INNOVATION IN URBAN DEVELOPMENT:
Incremental Housing, Big Data, and Gender

Edited by Allison M. Garland

Wilson Center

USAID
FROM THE AMERICAN PEOPLE

A NEW GENERATION OF IDEAS

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Introduction

AN UNPRECEDENTED URBAN AGE

Within the last five years, the global population reached a critical turning point, making the demographic shift from rural to urban; for the first time in history, the majority of the world's people now live in cities. Over the next two decades the number of city dwellers will soar to nearly five billion, 60 percent of the world's population. Virtually all of this urban growth is occurring in cities of the developing world, overwhelming ecosystems and placing tremendous pressure on the capacity of local governments to provide necessary infrastructure and services.

Cities are not only growing in size and numbers, they are engines of productivity, generating roughly 70 percent of global GDP (World Bank 2009). At the same time, urban poverty has become a global phenomenon. The inability of governments to keep up with rapid urbanization has led to the proliferation of slums. According to United Nations, 828 million people—33 percent of the world's urban population—currently live in slums. In sub-Saharan Africa, as many as 62 percent of urban dwellers reside in slums, characterized by deplorable living and environmental conditions, inadequate basic services and infrastructure, insecurity and exclusion (UN-Habitat 2010).

The profound demographic and economic transformations brought by urbanization are reshaping the world and how it works, demanding a paradigm shift where research, policies and practice reflect a new urban reality. The future of development is inexorably tied to the future of the world's cities. Finding solutions to the most urgent social and environmental problems begins by recognizing this new and unprecedented urban age.

A better understanding of the complex relationship between cities, growth and poverty will provide the tools for an urban approach to sustainable development. Quality urban research and expertise is necessary for conceptualizing

new principles that address challenges such as slum growth and urban environmental degradation, in order to prepare for cities of the future.

A NEW GENERATION OF IDEAS

To encourage a new generation of urban policymakers and promote early career research, the Wilson Center's Comparative Urban Studies Project, USAID, the World Bank, the International Housing Coalition, and Cities Alliance joined to co-sponsor an annual paper competition for advanced graduate students working on issues related to urban poverty. The goal of the competition is to develop and strengthen the ties between urban policymaking and scholarship, and to disseminate evidence-based research on urban development programming. This publication marks the fourth year of the competition and includes a range of perspectives offering innovative policy solutions to pressing urban challenges.

The 2013 "Reducing Urban Poverty" competition called for papers linked to one of the following subtopic topics representing new ways of conceiving urban development and moving beyond existing models: incremental housing approaches, big data, and gender. A panel of urban experts representing each of the sponsoring institutions reviewed over 80 abstract submissions, from which 17 were selected for invitation to write full length papers. Of these, eight were chosen for this publication to present new ideas and fresh perspectives from the next generation of urban planners, practitioners, and policymakers. The papers in this volume critically examine existing urban policies and projects, offering original, solutions-oriented research and strategies for tackling urban poverty.

INCREMENTAL HOUSING APPROACHES

The number of people living in cities in the developing world is expected to double by the middle of the twenty-first century and the spatial extent of those cities is expected to triple. The majority of new urban dwellers will meet their housing needs in illegal settlements in informal city spaces. Policies for informal housing that range from neglect and denial of services and infrastructure to forced eviction are giving way to incremental housing

approaches. Informal households commonly improve their living conditions and are regularized through incremental processes over many years: informal neighborhoods are recognized and incorporated in the city; land tenure is solidified; basic city services are extended and families invest their labor and savings in improving their dwellings. Current programs supporting incremental approaches tend to focus reactively to informal areas that have already been settled, but there is little planning for the large number of new urban residents who will come during the next several decades. Policymakers must look beyond traditional approaches to planning, upgrading, and housing finance to identify a new institutional framework for the incremental development of land, housing and infrastructure.

The first chapter in this volume, by Caleb Harper, Vasco Portugal and Layla Shaikley, illustrates the benefits of policies that support incremental expansion with a detailed study of two high-density government housing programs in Manuas, Brazil. The authors compare informal expansion in an experimental housing typology with a more traditional and inflexible configuration, recommending a framework that provides opportunities for user-initiated incremental transformation. The chapter concludes with suggestions for adopting incremental flexibility in housing design that takes into account residents' desires and participation.

