical structure, group of people, or practice. Again, the category of ‘tradition’ is a modern construction (Robinson, 2013). Thus, rather than take for granted the categorization of things as traditional, it is more productive to consider the power relations that produce these discourses. As Li (2004) argues,

“...a group’s self-identification as tribal or indigenous people is not natural or inevitable, but neither is it simply invented, adopted, or imposed. It is, rather, a *positioning* which draws upon historically sedimented practices, landscapes, and repertoires of meaning and emerges through particular patterns of engagement and struggle” (p. 339).

In this way, the positioning of individuals or groups around the idea of tradition points to issues of politics and power. This is not to deny that there are no distinct identities, practices, or histories. Rather, I consider the erasure or fragmentation of social and natural systems because of the naturalization and universalization of terms like

‘traditional.’ As Mosse (1999) argues in his writing on tank management in India, current development practices there mirror how previous colonial regimes "generalized and in some respects invented the 'custom' and 'tradition' of village communities" as a form of social control (p. 304). The stakes of this, he argues, is a dislocation of resource management "from its particular historical and social context" that "overlooks the importance of political relations and the *cultural* construction of natural resources" (Mosse, 1999, p. 304).

Most examples of the traditional, in either practice or material form, correlate with rural communities. As cities are thought of as the opposite of rural areas, tradition marks practices or objects that are stagnant, primitive, and backwards (Robinson, 2011). In other words, that which does not belong in the modern city (Robinson, 2011). Robinson (2011) argues that historical tenants of urban theory have created a taken for granted separation of cities by standards of wealth and the erasure of the traditional where, “certain modern cities, then, have been counterposed with those considered not modern or troubled by tradition, for at least a century of urban theorizing” (p.3). The presence of traditional practices in urban areas frequently signifies rural migrants, urban sprawl, or cities that have not progressed from ancient infrastructure and practices.

Discourses of modern and tradition largely emerged from colonial elites, who sought to idealize the model of European cities and control 'indigenous' or 'native populations' (Kooy, 2014; Gandy, 2006). Gandy points out that in colonial Lagos there was “a duality in colonial representations of ‘tradition’ as something which is both ‘dirty’ and thereby inferior but also ‘stable’ in the sense that it enabled some semblance of social order” (2006, p. 376). Thus, while tradition falls along these stereotypical divisions, it

also is still a marker of civilization, albeit inferior to colonial or modern life. While places like Lagos might maintain some elite networks of a hygienic modern water grid, the proliferation of traditional practices or objects and their correlates of poor, irrational, rural, primitive and undeveloped legitimize the labeling of places as a Third World other (Robinson 2013; Gandy, 2006). Hence, from colonialism to neocolonialism, ideas of tradition have worked to simplify and universalize groups as a way to make legible and profit from peripheral areas.

In many cases, the traditional does not even originate from ancient customs. Instead, traditions are frequently relatively new inventions that may promote certain patterns of consumption or sentiments of nationalism (Hobsbawm & Ranger, 1983). Evoking notions of tradition can work to create a unified national identity through a trademark aesthetic or commodity (Hobsbawm & Ranger, 1983). For example, 'traditional Chinese' architecture in Chinatowns was invented and erected by "Caucasian architects" after the 1906 San Francisco earthquake (Upton, 1996, p. 4). The making of "Chinese" stores was a form of segregation and control that became "commodified images of a mythical 'heritage'," where ethnicity in cities was assigned to the traditional (Upton, 1996, p. 5).

Similarly, many traditions are reinvented, for example the Cologne Carnival has been modified to fit modern identities of fun and tolerance instead of medieval representations of "evil human natures" (DeWaal, 2013). In terms of the ethnic identities associated with (re)invented traditions, Upton (1996) argues that, the "connection arbitrary rather than "authentic," and thus the meaning of the artifact requires careful analysis" (p.5). While the ability to choose the connection to "tradition" is embedded

within power struggles, the discourses of authenticity and shared identity through tradition points to important trends of categorization, difference, and commodification in cities. In Europe and the U.S., the invention of tradition has acted as a form of cultural capitalism, working to uplift or separate and control certain cultural groups, such as ceremonies in the British monarchy and the British creation of Scottish tartans (Hobsbawm & Ranger, 1983).

Modern Water Troubled by Tradition

Urban water has become so closely aligned with modernity that water and water infrastructure act as excellent vehicles to understand the unfolding of development and modernist projects (Linton, 2014; Bakker, 2012). Modern water, as Linton (2014) argues, is the “operation of abstraction, reduction, and representation that produces H₂O and the hydrologic cycle” (p. 111). In other words, modern water represents attempts to dislocate the historic, local, social, cultural, sacred, and political dimensions of waters to the physical and chemical behaviors of water molecules (Illich, 1985). Such purification of culture from nature makes water a resource that is “amenable to the application of instrumental reason” (Linton, 2014, p.113). As engineers and scientists render water legible through its molecular form, it acts as a reference that computer models and water purification systems can digest (Latour, 1993). As it becomes calculable, management systems can enable the efficient and hygienic flow of water through an underground network of water pipes (Kaika, 2005).

The technologies and discourses that create modern water as a physical system also work to create and govern modern urban subjects (Gabriel, 2014). In Jakarta, Athens, Jaipur, and Lagos access to the modern grid defines who is a modern citizen as

compared to the ideals of ‘Western’ cities (Kooy, 2014; Kaika, 2005; O’Reilly, 2006; Gandy, 2006). For example, in colonial Jakarta, European discourses of hygiene and privacy created a moral order for urban life that separated out the Europeans as modern citizens from the "natives" whose bathing in public canals was “rural” and “distasteful” (Kooy & Bakker, 2008). As the modern grid proliferated in Indonesia, those who could gain connection joined the ranks of modern citizens (Kooy & Bakker, 2008). Additionally, technologies like meters (Furlong, 2013) allowed modern water networks to quantify and map out users as modern consumers. Overall, the greater ease and quality of water from the grid enhanced the productivity and consumption of users in the modern city (Kaika, 2005). As McFarlane and Rutherford explain, literature on urban infrastructure

“has revealed the centrality of infrastructure in the construction of the city as ‘modern,’ as a site of capitalist production and expansion, as constitutive of social relations of inequality, and as a space of environmental transformation” (2008, p. 363).

In other words, compared to urban elites who govern and benefit from mainstream modes of service provision, for the marginalized infrastructure and service provision are sites of continuous struggle and visibility.

Thus water crises, in terms of either scarcity, pollution, hazards, or conflict, arguably reflect a crisis of modernity (Linton, 2014). Kaika and Swyngedouw (2000) describe how modern water disappeared from the view and awe of urban residents into a miraculous underground-piped system. Eventually, this ‘out of sight, out of mind’ system naturalized water as a mundane commodity (Kaika & Swyngedouw, 2000). In this way, the city’s underbelly conceals the mess of organs that keep it functioning, while its surface becomes a space of consumption and spectacle (Kaika & Swyngedouw, 2000).

Urban crises ironically represent a threat to this urban ideal, as bursting pipelines, rats, disease, pollution, floods, and urban trash from the underbelly spill into the modern urban aesthetic (Kaika & Swyngedouw, 2000).

The crises that engulf cities (Kaika, 2005) represent how the modern city is an incomplete and impossible project (Latour, 1993; Gandy, 2006; Linton 2014). In *We Have Never Been Modern* (1993), Latour explains how the notion of modernity is built on a dialectic of separating the moderns from the pre-moderns by the ability to purify nature and culture into distinct realms. Modern progress, thus, stems from an ontology that attempts to produce objective science, which distinguishes facts from values (Latour, 1993). However, it is impossible to prevent politics or culture from interfering (Latour, 1993; Jasanoff, 2004). As nature and culture remain indivisible, modernity has only been a performance (Latour, 1993).

The making of the modern usually occurs through the visible destruction or reinvention of tradition. Kaika (2005) explains how Athens attempted to mimic London's modern aesthetic, which incorporated archeology of a prominent historical period in England. Thus, during the Olympics, the Athenian government used visual images of ancient Greece as branding for the city (Kaika, 2005). Alternatively, Azaryahu's (2001) argues how Zionist conquest of the Arab desert filled with "idleness, savagery and moldy tradition" (p. 322) was accomplished by installing modern water towers. However, by the 1990s after Egyptian invasion even the bullet-ridden water tower became a "tradition-laden symbol" of nationhood (Azaryahu, 2001). In Mexico City, "water-control infrastructure has involved a process of grafting new objects onto old" where "modern water in one area has often meant destruction for another" (Banister & Widdifield, 2014,

p. 52). Here, the once modern water facilities from the 1900s that displayed water as a visible spectacle were replaced with new subterranean grids that increased the efficiency, spread, and hygiene of the water grid (Banister & Widdifield, 2014). This transformation of a once modern facility into something in the realm of the traditional invents new histories to allow for a certain kind of techno-politics to rule (Mitchell, 2002).

