(De)constructing Concrete: Meaning and Materiality in Postcolonial India

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(De)CONSTRUCTING CONCRETE:
MEANING AND MATERIALITY
IN POSTCOLONIAL INDIA

by

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B.Arch., University of Mumbai, 2011

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(De)Constructing Concrete: Meaning and Materiality in Postcolonial India

written by Siddharth Menon

has been approved for the Department of Geography

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The final copy of this thesis has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the abovementioned discipline.
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*Constructing Concrete: Meaning and Materiality in Postcolonial India*

Thesis directed by Professor Mara Goldman

Across rural India today, house building practices are rapidly transforming as communities discard traditional (*kuccha*) building materials like mud and bamboo and use modern (*pucca*) ones like concrete and steel. Within the elite urban discourse in India, the use of concrete is perceived as “bad” and “unpleasant,” due to massive energy costs associated with its production. Moreover, the association of concrete with ideas of modernity are considered primary reasons for these changes. However, not much is known about the circumstances under which changes in building material technology take place and about how these transformations play out in the daily lives of rural communities in India. This thesis aims to understand how transformation from traditional to modern building material technology occurs in a case study of Kandwari village in Himachal Pradesh province, northern India. Research findings suggest that there exist multiple reasons that explain the ubiquitous use of concrete in Kandwari village. Research participants are objectively aware of the benefits and drawbacks of concrete as a building material and are not easily swayed by its associations with colonial and post-colonial modernity, as popularly understood in urban India. Moreover, concrete use is understood differently by various members of the Kandwari village community based on identities of caste, class, gender, ethnicity, age and profession. These findings complicate simple, macro understandings of change in building materials taking place in Kandwari village. There are several factors at play that make the practice of using concrete in Kandwari a dominant and pervasive one. These range from social factors like caste, class, gender and ethnic affiliations to technical factors like cement, sand, stone, mud, roads, etc.
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I would like to thank my mentor-Didi Contractor, without whom I would have never reached my field site in 2011-Himachal Pradesh. She taught me some of the most important things in life and my journey in critical thinking began here. The three years that I spent in Himachal Pradesh would not have been easy had it not been the for the continuous guidance of friends, mentors and research assistants-Kakaji, Biharilal, Palakram, Rojhanlal, Bhondu chacha, Dharji, Dr. Ram and many more. I am forever indebted to these individuals for their unselfish love and care. Along the way there have been countless masons, carpenters and craftspeople, who have helped me build amazing structures across India. This has been a collaborative effort for which I have been getting undue credit for. Successive and cumulative advantages of feudalism, caste, gender, class, ethnicity, religion, physical appearance, history and geography have worked in my favor allowing me to be in the position that I am in today. If not for these privileges, any of my subaltern colleagues could have written this thesis. I acknowledge this reality, while also understanding the responsibility it places on my shoulders. I write for them.
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Since my father’s untimely death in 2001, I have struggled to locate my path and follow suitable role models. During these testing times of loss and rediscovery, I have been guided and influenced by the values and principles propagated of certain personalities. Some, like Didi Contractor, Charles Correa and Kishori Amonkar, I have had the fortune of meeting or working closely with. Others like Nari Gandhi, Laurie Baker and Arsene Wenger have had a profound influence on me from a distance of space and time. As I write my thesis Arsene Wenger has decided to step down as the manager of Arsenal Football Club after 22 years at the helm. Since 2004, the values preached by Arsene have been a guiding light for me through trying times. No matter how high I soared or how low I stooped, I always had the weekend to look forward to when Arsenal were playing. I reveled in their wins and wept in their losses but was always proud of the beautiful way in which they played football (soccer). Winning and losing was part of the game. But it’s how you play that mattered. This I learnt from Arsene. I believe I have finally found my path. I now intend to live it by following the values and principles put forth by Arsene Wenger as I transition onto a PhD in Geography at the University of Wisconsin Madison.
Contents

Introduction: From Kuccha to Pucca 1

Chapter One: Meaning 26

Chapter Two: Materiality 53

Conclusion: Towards a Puccafication of Social Life 74

References 80

Appendix 90
Glossary of Terms

*Bhai* - Brother

*Bidi* - Local cigarette

*Chai* - Hot, milky tea

*Chakka* - Local slate stone

*Chamaar* - Untouchable caste

*Chamadi* - Skin of a dead cow

*Chappal* - Sandals

*Cheer* - Pine tree

*Chowk* - Central plaza in village

*Chuna* - Lime wash

*Dahej* - Dowry

*Gaddi* - Local tribe

*Ghoonghat* - Veil worn on head by women

*Harijan* - Gandhi’s word for untouchables

*Jaali* - Screen

*Kacchra* - Dirt or rubbish

*Khaan* - Local slate mine

*Khud* - Local stream

*Kiraana* - Grocery/retail store

*Kuhl* - Small irrigation channels

*Kurta* - Local Indian dress.

*Mistri* - Mason or craftsperson

*Pipal* - Fig tree

*Roti-sabji* - Flat bread and vegetable dish

*Shaan* - Pride

*Tai* - Paternal aunt

*Thaakur* - Upper caste

*Tharra* - Local country made liquor

*Thekedaar* - Concrete contractor

*Topi* - Local hat
List of Figures

Figure 1: Map showing Himachal Pradesh in northern India.

Figure 2: Houses in the Kangra valley (Credit: Author).

Figure 3: Replacing *kuccha* plaster, Kandwari village (Credit: Author).

Figure 4: “Dikhaava”- *pucca* plaster on a *kuccha* wall (Credit: Author).
Introduction: From Kuccha to Pucca

The Travelling Architect

I grew up in neo-liberal Mumbai in India’s first privately managed integrated township-Hiranandani Gardens. In a burgeoning mega-city where more than half of its twenty million inhabitants lived in informal settlements, this elite gated community was developed illegally on land rightfully earmarked by the Government to house a section of these inhabitants. While the city’s fabricated urban setting was a laboratory of bustling energy, globalizing ideas and conspicuous mass consumption, I remained self-conscious of the fact that my privileged upbringing was pushing people who were marginalized by this development further to the periphery. A search for viable solutions to these inequitable living conditions led me to pursue an undergraduate degree in architecture at the University of Mumbai. I soon became disappointed with the degree’s narrow technical content and after completing my final year I began searching for alternatives. I wished to understand the circumstances under which rural communities trade-in their indigenous-vernacular lifestyles for gross inequality and poverty in urban centers. I decided to explore this further by leaving Mumbai to use my technical architectural skills in rural India.

In 2010 I was introduced to traditional building materials and practices while working with Satprem Maini-the Asian representative of the UNESCO Chair Earthen Architecture at an experimental township in southern India called Auroville. This was my first experience of using earth as a building technology and I was instantly captivated by its emancipatory potential as a great socio-economic leveler. Thereafter, my engagement with traditional material culture continued during three years of apprenticeship with Didi Contractor-an octogenarian environmental designer in Himachal Pradesh in northern India. While working with her, I was
fascinated by rich, diverse traditional systems of building construction and I realized this was where my passion lay.

Through several years of professional architectural practice in rural India, I have witnessed firsthand the wealth and diversity of indigenous knowledge for design and construction across the Indian subcontinent. I am intrigued and fascinated by traditional practices of using sun-dried mud bricks and bamboo rafters in the northern Indian state of Himachal Pradesh, cob mud walls and Neem wood beams in Telangana in southern India; wattle and daub partitions in the Sunderbans in eastern India and burnt brick arches, vaults and domes in the flat plains of Uttar Pradesh in northern India. Conversely, I have observed the large-scale loss of empirical knowledge banks as rural indigenous communities rapidly discard traditional ways of building for modern materials and practices. Since 2013 I have strived to address this duality while designing and constructing three contemporary buildings for non-profit organizations in India each of which employ indigenous building techniques and ideas. I practiced as an independent architect, travelling between construction projects in the Indian states of Telangana, Uttar Pradesh, Himachal Pradesh, Karnataka, West Bengal and Odisha. My backpack served as my office as I worked directly on site using natural building materials like earth, bamboo, stone and wood and conducted research on local built environments. Through prolonged engagements with community artisans from diverse regions, I gained familiarity with the social, political and economic problems they faced in a rapidly changing rural context. Situating my practice at the intersection of indigenous approaches to building, ecology and community, I conducted research on traditional built environments from different geographic regions, collaborated with local craftspeople and worked hands-on with natural building materials like mud and bamboo to understand the values and limits of indigenous approaches to design and construction.
These engagements were both enriching and fulfilling. But I soon realized that even craftspeople who worked with me on these building projects using traditional knowledge were not interested in applying their own knowledge to their homes. Most aspired to build their houses using modern materials like concrete, steel and glass. This stark realization led me to contextualize my architectural work in terms of its broader impact. I was building for non-governmental organizations and institutions run by well-intentioned intellectual elites of urban India. While all around me craftspeople with whom I worked on a daily basis wanted to use concrete. My architectural interventions seemed to be mere droplets in a larger ocean of change in building material technology.

I learned that the architectural profession had its inherent limitations. Less than 10% of the world’s buildings are designed and built by professional architects, environmental designers, builders or contractors. The remaining 90-98% is built primarily by residents, amateurs and members of the community often using local materials and designed to meet local needs (Oliver, 2003; Rapoport, 2006). This kind of indigenous-vernacular architecture can be found throughout rural regions of the Global South where traditional social systems and values have persisted despite industrial modernization, rapid urbanization and neo-liberal globalization (Vellinga, 2007). Importantly, a staggering 70% of India’s population (833 million people) lives in rural areas (Chandramouli, 2011) and still uses traditional ways of buildings without the help of trained professionals. The architectural community in India seemed to have no impact on them whatsoever.

**Research Questions**
Triggered by the above realization, I decided to take my practical engagements with building material technology in rural India to a conceptual and theoretical realm. I was driven by need to understand one primary overarching issue—why is there a shift in building material technology from kuccha to pucca across rural India and how do local people relate to this shift. In this thesis I use the terms kuccha-pucca to indicate a shift in building construction technology from kuccha to pucca taking place in different parts of rural India. Local materials in a region are known as kuccha materials. Kuccha in Hindi, broadly translates as temporary or impermanent owing to the time spent in maintaining, and repairing these traditional materials, and the perception that these kuccha materials do no last for a long time. The materials that fall under this banner are mud, bamboo, stone, wood, and cow dung. Therefore, the word kuccha can be used interchangeably with “traditional”, “local”, “indigenous-vernacular”, “natural” and “rural.” Similarly, pucca in Hindi broadly translates as permanent or strong. There is a perception among people that pucca materials are permanent, and last forever. There is a common understanding that once a pucca material is used, it does not need to be maintained at all. Hence, I use pucca interchangeably with “modern”, “global”, “industrial”, “factory-made”, and “urban.” I would like to state at the outset that these word choices are intended not to reinforce imagined and constructed binaries of “traditional-modern”, “rural-urban”, “natural-industrial,” and “local-global.” Rather they are intended to be used as an analytical tool to interrogate how this shift in building construction technology is taking place from kuccha to pucca. I also use the words cement and concrete interchangeably in this thesis. Cement is the binding material used to make cement concrete which also includes other materials like sand, aggregates and water. Concretes can be made of other binding materials as well like mud, etc. Since people in Kandwari village
only use cement concrete, I used the words cement, concrete and cement concrete interchangeably throughout this thesis.

These larger questions led me to think about a series of interrelated and pertinent questions. For example, why do people in rural India want to build their homes with concrete? What impact do changes in building material technology have on local communities? How does this shift in building material technology from kuccha to pucca play out in the daily lives of people? Who is impacted by changes in building materials and in what ways? Does everyone experience change in material technology in the same way irrespective of social differences of caste, class, gender, religion, ethnicity, generation and profession? What does this change tell us about the values and principles of contemporary society? Why are pucca materials like concrete so ubiquitous and popular across the Indian landscape?

Taking into account the brevity of a Master’s thesis, I decided to pursue a few of these questions in the two proceeding chapters. Chapter One presents findings from questions about why research participants thought people were favoring pucca materials over kuccha materials, to get at the hidden, implicit symbolic meanings associated with concrete use in India. This was done by asking specific questions like, why do you think change is taking place in building materials? What reasons make concrete a preferred choice of building material over mud? What kind of symbolic meanings are embedded in concrete? What other reasons are there for changes taking place in building material technology?

In Chapter Two, my main aim was to understand how local people viewed these changes and personally related to them. I focus on the qualitative aspect of these change on the daily lives of research participants by understanding how research participants experienced these changes on a day-to-day basis. This was done by asking the following specific questions: what do you
think about this change from *kuccha* to *pucca*? How do these changes in building material technology make you feel? Are these changes good or bad and why do you think so?

**Why Study Changes in Building Material Technology?**

Paul Oliver (2003) says that “indigenous-vernacular architecture consists of dwellings and all other buildings of the people. They are related to environmental contexts and available resources and are owner or community-built using traditional technologies. All forms of indigenous-vernacular architecture are built to meet specific needs, signifying the values, economies and the ways of living of the cultures that produce them. They may be adapted or developed over time as needs and circumstances change.” The study of indigenous-vernacular architecture started being taken seriously only after Bernard Rudofsky’s exhibition- “Architecture without Architects” in 1964. As Oliver (2006) notes, until then scholars and architects were primarily concerned with palatial, regal architecture of a large and grandiose scale. However, since then, this burgeoning field of study has been taken forward by many scholars.

Of vernacular traditions in architecture, Glassie (1990) notes that they record the history and values of people and society. They provide shelter and protection from the forces of nature and organize space for social activities. Rapoport (1989) argues that “traditional design is a treasure house of human experience-of successes and failures, of ways in which built environments have interacted with ecological settings and culture.” Glassie (1990) further says that “houses cannot be understood outside of their economic, political and religious contexts outside of their reality as cultural creations.” He notes that “architecture is a form of communication, to be architecture, an idea must be first realized in materials.” The above scholars make a case for the study of traditional built environments across the world. They point
out that traditional, indigenous-vernacular architecture records the history of people and they are reflection of society. If traditional architecture records the history of people, then I argue that building materials are the building blocks of this history. But what happens when building materials experience rapid changes in a short period time?

The tension between stasis and flux in traditions has animated scholars over the past few decades. Yi-Fu Tuan (1999) argues that traditions oppose creativity that traditions can accommodate change but not radical or revolutionary change. Paul Oliver (1989) seemed to be arguing that traditional architecture is fixed, stagnant and is not capable of undergoing any change whatsoever either incremental or radical. In Tuan’s eyes traditions in general can accommodate change but it is more gradual and occurs in small increments. He says that change is imminent and normal. By this Tuan (1999) means that traditional architecture has always had the flexibility to incorporate changes as long as they were gradual and incremental. It is an empirical method of building through the years where some aspects of construction are taken forward or “handed down” (Oliver, 1989) while others that didn’t work are discarded. But if change is always present then why study it now? What’s so alarming about changes from *kuccha* to *pucca* building materials in India context?

There are two concrete concerns about these changes. One has to do with the quantity of change and the second is do with rate of change. Let me illustrate further. These days there is frenzied focus on mega-city urban issues in India from both academicians and government agencies alike. There is a grand narrative about how India is becoming urban that circulates within popular corridors of media, print and television. But we seem to forget that a significantly large portion of India’s population-833 million people (Chandramouli, 2011) still resides predominantly in non-urban areas. This means that 1/8th of the world’s population resides in
traditional houses made of *kuccha* materials and are in some process of *pucca*ification. This also means that one-eighth of the world’s population will be added to the overall pool of concrete users in the near future. Furthermore, I argue that the rate of change in building materials from *kuccha* to *pucca* only seems to have increased over the last three decades since the liberalization of the Indian economy. As Bhanu (1995) notes, the rise and growth of private cement companies coincided with the complete deregulation of the cement industry in 1989. During this phase one has witnessed tremendous growth in the production capacity of cement in India being aided effectively by the mass promotion of concrete use through advertisements and endorsements by the vested interests of cement companies. There are two major concerns with these alarming numbers. One is to do with the environmental costs associated with concrete and second is to do with lack of knowledge of how this shift is in building practices is taking place. Let’s look at the environmental costs first.