In Chapter 2, author Laure Criqui examines incremental planning in the context of progressive infrastructure extension in Lima, Peru where uncontrolled growth and irregular urbanization have forced planners and service providers into a game of catch-up. Criqui analyzes the development of water and electricity networks as a locus for planning innovation beyond official discourse. Layout plans used by utility firms have in practice become a strategic urban tool, "the base map through which the city is incrementally built up," compensating for planning deficiencies in irregular settlements. Lima's experience shows how incremental planning with defined rights-of-way for progressive services offers a new approach to irregular urbanization that city stakeholders can use to prepare for unpredictable urban expansion.

Raphaëlle Bisiaux's chapter explores the meaning of land ownership and its consequences for incremental housing policies using discourse analysis of local actors' perceptions following the eviction of Kathmandu's Thapathali slum area in May 2012. Bisiaux finds that limitations to incremental housing approaches are largely influenced by land ownership meanings and patterns of informal space. Innovation, he concludes, lies in the creation of new tenure

policy instruments that create effective rights and in incremental housing policies that are anchored in the local social and political context.

In Chapter 4, Shohei Nakamura asks the critical question, "what kinds of land rights are really beneficial for protecting slum households and thereby encouraging their housing investment?" Nakamura reexamines the relevance of a self-help housing strategy in India, where government notification policies officially recognize slum settlements and ensure the occupancy rights of residents. Housing conditions and household investment behaviors differ between notified and other slums. The chapter offers empirical evidence to imply that notification policies can make a significant difference in tenure security and housing outcomes.

Chapter 5 also focuses on the impact of housing policies on slum residents in India through a study of the Slum Rehabilitation Scheme (SRS) in Mumbai. Author Ilse van Winssen presents data comparing the well-being of slum residents and rehabilitated residents to understand the impact of slum rehabilitation on the lives of the residents. The study provides evidence that rehabilitated residents are more satisfied with their lives than slum residents. However, improvement in well-being is only a partial reality, van Winssen suggests, as large numbers of evicted slum residents face hardships, uprooting and dispossession, induced by irregularities in the plans.

BIG DATA FOR SMARTER URBAN DEVELOPMENT

In this digital age, city leaders have more data at their disposal than ever before: vast troves of administrative records; real-time feedback from urban infrastructure delivered by "smart city" technologies; and networks of ubiquitous sensors, cameras, and connected citizens generating a steady stream of information. When combined with the right tools and mindset, this movement toward "big data" offers an unprecedented opportunity to inform urban decisionmaking and thereby improve city management. This data-driven approach is much needed in the rapidly growing cities of the developing world, particularly low-cost and nimble innovations—in tools, methodology, and policy—that are better tailored to local needs and conditions.

Drawing from his research integrating slum surveys conducted by various agencies in Ahmedabad City, Namesh Killemsetty finds current databases and statistics on slum populations grossly inadequate for planning efforts.

In the absence of adequate and reliable data, city officials cannot fully understand slum growth patterns and trends, and thus have not been able to address the concerns of the urban poor. Killemsetty calls for a standardized, comprehensive, and detailed central database of city slum surveys, which could be used for evidence-based planning and policymaking for effective slum development. "The vision of a slum-free India can be achieved only on the foundations of sound plans of sound data," he concludes.

In chapter 7, authors Stephen Kofi Diko and Augustine Ansah Akrofi examine the use geographic information systems (GIS) in Ghana, making the case for an incremental bottom-up approach using existing national systems to promote GIS use at the local level for urban planning and property rate collection. Academia and youth programs are a tremendous untapped resource for promoting national, regional and local GIS capacity in Ghana. The authors propose the creation of local GIS resource centers, located in universities and polytechnic institutions, that that will provide regional training and capacity building in GIS for students and professionals who can apply their skills in local planning agencies.

GENDER AND URBAN DEVELOPMENT

Women and men experience cities differently due to differences in roles, divisions of labor, resources, needs, constraints, and opportunities found in the urban environment. Male and female priorities are often different for basic services such as urban housing, water and sanitation, solid waste management, public transport, childcare, and education. While urbanization is generally associated with greater access to employment opportunities, lower fertility levels and increased independence for women, it is important for city planning and policymaking to integrate gender-sensitive considerations in urban design, infrastructure and services.

The final chapter of this volume, by Morgan Campbell, situates research on gender and mobility within the context of the information technology economy in Bangalore in order to investigate how this economy influences both urban space and the literal mobility of female workers. Campbell examines how the barriers that women face when accessing transportation influence the choices they make. Arguing that transportation policies that favor personal mobility can increase socioeconomic inequalities and

threaten long-term environmental sustainability, Campbell concludes that all city residents gain from transportation policies that emphasize universal accessibility, connectivity and equitability.