Generally, discussions of traditional water align with historic monuments (tangible cultural heritage) and intangible cultural heritage, like traditional knowledge. Much literature on ‘traditional water’ takes place in rural areas. There are also only a few accounts of the contemporary use of historic monuments compared to the intangible traditional management systems. However, the historical and contemporary prevalence of *qanats* in the Middle East and Central Asia, are a relatively well accounted for traditional structure still in use, providing water through a series of interconnected wells for irrigation (UNESCO, 2009). Other examples, like the historic proliferation of aqueduct technology from Rome (De Feo et al., 2013), or contemporary management of tanks in South Asia (Mosse, 1999), to the reintroduction of *paar* rainwater harvesting pits in India (Jhanwar, 2014), demonstrate how notions of ancient water infrastructure often transcend their association with certain regions and time periods. However, development groups and governments frequently frame traditional, informal, or alternative infrastructures as rudimentary artifacts that provide temporary services to the poor who lack connection to large-scale modern systems (Roy, 2005; Kooy, 2014).

Traditional water management systems, or intangible heritage, generally align with communities who represent non-modern cultures. Examples of ritual bathing (Drew, 2012), or sacred rivers (Cohen & Frank, 2009) highlight the importance of spiritual and

religious dimensions of water and their connection to ecosystem processes and politics. For example, Lansing (1987) describes the *subak* irrigation system in Bali as a traditional form of paddy irrigation management that connects community members with the nearby water temple. Alternatively, Trawick (2013) provides a case study of the moral economy of irrigation and domestic water management in the Andes, highlighting the importance of community, culture, and religion embedded in long standing traditions. For Boelens (2013), the diverse cultural and religious role of water in the Andes is part of a hydro-cosmological cycle. This cycle not only emphasizes the co-production of culture and nature, but also “offers a tool to examine ancient and modern myths and discourses that attempt to normalize and subjugate actors to control by the dominant groups in water society” (Boelens, 2013, p. 245).

In Australia, the Kuku Nyungkal people understand water flows spatially, connecting notions of water quality, biodiversity, and riparian health with beliefs in water as sacred, powerful, and ancestral (Maclean & Bana Yarralji Bubu Inc., 2015). However, the state marginalizes indigenous and traditional groups by recognizing their water values and knowledge as “‘just cultural’ (that is, customary traditions and practices)” (Maclean & Bana Yarralji Bubu Inc., 2015, p. 151). While examples of water infrastructure and practices demonstrate the proliferation of these technologies and knowledges over time and space, there are underlying themes of erasure as these structures and practices become museum-like, reinvented, or replaced.

Agencies like the United Nations Educational, Scientific, and Cultural Organization (UNESCO), Food and Agriculture Organization (FAO), and other groups that work with cultural heritage or traditional knowledge, provide evidence of the variety

of ways such “ancient” or “traditional” water infrastructure are under threat from modern lifestyles (Bigas et al., 2009). Alternatively, recent articles discuss the ways in which ancient water management or traditional knowledge can save modern society from water crises (Ghoshal, 2015; Cappellen, 2014), such as the \$23 million project to revive pre-Inca waterways called *amunas* in Lima, Peru (Blakemore, 2015). Other news articles like, "What the collapse of ancient capitals can teach us about the cities of today" (Perur, 2015), journal articles on cultural heritage (Tweed & Sutherland, 2007), development reports (Bigas et al., 2009), or organizations like, Traditional Knowledge World Bank are proposing ways for modern cities to learn from the ancient or traditional. \

Here, “ancients” represent how “mankind” maintained a harmonious relationship with nature. At least until they start to resemble rapidly growing and complex modern civilizations where, for example, failure to maintain aqueducts in Rome, or siltation of Angkor’s reservoir system led to civilization collapse (Mays, 2010). More broadly, many scholars and planners see the traditional as a source of community and sustainability, which can save cities from the ills of modernization (Mustapha, 2009). These accounts romanticize the traditional, communal, and sustainable by overlooking issues of accountability and uneven power geometries within groups (Bakker, 2008). Essentially, these framings re-invoke the traditional to uphold the modern; this juxtaposition of modern with tradition is what Robinson argues, “is the first and largest error of existing accounts of the modern” (2010, p. 7).

This error universalizes categories like traditional, which consequentially means diverse people, objects, practices, neighborhoods, and entire cities are erased through the categorization as other. As Robinson (2013) argues:

“the modernity of these [non-western, colonial, third world] cities remains in question, troubled by western urban theory’s close dependence on a contrast between modernity (defined in the West’s own image) and its implied others: tradition, primitivism, and difference” (p. 721).

Such conceptualizations limit the diverse expressions of “urban innovation, dynamism, and cutting edge economic practices” (Robinson, 2013 p. 721). This is evident in Jaipur where O’Reilly (2006) describes how a Rajasthani drinking water supply project created distinctions between 'backward traditional' and 'empowered modern' women by their water practices and ability to pay for water as a commodity. At the same time, there is a tension in Rajasthan to preserve some aspects of tradition, exemplifying how desires for a family, social group, city, nation to have a sense of common history and cultural heritage, can clash with the desire remove negative attributes like Third World or undeveloped. Thus, normative framings of development from the West can lead to the erasure or disciplining certain people or structures (Robinson, 2013).

Methods

Instead of perpetuating the myth of modernity, this article seeks to understand how diverse and interconnected infrastructural arrangements are transforming cities in distinct ways. The initial goal of my research was to understand why people use spouts and how different institutional domains interact with the spout system. After three months of field work in Kathmandu, specifically the Lalitpur area, or Patan, I gathered information from 11 spout users, 10 community leaders, 7 non-governmental organizers, 2 inter-governmental leaders, 3 general experts on spouts, and 8 government officials. I also observed 10 spout neighborhoods and collected archival material including policy documents, flyers, enumeration reports, booklets, books, articles, photos, and images.

Compiling all these data sources, I conducted a content and critical discourse analysis to understand how groups position themselves around the spout system and ideas of tradition. I treated discourse as the assemblage of practices, material objects, speech, images, and texts that signifies power relations, assumptions, and trends not immediately apparent. The following history of the spout system and discussion of contemporary spout trends draw on my content and discourse analyses.

Kathmandu's Pre-Modern Stone Spout System

This brief history of Nepal and the spout system provides insights into Kathmandu's shifting cultural politics. According to legend, the Kathmandu Valley was a giant lake ruled by *nagas*, or powerful snakes, until Manjushri Bodhisattva visited the area on pilgrimage and cut a ridge in the South of the Valley draining the lake and making the Valley habitable. The Newars were the first city builders in the Kathmandu Valley and ruled over the Valley until conquered by the Gorkhas. In fact, in the Nepalbhasa or Newari language, Newar means *Nepal* (Shrestha, 1999). Today Newars represent 5% of Nepal's 26 million (Nepal Census 2011).

The first records from the Valley are of the Licchavis, who ruled from the 5th-9th century. The Mallas followed this era from around 1200 to 1744 current era (C.E.). They separated the Valley into the Bhaktapur, Patan, and Kathmandu Kingdoms. Many argue that because of this separation the Valley was vulnerable to the Gorkha invasion by Prithvi Narayan Shah who conquered the Valley in 1796. With the rise of the British in India and Anglo-Nepalese war in 1814, the Shahs sought to keep Nepal as an isolated pure Hindu nation (Rademacher, 2011). However, after a court massacre in 1846, the Shah monarchy became merely a figurehead and Janga Bahadur Kunwar established

himself as Rana Prime Minister endorsed by the British Empire. The Rana Dynasty from 1846 to 1951 represents the first attempts at creating a modern state. The Ranas renamed the country as Nepal, with a national anthem and dress; they also renamed the Gorkhali language Nepali and made it the national language (Rademacher, 2011; Shrestha, 1999). As part of this national modernization project, the Ranas attempted to create new infrastructure and ordinances that mimicked British rule in India (Rademacher, 2011).