Concrete is one of the materials along with steel, glass and paint that forms the palette of *pucca* materials. But as Harford (2017) notes concrete is also a byword for ecological carelessness and lapses. Concrete is a composite material made of sand, aggregates, water and cement. Cement takes a lot of energy to produce and the production process itself releases tremendous greenhouse gases like carbon dioxide. On the production of cement Gross (2015) notes that the process hasn’t changed much since the early 19th century. Limestone and clay are ground into powder, mixed with water, baked in a furnace and ground into powder again. This powder is then mixed with a sufficient amount of water resulting in paste which is commonly called cement.

The main thing that’s changed over the last two centuries is the quantity of cement produced and used. Gross (2015) says that every year humans lay down nearly three tons of
concrete for every person on earth. Why is this a problem? To this Courland (2011) points out that the production of cement is one of the most polluting processes on earth. There are two reasons for this. One when limestone is processed into cement it emits greenhouse gas CO₂. Two huge amounts of coal are burnt to produce cement again resulting in greenhouse gas emissions. This means that concrete produces a mind-boggling 5 percent of the global CO₂ emissions (Gross, 2015). Engineers and architects have just started to take these energy costs into consideration with the term- “embodied energy.” Furthermore, the transportation costs involved in the distribution of cement bags from centralized production centers to remote villages also adds to its embodied energy.

Beyond embodied energy concrete also does not have the same thermal properties as local kuccha materials like mud. Pucca houses require huge amounts of energy to cool during summer and to warm during winter. An adobe house due to its thick walls has a high thermal capacity. It acts like a thermal battery, absorbing and storing the warm sunlight during the day and releasing in into the interiors of the house as night falls (Menon, 2015). It does the exact opposite during cold winter months where thick adobe walls act like a thermal insulation like an overcoat that slows down the penetration of cold through the walls, keeping the interiors warm. In this way kuccha materials regulate the internal micro-climate of a house. Pucca materials on the other hand do not have the thermal qualities of kuccha materials and hence are not effective in controlling micro-climate of the house. This means it requires more energy in terms of mechanical ventilation systems to control interior temperatures (Menon, 2015).

Additionally, both Harvey (2015) and Harford (2017) highlight concrete’s inflexibility to be absorbed back into the environment at the end of its life cycle. As Harford (2017) notes, it’s extremely flexible when making something but utterly inflexible once made. Courland (2011)
adds to this argument and says that steel in reinforced concrete was supposed to increase the strength and lifespan of structures but the design backfired. In only a few decades steel reinforcement rusts and causes concrete to crack. This cracked concrete cannot be absorbed back into the environment. In precarious times of the Anthropocene, all of these reasons - the embodied energy of concrete, its poor thermal capacity that demands the need for mechanical ventilation and its bleak incapacity to be absorbed back into the Earth’s cycle make concrete an extremely toxic and harmful material.

The second reason as to why it is important to study these changes is that although these changes mark a cultural shift in house building practices for 1/6th of the world’s population, not enough is known about how this shift is taking place. Within India there is discourse prevalent among the urban elite that changes in building materials taking place in rural India are not good. Hobsbawm (1983) analyzes this well. In The Invention of Tradition, he notes that “traditionalists” have existed since the Romantic movement in Europe. He calls them a group of intellectuals who romanticize traditions in order to preserve it in a static, unchanging state. He calls this kind of practice an “invented tradition” that should not be confused with actual traditions which continue to evolve with time. Within the Indian context there is a similar “traditionalist” movement taking place today. The popular discourse among the privileged urban elite suggests that changes taking place in rural India are bad and that “these” people should continue to reside in ecologically sound kuccha houses. The urban elite orientalize the rural population. They assume that people in rural India are swayed by symbolic meanings of concrete and its association with values of modernity and development. They vigorously hold onto these romantic ideas and practice them by living in neo-traditional homes made out mud and bamboo in rural India. In this way, the upwardly mobile elite satisfy their newfound ecological
consciousness. Yi-Fu Tuan (1999) analyzes this phenomenon well when he says that “people who have known affluence and who have found it curiously unfulfilling, yearn for a past that has more constraint… The return to something simpler, more fundamental, more traditional, is a constant temptation.” Moreover, this neo-traditional movement is not limited to architecture alone but encompass all aspects of modern life from eating habits to clothes to consumer goods and other lifestyle choices. Yet not enough is known about how this shift is taking place in rural India.

**Meaning and Materiality**

To address these pressing questions and better understand processes of transformation in building material technology, I use the dialectic tension between symbolic meaning and material production in Raymond Williams’ (1977) “cultural materialism” as a launching point for my thesis. In *Keywords*, Williams (1984) points out that culture is one of the most complex words in the English language. What started out as a noun of process of tending to crops and animals, then turned into a word denoting a process of human development through historic processes of extension of meaning by metaphor (Williams, 1984). But, when one thinks of culture today, it means different things to different people depending on your disciplinary affinities. For someone from the academic disciplines of archaeology and cultural anthropology, culture generally refers to material production. While for someone from history and cultural studies backgrounds, culture refers to signifying and symbolic systems. Of this tension between the “symbolic” and the “material,” Williams (1984) notes that these two readings of culture should always be related to each other as while they are fundamentally opposed, there are also significant overlapping positions between them. It is this dialectic tension between “symbolic meaning,” and the
“material” that Williams (1977) argues is at the heart of “cultural materialism.” I use this tension between symbolic meaning and material in the two chapters of my thesis to highlight how both these aspects play an important role in (re)producing the idea of concrete use as a dominant cultural practice in Kandwari village.

In Chapter One on symbolic meaning, I draw from postcolonial and subaltern scholarship to focus on the validity of multiple meanings of concrete use in rural India. To do this, I use Klaus’ (1993) analysis of Volosinov’s (1973) attempt at grounding abstractions of language, both socially and materially. I argue that if one analyzes concrete as a language, or a sign apart from its material component, it also has a signifying meaning that is not “fixed, stable or ready-made” (Klaus, 1993). Rather, it is variable and dynamic. The meaning component according to Klaus (1993) is “open to human initiative and social conflict, thereby acquiring a ‘multi-accentual’ quality.” This rejection of single universal set of meanings has huge implications in countering dominant and hegemonic meanings associated with concrete use in India. This brings to light contestations between different social categories of people based on caste, class and gender and the politics of the same. As will be seen in this chapter, concrete means different things to different people. Research participants not only reproduce predetermined meanings of concrete, but also create new ones.

In the Chapter Two on materiality, I attempt to reorient our focus towards the material means employed in cultural practices of concrete use. I do this by drawing on a new wave of scholarship from new materialisms and infrastructure studies that calls for a radical decentering of human subjectivity (Bennett, 2006) and the methodological treatment of non-human objects as ethnographic research subjects (Whatmore, 2006). By highlighting the affective and effective properties of concrete and the feelings and emotions it creates in research participants, I argue
that the materiality of concrete plays a key role in making it a popular and ubiquitous practice. An embodied engagement with the materiality of concrete creates paradoxical affects and emotions in research participants. These contradictory feelings complicate simplistic, macro understandings of changes in building material technology taking place in rural India from kuccha to pucca.

I then conclude the thesis by drawing on McFarlane to look at concrete use in my case study as a “sociomaterial assemblage” (McFarlane, 2011). This helps frame my research findings as a dynamic relationship between the social and material aspects of concrete use in my field site that make it a dominant and ubiquitous practice. This I call a puccafication of social life.

Locating the Field
As a professional architect in India, I have worked in rural parts of Himachal Pradesh, Uttar Pradesh, Telangana, Karnataka, West Bengal, Odisha and Maharashtra. As a general pattern, one can see rapid changes in building material technology taking place in all these places. Then what makes Kandwari village in Himachal Pradesh a suitable case study for this research. Why is Kandwari village a good field site to interrogate practices of using concrete as a
house building material? There are a few reasons that mark Kandwari village as an ideal case study.

Kandwari village is located around 40 kilometers from closest urban center-Dharamsala, which is also the winter capital of the Indian province of Himachal Pradesh. The Kangra valley is one of the wettest parts of Indian subcontinent rivaled only by Cherrapunji in Meghalaya. Every year the south-west monsoon winds make their way up the western coast of peninsular India while picking up moisture from the Arabian Sea. Kerala, in southern India is the first region of the Indian subcontinent to face the fury of the south-west monsoon winds. Thereafter, the monsoon winds slowly move along northward bringing relief to countless human and non-human lives in the parched landscape of the Indian plains. The heavy clouds finally collide with the majestic Himalayas in the north and drench the windward side of the mountains. The moisture laden monsoon winds cannot travel any further north as they are obstructed by the height and size of the Himalayas, thereby unloading all its remaining moisture on the windward slopes of the mountain. The Kangra valley lies on these slopes.

Due to the local microclimate of the place the Kangra valley of Himachal Pradesh is blessed with an abundance of natural building materials like bamboo groves, high clay-content soil for adobe, gray sandstone, pine and deodar forests for wood and small mines filled with slate stone for roofing. Traditionally, houses in the Kangra valley have been built using these local materials (Menon, 2015). These materials are known locally as *kuccha* materials.

Bamboo is known as green gold in the contemporary times by the architectural fraternity. Its tensile strength is said to be more than that of steel, and this makes it a good material to span free lengths. Bamboo also needs a lot of moisture to grow and the heavy rainfall in Kangra valley makes this a good region for it. The clayey soil in the region is also good to make adobes or sun-
dried mud bricks of the size-18 inches by 12 inches by 6 inches. Due to the low compressive strength of adobe, it is required to have thick 18 inches walls to take the load of the roof and floor above. Adobe is also susceptible to erosion and damage by water. The heavy rainfall in the region does not help these material qualities of adobe. This deficiency in adobe is overcome by designing roofs to have deep overhangs for protection from rain and by constantly maintaining the house. This is done through processes of plastering exterior and interior walls with wet mud and cow dung plaster which is known in Hindi as lipai (Menon, 2015).

Figure 2: Houses in the Kangra valley (Credit: Author).
The physical geography and micro-climate of the Kangra valley make it an extremely resourceful place in terms of natural *kuccha* building materials. As described above, there is an abundance of local materials from adobe and bamboo, to stone and wood available in this region. This traditional vocabulary of architecture gives rise to uniquely innovative and creative building solutions that have been employed here for centuries. They have been empirically tried, tested and passed down from one generation to another primarily through oral means of transmission (Marchand, 2009). Furthermore, in Kandwari village one can still find craftspeople who know how to use this traditional knowledge of building. Local community members are still commissioning houses to be built in mud, and bamboo. Hence, local craftspeople still know how to build with mud and bamboo. This traditional knowledge has not been completely lost yet.

Secondly, the process of *pucca*ification has not entirely taken over the local landscape of Kandwari village. This fact does not hold true for some other parts of the country where one
cannot find any *kuccha* houses whatsoever. They have all been completely transformed to become *pucca*. This is not the case in the Kangra valley in general and in Kandwari village. The rate of change in building materials has certainly increased since the first time I went there in 2011 but one can still find plenty of houses in the village that are still predominantly *kuccha*. Also, there is a spatial aspect to these changes. More *kuccha* houses are found in hamlets that do not have direct access to a metaled tar road. These hamlets are located on higher slopes of the valley where state led development projects like roads have not yet been implemented.

Lastly, according to conventional developmental metrics, the province of Himachal Pradesh is one of the most “developed” states in India along with Kerala, Goa and Punjab. Himachal Pradesh is regularly ranked highly in the human development index charts that measure objective standards of electrification, access to clean drinking water, schools, hospitals and sanitation infrastructure. This makes it an extremely interesting field site to study in terms of the contradictions that exist among local people about ideals of development and modernity and how they intersect with traditional building material technology. All of these reasons qualify Kandwari village in Himachal Pradesh as a apt case study for my thesis.

**Research Methods**

Ethnographic field research was conducted from 2011 to 2014 while working as site architect for the Sambhaavnaa Institute of Public Policy & Politics in Kandwari village. Thereafter, ethnographic data was collected on and off from 2014 to 2016 as I worked as a travelling architect in different parts of rural India. During this time, I worked as the primary architect for the Linger Guest House in Kandwari village which allowed me to return to the field site once every couple of months. Then in 2017, I did a short return visit to clarify concepts and
talk further on some of the issues discovered earlier which I have presented in this thesis. Over the next two chapters, I draw from follow-up interviews conducted in 2017 which builds on the long-term relationships and understandings that I established with my research participants from 2011 to 2016.

Data collections methods used were *participant observations, semi-structured interviews, focus groups* and *walking tours*. This data was collected from two sets of research participants—community members of Kandwari village and craftspeople of Kandwari village. I wanted to understand how both these sets of people related to changes in building material technology. Community members of Kandwari village are involved with decisions about building materials and engage with them on a daily basis. It was important to know what they felt about these changes as they were an integral part of it. The livelihoods of craftspeople are directly impacted by change in building material technology. Hence, they proved to be a crucial element of this research puzzle.

Care was taken to distribute the research participants across social boundaries of caste, class, gender, ethnicity, age and profession in order to reflect a representative section of Kandwari society. Due to the spatial geography of caste distribution in Kandwari, data was collected from three different locations in the village. Research was conducted with the upper caste *Thakur* community in the hamlet of Nain located on the upper slopes of Kandwari village. Research was conducted with the *Gaddi* community in the hamlet of Spadow. The *Lohaar* community was located in central Kandwari near the village chowk, and research was conducted with the lower caste *Chamaar* community in the lower hamlet of Nain. A research assistant from each caste group was needed to be my point of entry into these hamlets. Each of my research assistants—*Thaakur* Mekraj, *Gaddi* Palakram and *Chamaar* Rojhanlal had worked with me during
my time here as an architect. We trusted each other and were friends. It is through their extended caste-based networks that I could conduct further research with other participants in their respective hamlets.

Data was collected from 21 research participants. Over a period of five years from 2011 to 2016. Follow-up interviews were conducted with the same research participants in 2017 which built on data collected in prior years. Participant observations were conducted at community member’s homes and at building construction sites of craftspeople. Semi-structured interviews were primarily conducted at homes of research participants as it was a lot quieter to do it here. One focus group interaction could be conducted. This was done with Chamaar women in the lower hamlet of Nain. It was conducted at one of their homes during the day when the husband and children were away. This one focus group itself gave me a lot of rich data which has not been included in this thesis. I will be using this data in another research paper that focuses solely on the gendered aspect of building material technology in Kandwari. Walking tours were conducted with research assistants who were also participants in the research. Since, commute time to spatially separated hamlets by foot in some cases took up to an hour, these journeys also proved an effective method of collecting visual images of changes taking place in the village. It was interesting to note the conjunctures and disjuncture between my ideas of change in building material technology and those of my research participants. Pseudonyms of research participants have been used throughout the thesis.

Ethnographic data was collected through extensive note-taking as well as voice recordings. Both these initial sources were then transcribed later by me electronically. Since the quantity of data was manageable, all transcribed data was coded and classified by hand. Analysis was conducted with the aid of Johnny Saldana’s (2012) insights on qualitative research analysis.
Analytical memos formed a significant portion of my research analysis. The themes and concepts that are a part of this thesis were directly derived from the numerous analytical memos that were written and combed systematically through.

I have been mindful of practicing a methodology that Unni Wikan (2012) calls “ethnographic resonance.” By this, she means a process of going beyond language, by focusing on hidden meanings embedded in subtle body cues and signals that usually get overlooked. I have also been mindful of Whatmore’s (2012) call for beefing up our familiar humanist methods to practice a “more-than-human” geography by treating objects like concrete as research subjects. Christina Schwenkel’s (2015) advice for moving “beyond the ocular” analysis of things has come in handy for the same. This has been done by focusing on the affects, feelings and emotions that are produced in research participants through embodied acts of touching, feeling, hearing, and smelling concrete.

Throughout the thesis I introduce the community member’s local vocabulary to describe tools, building materials, architectural features and other salient objects and concepts. The Kangra valley represents a complex multilingual context where several languages are regularly employed in daily communication. Most prominent is the region’s lingua franca- Pahari which is a dialect of the Hindi language spoken in the northern parts of India. Hindi, India’s national language and English, India’s language of the elites, are also widely spoken, along with Punjabi, Chambiali and Gadiali. But, Pahari is predominantly used on building construction sites between laborers, masons and carpenters.