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Incremental Expansion: Examining User-Initiated Transformations in Government Housing in Manaus[1]

Caleb Harper, Vasco Portugal, and Layla Shaikley
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ABSTRACT

This paper examines user-initiated transformations of high-density government housing in the rapidly urbanizing context of Manaus, Brazil. The research, conducted in the summer of 2012, offers evidence-based analysis of two existing multi-story urban housing typologies, one traditional and one experimental, and the effects of these typologies on the process of incremental expansion. By critically examining two distinct contemporary typologies in identical social and geographical contexts, this paper seeks to provide nuanced strategies for future urban housing policy and development at the interface of informal and formal construction.

Results revealed that the first phase of development offered an experimental three-story housing typology that inadvertently encouraged owners to significantly expand their units. Users of these units expressed satisfaction with the ability to personalize their space as well as their demonstrated ability to expand with high quality and craftsmanship. However, as the expansions were not predetermined, the government expressed concern with the high number of resident disputes over

1 We are grateful to Professor Reinhard Goethert for being such a resourceful and rigorous researcher. The completion of this research would not be possible without his guidance and support. Acknowledgments and thanks are due to the PROSAMIM team, Concremat, Construtora Andrade Gutierrez, IDB, UBRA, and SUHAB. We also would like to thank Abrahim Frank Lima, the architect Luiz Fernando Almeida Freitas, Dr. Fernanda Magalhães, Professor Jaime Kuck, and Lúcio Rabelo for their general support.

shared space along with code and zoning violations. As an instinctive response, the government shifted to a more traditional and inflexible three-story walk-up configuration, which decreased resident and municipal tensions while also decreasing user satisfaction and the quality of expansion.

In both typologies, expansions materialized relative to the individual desires of the inhabitant, but most notably in three categories: home-based entrepreneurship, additional storage, and additional living space. By analyzing the nature and specifics of these expansions, the necessity of a home to dynamically evolve in support of the physical, social, and financial growth of its residents was immediately apparent.

Considering the results of this research, there is a strong and substantiated user desire and global benefit in promoting incremental expansion in the high-density urban housing context. By reprogramming formal high-density multistory housing through the lens of user transformation, it is possible to create a symbiotic hybrid of the desires of professional practice and those of its beneficiaries.

INTRODUCTION

The Inter-American Development Bank (IDB) funded the Programa Social e Ambiental dos Igarapés de Manaus (PROSAMIM), located in the central business district of Manaus in Amazonas, Brazil, focuses on providing infrastructure and housing options to the residents of low-income communities who lived in the *palafitas*. The *palafitas* are informal floating wooden settlements that surround the *igarapés*, or streams, of Manaus. Through in situ upgrading, the program seeks to maintain preexisting social and economic networks and preserve communal identity.

We conducted an analysis of the range of informal expansions to the two typologies of government housing in the central business district and derived questions and propositions for guiding future project designs.

Two typologies of settlement were extensively studied for similarities and differences. The first housing typology provides architecture to support incremental expansion, in discord with its legislating policy. The second iteration purposely rebuffs opportunities for expansion concretizing in a more rigid typology. While there was evidence of incremental housing expansion in both typologies, there was a direct correlation between the typology that adapted well to user-initiated expansion and the increased quality of life in

the community. This became evident through personal surveys vis-à-vis both typologies, increased social life in the expandable typology, and decreased safety concerns in the more social settlements. Independent of typological variation, several factors remained consistent. Our key findings centralize on evidence of both formal interior and informal exterior expansion. Both methods of expansion illustrate the ability of the inhabitants to expand with high-quality materials, despite governmental restrictions and without governmental support. Expansions materialized relative to the individual desires of the inhabitant, but most notably in three categories: home-based entrepreneurship, additional storage, and additional living space.

Considering the results of our analysis, we feel that there is a strong and substantiated urge for incremental expansion among local inhabitants—as seen in projects throughout the world. We provide evidence to demonstrate how such provisions, when initially considered, are affordable and manageable for high-density low-income housing settlements. We also provide data to support a reevaluation of current government policy to facilitate user-initiated incremental transformation for these settlements.

This paper concludes by suggesting ways to adopt incremental flexibility in high-density low-income housing design, the creation of architectural opportunities for user-initiated transformation, and suggestions for the modification of current government policy to support participation and policy responsiveness to community needs, adding new dimensions to the existing literature.