Rana rule largely sought to take control from the Newars through disregarding Newar customs and practices like the stone spout system. The stone spout system was the Kathmandu Valley's main water supply system until the Ranas democratized the modern water grid in the 1950s. To present knowledge, the system functioned continuously in the Valley for 1,500 years until rapid urbanization took place after 1950 (Prof. M. Aryal, personal communication, August 20, 2014). Respondents and experts explained how in ancient times spouts were indicators of "civilization" compared to rural peripheral areas.

Newars built spouts to provide a continuous flow of water all year. The word *hiti* in Nepalbhasa means moving (*hi*) conduit (*tila*). The spout system is interconnected and interdependent with the surrounding natural and built environment as water is channeled and stored through a cascading network of ponds (*pokharis*), canals, aquifers, pipelines, and conduits (Figure 3). Most spouts have a filtration chamber of burnt bricks and gravel that water flows through to eliminate bad taste and purify the water. Forested hills surrounding the valley provide drainage and until recently, canals would transport water from spouts in forest sanctuaries and farming settlements into the city. Base- and interflow processes also provide essential sources of water for spouts. In many ways, the

system acts as form of rainwater harvesting and groundwater recharge, and spout conduits are a type of spring.

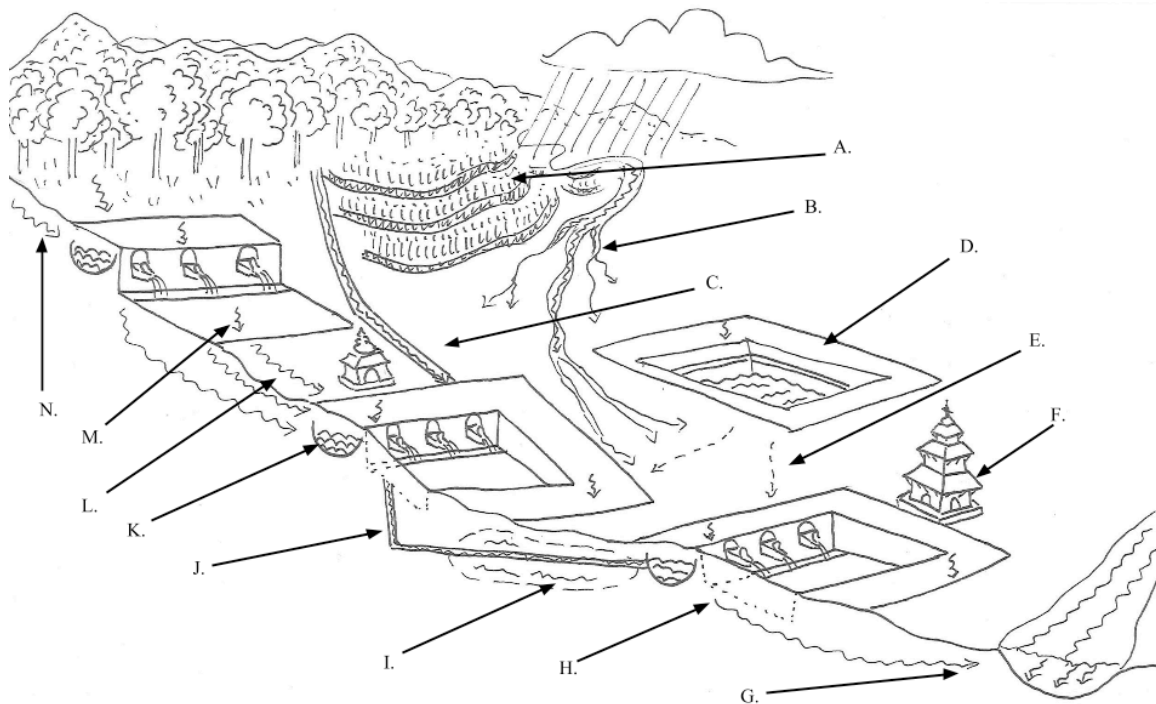


Figure 3: Water balance of the spout system. A. Irrigation drainage, B. Outflow from streams and rivers, C. Irrigation canal transport, D. Storage in ponds (pokhari), E. Drainage from ponds into shallow groundwater or pipes, F. Temples are important to water use and management, G. Baseflow into rivers, H. Drainage from upstream spouts, I. Shallow aquifer, J. Underground pipes, K. Filtration chambers, L. Overland flow, M. Brick chambers allow for infiltration, N. Throughflow from upstream sources.

The oldest known working spout, Manga Hiti in Patan, dates back to around 560 current era (C.E.) (Figure 4). Around this time, during the Licchavi period between the 5th and 10th century, spout construction was the most prolific, although the succeeding Malla Era (1200-1769) continued to build and manage spouts. Communities and wealthy patrons built spouts largely for religious merit to worship gods, build spiritual worth, and

honor ancestors. For example, one inscription reads, “by the grace of King Amsuvarman, I Bibubarma offered this fountain for the welfare of the departed soul of my father” (Prof. M. Aryal, personal communication, August 20, 2014).



Figure 4: Buckets waiting in front of Manga Hiti, Patan Durbar Square.

The archeology, rules, and patterns of spout use depend on its patron, era of construction and neighborhood caste, which lower concentrically from the city center (Becker-Ritterspach, 1995). Thus, the mechanics, aesthetics, religious meaning, and connectivity of the spout system vary across the Valley. In urban centers, spouts are set in stepwell-like areas near road intersections, homes, and temples, functioning as public gathering spaces and domestic water sources for neighborhoods. In the palace, the king’s golden spout was only used for worship and meditation (Figure 5). In rural areas, spouts may flow at the street-level and provide water for cattle or irrigation. Finally, those near

temples or in jungle sanctuaries provided water for spiritual purification, for example for bathing and drinking to cleanse oneself before entering a sacred place.



Figure 5: Photo of the recently restored and flowing Tusha Hiti in the Patan Palace. The gilded copper statue was stolen and reclaimed, however the version now installed is not the original. The spout honors Gods Vishnu and Lakshmi carried by Garuda. The spout dates back to 1647 during the Malla era.

Spouts provide spiritually pure water and honor water gods and guardians meaningful to Buddhist or Hindu beliefs of the surrounding neighborhood. At most spouts water flows from the mouth of a stone-carved *makara*, a water guardian that is

part elephant and crocodile. Icons of water gods, *nagas*, and water cleansing animals, like frogs and fish surround all spouts as protection and symbols of water (Figures 6 and 7). For many, spouts, wells, and ponds are the only sources of pure water for use in everyday *pujas* (see Gyawali, 2009), rituals that honor ancestors, community festivals, or national celebrations.



Figure 6: Bathing, drinking, and collecting water are allowed at Iku Hiti's three spouts. Note: the icon of King Bhagirath below the middle spout is the fabled king who brought the Ganges River, personified by the Goddess Ganga, from the heavens to Earth; *makara* shaped conduits; *nagas* (cobras) outlined in the brick wall; inscription on the upper right; and homes for the gods Vishnu and Laxmi. Many spouts also portray icons of gods Ganga and Shiva.



Figure 7: A Buddhist *chaitya* above recently restored NagBahal Hiti.

Research on the Valley's ancient kingdoms give evidence that spouts were tied to festivals that facilitated cleaning (*siti naga*), rules of use, and forms of local governance like family trusts (*guthis*). As the spout system is not confined to neighborhoods, a top-down authority governed the entire system, imposing laws and regulations that protected water sources and distribution systems. For example, kings set aside certain forests and wetlands as protected areas, while in some urban areas heavy modes of transport were not allowed in fear of breaking underground pipelines (Prof. M. Aryal, personal communication, August 20, 2014). There are legends that when spouts ran dry human sacrifice was required. In one instance, a man of twelve virtues needed to be sacrificed, so the king tricked his son into committing patricide to restore the flow (Prof. M. Aryal, personal communication, August 20, 2014). Archeologists and historians speculate that

the ancient water systems were at times difficult to maintain, embedded within power inequalities, particularly between different castes (Becker-Ritterspach, 1995).

Following the spout building years of the Licchavi and Malla eras, spout construction and management changed radically after the Shah dynasty. While the Shahs tried to incorporate Newar rituals and customs, Gorkha rule increased the rigidity of a caste hierarchy amongst the Newars (Shrestha, 1999). The succeeding Rana period, however, not only transformed the entire Newar group into one caste, but also sought to control Newar cultural and political activities, such as the suppression of Nepalbhasa (Shrestha, 1999). During the Shah regime, Newars started to see themselves more as an ethnic group; however, caste divides within Newar neighborhoods make it difficult for the Newars to feel unified as a whole group (Shrestha, 1999).