For the benefit of non-linguist and non-specialist readers I have employed a simple form of transliteration whereby the spelling of non-English terms is restricted to roman letters to stress pronunciation. I have tried to maintain the most conventional spellings taken from sources
wherever possible in order to facilitate the reader’s recognition of terms. For this, I follow the system in R.S. McGregor, *The Oxford Hindi-English Dictionary* (Delhi: Oxford University Press, 1993). Definitions for non-English terms are provided in the text at the firsts mention and a glossary is included at the beginning of the thesis. Hindi terms are pluralized in the English manner by adding an *s*.

No research on the Indian subcontinent can be conducted without touching upon the topic of the caste system. Caste in India is an extremely complex issue. As an institution, it has been a part of the South Asia landscape, right since the first Hindu scriptures were written more than 2000 years ago (Rege, 2013). What started out as fluid classification of crafts and trades morphed into rigid dictates and codes over a couple of millennia (Dirks, 2001). As Dirks (2011) notes, this codification intensified during the 190 years of British colonial rule from 1757 to 1947. In contemporary India, the caste system acts like a vertical hierarchy of social life. To use Gandhi’s (1993) simplistic terms, the caste system is divided into 4 *varnas* or clans starting from the top-Brahmins, Kshatriyas, Vaishyas and the Shudras. At the bottom of this social pyramid are the untouchables or Dalits (Ambedkar, 2014). They are the most oppressed and marginalized caste group among all and are at the receiving end of caste-based hatred and violence daily in India (Omvedt, 2011). No research in the Indian subcontinent can be complete without a mention of caste, and hence I attempt to explain it (simplistically) here. For a more detailed and nuanced analysis of caste and oppression in south Asia please refer to Ambedkar (2014), Nagraj (2010), Rege (2013), Omvedt (2011) and Dirks (2001).

Caste in India is also a very spatial creation. While Gandhi’s (1993) attempted classification is a useful beginning to understand caste, caste groups are complicated to define and classify, and measure thousands in number. Caste groups that exist in one part of India also
do not exist or co-relate with caste groups in other parts of India. There are multiple caste groups in the Kangra valley and historically they have been associated with specific trades. While this thesis does not deal with caste hegemony in the Kangra valley, I introduce caste groups descriptively with a focus on their connections to the building construction trade as well as their (and my own) positionality. I therefore provide a brief introduction to that system here.

The *Thakurs* are landlords in the Kangra valley and have traditionally lived in hamlets on the upper slopes of the valley. In Kandwari they live in the hamlet of Nanahar. This ensured that they had access to clean air, drinking water and an abundance of natural building materials from the forests. The *Gaddis* are lower than the *Thakurs* in the social hierarchy but are a respected group in this region. Traditionally, they lived in the hamlet of Spadow which is located slightly higher than the Kandwari village square. Historically, they have been associated with rearing sheep and *Gaddi* men would spend many months of the year high up in the mountains taking their flock of sheep from one green pasture to another. The *Gaddis* have also been given special protections and provisions under the Scheduled Caste/Scheduled Tribe (SC/ST) Act of the Indian constitution as they are considered a scheduled tribe. This allows them to take advantages of special reservations and quotas in governmental schools, colleges and jobs.

The *Deewans* or *Lohars* are lower than the *Gaddis* in the social hierarchy. The *Deewans* were formerly Muslims from the plains of Punjab who fled to the hills to escape religious persecution during the partition of 1947. The Kangra valley was formerly a part of the Punjab province that got divided between the newly formed states of India and Pakistan in 1947. The *Deewans* then converted to Hinduism. This caste group is renowned for its hand-based skills like carpentry and ironmongery. The *Chamaars* are the lowest caste group in the Kangra valley. They are also known as untouchables, *Harijans*, and the more politically active term-Dalits.
Historically, they have been associated with the task of disposing dead cattle. The word *Chamaar* is derived from the word *chamadi*, which in Hindi means the skin of a dead cow. In Kandwari village, they live in the lower marshy parts of the valley in the hamlet of Nain. The *Chamaars* are classified as a scheduled caste by the SC/ST act of the Indian constitution. Like the Gaddis, they also have access to special reservations and quotas in government schools, colleges and jobs. In this manner, the vertical hierarchy of social life in Kandwari village literally manifested itself in the spatial geography of caste group hamlets in Kandwari village.

**Outline of the Thesis**

This thesis is divided into two chapters. Chapter one-*Meaning* deals with symbolic meanings of concrete in Kandwari village as understood by research participants. It starts with ethnographic data of research participants who associate concrete with universal ideals of pride, progress and modernity. Thereafter, I draw from existing literature to make the case for how concrete became a modern material through colonial rule and subsequent post-colonial development in India. The chapter then discuses meanings of modernity and how postcolonial and subaltern scholars have looked at it. I then analyze ethnographic data from two research participants who appropriate universal meanings of concrete and practice them in their own unique and nuanced ways. Drawing from the scholarship of Sivaramakrishnan and Agrawal (2003), I frame these appropriated meanings of concrete as “regional modernities.”

Chapter two-*Materiality* draws from recent scholarship in new materialisms and infrastructure studies to look at the “more-than-human” agency of concrete. This chapter looks at concrete as a research subject by focusing on the affects and emotions it creates in research participants. Drawing on scholarships from the “material turn,” I argue that the materiality of
concrete produces “paradoxical” feelings and emotions among research participants in Kandwari village. Through these paradoxical feelings and emotions, the material comes to life for research participants as the same material is spoken of in different ways by different people. Hence, this materiality of concrete complicates homogenous notions of changes in building materials taking place in Kandwari village.

In the concluding section of my thesis, I make an argument for the theorization of social life by following everyday objects and things. This I call as puccafication of social life. By following on the flow of concrete in Kandwari village I have attempted to highlight various issues and contestations that are simmering under the surface between categories of people. The materiality of concrete helps in producing social relations in Kandwari village that are highlighted through ethnographic data. The practice of using concrete in building forms a “sociomaterial assemblage” (McFarlane, 2011) of disparate elements like gender, caste, class, profession, generation, ethnicity, nationalist ideas, regional appropriations, materiality, micro-geography, roads, water, sand, stones, mud and houses. All these factors act together in a way to situate concrete not only as mere building material, but as an important mediator of social relations within Kandwari village. This puccafication process that is taking place in Kandwari village is a key agent in organizing and cementing social life around concrete usage. Moreover, as McFarlane (2011) notes, it is process that is not fixed and stable. Rather, like concrete that continues to gain strength throughout its life cycle, the process of puccafication is dynamic and always changing. It is assembling.
Chapter One: Meaning

The Metaphoric Material

Pride

It was a warm, humid summer day in the middle of July in the Kangra valley of Himachal Pradesh. I was in the hamlet of Nain on the lower slopes of Kandwari village. Nain was inhabited by the Chamaar community. Rojhanlal informed me that there weren’t too many houses in the hamlet of Nain that were still kuccha. Most houses had already become completely pucca or were in some stage of puccafication. Due to their geographic location at the base of the valley, the Chamaars had accrued the fruits of state-led development initiatives like roads and allied infrastructure. Access to roads also meant easy access to market products. Trucks could transport pucca materials like cement, steel, and glass from far-away production centers right up to people’s doorsteps. This ease of access to industrial building materials had radically altered the built environment of Nain. Pucca was now becoming the norm.

On further inquiry I was told that there was one kuccha house left in the village that was still inhabited. Most others had either been demolished to build new pucca homes or had been completely abandoned. I asked Rojhanlal to take me to this house. We walked through lush green fields of rice paddy as we meandered our way atop narrow bunds and embankments. These bunds were built of mud to hold water for the paddy during the growing season. They also served as temporary elevated pathways, but one always had to be careful not to fall into muddy waters below. As we walked along, Rojhanlal pointed out the houses that had been puccafied in Nain over the last few years. The sheer number of pucca houses that now stood cheek by jowl was
spellbinding. After tip-toeing our way across mud bunds we finally arrived at the lone kuccha house in a larger ocean of pucca homes.

As we turned the corner around its soft, lightly-cracked adobe wall, we notice a very inviting lean-to, south-facing verandah in front of the house. It was a hot day, and we both were relieved to take temporary shelter in its shade. This was an exquisitely maintained kuccha house. Care had been taken to plaster its walls, and floors with mud and cow dung on a regular basis. It still smelt of fresh cow dung plaster that was probably applied on the walls that morning. These were clear signs of habitation and care. There were other run-down kuccha houses scattered in the vicinity. Their owners had long abandoned them. For most, the cost of breaking down and rebuilding kuccha homes was much more than abandoning it and building a new pucca house altogether.

From the cool shade of the verandah we could hear the cacophonous sounds of a local Hindi TV channel blaring out from the dark interiors of the house. Rojhanlal went up to the front door and hollered to someone inside. I could hear movement inside the house and out came Muldhiramji. Seeing us, he went back inside, switched off the television and promptly came back out with a couple of synthetic plastic chairs. He sat on one of them and offered the other to me. Muldhiramji was an old, wiry man with a greyish-white stubble. Born in 1938, he still lived in his old kuccha house which had been in his family for generations. His eyes were warm and friendly. It felt like he had experienced a lot during his life. Muldhiramji had served in the Indian army until his retirement. In this part of the country, the armed forces were one of the highest profiles jobs that once could aspire for. Men who were enlisted were in high demand for marriage alliances and could therefore demand a huge dowry (dahej) from the girl’s family. Due
to his military background, Muldhiramji was respected in the larger community even though he was a lower-caste Chamaar.

Like other older men in the region Muldhiramji wore a loose grey Indian shirt (kurta) and a black woolen jacket. Atop his head stood the classic Kangra hat (topi), a hand-woven, round hat with colorful designs, and patterns in red, yellow, orange and green hues. This helped keep a person’s head warm during the cold winter months of Himachal Pradesh. The colors of his hat matched the colors of the flower garland strung across the front door of his house. This garland was a symbolic Hindu gesture that carried meaning. It was tied during festivals and auspicious days to welcome Gods and Goddesses into homes. Little did Muldhiramji know that he was soon going to be asked about the symbolic meaning of another material element—concrete.

Muldhiramji was conversant in Pahari1— the local dialect of the Kangra region. He was also short of hearing. Rojhanlal had to shout into his ears to communicate with him.

“Yeh shaan ki baat hai,” said Muldhiramji, in response to my question on his reasons for change in building materials in the village. Shaan in Hindi, broadly translates as pride. He said pucca materials are associated with pride. If you had a pucca house in the village, it meant that you were a wealthy, moneyed man. This might not be the literal case, but this was the impression that an outsider got. Due to this association of the value of pride with concrete he said people would go to great extents to build a pucca concrete home. They might not have the immediate financial resources for the same, but they still attempted it even if that meant incurring huge economic debts.

To illustrate his point further, he pointed across the courtyard to the bright pink brick and mortar house in the distance. This house was a stark contrast to Muldhiramji’s house. It had baked brick walls and pillars with semi-circular arches and a flat concrete roof slab. These design
features were not part of the local vernacular palette of the region. In fact, some of them were lethal and dangerous due to the Kangra valley’s geographic location in a highly active seismic zone that experienced regular earthquakes. Arches carry the load of a roof down to ground in compression—a force that does not work well during the lateral movements of an earthquake. Similarly, flat concrete slabs are heavy and capable of instantly killing occupants of the house in case of failure due to an earthquake. In fact, the last major earthquake in 1905 had completely decimated villages, destroying lives and flattening homes. Traditional *kuccha* houses were designed to meet these challenges. Contemporary *pucca* homes seem to have forgotten these lessons and thumb-rules.

On further inquiry, I was told that this pink *pucca* house belonged to Muldhiramji’s son. He again said that it was matter of pride and prestige for his son and his family to live in a modern *pucca* house. His children considered him backward for staying on in the old family *kuccha* house. The younger generation did not want to live in *kuccha* homes. *Kuccha* homes carried a stigma and hence they lived separately. He concluded his point in a melancholic tone and said that this might be the last generation that lived in *kuccha* homes. After him, no one would live in it. Like him, his *kuccha* house would die and fade away.

I left this interaction with Muldhiramji with many unanswered questions in my head. How exactly did concrete signify pride? Why did people of Kandwari village consider living in a *pucca* house as prestigious? Through what historical processes had concrete become a material embodiment of abstract values like modernity and progress? Moreover, I was keen to find out how these implicit meanings inscribed in concrete were practiced in the daily lives of residents of Kandwari village? Could there also be variations in meanings of concrete among people from
different socio-economic categories of caste and class? I was determined to pursue this line of inquiry further.

**Progress**

The famed hamlet of Spadow was situated on the upper slopes of Kandwari village. Spadow was the ancestral settlement of the *Gaddi* people. The *Gaddis* were nomadic tribes who had been bestowed with special considerations as a ‘scheduled tribe’ within the Indian Constitution. Due to their historically marginalized status they were legally entitled to a quota of reserved seats in government jobs and public schools and universities. Traditionally the *Gaddis* have reared sheep, often spending months at end high up in green mountain pastures. Within the social hierarchy of the Kanagra valley, they are a respected caste group and are higher than the *Chamaars*.

My research assistant Palakram (a *Gaddi* himself) and I arrived at Spadow around noon time. The hike from Kandwari village center (*chowk*) took us about an hour on foot. The metaled tar road goes only up to the center of the hamlet. Here is located the local primary school, a Hindu Hanuman temple and a few grocery (*kiraana*) stores. From here on, the path uphill to Spadow settlement was a slippery, potholed *kuccha* road. The road twisted and turned through pine (*Cheer*) forests and crisscrossed the gushing Ava stream (*khud*). As we made the arduous hike up, we were passed by noisy, rickety tractors carrying cement bags and people to the small-scale hydro-power plant located upstream. Soon enough, the houses of the hamlet were visible in the distance. Along the way we came across many *kuccha* houses. Some were visibly uninhabited and had seen better days. They were run-down and derelict. Green algae and moss had taken over their facades. Slate tiles of the roof had been broken by mischievous monkeys. Other houses were in different stages of *puccafication*. Locals called them *kuccha-pucca*. They
were “hybrid” houses (Gupta, 1998) which had both *kuccha* and *pucca* materials. I asked Palakram to take me to a lived-in *kuccha* house. He said that he knew of one.

Palakram and I arrived in the central courtyard of Pramesh Kapoor’s house. It was a large ancestral one-story *kuccha* house consisting of three C-shaped wings enclosing a south facing central courtyard. Most traditional houses of the Kangra valley had a south facing courtyard and verandah. Due to the apparent migration of the sun towards the southern hemisphere in the cold winter months these south facing courtyards and openings allowed for deep penetration of slanting rays of the sun in the winter. This helped in heating up the interior spaces of the house and allowed the courtyard to be used for household activities like drying food grains and clothes in the winter months. In this way traditional *kuccha* homes were designed keeping in mind local weather patterns to control the micro-climate of the house. We stood in one such south-facing courtyard.

Pramesh Kapoor’s house was made of adobe, stone, wood, bamboo and slate. It had an intricately carved Cedar (*Deodar*) wood balcony that overlooked the courtyard. Adorned in natural green dyes with decorative screen (*jaalis*) and lattices, this was a gendered space from which women of the household looked down on proceedings below. Plastered in a lime wash (*chuna*) and ochre hues, one could see the discolorations of countless monsoons that the house had withstood. Moss was growing on lower stone plinth of the house. One could also notice layers of lime, and mud plaster peeling away from the walls, slowly uncovering time and memories of the past. How many people might have lived in this inter-generational house? How many hands had plastered, and re-plastered these walls?
Pramesh Kapoor was a short middle-aged man with a greying stubble and a balding hairline. Dressed in a pair of causal shorts and t-shirt, he stood in the courtyard of his house, peering over his shoulder as he saw us arriving. He immediately recognized Palakram who was like an elder brother to him and touched his feet as a mark of respect. Pramesh Kapoor ushered us into the covered verandah and quickly went indoors to return with two plastic chairs for us to sit on. Within minutes, the house was abuzz with activity due to our presence. His two young sons came rushing out to play around us in circles. His mother came out to see what the commotion was all about. Almost out of nowhere three cups of tea appeared as his wife with her veil or ghoonghat drawn over her head, placed it on the table in front of us.

Pramesh Kapoor worked as a security guard in the city of Mumbai. On hearing that I was also from the city, his eyes lit up in kind affection. He had left the village for the big city to find work due to the promise of higher wages and the allure of a better life. He was employed by a private contractor that provided vetted security personnel for different establishments in the city. These days he was back home for his yearly break and was still connected to his ancestral land. The paddy growing season demanded a lot of physical labor and he always came home during this time to help the household carry out these activities.