CONTEXT AND ELUCIDATION

Like other Brazilian metropolitan areas, the city of Manaus expanded rapidly in the second half of the last century, growing by an average of 4.87 percent a year and outpacing nationwide growth following the creation of the customs-free zone in 1967. According to the Brazilian Institute of Geography and Statistics (IBGE), the population of Manaus grew from 311,622 in 1970 to 1,802,525 in 2010. In 2007, the customs-free zone created 100,000 direct jobs and achieved annual output on the order of $23 billion. Given the job prospects it offered, this zone has made Manaus a pole of attraction for large and particularly low-income population contingents. Yet while the city's population multiplied, Manaus

had an insufficient urban infrastructure that had not been built to receive swollen population growth. In addition, business and industry could not absorb the quantity of unemployed constituents, causing haphazard and often illegal occupation of urban areas. Low-income immigrant populations occupied areas on the banks of the *igarapés*, the small streams that once traversed the Amazon when it covered the area before it was replaced by the metropolitan capital. The end result has been a proliferation of precariously situated housing in the downtown area, creating what has historically been defined as the floating city.

Every year in the rainy season (January to June), the *igarapés* are flooded by the Negro River, whose volume increases significantly, leading to raised water levels. The settlements (*palafitas*) along the *igarapés* are flooded nearly every year, with the accompanying human, financial, environmental, and social damage (Rojas and Magalhaes 2007).

THE GOVERNMENT'S STRATEGY

The current administration of the government of the State of Amazonas has adopted a strategy of working with the *município* on a broad range of actions and interventions to address these problems of the *palafitas* (Government of Manaus 2002). Total investments are $800 million over a twelve-year period, calling for systematic planning and effective community participation. At the same time, the *município* is acting to minimize the risk of new squatting in the *igarapés* through preventive policies based on increasing the supply of low-cost housing and by controlling vulnerable areas (IDB 2005).

The government of Amazonas, seeking to resolve the local environmental and social problems of the *igarapés*, founded PROSAMIM in 2003 to improve the quality of life for squatters. The methodology for intervention in PROSAMIM manifests itself in four ways, two corrective and two preventive:

1. The implementation of macro and micro drainage systems to regulate the impact of rainfall and flooding due to the Rio Negro;

2. The resettlement of the population occupying the *igarapés* to land that is suitable for housing and equipped with all the basic services;

3. Creation of boulevards and parks in the areas most vulnerable to illegal invasions;

4. Establishment of a general master plan and increase of the supply of land for housing, by means of a greater control and surveillance;

In order to achieve these goals, it was necessary to eradicate the locally established *palafitas* by implementing a method of resettlement for the squatters. The options to relocate the families set out in the Operational Guidelines of PROSAMIM (UGPI 2012) are:

1. Building new housing units (as shown in figures 1 and 2), further prioritizing the resettlement of families from the reclaimed land along the *igarapés* (the focus of our research) and ensuring access to services and existing social infrastructure;

2. Monitored resettlement, subsidizing and supporting the resettlement of families to housing in the local and regional market through the delivery of a housing bonus of R$21,000;

3. Resettlement to affordable housing programs offered by the state government and the City of Manaus;

4. Independent relocation—that is, compensation in cash—in accordance with the IDB policy, which applies to owners who meet conditions to initiate their own relocation process;

5. Housing allowance, as a monthly supplement to families that were previously renting in the squatters or to those with no other option to stay close to where they previously lived.

THE PREEXISTING SITUATION AND THE PROCESS OF INCREMENTAL POLICY DEVELOPMENT

The wooden *palafitas* that occupy the *igarapés* have historically been the most typical solution for squatters in Manaus, especially in areas close to

the city center. For this exploration, we delimited our search scope to the *palafitas* deployed along the margins of the Igarapé Quarenta. These specific *palafitas* stood alongside new residential parks, which facilitated access to the existing squatter settlements. In addition, the *palafitas* had already been subjected to an extensive assessment from the government, which simplified our work in terms of socioeconomic characterization. Fundamentally, we sought to understand the original context of this population. This would allow us to appreciate the social and household characteristics established, and we were able to comprehend the relevance of the *palafitas* in the context of Amazonian culture. Through an understanding of the *palafitas*, we looked for indications of the local culture to understand how the architecture of the *palafitas* would affect their integration into the new housing typologies of the resettlement program.

It is challenging to categorize the physical characteristics of the *palafitas*, but there are patterns of uniformity in certain formal characteristics and usage. We observed that the *palafitas* are used mainly for residential purposes, which eventually also often function as the basis for home-based enterprises (HBEs) and a subsequent source of income. Structurally, the *palafitas* are supported by stakes at approximately 1.5 meters above the ground, so they are protected from water during the flood season. During the period when the water level is lower, some of the locals use the space underneath their houses as either living or commercial space. In terms of construction, there are explicit differences, such as diversity of shapes, sizes, material, and quality of construction.