The Rana period saw cultural diversity as a hindrance to development and modernization, and squelched the cultural activities of many prominent Newar leaders (Rademacher, 2011; Shrestha, 1999). In many ways, the Rana regime exerted power by not incorporating previous Newar systems, like stone spouts. Instead, the Ranas imported metal pipelines from Europe for elite households and stand posts were installed for the public. The Ranas took control of lands that family trusts (*guthis*) used as revenue for social services, such as building and maintaining spouts, and ignored previous laws that protected forests and watersheds to gather resources for large palaces. One neighborhood leader told the story of how their spout disappeared because a Rana ruler's elephant slipped on the bricks surrounding the spout. Now a metal stand post and well mark the spout's location and most people in the area are not even aware that there once was one

(Figure 8). Nevertheless, there is evidence that some Rana rulers and family members did take an interest in protecting spouts for religious merit and aesthetics.



Figure 8: The location of Nakabahil's spout, now a tap connected to a reservoir. The metal stand post is unused but still standing next to a well.

Crisis and Modernization in Kathmandu

Under the influence of the British, the Ranas sought to present their territory as a culturally unified “Nepal” to the rest of the world with a national language, dress, anthem, and state schools (Rademacher, 2011). From 1960 to 1990, the Rana Panchayat sought to modernize Nepal by opening the country to foreign aid and development projects (Rademacher, 2011). Between 1951 and 1959 there were attempts at democracy, such as free elections or attempts to build a new constitution, however the Panchayat constitution in 1962 "reassigned power to the kingship and banned all political parties" (Rademacher, 2011, p. 51). Growing disparities in wealth and power from this regime,

particularly between Kathmandu and the rest of Nepal, led to the start of the Maoist resistance and People's War starting in 1996. The war ended in 2006 when the Maoists signed a peace treaty and in 2008 the Maoists were voted into the Constituent Assembly. The country is still governed by an interim constitution from 2007, which declared a new constitution be made by 2010. As of January 2015, Nepal still lacks a constitution due to divides between political parties.

One of the Ranas main contribution to Kathmandu's modernization was the installation of the metal, sanitary, underground water grid. After the 1950s, the Ranas expanded this water network in attempts to supply water to all residents of the Valley. During the 1970s, abandonment of spouts was a major issue due to the ease of access to stand posts and household taps installed by the Ranas. However, records and interviews indicate that the modern water grid functioned fairly well until the 1970s.

Until the late 1990s, the government ignored the spout system and saw the public space around spouts, ponds, aquifers, or wells as prime real estate. Government buildings, hospitals, schools, and industrial estates were built on top of, or encroached on, spouts, ponds, and protected aquifer areas. For example, the government in the 1990s destroyed a lotus pond in an untouchable caste area. Declared dirty and unproductive the government built a trade center on top of the structure without consideration of residents. Many from outside the area are upset as this pond played an important role in the 12-year *Rato Macchendranath* festival. Even the Lalitpur Municipality built their headquarters on top of a large pond in the 1990s. Desires for a new modern Nepal, starting with efforts by the Ranas until recent, sought to erase the traditional and pre-modern practices of Newars.

Between the 1970s and 80s the grid system rapidly deteriorated due to a lack of maintenance and damage from rapid construction. Additionally, growing population and consumption rates outpaced the expansion of the grid. In fact, the Valley's current growth rate is about 3.6% per year, one of the fastest growing metropolitan areas in South Asia; since 2000, population has grown rapidly from 1.6 million to 2.5 million in 2013 (Muzzini & Aparicio, 2013). Much of this growth is because of rapid rural-urban migration from either families fleeing violence during the war or seeking employment and opportunities like schooling. Lifestyles have also radically changed to need more water, with toilets, showers, and washing machines demanding many more liters than pre-modern lifestyles.

Across the Valley, 58% of households have access to piped water (Muzzini & Aparicio, 2013). ICIMOD survey data indicates that in the Lalitpur Municipality roughly 80% have access to the piped water with or without a meter. The piped water mains operate through the public water company, Kathmandu Upatyaka Khanepani Limited (KUKL). However, access does not imply reliable water service. KUKL (2014) estimates that the Valley's total demand is 350 million liters a day (MLD), yet KUKL only supplies 60 MLD in the dry season and 150 MLD in the wet season. High leakage rates of aging and damaged pipes also contribute to huge losses in supply. Interviews indicate that even in the monsoon, most households receive only half an hour of water at an unknown time of day from their tap.

As households lack reliable public water service, they rely on buying water or securing water from a number of non-grid sources. Many wealthy households hire private tankers, buy water jugs, build wells, and some have constructed rainwater collection

system. For low-income households, or those who rent and lack access to household water services, inexpensive or free water sources are crucial. These include the delivery of free but infrequent government tankers, public spouts or wells, rainwater collection in buckets, community reservoirs, or polluted rivers and streams. In many cases households set up illegal connections to the grid by removing meters or modifying underground pipes. Groundwater is also largely unregulated, however permits are required for deep wells, and due to rapidly declining shallow groundwater levels in some areas the government is creating new laws to regulate rampant extraction (Regmi, 2005).

The Kathmandu Valley Water Supply Management Board (KWSMB), which runs KUKL, has plans to expand the water network, reduce leakage, and increase supply. Part of this is through the Melamchi Water Supply project. The expression “until Melamchi” is common in the city; however, Melamchi has been a topic of debate, protest, and hope for around two decades (Colopy, 2012). The project plans to transfer 170 MLD annually in a 26.5-kilometer long tunnel from the remote Melamchi River to the pipelines of Kathmandu. After feasibility studies in 1986 and the subsequent withdrawal of the World Bank from the project, the Asian Development Bank (ADB) provided a loan in 2000 to cover the \$464 million for the project and required privatization of water supply (Colopy, 2012). ADB’s investment meant the grid and Melamchi were placed under the control of a public-private partnership, governed through the KWSMB.

While the Melamchi project was only 30% complete in 2014, the group estimates full completion by 2016. As Melamchi has been in progress for so long, its supply is well under the needs of the growing city. Although the project may reduce the number of days without water, it will only increase the price of metered water (Domènech, March, &

Saurí, 2013). Additionally, the past three years of work on Melamchi and urban water supply have been highly visible as roadways, sewage, and water pipelines have encroached on buildings and dug up roads. However progress has been slow, the dusty rubble from road, sewage, and water expansion have intensified traffic jams and air pollution to dangerous levels.

Many of the same factors that influence the functionality of the grid, such as rampant construction and increasing water demands, also have influenced the spout system in the past two decades. NGOForum (2013), a knowledge center formed by a number of NGOs interested in urban social and environmental justice, estimates that there are 389 spouts in the Valley. Of this total, 233 spouts are in working condition, 43 work with the public grid, 68 are dry, and 45 have been destroyed. Today spouts rely on baseflow or interflow processes more than ever because underground conduit systems are damaged or disconnected from the aquifer. Despite this disintegration, NGOForum speculates that spout water serves roughly 10% of the Valley's population. In the Lalitpur Municipality, compared to Kathmandu and Bhaktapur Municipalities, spouts are more functional, with 47 working spouts (NGOForum) accessed by around 20% of the Lalitpur population (ICIMOD survey). While it is important to stress how vital spouts are for low income and vulnerable households (ICIMOD survey), this relationship to poverty and crisis has become a dominant development narrative of how spouts and informal infrastructure fit within modern Kathmandu.

Modifying the Traditional

For Nirmala gathering water is an everyday struggle. Like most migrants, she does not have a faucet or access to the public grid. She moved to the Kathmandu Valley

with her son and daughter from a village in the mid-hills so that her children could go to school. She makes carpets and her husband builds skyscrapers in Dubai. They have moved several times and currently live in one room on of a large house the outskirts of Patan. Like other households in Kathmandu, migrant families are jammed into single rooms in a larger home. In Nirmala's building, there are twelve other migrant families.

During the rainy season, renters in the house leave out buckets to collect rainwater, which they will use for cleaning or bathing. Nirmala has access to the household's well in the yard, but the little well water available is milky and she uses it for the toilet. To find better quality water she walks to a spout, which is a 10-minute journey from her home. There she collects one or two 10-liter buckets of water, which she uses for cooking and drinking. During the dry season, she sometimes waits in line at the spout for an hour. At times when there is not enough water, she has to buy water from the community reservoir or jugs from a store. She prefers spout water because it is free and thinks it is a good quality source; however, she worries that if there is less water in coming years she will have to move back to her village. Even during the rainy season, she complains that she only has enough water for basic needs, and that her children have to wait several days to bathe or wear clean clothes.