Incidentally, this time he had also started the process of puccafication of his house. He had hired a local skilled mason (mistri) and had begun to concretize the floors and skirtings. When I asked him why he was doing this he said that people in his community-his neighbors, friends, and extended family- considered him “backward” for continuing to dwell in a kuccha house. His over a 100-year-old kuccha house which had sheltered several generations of Kapoors and had even withstood the 1905 mega-earthquake, was now considered “not progressive enough” by the community. He further added that pucca materials like concrete, steel and paint
required huge amounts of initial financial investment to procure. This made it very difficult for him to completely *pucca*fy his house all at once. Therefore, he did this incrementally, one space at a time, one building component at a time. He saved money during his work in Mumbai and then used it to *pucca*fy a part of his house every time he returned home. During this visit, he is tasked upon concretizing the floors and skirting of walls as attested by the pile of river sand and empty cement bags in the corner.

Again, I left this interaction with Pramesh Kapoor with questions like the ones I had after my meeting with Muldhiramji. Why is concrete associated with progress? Did the physical properties of concrete adhere itself to abstract meanings of progress and prestige? Did concrete embody values that went beyond its material properties? What made Pramesh Kapoor go to extreme financial hardships to use concrete in his home? What could Pramesh Kapoor’s association with concrete tell us about universal standards of development? Is the use of concrete a material means to attain progress?

**Modernity**

We were up in the tiny hamlet of Nanahar. Nanahar lies on the upper slopes of Kandwari village and is a two-hour hike away from the main village square in Kandwari. Home to the *Thakurs* community—the upper castes of this region, this hamlet was rich in natural materials and had access to clean air and drinking water. But while its natural geography afforded it a traditional advantage in terms of the above parameters, it did not fare well in terms of universal “development” metrics like roads and access to allied infrastructure. Due to its remote location on the upper slopes of the Kangra valley state-led development initiatives had not completely reached Nanahar. The closest tarred road was still a 30-minute hike downhill. For this reason, trucks and lorries could not ferry industrial *pucca* building materials right up to these
communities. So, while there was a desire among the Thakurs of Nanahar to use _pucca_ materials, they could not freely do so. Cement bags would have to be brought up-hill by donkey. Apart from being labor intensive, this process also added to costs, hence making it prohibitive for most. Due to a combination of these reasons, one could still find many _kuccha_ houses located in Nanahar.

My research assistant Mekraj (who was also a _Thaakur_) and I were seated in the courtyard of his house in Nanahar. He lived in a _kuccha_ house like many of his neighbors. The whole hamlet of Nanahar had only two _pucca_ homes. I asked him to take me to one of them. Just a little downhill from his house, stood a big _pucca_ house. It was the time of dusk and we were losing light quickly. We skirted a couple of embankments and made our way down a rickety stone staircase that was built into the hillside by the locals. The croaking of the crickets and frogs had indicated to us that sun was beginning to set behind the Dhauladhar mountain range. There was still a sliver of light left on the horizon and Mekraj was quick to remind me of our long trek back to Kandwari village and the perils of doing so in darkness. We arrived at the front porch of the _pucca_ house. It was a large longitudinal house with a deep south facing verandah and a balcony on the first floor. Bedsheets and clothes were left to dry on the metallic railing of the balcony. It was a _pucca_ house built out of brick and concrete, but still followed the spatial vocabulary and thumb-rules of the region.

No one seemed to be at home at this time. We waited for a while in the courtyard and very soon saw a silhouette fast approaching us from afar, growing bigger by every passing second. It was Multan Singh, one of the younger generation inhabitants of the house. He grew suspicious of two strangers on his property at this time of day. On arriving closer, he was quick to recognize his neighbor Mekraj, and this dissipated his apprehensions. Multan Singh was a
young 23-year-old graduate student in Agricultural Economics at Palampur University-the closest government university to the village. He was thin, lean and clean-shaven, and was dressed in a grey shirt, black trousers and rubber sandals or chappals. He wore his shirt with the top button left open. Multan was just returning from college when we met him. Mekraj introduced the two of us. After a brief explanation of my research project and my reasons for being here I asked him his views on changes in building materials from kuccha to pucca and what he felt of the same.

Multan Singh was a bit suspicious of my research agenda at first. He wanted to know why I wanted this specific information. I explained my research project to him again, this time in more detail with reasons as to why I embarked on it in the first place. My connections and time spent in Kandwari as an architect helped in quelling some of his initial apprehension. Once he became convinced of my research integrity he began to open-up a bit more and warmed up to my inquisitive questions. Multan Singh believed that puccafication was good for the village. He said this change was taking place because they are developing and becoming more modern. In his views, even if a new house is built with kuccha materials today, it will still be stigmatized and frowned upon. He beamed with gusto and pride in front of his new pucca house.

My interaction with Multan Singh left me convinced that there were hidden meanings embedded in concrete. Multan Singh was very explicit in his association of concrete with universal concepts of modernity and development. Why did Multan Singh equate the use of concrete with modernity? Was the modernity he spoke about, the same as the ones we hear regularly in international development discourse? If not, are there other forms of modernity that help us understand changes taking place in the built environment of Kandwari village?
In the above ethnographic vignettes, three people from different caste groups, generations, professions and from spatially different parts of Kandwari village associated *pucca* materials like concrete with abstract values of pride, progress and modernity. How did a material object like concrete emphasize these “more-than-material” meanings? Through what processes did concrete become a signifier of universal ideals of progress and modernity? Before I answer these questions, let’s briefly look at the history and genesis of concrete. It is important to understand how and where concrete developed to completely grasp its popularity and ubiquity. The next section will serve as a primer to my argument for the association of concrete with the values of modernity.

**The Marvelous Material**

Concrete is “a marvelous material,” says Courland (2011) in his book *Concrete Planet*. He says that its versatility and simplicity have adapted it for everything from urban sidewalks to rural schoolrooms to modern sculpture and hence it has become a symbol of practicality and action. Therefore, it is the most used building material on the planet, as every year humans lay down three tons of concrete for every person on earth (Courland, 2011). But how did concrete become so ubiquitous across the world? Adrian Forty (2012) argues in *Concrete and Culture* that this widespread use and application of concrete didn’t happen instantaneously. It was around a hundred years in the making. Forty (2012) notes that concrete as a building material is both modern and traditional at the same time. He illustrates the latter point further by saying that concrete has been used for millennia. Concrete was used right from the first human settlements in southern Turkey almost 12000 years ago, to desert traders in modern-day Jordan and Syria.
around 8000 years ago, and to tomb builders in Greece over 3000 years ago (Harford, 2017). Thereafter, the Romans elevated the material to another level altogether with the use of a naturally occurring volcanic cement near Pompeii to build grandiose aqueducts, bathhouses, and temples (Courland, 2011).

Contemporary concrete as we know it today wasn’t used until the first half of the 19th century. This discovery of Portland cement was based on a high-quality limestone found in Isle of Portland in England. Portland cement was a better version of traditional Roman cement as it cured and hardened more quickly than the former (Gross, 2015). It was during this period that ordinary craftspeople across industrializing Europe started experimenting with concrete to make it better. It wasn’t until the mid-19th century that reinforced concrete was accidentally discovered due to such hands-on experimental practices. The credit for this discovery went to a French gardener, Joseph Monier, who was dissatisfied with the range of available flower pots. Although concrete pots were fashionable, they were also bulky and extremely brittle. He experimented with pouring concrete over a steel mesh and it worked brilliantly (Forty, 2012). Forty (2012) also notes that Monier was lucky to be credited with this discovery. As mentioned earlier, during this time there were number of people across Europe who were all simultaneously working with concrete and experimenting on it. They fed-off each other’s developments through small iterative processes. Anyone of these individuals could be been credited with the discovery of contemporary reinforced concrete.

In this way, Forty (2012) argues that concrete easily fits the bill of being a traditional material in the context of industrial Europe. It was discovered through a trial and error experimental approach that would not fit the classification of being modern and scientific. In contrast, steel and iron were the modern materials of 19th century Europe. They were made with
scientific precision and detailed calculations in laboratories and factories. Only scientists, engineers and skilled personnel had access to it, could make it and could use it. Concrete on the other hand was the material of the masses. Almost anyone who had access to cement and sand, could make concrete. Its genesis lay in the spirit of hands-on, rudimentary experimentation by unskilled labor. How then did this basic, rudimentary material become a symbol of modernity? How did it become ascribed with meanings of progress, and development?

The Colonial Material

According to Stuart Tappin (2003), concrete was first introduced in India and in large parts of the colonized world through colonial development. The first concrete structures were constructed in India in the first decade of the 20th century by British military engineers. They were bridges, harbor facilities, water tanks, roads, houses, offices, industrial and public buildings. They designed simple structures, based on technical information from European journals, patents and specifications. This phase of introduction of concrete to the Indian subcontinent was a period of experimentation and learning for both British engineers and Indian builders and craftspeople. At first, most of the raw materials had to be imported from the metropole of Britain including cement, steel reinforcement and sand. It was only in the 1920s that India had sufficient indigenous factories to produce these materials.

Once this industrial infrastructure was in place, the construction industry was steered towards reinforced concrete through strong promotion by The Concrete Association of India and The Associated Cement Companies (Tappin, 2003). As Tappin (2003) further notes, growth in reinforced concrete in the 1920s, and 1930s was largely driven by the need for large scale industrial buildings. Traditional materials like mud, bamboo, stone and wood did not have the
structural properties for large span buildings. Furthermore, this use of concrete was restricted to urban centers due to centralized production and distribution networks of cement and steel. Forty’s (2012) insistence on concrete’s rudimentary origins in low-skilled experimented labor, also helped it to become a material technology of the masses according to Tapping (2003). The subcontinent, and large parts of the developing world have low labor costs and a large labor pool. These qualities have led concrete to become a widely used material.

There are three parts of Tappin’s (2003) argument that I will use to make my case for the association of concrete with colonial modernity. Firstly, the use of concrete increased due to the need for large scale industrial buildings. Traditional building materials like mud and bamboo can only be used to make buildings of a certain size and scale. In the Kangra valley, traditional houses did not have a roof span of more than nine feet. This was because Pine wood rafters measuring more than nine feet were not economically feasible to procure (Menon, 2015). One could not build more than nine feet width buildings without incurring huge financial losses. This was the economical span of local houses and everyone followed these rules of thumb. The malleability, tensile strength and plasticity of concrete changed this dynamic completely. Suddenly, one could have buildings as large as one’s heart desired. Brian Larkin (2008) analyzes this aspect of colonial technology well when writing of cinema infrastructure in Nigeria. He says that it had an effect of “colonial sublime” on indigenous population of Nigeria, who were mesmerized by cinema and motion pictures. Never before had they seen anything like this and were in awe of it. According to Larkin (2008), the intent of using infrastructural technologies in colonial rule was to evoke emotions of awe and aspiration among the colonized people. The building of bridges, factories, railroads, were all ways of creating a visual spectacle as part of colonial power. The idea of the “colonial sublime” worked in two ways, he says. The first way
was that it created a distinction between the colonized and the colonizer through the mediation of technology. Secondly, the same technology was offered as a mode of development. By using it, it allowed people a way to become modern and to overcome one’s oriental “otherness” (Said, 1979). Similarly, concrete as a building material could do things that traditional materials like mud, bamboo and wood could not. It evoked feelings of awe and aspiration among the local people much like the effect cinema had on Nigeria’s colonized population.

Secondly, Tappin (2003) argues that the use of reinforced concrete was restricted to urban centers in India due to limitations of its centralized production and distribution systems in colonial India. This aspect changed drastically with the building of roads and allied infrastructure through successive five-year plans by the post-colonial state. Roads allowed cement and steel to be transported to remote villages via trucks and lorries. Concrete became accessible to rural households through state-led mega projects and development initiatives.

One such mega project was the construction of large-scale hydroelectric plants on subcontinental rivers. In 1954, independent India’s first prime minister, Jawaharlal Nehru, coined the famous term- “temples of modern India” while speaking at the inauguration of Bhakra Nangal Dam in Punjab (The Hindu, 2015). Newly independent India was an energy-starved country and mammoth hydro-electric projects like the Bhakra Nangal dam were expected to provide energy security for the development needs of the young state. Understandably, due to its structural properties, concrete was the material used to build these large infrastructure projects. Therefore, if dams were the “temples of modern India,” then I argue that concrete was the material of modern India. Concrete was also the material of choice for French modernist architect, Le Corbusier, who was invited by Nehru in 1952 to design and plan the new capital city of the partitioned province of Punjab, Chandigarh. Of the brutalist concrete architecture in
Chandigarh, Nehru said, “It is the biggest example in India of experimental architecture. It hits you on the head and makes you think. I like the creative approach, not being tied down by what has been done by our forefathers but thinking in new terms… In the ultimate analysis, a thing which fits in with the social functions is beautiful” (Scroll.in, 2018). Here again, if Chandigarh was an example of a new experimental architecture that look towards the future without being held back by tradition, concrete was the material of this new modern architecture. This nationalist discourse propagated by the post-colonial state in India helped concrete become a metaphor for modernity.

The last point that Tappin (2003) makes is about a concerted push for the use of concrete by cement companies and associations like The Concrete Association of India, and The Associated Cement Companies. Concrete buildings were first designed by British military engineers and the Public Works Department (PWD) of the colonial Government. But construction practices for concrete were soon over-taken by private architectural and engineering practices which were primarily located in Bombay. From 1914 to 1929, India’s cement usage almost quadrupled to 632,653 tons, and 90% of it was produced by 10 Indian companies, while the rest was imported from Britain (Tappin, 2003). Bhanu (1995) notes that since the second world war right until 1982 the cement industry was under a regime of price and distribution control. In 1982 it was partially decontrolled. In 1989 it was totally decontrolled like many other industries as the Indian economy transitioned into the deregulated neoliberal phase. During this phase, the cement industry registered significant growth, growing from an initial installed capacity of 29 million tons to 60 million tons. By 1988, the cement industry was 87% owned by private companies. The remaining 13% was owned by the Cement Corporation of India and state government owned private companies. While there was an explicit push towards extensive use of
concrete by private companies in India during the early part of the 20\textsuperscript{th} century (Tappin, 2003), this push was accelerated during the deregulated phase of the Indian economy. With massive growth and development in media technology during this phase (Appadurai, 1996), it became easier for cement companies to propagate their views about concrete use. They no longer needed road networks to transport cement to remote villages and households. They used the networks of media technology-print, radio, TV and, internet to transmit their views with the aid of flashy advertisements and celebrity endorsements.

In these ways, the discourse of concrete and modernity was propagated throughout India during different phases. What started out as an integral part of the colonial project of modernization in the early 20\textsuperscript{th} century was soon appropriated by the post-colonial state in its mega development projects post 1947. Over the last thirty years, this discourse has been carried forward by the vested interests of private cement companies and their associates to make concrete a metaphor for modernity in India today.

The Modern Material

In his introspective article on concrete in India, Duncan McDuie-Ra (2018) labels concrete as a building material that “materializes aspirations of being modern.” He echoes Adrian Forty (2012) who calls concrete a “material through which our modernity is mediated.” But what do we mean by modernity in the first place? Does modernity mean the same thing for both these scholars? If so, does their meaning of modernity match those of research participants in Kandwari village?

There have been many attempts to understand the meaning of modernity. Habermas (1985) describes modernity as a “rationalization of life worlds that became more distinctly
visible in eighteenth century Europe with universalization of norms of action, generalization of values, and patterns of socialization centered on individuation." According to Habermas (1985), the “project of modernity” started with the Enlightenment period in Europe in the 17th and 18th century. Lefebvre (1962) makes a distinction between modernism and modernity, defining modernity as “the beginnings of a reflective process, a more-or-less advanced attempt at critique and auto-critique, a bid for knowledge.” This is further articulated by Jyothi Hosagrahar (2005) who calls modernism as a “state of being,” which appears to be the sole propriety of the developed west. She calls modernization as a systematic process to achieve that “state of being.” It is personified by high art, culture, architecture and design. French and American modernist architects, Le Corbusier and Louis Kahn, were symbols of this modernism. Both had an important role to play in South Asia, with the propagation of this discourse that is materially mediated through their architectural works in concrete. David Harvey (1989) refers to modernity as the “accumulation of knowledge for the pursuit of imagination, and the enrichment of daily life.” In these definitions of modernity, there is a Euro-centric tendency to look at this process as a singular whole that emanates from the Western world through a process of globalization and development practice and that engulfs local cultural traditions to homogenize them all. It assumes that the effects of global modernization are experienced homogenously in different parts of the world to create similar outcomes and results.