The spout she frequents is Washa Hiti, dating back to the Malla period. Washa means medicine in Nepalbhasa and is famous for its healing properties due to the legend of a tantric priest who healed a *naga* queen. Washa Hiti and four other spouts are in Ward 22, a historically low caste Newar community, responsible for street cleaning and milling bones. Ward 22 is located on the outskirts of the historic UNESCO Patan site in the Lalitpur Municipality, and used to be a dumping ground. Although there is still a bone

mill and small dump near Washa Hiti, the community removed the large garbage mound that was directly above the spout and converted it into a children's playground after donations from a tourist.



Figure 9: For several hours a day water is diverted away from Washa Hiti to the community reservoir.

Dal Bahadur and his team of six local youth maintain the Ward and provide water services to 142 household members. For a small fee of 200 rupees (2 US dollars) a month households can pipe 300-liter water from the reservoir into their homes. So far, 92 households use this service. However, most of the renters, who Bahadur says make up 60% of the Ward, use the spout directly, and if it is dry, pay a small amount to use the reservoir. Every day the committee cleans the spout areas and at certain hours channel water from the spouts into the 13,000 L underground reservoir funded by the community and municipality (Figure 9). The United Nations Human Settlements Program (UN-

Habitat), Center for Integrated Urban Development (CIUD), and the Metropolitan City Office helped fund the repairs on Ward 22's Amrit Hiti and Washa Hiti. The other two nearby hitis have been abandoned. The storage tank and repairs at Washa hiti are small modifications compared to many communities or individuals who have radically modified or reincorporated their spout as seen in Table 3.

Table 3: Spouts of research focus

Spout Area	Number of spouts	Estimated age (yrs.)	Location	Number of household users	Cumulative flow* L/day	Reliability
Sundhara	4	1500	Urban	500-1000	199543	Minimal dry season flow
NagBahal	3	1500	Urban	15 (only locals)	108343	Poor quality
Nakabahil	3 taps	?	Urban	200	?	Reliable
Aalko	5	600	Urban	225 (direct), 500-600 (indirect)	683105	Minimal dry season flow
Washa and Amrit	2 in each	815-246	Urban fringe	92 (direct), 140-200 (indirect)	416143	Reliable
Iku	3	815-246	Urban fringe	200-1000	480715	Reliable
Harisiddhi	1 at several sites	1500	Periurban	?	?	Reliable
Godavari	9	200	Rural	0	?	Reliable

* Cumulative flow includes wet and dry season flows in liters per day (data from NGO Forum and Lalitpur Sub-Metropolitan City Office).

During the 1990s Iku Hiti was the first spout modified with a storage tank by suggestion of a Newar engineer (Figure 10). Iku Hiti's success has worked as a model for other communities. However, the proposed modifications made several neighborhoods fearful of the consequences of such "corruption." There were similar fears for other modifications, such as the Urban Environment Management Society's (UEMS) efforts to reduce cholera in public wells through chlorination. Many elders believed that the *nagas*

would punish them for such alterations; however, both the engineer at Iku hiti and UEMS group said that local youth helped convince their communities.



Figure 10: Water hoses connected to Iku Hiti’s underground reservoir provide households with water when there is electricity.

Communities and households have illegally modified a number of spouts as seen in Table 4. Modifications include attachment of city supply lines, and even more have been modified with multiple underground or overhead reservoirs, pumps, rainwater collection systems, and new pipeline systems. Many neighborhood spout organizations also have attempted to ban the construction of new wells or regulate existing ones to improve spout flows. For example, to keep the spout flowing Aalko hiti does not allow well usage in the neighborhood. They have also rebuilt a *pokhari* for rainwater harvesting, created a series of recharge pits, and installed an impressive underground grid

system to member households. These modifications provide convenient and inexpensive water services to nearby households and the growing number of migrant renters. The aim for many neighborhood leaders is to form self-sufficient micro-grids.

Table 4: Significance and modifications of stone spouts

Spout	Notes on uses and significance	Notes on modifications/add-ons
Sundhara	Unique gilded street level spout just outside of Patan UNESCO site. Sits in front of famous Krishna temple.	25,000 L underground tank, community building
NagBahal	Important for Newar Buddhist celebrations and Janipurnima. UNESCO Patan site.	40,000 L spout water to a tank every day, wells, fountains, overhead tanks, community building
Nakabahil	Only a few elders know the tap was a spout. The spout was destroyed around 100 years ago.	Well, metal stand post, and pump to overhead tank
Aalko	Many stolen icons. Sits next to Washa hiti, just outside Patan UNESCO site.	Rainwater recharge pits, ponds, overhead tank, underground pipes, community building
Washa and Amrit	Famous for its medicinal properties. In low caste area just outside Patan UNESCO site.	Spout collection to 13,000 L underground tank, community building
Iku	Laundry spout – represents historic caste and present activities.	Spout collection to underground tank, rainwater recharge, pumps, hoses, restored spout and clothes washing area, community pavilion
Harisiddhi	Historically wells have been more important in Harisiddhi. Spouts are still used and worshiped but many have disappeared	Harisiddhi installed a pipe from Godavari for household connection, government is building a septic and drinking water system
Godavari	Spouts, pokhari, and temple were by Silwals (Chhetri) in honor of Goddess Pulchowki. Used more for bathing and religious purposes.	None, keeping water source a secret because of worries other areas will steal water. Sits above Harisiddhi at the base of a community forest.

Although there is growing movement around the utility of spouts, interviews and ICIMOD survey findings show that networked water is the preferred form of provision because of the convenience and quality. For many, this networked water does not have to come from government sources; rather spouts provide micro-networks that can satisfy the needs of many residents. Changing lifestyles along with the empowerment of women in

the workplace, means that communities or households are modifying and appropriating spouts in ways that mesh with contemporary urban networks (Robinson, 2013). This does not necessarily conform to discourses in Jakarta (Kooy, 2014) or Lagos where the:

“politics of urban governance in post-colonial Lagos was marked by an ambivalence between tradition and modernity expressed through a tension, on the one hand, between a proliferation of impoverished communities which were somehow perceived to exist outside or in opposition to the modern city and, on the other hand, by the promulgation of new kinds of social and economic aspirations fostered by capitalist urbanisation.” (Gandy, 2006, p. 380).

The modification and management of stone spouts not only creates micro-grids that communities have greater autonomy over, but also saves time and effort, while increasing social and economic relations between neighborhoods to enable different kinds of capitalist urbanization centered around neighborhoods. Although such modifications that transport water to households are part of the spout system, many officials and development groups tend to focus on the visible lines of buckets by spouts.

Despite the modification of external features of the system, in most areas the internal filtration and inlet system of spouts have rarely been tampered. This is because engineers and community leaders found inscriptions and carvings of palms during digs around spouts, a sign they interpreted means "go no further." Because of such symbols and the inaccessibility of this invisible system, a number of engineers and leaders speculate that the original builders constructed the internal spouts system to require minimal maintenance. Interviews repeatedly brought up how animals like snakes, frogs, and fish, or as some noted, microbes, keep the passageways clear. This is one reason why the sight of these animals in ponds, wells, or spouts is a sign that the water is spiritually strong and clean.

These discourses of spout sustainability, engineering, and vitality work to elevate the traditional above modern works, which require constant maintenance and repair. Additionally, such valorization emphasizes the emotional, sacred, and symbolic power of cultural heritage. Little work on infrastructure and water in contemporary society has emphasized these dimensions, especially compared to the wealth of literature on the operation and management of water resources (Boelens, 2013; Kaika 2005). Spouts demonstrate that the religious and cultural aspects of water and infrastructure are not limited to rural areas, as is the focal area of similar research. The case of spouts demonstrates that they are not just cultural artifacts of the past waiting to become museum pieces or sites for new modern construction seen in other literature on the ancient or traditional. From engineers, to officials, to renters, so many respondents said, “water and culture cannot be separated at spouts,” expressing frustration at how policies and development plans created a rift between the historical and functional dimensions of spouts.

The modification, use, and management of spouts in contemporary Kathmandu trouble the idea of the traditional as a category encapsulating pre-modern life. Modern pumping systems, PVC pipelines, cement, gages, and filtration devices attach with spouts, while in other areas abandoned spout conduits have been reinstalled, such as a family in Harisiddhi who connected a spout to an irrigation canal to access free water (Figure 11). These add-ons have plumbed new hydrological possibilities for families, whether they are households struggling to meet daily water needs or middle-class households who use the spout as a supplemental water source. Archeological evidence also demonstrates that people have modified and repaired spouts over the centuries (Prof.

M. Aryal, personal communication, August 20, 2014), implying spouts are an assemblage of different generations and technologies. Echoing Silver's (2014) findings of "incremental infrastructures" from Accra, stone spouts provide a foundation for transformation, possibility, and collaboration.



Figure 11: A re-appropriated spout channeling canal water in Harisiddhi, the pipeline cutting through is the metered government pipeline.

Power Geometries of Community Governance

Beyond the utility of spouts, the contemporary management of spouts reaffirms feelings of community as members must help pay for, and deliberate on, spout related activities like cleaning festivals, repairs, or modifications (Figure 12). Much like, water governance in the Andes where, "water myths and discursive practices function both to

stabilize the status quo and to mobilize against water-power hierarchies” (Boelens, 2013, p. 246), communities in Kathmandu assert collective power through invented notions of tradition. Similarly, Perreault (2008) describes how irrigator groups during the Cochabamba Water Wars saw their “traditional customary practices” threatened by “the government’s implementation of neoliberal policies of water governance” (p. 843). Rather than romanticizing this peasant movement Perreault explains how “everyday struggles are often expressed in and through *cultural* referents, for example through contestations over identity, religion, or other modes of social difference” (p. 846). However, power relations within Kathmandu’s hydrosocial cycle do not easily fall between communities, the government, or corporations; there are alliances and struggles in unexpected places within communities and across the overlapping water networks.

Since the 1990s, many communities have shown a desire to protect or revive neighborhood spouts systems. News, municipalities, and non-governmental organizations have also taken a greater interest in discussing the preservation of the spout systems since the civil war. A Google news search for Kathmandu and "stone spouts" or "dhunge dhara" (Nepali for stone spout) or "hiti" show 33 news articles written between 2012-2015, with headlines like, "Water crisis looms as Nepal's ancient spouts dry up" (Asia Report, 2014). The same search brings up 44,500 links in Google with headlines like “Water for Future: Hope trickles back for disappearing stone water spouts” (Ekantipur, 2011). Melamchi’s slow progress alongside the government's failure to regulate groundwater and construction has generated pessimism among some residents and leaders on the future habitability of the Valley. Many, particularly Newar communities, see spouts as spaces of opportunity for self-determination. The contrast between

Melamchi and spout modifications demonstrates not only the incomplete process of modernization, but also the responses to these failed promises.

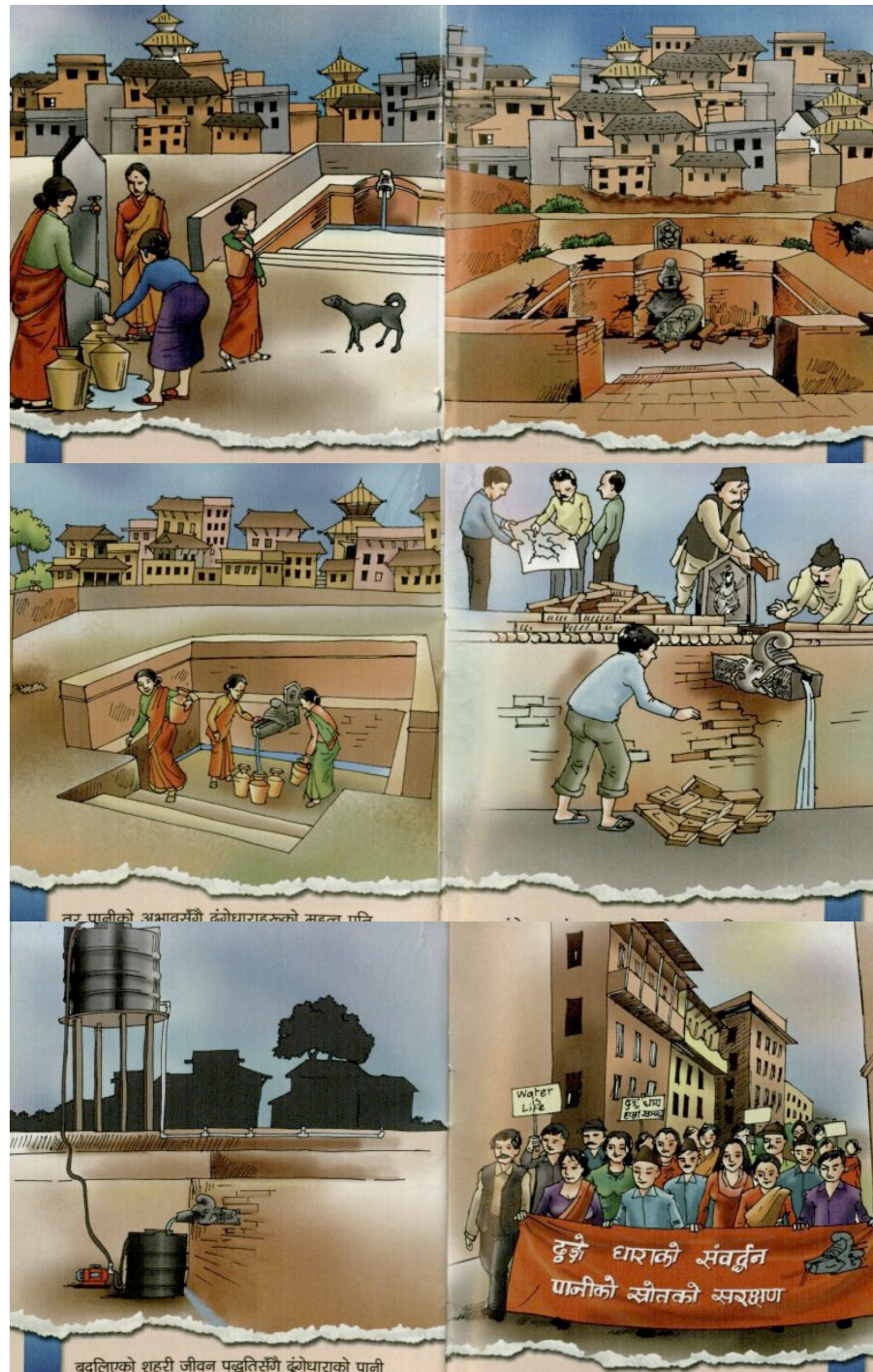


Figure 12: Selected images from a booklet on protecting stone spouts supported by UNHabitat, CIUD, and Lalitpur Municipality

News articles and experts claim that if all the spouts ran dry there would be riots. In fact, since the 1990s, several documented protests and legal battles worked to protect spouts and their spout water sources. For example, In 1991 Sundhara Hiti staged a massive protest where residents of the area moved “as a mob” to destroy the wells at an upstream industrial estate who they claimed were stealing their water. The government permitted industrial estate to be built on a once protected aquifer site and pond that residents knew connected to Sundhara Hiti. After destroying the wells, residents say that the spout started to flow again. While the government says the issue has been resolved, the Sundhara community is still angry at the “water thieves,” especially since the spout now only provides water during the rainy season when the water table has risen. At all the other study sites, communities and leaders expressed that they were also ready to protest and do what is necessary to protect their spout and its water. Images in Figure 12 show the plight of modern taps replacing the traditional, communities revaluing and repairing their spout with experts, and ways communities can modify spouts and advocate for spouts. Such public material seeks to reinforce ideas of the traditional and communal. Such mobilization over spout water and space demonstrates how communities are advocating for their rights to the city (Roy, 2005).

Sentiments of community are largely between Newar residents of the same caste, however, there are also many Newar leaders who may not use a spout but still advocate for spout restoration, expressing feelings of shared cultural heritage, ancestry, and pride. For many Newar communities, leaders strive for autonomy and service provision beyond water, such as the formation of self-sufficient economies. For example, NagBahal tries to keep all economic activity within the neighborhood, provides family services, clinics,

youth organizations, emergency services, and a variety of other organizations. Additionally, at many spouts, like NagBahal, committees only allow Newars to become members or provide Newar residents privileges over the water such as household connections, free public use, and priority in line if someone is waiting for water. For most Newar respondents, spouts are a physical manifestation of cultural unity in the face of growing ethnic diversity and Westernization.