This universalizing ideology has been challenged by more culturally and spatially nuanced understandings of modernity by postcolonial and subaltern scholars alike. These scholars argue that modernity occurs at differing and varying scales. There is one occurring nationally which Chatterjee (1997) calls “national modernity.” This occurs at the scale of the nation-state and is important in postcolonial states for the creation of a national identity. One can
see an aspect of this “national modernity” with Nehru’s rhetoric on dams as “temples of modern India.” “Regional modernities” (Sivaramakrishnan and Agrawal, 2003) on the other hand, occur at a lower scale. It is a process that takes place with its own temporal and spatial considerations and particularities. Chatterjee (1997) says that “there cannot be just one modernity irrespective of geography, time, environment, and social conditions. The forms of modernity will have to vary among different countries depending upon specific circumstances and social practices.”

An important consideration in these arguments, is the temporal uncertainty of modernity. As Asher Ghertner (2015) points out in his analysis of the displacement of informal settlements in the millennial New Delhi, the parameters of modernity are constantly in debate and are always mutating. This is also alluded to by Chatterjee (1997) calling non-Western modernity as an “incomplete project.” Failure and incompleteness are part of the universal discourse of modernity. Partha Chatterjee (1997) adds to this argument by stating that the colonized “other” can only “aspire, seek, adopt, or mimic modern forms in the dominant world.” S/he can never become completely modern. Akhil Gupta (1997) further notes that modernity has a “few stable referents like progress, teleological beliefs, the privileging of reason and skepticism, and the reorganization of collective identities around the territorial nation-state.” Arjun Appadurai (1995) says that “modernity is decisively at large, irregularly self-conscious, and unevenly experienced.” All of these perspectives counter the totalizing discourse of modernity, and modernization as a homogenous, unilinear process. They speak of the multiple practices and appropriations of modernity that are more situated, complex and nuanced.

The next part of this paper will build on the “regional modernities” framework put forth by Sivaramakrishnan and Agrawal (2003) on the multiple identities of modernity that are “unevenly experienced” (Appadurai, 1995). Ethnographic field data suggests that in Kandwari
village, meanings of concrete are intertwined with universal meanings of pride, progress and modernity. These were illustrated through the experiences of Muldhiramji, Pramesh Kapoor, and Multan Singh, in the first section of this paper. But ethnographic field data also suggests that these universal meanings are appropriated by community members of Kandwari village and practiced in completely contradictory and inconsistent ways.

The Contradictory Material

“Dekho-Dekhi”

“Yeh sabh dekho-dekhi hai,” he said. Zamlesh Kumar was a 27-year-old carpenter from the village of Sidhbari, a few kilometers away from Kandwari. I met Zamlesh Kumar in 2011 when I first arrived in the village as a novice architect armed with a university degree. We both were of a similar age, but we were on different ends of the social and economic spectrum. I was born and raised in a big city of 20 million inhabitants. He came from a small village of 1500 inhabitants located more than few thousand kilometers from the nearest metropolis of New Delhi. Due to these circumstances, I came to Kandwari as the site architect and in the vertical hierarchy of work, he reported to me.

Zamlesh had always been a shy and reticent person. I remember him quietly sitting in his corner of the carpentry shed, sawing and chipping away at a block of wood, creating tangible meanings out of inert materials. Even while the other craftspeople lazed around at times, Zamlesh carried out his work diligently. We always had friendly interactions with each other. He was curious about my life in the big city as I was curious about his life in the village. Zamlesh was introduced to carpentry just after graduating high school. He was a Gaddi and historically his forefathers had reared sheep. Zamlesh was not interested in his ancestral trade and after
finishing school, decided to get into this new profession. He had been a carpenter now for around 8 years. At first, he worked in the local carpentry shop in his village. Here he learnt the basics of the craft and produced standardized designs of cupboards, cabinets and frames. He worked hard and long hours on a motorized planer machine tool, doing the same monotonous job, day in and day out. Eight months into this job, he decided to quit due to a lack of growth in his skills. Thereafter, he started working with American octogenarian designer-Didi Contractor. Here he expanded his skills as a craftsperson and developed into a reliable and capable carpenter.

I met Zamlesh now at his woodshop in Kandwari village where he was busy refitting window frames. He wore a round neck t-shirt and an unbuttoned checkered shirt along with a pair of shorts and rubber chappals. His eyes lit up with an aura of familiarity as he saw me approaching from a distance. Zamlesh had changed a lot since the time I first met him. I remember him as a young apprentice carpenter who was shy but also eager to learn new things. He now assumed the role of a seasoned and skilled carpenter. His shaggy appearance also added a few years to his actual age. We spoke for a bit about my experiences in the US and about how life had changed in the village. We spoke of friends and fond memories of the past as we exchanged stories since the last time we met. I finally got down to my research project and explained it to him. I asked him about his thoughts on change in building materials in the village and why he felt this change was taking place.

Zamlesh said this was all an act of “deko-dekhi”. By this he meant that people copied the practices of their neighbors which was like the idiom- “keeping up with the Joneses.” He added that it had now become “fashionable” to build pucca homes. In earlier times, people built kuccha houses as all necessary materials were available locally. Earth for adobe was available right beneath your feet. All the mud dug out from the foundation trenches were used to make
sun-dried mud bricks. Stone for foundations and plinths were also found on your parcel of land. They only had to be broken into smaller pieces and dressed by a skilled mason. Bamboo grew wildly in the Kangra valley due to favorable weather conditions. These could be harvested every two to three years from the same grove. Pine and Cedar wood was usually harvested from the adjoining forests and were plentifully available. Slate tiles for roofs were procured from nearby mines (khaans).

Zamlesh continued to say, that people knew about the objective benefits of kuccha materials over pucca materials. In particular, kuccha materials were quantifiably better than pucca materials for maintaining the micro-climate of a house. Adobe walls needed to be the at least 1.5 to 2 feet thick to not compromise the structural integrity of the building. These thick walls in-turn acted like a thermal battery, absorbing the warmth from the sun during the day and releasing it into the interiors during the night (Menon, 2015). This helped maintain the interior temperatures of a kuccha house, ensuring that the difference between maximum and minimum temperatures during summers and winter remained relatively stable. Pucca houses did not have any comparable thermal insulating properties as substantial wall thicknesses were not required for structural integrity of the house. Therefore, people of the Kangra valley intrinsically new that kuccha materials were better equipped thermodynamically than pucca materials.

“Dikhaava”

It was a hot summer day in Kandwari village. I was on my way to a building project in the locality where I had formerly worked as an architector from 2011 to 2013. I hoped to speak to a few more participants there for my research. While walking by the local government school near the village square, I admired the quintessential pipal tree that adorned its courtyard. As the clock struck 3 pm, the school bell rang out loud to signal the end of day’s proceedings. Hordes of
school children in white shirts, navy-blue shorts, trousers and skirts rushed out of its gates all at once. I was caught amid this horde, trying to navigate my way safely out of it when I heard a voice call out to me, “Siddharthji!” It was Beherchand and he was steering me towards a safe spot away from the cacophony of the school children. I was relieved to see him.

Beherchand was a 48-year-old carpenter from Kandwari village. He belonged to the Deewan community. In the hierarchy of social life in the Kangra valley, the Deewans were a middle-tier caste group who were respected for their craft-based skills like carpentry and ironmongery. Beherchand was born into a carpenter’s family. This had been his ancestral trade. Beherchand and I first met in 2011 when I arrived in Kandwari as a recently graduated architect. He had a short and sinewy body type that made him an excellent climber. He was always called upon for climbing bamboo scaffolding to reach spots that other pot-bellied carpenters could not. Having dropped out of the free local government school after the 4th grade, Beherchand had spent more than 30 years apprenticing as a carpenter. He was also an extremely quiet individual who never said anything more than required. But Beherchand was also an alcoholic and when not sober, he didn’t know when to stop talking. This encounter was one such moment.

It was 3 pm in the afternoon and Beherchand had already consumed two bottles of local country made liquor. He was reeking of alcohol and his swaying gait betrayed his attempted sober face. He greeted me with a warm, tight hug, held my wrist and led me up a narrow winding pathway up the side of the roaring stream (khud). He wanted to show me his new pucca house that he had begun to construct for his family. I was relieved to reach his house without falling into the stream with Beherchand in tow. We turned left atop the hillock and stood before a half complete pucca house made in baked brick and concrete. Beherchand proudly stood before his creation and showed me around his new house. The house had three rooms excluding a kitchen
and was built on a high stone plinth. Wet jute bags were tied around its vertical concrete pillars to keep it wet for curing and strengthening. Piles of baked brick, and bamboo scaffolding lied strewn around the construction site. I asked him what he thought about *pucca* construction and why he was building a *pucca* house?

Beherchand was quick to tell me that this was an act of “*dikhaava*” or pretense. He said that these days it had become a “fashion” to use concrete in Kandwari. Therefore, he was competing with his neighbors to be perceived as modern. Like Zamlesh Kapoor, he objectively acknowledged that *kuccha* construction was better than *pucca* construction in many respects. Beherchand told me that for him, mud was always new, and that after every application of mud-cow dung plaster, which they call *lipaai*, he felt like he had a new house. Concrete on the other hand, he said, cannot be re-used nor can it go back into the earth’s cycle once it had lived its life. In this manner, Beherchand echoed Harford’s (2017) views about the “(in)flexibility of concrete.”

To practice “*dikhaava*,” Beherchand had to incur huge financial hardships. He did not have the economic resources to completely *puccafy* his house in one go. As and when he saved up money, he used it to procure more *pucca* materials and continue this incremental process. But with this incrementalism also came a state of incompleteness. When would his house be completely *pucca*? There will always be new *pucca* materials in the market that Beherchand will “aspire, seek, adopt, or mimic” (Chatterjee, 1997). His house will always seem incomplete without these new *pucca* materials. And like his house, Beherchand’s encounter with universal modernity will always be incomplete. He will be in a continuous state of trying to achieve modernity but will never be able to completely attain it.
The Complex Material

“It’s a complex material,” says Penny Harvey (2015) of concrete. Its composite makeup of cement, sand, aggregates and water make it a synthetic material that escapes classification. It does not exist in its raw form. Cement—its principal component, reacts with water to irreversibly bind sand and aggregates in place. Cement emerges from processes of modern scientific experimentation and analysis (Harvey, 2015). Courland (2011) notes that cement is made by grinding limestone and clay into fine powder, mixing it with water, baking it in a furnace to scorching temperatures of 2500 degrees Fahrenheit and then grinding it into a powder again. This powder, when mixed with a sufficient quantity of water, produces a versatile, quick-drying paste which we know as cement (Gross, 2015). This process of production of cement is performed in scientific laboratories and factories by trained scientists, professionals and engineers. Yet, when cement is combined with sand, aggregates and water to me made into concrete, it is completely rudimentary, hands-on and experimental. Its ease of use, makes it accessible to almost anyone who has a basic understanding of working with their hands. Hence, Forty (2012) says that concrete is both modern and traditional at the same time. All these factors make it an extremely complex material.

Like its complexity in composition, concrete also has complex meanings associated with it. For Muldhiramji, Pramesh Kapoor and Multan Singh, concrete means similar universal ideals of pride, progress and modernity respectively. These have been ascribed to it by processes of colonial development and nationalist discourses of the postcolonial governments in India since 1947. But, these universal meanings do not play out in generally expected ways. For Zamlesh Kumar, concrete is associated with practices of “dekho-dekhi,” where community members compete with each other in the race to be perceived as modern. Like the English phrase-
“keeping up with Joneses,” community members of Kandwari village go to extreme lengths to procure and use concrete in their homes even though they objectively understand its demerits, and shortcomings. For Beherchand, concrete is basically an act of “dikhaava,” a fashionable veneer added to the external facades of houses to make it look pucca. He says this by pointing to a house nearby that is undergoing puccafication. This is kuccha house made of adobe and stone. The owners are only making the external plaster pucca. This veneer of modernity is being added to its traditional kuccha core. It is made to look modern and progressive on the outside but is kuccha on this inside. Beherchand reiterates his point by calling this practice, a “dikhaava.”

Figure 4: “Dikhaava”- pucca plaster on a kuccha wall (Credit: Author).
Sivaramkrishnan and Agrawal (2003) argue that modernity has multiple identities that are spatially and temporarily unique and different. They call these multiple identities “regional modernities.” Like the multiple identities of “regional modernities,” concrete has multiple meanings. It has many meanings and it means different things to different people. Both “dekho-dekhi,” and “dikhaava” are valid meanings associated with concrete use by Zamlesh and Beherchand respectively. In both cases, like “regional modernities,” it is situated, nuanced and complex. In these ways, multiple identities of modernity are mediated through the use of concrete in Kandwari village. Like McDuie-Ra (2018) says, it is material that “materializes our aspirations of being modern.” It is also a “material through which our modernity is mediated.” (Forty, 2012). Concrete is ascribed with universal and totalizing meanings that come from coloniality (Radcliffe, 2015). But, these universal meanings are then appropriated by community members in Kandwari village, to be reinterpreted and practiced in its own unique, nuanced and complex ways. It is their modernity. It is a “regional modernity” (Sivaramakrishnan and Agrawal, 2003).
Chapter Two: Materiality

What Do You Want, Concrete?

You say to brick, “What do you want, brick?” Brick says to you, “I like an arch.” If you say to brick, “arches are expensive, and I can use a concrete lintel over an opening. What do you think of that, brick?” Brick says: “I like an arch.” —Louis Kahn

These were the famous words of the late American architect Louis Kahn at a Master Class at the University of Pennsylvania in 1971 (Lesser, 2017). Khan was one of the least-known, but most influential of the great American Modern architects. He gave us a remarkable string of masterpieces that includes the Salk Institute in California, the Indian Institute of Management (IIM) building in Ahmedabad and the Bangladesh Capitol Building in Dhaka. His genius also came with its fair dose of oddities. One of the many quirks of Louis Kahn was his undying faith that his building materials had a stubborn sense of their own destiny. In other words, he believed his building materials had vitality. Kahn’s famous words have always fascinated me from the moment I first heard them as a then 18-year-old gawky architecture student in Mumbai. As a practicing architect thereafter, I have strived to stay true to these hallowed words by listening to what the site and local geography of place had to say to me.

It’s been twelve years since I first heard Louis Kahn’s words, but they still resonate very strongly with me. Inspired by his words, in this chapter I intend to examine changes in house building practices occurring in Kandwari village in Kangra District of Himachal Pradesh in northern India. I will do this by conducting an ethnography of concrete using an “object-oriented” perspective that focuses on what Jane Bennett (2010) calls “following the material.” I will analyze how a shift in building material technology plays out in the daily lives of human actors in Kandwari village who are entangled in a network of concrete. But how does one conduct an ethnography of a “non-human” element? Why is this even important? What does concrete have to say anyway? I will start to answer these questions by historicizing some of the shifts, turns and phases on the matter of materialism in cultural geography.
Over the last forty to fifty years in the social sciences and the humanities there has been a radical shift in our understanding of what constitutes a “research subject” (Whatmore & Hinchliffe, 2003). Hetherington and Munro (1997) argue that there has been a host of research during this period that has shaken the foundations of the social sciences. These foundations made it possible to divide the world into binaries like nature-culture, capital-labor, hand-brain and go further on divvying up these above binaries into smaller and smaller categories. But what are these foundations that Hetherington and Munro refer to? In the introduction to their book, *New Materialisms: Ontology, Agency, and Politics*, Diana Coole and Samantha Frost (2010) point out that since the period of 17th century European Enlightenment, “immaterial” abstract ideas like language, consciousness, subjectivity, agency, mind, soul, imaginations, emotions, values and meanings have taken precedence in our material world. These abstractions have been termed superior to mundane material entanglements. Coole and Frost (2010) trace the origin of this line of thought back to Descartes who defined matter as an inert substance instilled only with three dimensional physical properties of length, breadth and height. This idea formed the foundational basis of Newtonian physics and Euclidian geometry which sees material objects in motion only when acted upon by an external agentic force. Coole and Frost (2010) further articulate this Cartesian way of thinking about matter and subjectivity as follows. As part of the Enlightenment movement, human beings were given ontological precedence in the vertical structural hierarchy between humans and non-humans, culture and nature, man and material. Descartes’ famous quote, “I think; therefore, I am,” attributed to homo-sapiens of the modern world the quality of being rational and self-aware. Humans were destined to be free, capable of manipulating and using (for their own purpose) non-human components of the world that are either dead or inert. But what if this way of dividing the known world was problematic in the first place? What if basing the foundations of modern social and physical sciences (as we know it today) on Biblical distinctions between man and nature has serious and life-threatening limitations? Where does that leave us in today’s world where the constructed boundaries between culture and nature are constantly being questioned by the infiltration of GMO crops and food, AI cyborgs, robots, and bio-fuel? More importantly, how are we so superior to nature if we cannot predict climate change and extreme weather
events anymore especially in this Anthropocenic age (Ghosh, 2016)? Animated by these pressing and pertinent questions, there has been serious pushback to cartesian dualism (Bennett, J., 2010) by scholars from radical schools of thought like STS (science and technology studies) and new materialisms.