However, at some spouts, like the low caste areas of Iku Hiti or Washa Hiti, culture and local tradition are not forces of exclusion as committees desire strong community governance and interdependence. Community leaders and managers may be Newars at Washa or Iku Hiti; however, renters are welcome like “family” and can become members. As interviews explained, there is a desire for community-governed water supply due to a great distrust in the government. This distrust stems from the failure to deliver basic services and the high turnover or corruption of politicians. All spout users interviewed, none of whom could afford to connect their homes to spout reservoirs, felt a great distrust and frustration in the government. In particular, women who have to carry heavy water jugs everyday expressed a desire for more convenient and reliable source of water, but do not expect the government to provide such services.

At Washa Hiti, issues of caste are still clear, the leaders and managers explained how all the educated and wealthy Newars abandoned them and did not provide any help. Bahadur said that he, like other residents there who did not receive an education, became motivated to work for the community instead of serving tea or cleaning the streets. Bahadur explains that even if the spouts run dry they will create a deep well to make sure households in the area have water. No matter how much water they get from the

government Bahadur says that they will still value community water the most, and will do anything to protect their “God given hiti.”

Many community leaders have requested that the government give more control to community committees, and that the government enforce laws that support the self-sufficiency of neighborhoods, such as regulating upstream withdrawals from industry and construction that could divert flows. Some communities, particularly those that are wealthier or in tourist areas like the Patan UNESCO World Heritage site, have greater connection to official ears and need not “bang on doors” or engage in protest. However, others like Sun Dhara or Washa Hiti feel like the government largely ignores their requests and only provides a few cleaning tools every year.

All leaders expressed how they engaged in protest or support court cases that protect spouts and aquifers. Few, however, know of the laws relevant to spouts and prefer separation from the government, and say, "what is the point?" To address government frustrations, Patan spout committees formed the Historical Stone Spout Conservation Association (HISCA) in the 1990s. Spout leaders used to meet regularly to share ideas for spout modifications or mobilize around protecting common resources like ponds or aquifers. HISCA rarely meets these days because all leaders are too busy with their own jobs and neighborhood needs. Leaders continue to be frustrated by the lack of regulation that enables large industries, hotels, and schools to grab land and water. Moreover, spout leaders and residents know that entire communities, regardless of their innovation and governance, are vulnerable to upstream politics.

For many government agents, community managed water systems alleviate their responsibilities to preserve cultural heritage or provide water services to some of the most

vulnerable groups. Government respondents argue that they can focus on other issues because the traditional system works, and many see the spout system as only temporary until Melamchi. Interestingly, government officers recognize that they over rely on communities and complain that corrupt politicians, conflicting policy, and bureaucracy prevent them from adequately assisting the stone spout system. In addition, when funding and government action is available to enable change, politicians and bureaucrats channel money towards Melamchi-like projects.

The micro-grids and committees formed around these public assemblages of water pipes, spouts, storage tanks, and gathering spaces, demonstrate how communities are adapting physical systems to create additional modalities of governance. Frustrated with the lack of government responsibility and lack of accountability from private groups, community committees act as micro-states, with their own norms, rules, regulations, and service provisions. Thus, anxieties over the failed promises of development, like Melamchi, have led to a surge of interest in, and activity around, the spout system. On the surface, discourses of tradition act in opposition to modernity to demonstrate the failures of development and successes of the ancient. However, at its roots and in practice, stone spouts are not alternatives to modernization, they are technologies, which are, and always have been, intricately connected to the physical and social worlds beyond their neighborhoods.

Between Nostalgia and Looking Ahead

Stories of how great spouts used to be, such as memories of bathing at a spout that ran dry or wanting to try sweet taste of a now polluted spout, evoke sentiments of how pre-modern life was superior. Like most cultural heritage, spouts embody memories that

generate and propagate feelings of pride (Waterton, 2014). Even for renters or outsiders who are not of a certain Newar caste surrounding a spout, this infrastructure is a powerful symbol that garners respect largely because they are “beautiful” and sacred. Communities and families continue to worship and protect many dry spouts, and at many places hope their spout will flow in the future (Figure 13). Water and spouts are indivisible, spiritually and physically.



Figure 13: Families in Harisiddhi worship a displaced spout, which sits next to a temple and *pokhari*.

The aesthetic and affective power of spouts has made visible power struggles in the Valley. For example, Rana King Mahindra during his coronation in 1956 requested that his engineers fix the spouts so that they could flow as they did during the Malla era. However, the engineers did not make repairs; instead, they pumped water into the spouts to make it look like they were working. The appropriation spouts by historic invaders and

King Mahendra, signify the importance of spouts as cultural and political symbols of the ingenuity and wealth of pre-modern Kathmandu. More broadly, the aesthetic of pre-modern Kathmandu is a powerful force for both Newars and migrants in affective, sacred, and/or commodified ways, such as the iconic skyline of Kathmandu’s temples or “living museum” tourist sites.



Figure 14: Street art by Prabal Shrestha, Shramdip Purkoti, and Shristi Shrestha showing the demise of Kathmandu.

For Newas specifically spouts are symbols of ancestral ingenuity and rule over the Valley. Many Newar leader expressed great pride in their spout because of their “scientific engineering.” Newar engineers, some of whom worked for communities, NGOs, the government, or development groups, also expressed this pride in ancient engineering. When discussing the historic properties and management of spouts, some attempted to rationalize why and how certain religious rituals or Gods were associated with protecting the water and infrastructure, while others delved into the spiritual

importance of spouts. Although some government workers, Newas, and outsiders to the spout system think that “modern water” will mean the abandonment or transformation of spouts into museum pieces, many residents explained how they would still value their neighborhood spout for its aesthetic, ancestral, or religious values. Spiritual or not, the cultural heritage embedded within spouts is a vital part of Newar identity, even across caste groups, due to recent political and economic change.

In addition to the nostalgia of spout aesthetics and Newar identity, the "traditional knowledge," or "ancient wisdom" associated with spouts indicate how pre-modern life was pure and sustainable compared to today. Figure 14 shows a painting of ancient and modern Kathmandu, separated by an image of Manjushri Bodhisattva who drained the Valley. The change in color of water from the hiti mouth from blue to black as the encroachment of large gray building-like blocks increases signifies the demise of Kathmandu from its pristine and sustainable past. Images of worship compared to gray faces of people and colored faces of gods indicate the disjointed psychological and cultural conditions of modern life. Ironically, empty plastic water bottles foreground the street art. Echoing this dark modern side of life, a local newspaper proclaimed that:

“by most international standards Kathmandu should be considered uninhabitable because the city of 2.5 million has few functioning water mains. But one of the reasons the city hasn’t been abandoned is that its 400-year-old Malla-era water mains are still functioning” (Baidar, 2015).

Narratives of pride and sustainability tied to the traditional spout system demonstrates how pre-modern life is not only difficult to erase, but unwanted compared the perceived ills of modern life.

Most spout leaders and community-interest groups argued that Kathmandu could provide its citizens with “its own water” without importation projects. Even specialists

and engineers in inter-governmental offices, government agencies, and non-governmental organizations, some of whom used to work on the Melamchi project, say that with numerous other Melamchi projects, spouts will be important and sustainable water sources. They posit that through reviving the spout system and building rainwater harvesting systems Kathmandu can have a more sustainable and reliable water system. Respondents cited a televised interview several times, which argued that if Kathmandu could capture 6% of its annual rainfall, with a mean annual precipitation of around 1500 millimeters, and integrate this into the grid the increase in supply would be the same as the promised input from Melamchi. On a small scale, NGO and community groups have created successful rainwater recharge and harvesting projects that have improved the supply of targeted spout systems and storage in community reservoirs. These arguments place the cultural value of spouts against the modern to call for a reworking of the state to provide security through decentralized environmental governance.

Much like examples of informal water infrastructure (Kooy, 2014), a dominant perception seen in headlines and among many government or development workers is that spouts are providing temporary but necessary services "until Melamchi" can fill the main water grid. As Gywali and Dixit (2010) argue in their history of hydropower development in Nepal, the discourse of water scarcity is one that represents influences of foreign development and global capitalism in Nepal,

“scarcity is thus inherent in the industrialization process where consumerism - an ideology founded on the re-engineering of human values - requires the uprooting of traditional values and the fostering of individualization” (p. 235).

For example, the government turned down or ignored several opportunities and proposals for the rehabilitation of spouts or integration of the spout system with the public grid

during the 80s and 90s in favor of new large-scale development projects, like Melamchi. Additionally, as one prominent leader notes the government does not care about constructing rainwater harvesting systems or revitalizing and integrating the spout system because the World Bank does not provide loans for those kinds of projects. These arenas describe "traditional stone spouts" as inefficient, transitory, and signs of underdevelopment that are 'just cultural.' Respondents fear that with modern development projects, which do not consider both the natural and cultural aspects of the built environment, spouts will become merely "museum pieces" in the future.