Scholars like Bruno Latour (1993), Michael Callon (1986), Jane Bennett (2010), Donna Haraway (1997), Mara J. Goldman & Mathew Turner (2011), Bruce Braun & Sarah Whatmore (2010), Sarah Moore (2012) and Appadurai (2015) through their work have recognized the “more-than-human” agency of non-human objects. This new attention to rethinking binaries of nature-culture, human-nonhuman and man-animal is being referred to as “post-humanism” and the “ontological turn.” Latour (2004) uses the word “actant” to describe a human or non-human element that can act and influence other humans and non-humans. It is neutral term that draws attention to the efficacy of things. Bennett (2010) also draws on the philosophy of Spinoza’s “ethics” (1992) to focus on the affective and effective properties of things. For Spinoza (1992), all events occurring in the universe are due to the essential nature of objects, God or nature. These were further elaborated in the continental philosophy of Henri Bergson (1990) where immediate experiences and intuition were given more significance than abstract rationalism. The word “affect” became more important through Deleuze and Guattari’s, A Thousand Plateaus (1987). Here, affect was referred to as non-tangible feelings and emotions created in a body when it acts in conjunction with another body. Any body that has a capacity for activity and responsiveness is therefore termed “affective.” Bennett (2010) draws on these ideas of affect to call for a theorization of the social and political from feelings and emotions created by the material.

One of Sarah Whatmore’s (2006) arguments in her clarion call to practice a “more-than-human” cultural geography was that this new interest in the material is not new after all. She frames this as a “return” in social science literature. By this, she refers to the arguments put forth by earlier cultural studies scholars and social scientists like Raymond Williams (1980), Peter Jackson (2000), Stuart Hall (2016) and Arjun Appadurai (1986) to focus on the material dimensions of culture. Williams (1977) calls this “cultural materialism.” Williams (1977) vehemently criticized the “base-superstructure” features of Marxist cultural theory. He argued that by relegating culture to the derived, determined “superstructure”
realm, culture in Marxist theory had moved away from its material origins. According to Williams, culture is not simply derived or determined by material practices in the base. Rather, it has a mutual and dynamic relationship with material. Material practices inform culture, but culture also informs and alters material practices.

On this issue of materialism in historical materialism, Jason Edwards (2010) adds that the theoretical approach of Deleuze and Guattari (1987) posed a significant challenge to conventional structural Marxism. They seemed to be on diametrically opposite ends of spectrum and social scientists were forced to choose sides. But, Edwards (2010) argues that this need not have been the case. He agrees with Williams (1977) that historical materialism had a good deal of materialism to begin with. He further articulates his argument as follows. Historical materialism not only looked at the material modes of immediate production but also considered the totality of daily material practices that helped to maintain those modes of production. For example, if one analyzed a material object like a gun from a historical materialist perspective, there is tendency to focus only on the unequal social relations during the production of the gun. This could be the hierarchical relationship between the bourgeois gun company owners who made profits off the hard work of proletariat workers in the gun factory. These relations of production are said to be the “base” and are considered to be unchanging and fixed. They determine the superstructure, shape it and maintain it. To this, Edwards (2010) argues that one must look at a gun not just as an object built out of unequal modes of production, but rather in the totality of all material practices involving the use of that gun. By focusing on this totality of material practices involving the use of the gun, one can then get to hidden social inequalities that are undoubtedly political.

In the above section, I have shown some of the overlaps between “cultural materialism” and “new materialism” based on Whatmore’s (2006) argument for framing the “material turn” as a “return.” But, here I would like to digress from her argument. Framing this as a “return” is a bit misleading. Whatmore (2006) herself says that the main difference between materialism in “cultural materialism” and materialism in “new materialism” is the radical decentering of human subjectivity. It is an understanding that subjectivity is not the sole dominion of human beings that lies inside their soul. Rather, it lies outside
of us in the broader material world (Whatmore, 2006). John Frow (2010) frames “new-materialism” as a thinking of relationality between objects and subjects without thinking of the ontological hierarchy between subject and object. Here material and non-material objects interact with each other on the same horizontal plane and consequently (co)produce each other’s identities. To articulate his point, he uses a series of terms and concepts that help us make sense of the “ontological turn” - disposition, agencement, assemblage (Anderson, et. al., 2012), network (Latour, 2003), chain, performativity (Hetherington & Munro, 1987), and hybridization (Latour, 1993). Frow (2010) argues that the use of the word “actant” enables us to move beyond the hierarchal vertical relationship between subjects and agency. It forces us to think about the multiplicity of relations between humans and non-humans. On the subject of redistribution of subjectivity, Bennett and Joyce (2010) note that the main intellectual difference between “cultural materialism” and “new materialism” is the moving away from a “coherent social totality”. It means moving towards an erasure of familiar binary ways thinking of human and non-human, subject and object, cultural and material. As earlier explained, all of these binaries are constructed on the cartesian dualism of the material-immaterial divide. Bennett and Joyce (2010) further add that the intentionality of actions should not be the focus of our attention. Rather, the focus should be on the affective and effective qualities of materials through the forces they exert by the consequence of being entangled in a complicated network of human and non-human “actants.”

While this new wave of scholarship on “new materialism” is exciting and refreshing, some recent works have also been criticized by scholars like Divya Tolia-Kelly (2011) for being mere “surface geographies.” She argues that certain scholars have been quick to jump onto this new fad of the “material turn” without fully understanding it and diving into its depths. Their ways of looking at materiality has not been deep and engaging where one follows the trails and “complications” (Harvey, et al., 2017) of material entanglements to unravel the hidden forces of power and contestation. She argues that some of their analysis of material and “semiotic” (Larkin, 2013) engagements are not reflective enough and hence terms these as “surface geographies.” Scholars like Hetherington and Munro (1997) and Ash Amin (2014) are certainly not a target of Divya Tolia-Kelly’s criticisms. In each of their works, they have argued that
materials are alive, active, agentic and extremely powerful. Heatherington and Munro (1997) note that by focusing on the “performativity” (Butler, 1988) of non-human elements, one can then begin to understand their affective and effective powers. They use this performativity and affective powers of materials to then come to power relations and structures thereby criticizing the Marxist political economic way of starting with social categories first. Quite creatively they call this criticism- “the labor of division” (Heatherington & Munro, 1997).

Furthermore, Jane Bennett (2010) argues that humanity and non-humanity have always performed this dance together while constantly (co)producing and (re)creating the circumstances of each other’s existence. Some like Scott Kirsch (2012) have termed this phase of “new materialism” as “historical-geographical materialism” that focuses on the radical de-centering of subjectivism by bringing to light what is outside (object) as well as what is inside (subject). This new and radical way of thinking about non-human entities and material forces has seeped into another recent sub-field called “infrastructure studies.” Scholars like Ash Amin (2012), Hanna Appel (2015), Nikhil Anand (2017), Akhil Gupta (2015), Ashley Carse (2017), Penny Harvey (2017), Brian Larkin (2008), Lisa Bjorkman (2015), Hanna Knox (2015), Timothy Mitchell (2014), Abdou Maliq Simone (2014) and Susan Leigh Star (1999) among others have strived to entangle this complex web of human-material networks and assemblages in order to get to hidden meanings and forces of unequal, contested power relations.

In this chapter, I am going to draw from this rich, new body of scholarship in new materialisms and infrastructure to focus on the experiences and meanings of changes in building material technology from kuccha to pucca as understood by local community members in Kandwari village. To frame my central argument, I use Penny Harvey’s quote on concrete from the *Infrastructure Toolbox* (2015),

“It is a paradoxical material. Its combination of plasticity and inflexibility, the synthetic origins that link it to human intention, and its particular mode of decay, which speaks of a bleak incapacity for absorption into the wider environment, collectively provoke complex associations of hope and despair” (Harvey, P., 2015)
Throughout the next section of this chapter, I will draw on this “paradoxical” nature of a *pucca* material like concrete to make one main point—that change from *kuccha* to *pucca* is not understood homogenously. It is more situated, nuanced and specific. My findings suggest that the same material—concrete is spoken of differently by different members of one village community. Depending on whom you ask, one gets different responses about feelings and perceptions of concrete. Drawing on the new materialisms theory, I argue that it is precisely because of the “more-than-human” (Whatmore, 2006) materiality of concrete that one gets these “paradoxical” and divergent views on it. I highlight that the specific physical properties of concrete adhere itself to social and political identities of my research participants. Through ways in which research participants speak of concrete as a “non-human” material, it comes to life and becomes active, agentic and powerful. The perceptions of concrete through embodied acts of seeing, touching or feeling, hearing and smelling, bring the dead material to life. It creates differing “affects” for community members which then affects their decisions about using the material. These findings complicate dominant discourses of simplistic and macro understandings of change in building material technology prevalent among the urban elite architecture and planning community within India.

For this research, I draw on Jane Bennett’s (2010) methodology of following the “scent of a non-human.” By this, she means that while it is important to follow the trail of human power to unravel contestations and cases of “hegemony” (Gramsci, 1985) like historical materialists do, there is immense value in starting from the material first and then moving on to socio-political categories, and identities later. Cook (2004), follows a similar approach when he writes about “following the thing” in his research about the geographies of food like papayas. Sarah Whatmore (2006) argues that for practicing this kind of “more-than-human” geography, one must add to our standard humanist data collection methods that are based on understanding meaning through language—both oral and written. She urges my generation of social scientists to use experimental research practices that relate to the sensory, bodily and perceptive feelings of non-human elements. Unni Wikan (2012) calls this kind of a research methodology as “ethnographic resonance.” She calls on ethnographers to move “beyond the words” in order to understand
meanings that are not necessarily embedded in language. She stresses the importance of feelings and the use of one’s own perceptions and sensibilities to learn non-verbally. Here, I will add that the knowledge of language might even hinder such an experimental practice. There is a lot that gets said in-between words and conversations. Some of these body cues, signals, perceptions and sensibilities are much more valuable than words in analyzing their eventual meanings. This research stays true to the above ideas on practicing a “more-than-human” geography.

The “Paradoxical” Materiality of Concrete

Safety and Risk

Safety

Manju Devi was a middle aged Chamaar woman from the hamlet of Nanahar which located on the lower slopes of Kandwari village. My association with Manju Devi began seven years ago when I first moved to this village as a young city-bred architect from Mumbai. Not knowing anything about the place or its people, she was kind enough to invite me over to her home for a hot meal. This genuine act of kindness stayed with me ever since. We worked together on a building project in Kandwari village from 2011 to 2013. She was a daily wage laborer and I was the site architect, but to her I was more like a brother (bhai).

It was the warm, humid month of June. As the monsoon clouds conspired to gather above us and threaten a deluge, Rojhanlal and I made our way down to Manju Devi’s house along a winding bamboo grove laden path. Not too long ago this was kuccha or dirt path. Now it had been cemented over to be made pucca. As we turned into the courtyard of Manju Devi’s home, the heavens finally opened up. What started as tiny droplets of water, quickly turned into a deluge and we were forced to take refuge under Manju Devi’s sheltered verandah. As the incessant rain pounded the corrugated galvanized iron roofing sheets atop her house, thereby drowning out other sounds, Rojhanlal struggled to make himself herd as he called out Manju Devi from inside. Her husband-Ghuscharan Singh was the first to heed Rojhanlal’s call.
He came out to check who it was and then on seeing us he called out to his wife. Manju Devi was at first surprised to find a visitor bold enough to step out in this thunderstorm, but on recognizing me and Rojhanlal, her face glowed with a familiar smile. She exclaimed, “Oh its bhai,” put on her head veil (ghoonghat) and rushed back inside to make a kettle of hot tea. It was like she had read my mind.

Rojhanlal and I spoke to her husband in the interim. Ghuscharan Singh was also a carpenter like Rojhanlal and had a private workshop in his home from where he worked.

Manju Devi was back in few minutes with kettle of piping hot masala tea (chai). I could smell the aromas of ginger, cloves and cinnamon emanating from it and I was extremely grateful for it. As we sat there, sheltered from the cold rain, sipping hot chai from a saucer, I told her about my purpose here and my research project. I wanted to know what Manju Devi felt about changes taking place from kuccha to pucca in Kandwari village. I wanted to know how she felt about pucca materials like concrete. When I quizzed her on this, her face lit up. She exclaimed, “pucca is much better than kuccha.” On further inquiry she said that in traditional kuccha houses there were always issues about safety and security. Mice could easily burrow into mud wall of kitchens to reach leftovers of food inside. Snakes followed them through these borrows in search of mice thereby entering households. This problem posed a serious safety and security issue for communities, especially women and children who spent more time in kitchens. In traditional houses of the Kangra valley, kitchens are placed on the upper floor of a house to prevent mice from getting in.

Here, Manju Devi was making an argument advocating the use of pucca materials like concrete over kuccha materials like mud. Specific material properties of concrete- its high compressive strength and brute solidity made concrete appealing to Manju Devi. For her, these physical properties of concrete address a very practical problem. They prevent mice from burrowing through strong walls, thereby protecting herself and her family from snakes who follow the mice. This materiality of concrete resonates with her and creates an emotion of safety, and security that she will always associate with the material.

**Risk**
We were on our way to the famed hamlet of Spadow--the settlement of the Gaddi people. Traditionally Gaddis have reared goats as an occupation and would spend months on end in the high Dhauladhar mountains of the lower Himalayas, travelling from one valley to another in search of greener pastures. Palakram—my other research assistant and longtime friend (who is Gaddi himself) and myself were making our way up the mountain to the ancestral home of the Gaddis. While the Gaddis are protected under the constitution, here in Kandwari they are a well-respected caste and are considered higher up in the social hierarchy. Occasionally, nasty comments are made about their occupation and their appearance. I have heard people from both lower and upper castes make mock the fact that the Gaddis did not bathe for days (as they were up in the mountains with their goats). Therefore, they claimed that one could not differentiate between the smells of goat and man.

Daldevji’s house was a kuccha-pucca house, or a “hybrid” (Gupta, 1996; Latour, 1993) house. It was an older house with a deep sheltered verandah to protect us from the south-west monsoon winds. It had been made pucca from the outside with the use of new factory made ceramic tiles for the plinth and verandah walls. The plaster of the lower floor had also been made pucca with cement. Cement adheres well to stone which was the material of the lower floor walls. Daldevji was sitting in the space inside the house right below the narrow staircase leading up to the warm kitchen upstairs. He graciously welcomed us into his home and Palakram touched his feet as a sign of respect to his maternal uncle (Palakram’s mother was Daldevji’s elder sister). Whiffs of delicious North Indian flat wheat bread (roti) filtered into the room from the kuccha bamboo and mud floor kitchen upstairs. Daldevji, sitting on his cushioned sofa like the patriarch that he is, ushered me closer for a tight hug. He was an old, rotund man of around 70 years of age. He wore a black sheep wool jacket atop a grey cotton loose Indian shirt (kurta) along with a round Kangra hat on his head. Traditionally, men dressed similarly in the Kangra valley. These days, older men still wore these clothes while the younger generation slowly shifted to jeans, and t-shirts (his son Puroshottam, who joined us later, was wearing jeans and t-shirt). As he held a pack of local unfiltered cigarettes (bidis) in his left hand, he asked Palakram, and me how we were doing with a slow horizontal gesture of his right hand, saying in the Pahari dialect, “Kaise ho?” how are you? Daldevji was an
intimidating research participant even for a six-foot frame urban male Hindu researcher like me. The respect that Palakram payed him added to his overall intimidating persona. I told him about my research project and asked him how he felt about the change from kuccha to pucca building materials in Kandwari. He laughed with a demonic hoarse voice and one could distinctly notice his tobacco stained teeth beyond his laughter.