Although spouts symbolize pristine and sustainable pre-modern times, contemporary spout arrangements show how communities are not attempting to return to ancient Kathmandu. While, communities take pride in ancient rituals tied to the spout system or the aesthetic aspects, these practices continue to transform and aesthetics are remade through restoration projects. The modification of spouts and formation of diverse community committees, alongside propaganda of the spiritual and hydrological importance of spouts demonstrates how groups are attempting to create their own urban lives, especially since they cannot, or do not want to, be dependent on the government. However, these are not alternatives nor idealized solutions. Spout systems have their own uneven power geometries and are still intricately tied to upstream flows, politics, and changing economies.

Conclusion

Opposite from the skyscraper heights of modernity, spouts in their depressed chambers seem like a perfect example of the traditional. While spouts are hundreds of years old, associated with certain rituals or practices that have been passed down over

generations, they are not inherently traditional. Rather, the construct of spouts as traditional in a positive light works to distinguish these structures, places, and people from the unwanted aspects of modern Kathmandu.

Much of this comparison lies in the visibility of spouts. From the junction of a main road to neighborhood courtyards, spouts and spout activities are highly visible public spaces. The visibility of tradition in certain places acts as evidence for development groups to build around and capitalize on particular aesthetics, identities, and development strategies, such as the greater protection of spouts in Patan World Heritage Sites. However, spout neighborhoods are not living museum. People waiting, buckets lined up, dry spouts, spouts filled with rubbish or rubble, modifications, signs with spout rules and costs, renovations, the sound of diesel water pumps, and smell of sewage - are all forms of advertisement that indicate physical and social disparities in the Kathmandu Valley (Amin, 2014).

Looking down into spouts it is easy to say users are poor and lack political representation. However, the less visible users, such as those benefiting from micro-grids, the managers, or advocates, are from a variety of socio-economic and political backgrounds. Thus, although people may label spouts as traditional, this interpretation varies and sometimes does not align with the usual association of rural, customary, pre-modern lifestyles. As there is limited literature that critically considers tradition in contemporary cities, spouts provide an empirical example of how the construct of tradition play out in the cultural politics of contemporary urban life.

Kathmandu's modern development, like Jakarta (Kooy & Bakker, 2008), Gandy (2006), or Jaipur (O'Reilly, 2007), is marked by its colonial-inspired transition to

hygienic infrastructure that attempts to create modern capitalist subjects (Kaika, 2005). However, as of recent, the management and modification of spouts demonstrate how development efforts cannot easily erase the traditional. This is because spouts are not dormant reminders of the past or temporary water sources that households only use to meet their basic needs. Many use, organize, and advocate around spouts because they are discontent with the promises of modernity. Here, spouts represent a nexus of water, religion, governance, and technology, where infrastructure is a source of cultural and political ideology. Discourses of tradition around spouts link with symbols, structures, and practices that are dynamic in both utility and cultural meaning. Thus, infrastructure does not matter merely for its efficiency and utility. Rather, cultural, emotional, religious, and political dimensions are also embedded in infrastructure and service provision.

This case of stone spouts has conversed with cultural and urban geography to treat infrastructure not as a fact of urban life, but rather a discourse of pipes, buckets, meetings, and *pujas*. Seeing aspects of the built environment, like infrastructure as a discourse of practice troubles the fixture of these things as inherently modern, traditional, developed, or poor. Beyond the anxieties of Kathmandu, spouts demonstrate how discourses of tradition are multiple. While they may appear in juxtaposition with notions of the modern, the effects make room for new power arrangements and developments that are neither traditional nor modern. Frequently cities like Kathmandu framed through crises and failure, and seen through images of the traditional. Such discourse of cities troubled by tradition limits their potential (Robinson, 2010). Thus, urban theorists and planners need to see places like Kathmandu beyond their failure to mimic the shiny skylines of Singapore and London as they are brimming with their own possibilities.

Postscript

Historically, most spouts survived other major earthquakes documented in the Valley. Because of this, leaders and other experts argued during interviews that when the next big earthquake hits Kathmandu, spouts would be the only form of emergency water available. After the recent quake in April 2015, spouts not only continued to provide water, but also were some of the first spaces communities cleared of rubble (Figure 15).



Figure 15: Manga Hiti before and a few days after the 2015 earthquake (Facebook).

Based on social media posts and news articles it appears the earthquake has further cemented the symbolic value of spouts and ancient monuments as signs of Kathmandu’s unity and strength. Although many heritage sites fell during the earthquake, there are signs like “Nepal will rise again” next to iconic images of historic monuments

like Bhimsen or Dharhara Tower (Figure 16), evoking sentiments of strength and unity. In juxtaposition, the foreign press focused on the destruction of Kathmandu's cultural heritage and traditional monuments as a sign of the nation's poverty and loss. Following the earthquake, I am curious to see how communities and the state will rebuild and reintegrate infrastructure and monuments.



Figure 16: A poster for rebuilding after the Earthquake (Facebook from Designers, Artists and Creatives for Nepal Earthquake Relief page) showing the ancient monuments of Kathmandu as the city's skyline.

CHAPTER IV

CONCLUSION

This thesis includes unpublished coauthored material.

The ways certain actors align themselves to the ideas indigenous, communal, traditional, Western, scientific, and modern is revealing of power struggles in urban development imaginaries. Discourses of tradition, and practices around stone spouts do not fall in line with the development standards of Western cities. Although dominant framings of the traditional work in juxtaposition to modern Western cities, there is no universal idea of ‘traditional’ or ‘modern’ apparent in the streets of Kathmandu. While the traditional is usually in reference customary practices or the ancient, such discourses matter more to shaping urban identities and power networks, especially since spouts themselves are an assemblage of different eras and customs.

Spouts are not temporary or rudimentary fixtures waiting to become modern museum pieces; spouts are symbols of community strength, culture, and adaptability. While there is nothing inherently traditional or modern about spouts, these ideologies have material effects. The ways in which powerful actors position themselves around spouts demonstrates the multiple imaginaries for Kathmandu's urban future, rather than just one trajectory of replacing the traditional with the modern. Engaging with the ways in which groups and individuals position themselves around tradition can draw attention to the cultural politics of urban modernization in cities globally. My research argues that Kathmandu's urbanization is unfolding in ways that do not conform to teleological standards of modernization. More broadly, such examples show how, the modern has not

engulfed the traditional. Rather, both the notions modern and traditional are incomplete and impossible ideas for urban life.

The patterns of spout management, use, and functionality are a legitimate mode of development in Kathmandu, and represent powerful social movements as groups attempt to create their own urban realities. Contributions of literature concerning religion, culture, and plural ways of knowing, such as case studies from Trawick (2013) on Andean irrigation practices or Drew (2012) on Hinduism and glacier retreat, or Roger and Schutten (2004) on gender alienation and the Hoover Dam, are important in questioning the role of urban infrastructure and technological assemblages. As Castree et al. (2014) explain, global environmental change has been narrowly framed through certain kinds of technical science, however,

“other forms of knowledge, discourse, and understanding must be properly acknowledged, precisely because they both affect, and are affected by, science and technology. These forms range beyond the cognitive to encompass the moral, spiritual, aesthetic and affective” (p. 765).

As Kaika (2005) and others (Amin, 2014; Roy, 2002; Gabriel, 2014) suggest the politics of aesthetics, ideology, and culture are important dimensions of infrastructure, and by extension cities.

Finally, comparing water service issues in urban peripheries of Mumbai, India and California, United States, Ranganathan and Balazs (2015) argue that problems of service provision, like drinking water, are not limited to the ‘Third World.’ From the case of mutual water companies and poor state provision in Tooleville, California (Ranganathan & Balazs, 2015) to water efficiency technologies in Canada (Furlong, 2011), ‘non-modern’ water systems are not limited to ‘developing’ nations or cities. Thus, Robinson and McFarlane (2012) call for experiments in comparative urbanism to

move beyond ideas of cities as wealthy or poor, developed and underdeveloped, North and South, where “differences need to view less as a problem to be avoided and more as a productive means of conceptualizing contemporary urbanism” (p. 767). Understanding the cultural practices of infrastructure across space invites conceptualizations of the multiple forms of political governance, commodification, and marketization, and to the emotional, spiritual, or religious dimensions of water flows or infrastructures.

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