When he finally answered my question, Daldevji was very romantic about this change from kuccha to pucca. He seemed to be a proponent of kuccha houses. He noted, “kuccha houses are the best. Pucca construction is not safe for us.” Once again, we come across this recurring theme of safety and risk. How is it that Manju Devi speaks about pucca houses and safety in an affirmative manner while Daldevji speaks about pucca construction and safety in a negative way? How is the same aspect of concrete—its safety, spoken of in differing ways depending on who you ask? On further questioning, Daldevji reiterated his point by saying that there is huge risk associated with pucca construction in Himachal Pradesh due to frequent earthquakes.

Large parts of Himachal Pradesh lie in Zone 4 and Zone 5 earthquake zones which the Government of India categorizes as zones of severe intensity to very severe intensity (Government of India, 2015). The Kangra valley still witnesses periodic earthquakes that cause destruction to lives and property. The last major earthquake in 1905 had wiped out whole villages as people were forced to rebuild their homes and their livelihoods (Ambraseys & Bilham, 2000). These days even rumors of predicted earthquakes can make whole villages spend the night outdoors in the cold, huddled together, waiting for the tremors to pass. Pucca concrete construction is very rigid. During an earthquake, the framed RCC (reinforced cement concrete) structure cannot handle lateral forces induced by an earthquake. It develops cracks and breaks along corners and intersections. The same solidity and strength of concrete also makes a concrete roof very heavy. When the house collapses, this heavy concrete roof will fall and kill anyone inside the house. Traditional kuccha houses are made of lighter materials like bamboo, wood and slate that are framed and latticed together. They allow a degree of flexibility in terms of lateral movements during an earthquake. Complete structural failure, if at all, is slow and predictable,
giving residents enough time to escape their collapsing homes. Furthermore, *kuccha* roofs are much lighter than *pucca* roofs. There is still a chance to escape with one’s life if one is unfortunate enough to be trapped under a falling roof during an earthquake.

In this way, the same physical properties of concrete—its brute strength and solidity mean something completely different to both Manju Devi, and Daldevji. While Manju Devi associates this strength and solidity with safety from mice and snakes, Daldevji associates it with risk of being killed during an earthquake. Here, I draw from Arjun Appadurai (2015), to argue that there is an act of mediation between the material-concrete and Manju Devi and Daldevji that creates these paradoxical emotions. Appadurai (2015) notes that the relationship between mediation and materiality is important for a clear understanding of vital materiality. How does concrete come to life here for Manju Devi and Daldevji? It is through the practice of mediation. For Appadurai (2015), mediation is an embodied practice that produces an effect of materiality. They both exist together and mutually (co)produce each other. Mediation, he argues, is the mode of materialization. Hence, mediation between concrete and Manju Devi and Daldevji, through the embodied act of touching, produces a paradoxical materiality. By physically engaging with concrete, it becomes alive for them, through the creation of paradoxical emotions of safety and risk respectively.

**Maintenance and Cleanliness**

**Maintenance**

Bhondu *chaccha* (uncle) is a 71-year-old mason and carpenter in Kandwari village. He belongs to the *Lohaar*, or *Deewan* caste. Bhondu *chaccha* was an excellent mason and an equally superb carpenter. In his free time, he also worked as a blacksmith. He was the most skilled craftsperson in Kandwari village. Everybody in the village and the surrounding areas, regardless of caste or class, approached Bhondu *chaccha* to work on their house construction.

Bhondu was also my mentor. I learned all the skills of masonry from him. When I arrived in Kandwari in 2011, I was a kid straight out of college with a will to learn. I was armed with a fancy
college degree but lacked the practical skills necessary to build with my hands. It was at this juncture that Bhondu took me under his tutelage. There was a productive tension between us. My privileged urban, upbringing had given me the opportunity to be the site architect on a large building construction site in Kandwari where Bhondu was employed as a mason. Hence, I was higher than him in the work place hierarchy. I acknowledged my privilege and was humble about the same. I wanted to learn how to build with my hands. I strongly believed that an architect is worth his salt only if s/he has the knowledge of hands-on building. After all, how can architects tell their craftspeople what to do if they don’t know how to do it themselves?

Bhondu understood this fact as well. He took me under his wing like I was his grandson. I arrived every morning on site and gave instructions for the day to craftspeople and labor. Thereafter, I wore my apprentice hat, rolled up my sleeves and got to work under Bhondu’s guidance. He was strict with me, but kind as well. Whenever I made a mistake, he came over and corrected me while also explaining why and where I went wrong. I questioned him sometimes based on what I had learnt in colonial era text-books back in my Mumbai college. His practical reasons for doing what he did always made more sense to me. Bhondu always had a local cigarette (bidi) perched in between his lips while working. He sometimes offered one to me, but I politely declined during work hours.

When I visited Bhondu during my fieldwork in 2017, he had grown older and his body was slowly feeling the winds of time. He had stopped working for a while after collapsing during a routine work session. Maybe the years of smoking packets of cigarette were starting to take a toll on him. He had breathing difficulties and his dysfunctional lungs were a major source of concern. I was sad to see my mentor and teacher in this deplorable physical condition.

I visited him around dusk on my way back from other field interviews. I knew I would find him in his verandah as I always did on multiple occasions during my earlier stay in Kandwari. When he saw me, his eyes went moist. We hugged each other, and he offered me a plastic chair to sit on. I sat right across from him as he gently and unevenly seated himself on a wooden cot. I told him about my research project and about how I had stopped constructing for a while in order to attend graduate school in the U.S.
He sounded a tad disappointed by this development, because I wasn’t building with my hands any more. I promised to get back to it in due course.

Having worked with building materials all his life, Zhondu was very forthcoming about his views on *pucca* construction. He spoke at length about how *pucca* houses had very little maintenance work as opposed to *kuccha* houses of mud and bamboo that required constant repair and care. *Kuccha* mud walls are susceptible to damage by moisture and rain. The Kangra valley is arguably one of the wettest regions in the country with the Dhauladhar mountain ranges acting as huge barrier to the movement of moisture laden south-west monsoon winds. Due to this local geography, these slopes received the brunt of the rainfall. Mud plaster wears out slowly and consistently when hit by rains. This problem was traditionally overcome by having high stone plinths and deep roof overhangs, facing the windward side of the mountain (Menon, 2015). Practices of maintenance and care of *kuccha* houses were traditionally gendered as these were the primary responsibility of the women of the household. They would dig up the mud and mix it with cow dung, wheat husk and sand, (if needed based on the consistency of clay content) and re-apply plaster to external walls. The same process is repeated for internal walls and floors that experienced significant wear and tear. The kitchen floor in particular was plastered every morning with fresh cow dung. This cow dung-mud mixture was called *lipai*. Other walls and floors were plastered as and when need arose or during festive occasions like religious ceremonies, marriage ceremonies and child births.

The materiality of concrete makes these traditional practices of plastering *kuccha* walls obsolete. Concrete’s imperviousness to water makes sure that *pucca* walls do not have visible cracks and leakages for the first few years. The cement component of concrete actually becomes stronger with more water as it cures and strengthens. This curing process continues throughout its life cycle. Similarly, for cemented and tiled floors, the high compressive strength of the material ensures it does not develop cracks and breakages (if proper protocols are followed during installation). Hence, they do not require regular maintenance. Bhondu *chaccha* ends our conversation by exclaiming, “A *pucca* house is a happy house.” He articulates this point further by adding that since women and children are no longer involved in the tedious job of maintaining a *kuccha* house, everyone is happy.
Cleanliness

On the issue of maintenance of a kuccha house, Daldevji, who we were introduced to earlier in this chapter, had a completely divergent opinion. He argued that there is more work in keeping a pucca house clean as compared to kuccha house. At first, I was a bit confused about what he meant by this proposition. Since it has been documented that pucca houses require less maintenance, I was amazed as to hear someone think otherwise. Had Daldevji misunderstood my question? On further inquiry he said that in pucca houses, one could see dirt very clearly. Therefore, one must spend more time in keeping it clean. In traditional kuccha houses, dirt wasn’t visibly noticeable as it merged with the unevenness of a kuccha mud floor. But with the clean straight-line finishes and modernist sleek aesthetics of a pucca cement-tile floor, one could distinctly spot dirt or rubbish (kacchra).

Through these two stories we again see how the same aspect of the concrete is spoken of in completely paradoxical ways. In one instance, the materiality of concrete – its strength and ability to form clean smooth crack-less surfaces – creates an affect of “hope” (Harvey, 2015) in Bhondu chaccha. He hopes that his house remains happy since women and children are not involved in the manual labor of maintaining a house. In the other instance, the same materiality of concrete produces an affect of “despair” (Harvey, 2015). Daldevji despaired that his house still required a lot of effort to keep clean. (In both these anecdotes, I acknowledge the fact that although practices of maintaining and cleaning a kuccha house are heavily gendered, I have interviewed older male research participants. The gendered aspect of building is discussed in detail in a forthcoming paper.)

“Over-Specialization” of Skill and Adaptive Role of Craftspeople

“Over-Specialization” of Skill

Like the romantics of 18th century Europe (Tuan, 1999), there is discourse among the urban elite architectural community in India about the loss of jobs for craftspeople in rural India due to changing building practices. This discourse is used by “traditionalists” (Hobsbawm, 1983) as the primary argument
to push through a neo-traditional movement for the advocacy of kuccha building materials like mud and bamboo. But is there a factual basis to support this discourse?

Findings from the field suggest that Kandwari has its fair share of romantics. Articulating his thoughts on the issue of specialization of skills, Daldevji says, “pucca construction is bringing in outside contractors (thekedaars) into our village.” “Why is this a bad thing?” I ask. He says that thekedaars take away jobs from local craftspeople and goes on to describe how thekedaars are mostly powerful upper caste men who come with their own entourage of exploited Nepali labor, huddled together in tractors like cattle for slaughter. They also bring their own specialized machines and cement mixers. This thekedaari, he adds, changes practices of building within the village. Traditionally people employed local masons and laborers who were known to everyone. Relationships were friendly, cordial and less professional. Nowadays, relationships between thekedaars, clients and labor has become exploitative and transactional. “Local craftspeople are losing their jobs and livelihoods,” Daldevji anxiously concludes.

I would like to counter this argument made by Daldevji. Traditional architecture also had its fair share of experts – there were masons, carpenters, blacksmiths, slate (chakka) cutters, etc. All of these crafts were very specialized, and one had to spend a lifetime being an apprentice to acquire these skills (Marchand, 2001, 2009). Hence, craftspeople like Bhondu, who were good at all skills were very hard to come by. Henry Glassie (1990) argues that the difference between specialization in traditional kuccha architecture and specialization in contemporary pucca architecture is that traditional architecture still had a large element of participation and an egalitarian work ethic. Traditional vernacular architecture is egalitarian and comes out of direct joint participation. Since an egalitarian work ethic accepts specialization and varying degrees of talent, change can occur subtly and slowly. Specialization can increase without severe stress to social fabric. But if specialization increases past the point of mutual understanding, the political order is poised for disruption. Over-specialization Glassie (1990) says, causes a divide between vernacular and non-vernacular architectural practices or in my case between kuccha and pucca building practices. When a contemporary architect designs and builds a house for a client, the laborer who works on the house, in most cases does not know what he is building. This was never the
case in traditional architecture since every individual knew what his role was and why he was doing it. In this way, through *pucca* construction, the egalitarian work ethic has vanished completely along with a participatory work experience. The political structure has become one of dominance and submission. The architectural product is no longer vernacular. It has been produced by a society within which relations among people are not egalitarian, but exploitative and transactional.

Here, Glassie (1990) uses the analytical unit of participatory practice to distinguish when *kuccha* construction ends and *pucca* construction begins. One can also bring Karl Polanyi (1944) into this discussion. Polanyi (1944) argues that traditional societies had two distinctive qualities that have been lost in modern societies: reciprocity and redistribution. This certainly relates to Glassie’s (1990) argument about traditional architecture. Traditional *kuccha* architecture in Kandwari had a value of reciprocity attached to it. People worked on each other’s houses within the community with full knowledge and trust that when their time came, other people would reciprocate their time and effort in return. On a related note, Yi-Fu Tuan (1989) argues that traditions have always been flexible enough to accommodate change, however slow and gradual. In fact, tradition means “slow incremental changes” (Tuan, 1989). But when the rate of change increases drastically over a short period of time, it creates a problem, a sense of insecurity among people and relations. This emotion of insecurity is prevalent in Daldevji’s words and behavior.

**Adaptive Role of Craftspeople**

Rojhanlal is a 36-year-old carpenter from the hamlet of Nanahar, in the lower part of Kandwari village. Like Manjudevi, he belongs to *Chamaar* community—the untouchables of the Kangra valley. He was also one of my research assistants during the field-work period. I met Rojhanlal like Bhondu, in 2011 when I came to work in Kandwari as a young architect. I didn’t warm up to Rojhanlal initially. He was young, smart and slightly arrogant. He questioned my decisions and judgments on site regularly and impudently. I always had to prove my knowledge and competence to him. I also felt he sometimes mocked me in the local *Pahari* dialect (something which I didn’t understand then, but I am comfortable with now). This initial frosty relationship matured over time where we both learned to trust and respect
each other. He was arguably the smartest craftsperson on my building site and a very inquisitive personality. These innate qualities enabled him to work on more challenging design development problems. I always sought out his counsel in such cases. He also regularly asked for my help in designing new furniture details wherein I used my sketching skills to communicate ideas from mind to paper. In this way, we grew to enjoy working together and he became my research assistant and a research participant during my field work in 2017.

We sat in Rojhanlal’s upper floor balcony overlooking his lush green paddy fields. His was an old kuccha house that had been converted to become new and pucca. The availability and massive choice of factory-made building materials had led to a multitude of combinations of tiles and designs that were used in the house. We were joined by his aged parents and his wife. Though they were Chamaars, Rojhanlal had learned carpentry and iron-work welding from his father. The acquisition of these valuable skills had allowed him to rise up through the economic hierarchy. Today, Rojhanlal’s family was one of the wealthier families within the Chamaar community. His skills were routinely sought after. Rojhanlal’s father also had a carpentry and iron workshop on the lower floor of their house. It stood right next to the animal shed where they reared noisy goats.

I was very keen to know if Rojhanlal, who was a craftsperson unlike Daldevji, also shared a similar sense of insecurity about loss of livelihoods with change in building materials. I put this question directly to him, “Are you concerned about loss of jobs due to pucca construction?” His response was quick and direct, “There will be no loss of jobs. Craftspeople will always have work.” He said these words with an air of nervous confidence. I could sense this through his shift body language and through his folded arms indicating a defensive posture.

What made Rojhanlal seem nervously confident about adapting to changing skill requirements of pucca concrete construction? What aspect of building construction practices makes the role of craftspeople adaptable? Here, I draw from Cyril Smith (1960), to argue that for craftspeople, their materials become alive. By working closely and intuitively with building materials, they can get the material to do things that other people just cannot do. In the case of concrete, it can become an overhead
water tank, a tensile staircase, or a cantilevered slab. It is through the act of “mediation” (Appadurai, 2015) of working on concrete like a time-honed craft that concrete becomes alive and vibrant. Smith (1960) argues, it is the due to the intimacy of knowledge of the physical properties of a building material, and its limitations which infuses it vibrant vitality. This process of “materialization” (Appadurai, 2015), creates an affect of nervous confidence in Rojhanlal.

Furthermore, Yi-Fu Tuan (1999) argues that changes in tradition are normal and expected. Rapoport (1989) adds to this argument that different parts of traditions may change differentially and in different ways such that certain aspects of tradition will get left behind while others will continue and merge with new ones as often found in developing countries like India. Then how does one decide what aspect of tradition gets carry forward and what gets leave behind? To answer this question, Tuan (1999) argues that it is the skill of building that must be “transmitted” (Oliver, 1989) to the next generations. If we retain skills to reproduce traditional buildings in new ways, then the history of human work is not lost and maybe we do not end up compromising the basic tenets of traditional architecture-its egalitarian and participatory work ethic.

Here, I further argue that the mediation of touch is very important in the transmission of skill in building. It is through the embodied act of touching and using one’s hands that a craftsperson like Rojhanlal is confident to adapt a new building material. The skills required to build mud houses can be used again with concrete. A skilled craftsperson can easily adapt to change in building materials. Concrete when poured is an extremely moldable, plastic material much like wet mud. All mud construction across the world starts with the mixing of mud and water. This activates the clay particles in the soil leading to adhesion and cohesion (Menon, 2015). Penny Harvey (2015) notes that cement is produced in factories and is a generic, inert product. But when mixed with water, much like mud, this inert material gets transformed into something magical that can be molded into any form or shape. The same hands-on skills that were used by masons for kuccha mud construction can now be used for pucca concrete construction. Rojhanlal alluded to the fact that the materiality of wet concrete and its similarity to wet mud creates a sense of confidence in him. Due to this, craftspeople like him will always be in
business. In this way, I also depart from Henry Glassie’s (1989) distinction between vernacular and non-vernacular technologies. He said that vernacular technologies involved the use of local materials and the direct touch of hand while non-vernacular ones did not have the mark of a hand-tool. I argue that in Kandwari, concrete also has the mark of a hand tool. It is made and molded by hand and the skill to do the same will carry on.

**The Situated In-Situness of Concrete**

I would like to conclude this account of concrete use in Kandwari village by making two specific points. I went into the field with one broad evocative question for my research participants—“how do you feel about change in building material technology from *kuccha* to *pucca*?” The intention behind this was to understand how local community members of Kandwari understood change and what this understanding could tell us about the quality of change itself and how it was affecting research participants. To ensure a diverse pool of research participants which could potentially reflect the local Kandwari population, participants were interviewed across identity lines of caste, class, occupation, gender, generation and ethnicity. Through the above section we have seen that the same *pucca* material-concrete is spoken of in different ways depending on who you ask. We have seen through the above-mentioned themes that even under a similar theme, people speak of concrete in diametrically opposite and often “paradoxical” ways. Why does this happen?

Firstly, this case study shows that changes in building material technology from *kuccha* to *pucca*, are not understood homogeneously across Kandwari village. It is more situated, nuanced and complex. The materiality of concrete has a role to play in complicating notions of homogeneous change among all participants. It creates unique affects, emotions and feelings among research participants. It forms a bond between the material and the social that nuances simplistic ways of theorizing the social without a strong material focus. In this way, by “following the thing” (Bennett, 2006) -concrete and the way people use it in Kandwari one can get to social categories of people. The paradoxical affects that concrete generates in
research participants make it agentic, powerful and lively. It comes to life for research participants in Kandwari village.

Secondly, I put forth an argument that this paradoxical materiality is generated by the embodied in-situ practice of using concrete. Penny Harvey (2015) notes that concrete is an industrial material and cement is a major constituent element of it. But while cement is generic material produced in distant factories and then transported in standardized cement bags, “concrete emerges from processes of modern scientific experimentation and analysis, but its composite makeup results in a material that is open-ended and accessible to vernacular use and modification. It is an entirely synthetic material, but unlike other synthetics, it is routinely assembled in situ” (Harvey, 2015). Cement when mixed with an activating agent like water and muscled up with aggregates like sand and stone, produces the building material we know as concrete. And while cement is produced through scientific experimentation and technological input, concrete on the other hand is easily accessible to local vernacular use. Like Forty (2012) says, concrete is both traditional and modern at the same time. Its genesis lies in the spirit of rudimentary experimentation. Almost anyone has access to it and can learn to use it. While there exist standard codes and rule of use, one can easily use concrete without necessarily learning building codes. This ease of access and the non-conformity of rules of use add to its paradoxical materiality. Concrete becomes what you want it to become. Its unique plasticity when wet is very similar to wet mud which still is the most widely used building material in the world (Oliver, 1989). This in-situ practice of using concrete complicates its materiality and makes it paradoxical. It means different things to different people.
Conclusion: Towards a *Puccafication* of Social Life

Indian society has experienced rapid changes in different aspects of social life since the liberalization of the economy in the 1990s. The world’s largest democracy was cautiously ushered into a new era of laissez faire neoliberal development practices which was a paradigmatic shift from the earlier policies of the postcolonial socialist state. Since then, consumers across India have been bombarded with a plethora of consumable options in all aspects of living from food items and agricultural products, to media appliances, electronic devices, fashionable clothing, etc. The building construction industry was not immune to these large-scale lifestyle changes. The material palette of traditional vernacular houses was controlled by the micro-geography and cultural patterns of place (Rapoport, 1969). Today, the average Indian house builder is spoilt for choice with the proliferation of the latest, glitziest building materials from across the globe like gleaming, colorful Italian marbles, bright neon house paints, luxurious vitrified ceramic tiles, ornate bathroom fittings and different brands of cement.

As Bhanu (1995) notes, the cement industry has also been heavily privatized since the 1990s. This has coincided with aggressive marketing campaigns by these private players to make cement concrete¹ a desirable consumer product. Hence, what once was a material of nation-building endeavors of the postcolonial Indian state, which was scarce and expensive to procure, has now become a readily available material at town markets and village retail shops across the country. Furthermore, in some cases, cement bags have become cheaper than locally available materials. For example, in rural Telangana (January 2014) one bag of cement (88 lbs.) of cement cost a mere 3.36 USD while an equivalent quantity of lime (raw material that is processed to make cement) costed 8.4 USD. Moreover, the active use of market materials like cement also aid in steadily dismantling local village economies. Money, which would have gone to a local craftsperson (who built bricks out of mud), would now be concentrated in the hands of a few private cement manufactures who are based faraway from these villages (Menon, 2015). Additionally, the external environmental costs involved in the manufacture of modern cement has
certainly not been accounted for in its eventual price to the consumer. This dubious political economy of cement and its role in the breakdown of traditional building systems requires further detailed study that is beyond the purview of thesis.

For this thesis, I was primarily concerned with the relationship between local people of Kandwari village and cement concrete as a building material. This was done with the intention of stepping away from macro urban elite understandings about changes in the rural built environment (that I had become accustomed to during my time as an architect). Instead, I wanted to focus on micro-understandings of changes in the build environment by gathering ethnographic data from research participants who were most impacted by these changes- craftspeople whose livelihood depended on building materials and rural house owners who had daily interactions with these building materials.

To reiterate the findings from my thesis, Chapter One focused exclusively on questions of why research participants thought changes were taking place in building material technology in Kandwari village. I wanted to understand what local people thought the reasons for these changes were. My findings suggested that in Kandwari village, concrete was associated with nationalist ideas of modernity and progress due to its symbolic role in nation-building practices of the Nehruvian postcolonial state. Therefore, using concrete was seen as the quickest way of becoming modern and developed. Furthermore, results also suggested that while research participants were objectively aware of the benefits of using kuccha materials, they still chose to act in contradictory ways by using pucca materials like concrete. This was done by interrelated practices of “dekho-dekhi” and “dikhaava” which allowed people to engage with this complex material. I call these practices an example of “regional modernities” (Sivaramakrishnan & Agrawal, 2003) that are contrasted with the grand universal ideas of post-independence modernity practiced in India. It is a modernity that is situated in and mediated by the materiality of concrete in Kandwari village.
Chapter Two focused on how local people related to changes in building materials and what research participants felt about these changes. The findings from this chapter suggested that different people feel different things about concrete as a building material. The same material evokes paradoxical emotions and reactions from research participants depending on who you ask and who they are, based on social identities of caste, class, gender, ethnicity and profession. I argue that the materiality of concrete—its brute strength, its initial plasticity and eventual rigidity, its imperviousness to water, its smooth alluring texture—all of these make it adhere itself to research participants in differing ways. It is the paradoxical materiality of concrete that complicates macro notions of change as a simple, linear, homogenous process and makes it more complex, situated and nuanced. These nuances need to be acknowledged and understood to better comprehend massive built environment changes taking place at the frontiers of rural India as 833 million people steadily move towards more pucca materials and more concrete.

The above research findings from both chapters vehemently suggest that there exist multiple reasons for concrete being a dominant and ubiquitous building material in my case study field site of Kandwari village. In my introductory section, I had used Williams’ “cultural materialism” (1977) as an organizing framework and launching point to think through research questions and ideas. Yes, there exist symbolic meanings embedded in concrete as well as reasons to do with its paradoxical materiality that help in making it a pervasive building practice. But, there are also several other human and non-human factors that help in propagating concrete as a building material of choice in Kandwari village. These include the skills of masons, the dexterity of carpenters, the availability of local labor, the aspirations of home owners, the guile of building contractors, the technical drawings of architects, the lack of detailed calculations by structural engineers, the growing number of cement retail shops, the massive profits of cement manufacturers, the changing policies of government agencies, the cheap price of modern cement, the slaking of ordinary limestone, the dredging of sand from riverbeds, the dust from stone quarries, small and large aggregates, quick drying binders and adhesives, fast depleting fresh water resources, the
accuracy of building tools, hegemonic caste structures in Kandwari, metalled and unmetalled roads, local micro-geographies of the Kangra valley, class hierarchies, gender boundaries, professional affinities, ethnic affiliations and generational differences. One can think of all of these variables/factors/elements act in a sociomaterial assemblage (McFarlane, 2011) or a sociotechnical assemblage which is composed of both social and material components, that contribute to making concrete a dominant building material in Kandwari village. I call this phenomenon the *puccafication* of social life.

Analyzing the practice of using concrete as a sociotechnical assemblage, allows me to situate concrete within larger social relations within Kandwari village. It exposes how a material element mediates interactions between different social categories of people based on caste, class, gender, ethnicity, profession and age. The practice of using concrete creates tensions and contestations between various social groups thereby becoming political in nature. Therefore, concrete (re)produces social relations in Kandwari village. It *puccafies* it and cements it in place. By following the ebb and flow of this material, we see that social identities are not necessarily preexisting or preformed (as I had assumed) but are constantly being (re)created by this material practice. Therefore, social identities are constantly changing and are in a process of *puccafication*. They are always being formed. Therefore, the *puccafication* of social life as a sociotechnical assemblage allows us to reorient our focus back to material objects like concrete. It allows us to analyze concrete not just as a mere building material, but as a conduit around which social life organizes itself in Kandwari village. By following concrete in Kandwari village, we can analyze the problems and politics around built environment changes in Kandwari village, thereby allowing us to plan for these better.

Furthermore, the in-situ nature of concrete adds to its complexity as a sociotechnical assemblage. As mentioned earlier, concrete is a compound material (D’Avella, forthcoming) that is made of cement, sand, stone, aggregates and fresh water. Cement is an inert material that is made in factories and transported in standard bags to construction sites across the country. Cement bags are then opened on site and mixed with water to activate its adhesive properties which then combines with sand and aggregates to
form varying forms of concrete. It’s a process whose genesis lies in rudimentary experimentation and a hands-on work ethic (Forty, 2012). This holds true even today. Cement is manufactured to accurate specifications. Concrete also has strict codes and guidelines for its use. But in Kandwari village (and much of rural India), these get rarely enforced due to the lack of trained architects and structural engineers. Its materiality (when wet) is like that of wet mud which allows traditional builders and craftspeople to use in varying capacities to suit different needs. Therefore, at any given moment of time the sociotechnical assemblage of concrete has a different character. Every moment of this assemblage is unique. Furthermore, even after liquid concrete hardens, concrete continues to grow in strength for the remainder of its life cycle until it finally breaks down. In this way, concrete is always in a process of assembling itself. As McFarlane (2011) says of the city, it is more a dynamic, changing assemblage (in the present tense) rather than a fixed, formed, static assemblage (in the past tense).

I would like to end on an interpretive note by thinking through what these findings might hold for future research. Over the last decade, there has been a spurt in scholarship in infrastructure studies that challenges social and behavioral scientists to theorize the social by analyzing the material. Scholars from across the social science disciplines have studied various material and technical objects like water pipes and taps, dams and canals, roads, cinema and media technology, food systems, internet technology, etc. to untangle their relationship with social life. Some like Elinoff (2017), Abourahme (2015), Harvey (2010), Harkness, Simonetti, & Winter (2015), Mcdue-Ra (2018) and D’Avella (forthcoming) have aimed their theorization attempts by focusing their scholarly attention on cement and concrete as I do here. I draw form this rich vein of scholarship to begin to ask how an analysis of the puccafication process in Kandwari village help us in theorizing socio-political issues there. As we have seen in Kandwari village, a study of concrete helped us highlight many hidden contestations and tensions among people. It brought to light the cultural politics of concrete in Kandwari where the material was perceived as a great social-economic leveler. It highlighted the incompleteness of the Western modernity project as seen in the analysis of Beherchand’s house. It foregrounded the tension between traditional caste hierarchies and new
class categories as seen in the tension between upper caste *Thakurs* and lower caste *Chamaars*. It made explicit the different gendered understandings of the *puccaification* process as women seemed more aligned to this new material as opposed to men. And, it highlighted the tension between younger and older men as the latter seemed romantic and nostalgic about traditional materials like mud.

Furthermore, following the flow of concrete brings to the foreground issues of ontological distinction between the urban and the rural. It helps to highlight rapid transformations taking place at the fraught intersections of these ontological boundaries. For many parts of the developing world, concrete was a part of the bandwagon of colonial modernization, a material introduced with the singular aim of helping colonial oppressors continue their systematic oppression of their dominions. Today, we are seeing how this material is being appropriated and used by the subaltern people in Kandwari village to make their own agendas and claim their own modernities. Importantly, this process is taking place across the rural Indian landscape as 833 million people aspire for and move towards a built environment where concrete becomes the most prevalent material. All these things open up a host of questions for India and the world in terms of our interdependent futures in the age of the Anthropocene.
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Appendix

Introduction: From Kuccha to Pucca

1. I was urban, male, Hindu, upper caste, upper class. All of these identities made me very privileged in the general Indian context.

2. Auroville is an experimental township in Tamil Nadu, near the city of Pondicherry. I did my final year of professional practice here with the Auroville Earth Institute.

3. Didi Contractor is an 88-year American environmental designer. She was raised in New Mexico by her artist parents. She met her husband Narayan Contractor at the University of Colorado Boulder in the 1940s where she had come to study art. Thereafter, she moved to India and started a family with him.

4. My team and I built three buildings across India-Linger guest house in Himachal Pradesh, the Anubhuti Pragati aur Parivartan Kendra in Uttar Pradesh, and the Kudali Intergenerational Learning Center in Telangana.

5. I practiced as a professional architect from 2011 to 2016. My practice was registered out of Mumbai but practiced in different parts of India. It was called the travelling architectural practice.


8. A lot of these neo-traditionalists were my clients.

9. One just has to look at the spurt in growth of ecological, green, and organic products like fruits, vegetables, clothes, soaps, etc.

Chapter One: Meaning

1. Pahari is the local dialect spoken in the Kangra valley. It does not have its own script but uses the Devanagari script of the Hindi language.

2. A khud is a small river in the pahaadi dialect. There are numerous khuds in the Kangra valley. Traditionally they have been tapped for irrigation purposes by making embankments and kuhls (see Baker, 2005).

3. It is a common practice in north India to touch the feet of older relatives as a sign of respect when you greet them.

5. People in northern India colloquially added a “ji” at the end of your name as a sign of respect.

Chapter Two: Materiality

1. I was the site architect for the construction of the Sambhaavnaa Institute of Public Policy and Politics in Kandwari village. It was designed by octogenarian American designer-Didi Contractor.

2. I came to Kandwari village straight after my undergraduate degree in architecture from the University of Mumbai in 2011. Here I worked with my mentor- Didi Contractor as a site architect on her building project-The Sambhaavnaa Institute of Public Policy and Politics. I spent two years with field participants while working on this project from December 2011 to December 2013. My current fieldwork builds on my understandings of context and personal relations from that period.

3. I do not mean to romanticize the vernacular use of concrete here. There are countless problems that are associated with not following correct building codes and procedures, primarily to do with the structural integrity of the building.

Conclusion: Towards a Puccafication of Social Life

1. Concretes can be made of many binders. Cement is one of them and the most popular one. Other binders include mud, lime, etc.

2. Please see Journal Parallax, Volume 21, Issue 3 for a special issue on concrete.