The material used in the construction ranges from unit to unit, although there is a predominance of wood as a natural consequence of the proximity to the forest and a common pattern within the traditional architecture of the Amazon River region. Less commonly but still prevalent were concrete slabs, ceramic brick, and metallic plates. The roof, in most cases, had been made of wood frames and roofing cement or zinc.

The interiors of the dwellings usually exhibit one central space that is further divided through the use of furniture. However, some houses employed interior partitions to separate bathrooms and kitchens. The interior walls are usually made of wood and are independent from the exterior structure, indicating the user's preference for some degree of flexibility to adjust space according to need. Regardless of the conditions of these structures, internally most of them had been guided by organization, creativity,

and cleanness. However, paradoxically, the exteriors were consistently dominated by garbage and contaminated water.

The facades of the *palafitas* clearly express some concern with aesthetics, regardless of their informal condition and independent of the fact that they had usually been built using construction debris or scavenged materials. We found a variety of construction details, such as wood moldings, an array of colors and paintings, small gardens, and detailed carpentry.

As part of our research activities, we deliberately accompanied one of the squatter families as they resettled from the *palafitas* to the housing units in the residential area Gilberto Mestrinho. We observed that while the family moved their possessions from *palafita* to the PROSAMIM government units, neighborhood residents were already salvaging construction materials from the freshly abandoned *palafita*. While the *palafita* had been scrapped, the materials were being used to erect or expand a *palafita* elsewhere. These observations support the concept advocated by several authors (Jacques 2004; Tuhus-Dubrow 2009) that informal settlements should be understood as living bodies in constant development. In these settlements, as in the majority of cities, there are no standard units and no single solution to respond to the dynamics of these continuous transformations. This particular context, when combined with the geographical features of a river peninsula and the peculiarities that the local climate shows through floods and droughts, configures an extremely irregular framework. A simple observation gives us examples of a permanent necessity to adapt and change, especially when considering the extreme weather events and climate change that may result in significant structural changes in several of the physical spaces, particularly in the housing units to prevent the aggravation of the precarious existing social conditions. The process of informality responds to several of these changing pressures—by adding structures, densification, or expansion of the settlements; as the occupants change; as the family grows; as a rental market emerges; and as sections may be demolished, and others may be gradually consolidated—but that is the nature of the informal settlements (Turner 1972). For centuries, the inhabitants of Amazonas have depended on their own capacity to respond to their own housing needs (Oliveira Júnior 2009). Considering the array of key challenges facing the informal sector, the built environment in the physical sense is not a major concern to those who live in Manaus's informal settlements. As observed, this self-built household sector is characterized not only by informality,

irregularity, and illegitimacy but also by its flexibility and resilience. The occupants in the *palafitas* adapt their households to personal needs; as the family grows or needs to create an informal business, the unit responds and adapts by reappropriating adjacent spaces.

METHODOLOGY

The methodology was established from a combined application of subjective methods (qualitative assessment) and objective methods (quantitative assessment), based on our field research. The objective methods were focused on the physical constructions, population surveying, and collected data. The subjective methods were based on ethnographic research, which was derived from the visits to the site and empirical observation.

We started by gathering data from the combination of the analysis of documents and material available on the different phases of PROSAMIM. We furthered our understanding of the information obtained through interviews of the various stakeholders, from the coordination of the program to the users of the housing units. This allowed us to have a basis for comparison with the data collected during our field study. In the field study, detailed information had been gathered through observation and survey of the interiors and exteriors of the housing units.

The combined use of methods had the main objective of extracting conclusions about the housing units and their socioeconomic impact. We were interested in understanding the impact on the immediate surroundings and the city of Manaus as a whole, with particular interest in the units that had been informally extended in the new PROSAMIM housing projects. We were also interested in the reasons that motivated the adjustments and expansions to the original design.

We have used a comparative research methodology (Tipple 2000; Tipple and Willis 1991; Landaeta 1994) to evaluate and relate the many variables of the resettlement program, from its first phase (PROSAMIM I) to its inflexible second phase (PROSAMIM II).

Survey of Users and Building Expansion

In order to evaluate the use and modification in the housing units and to trace the social economic characteristics of the population living in

allocated habitation units (HUs), we applied a total of 125 questionnaires semistructured to the local community, based on the model proposed by Gattoni, Goethert, and Chavez (2011).

We used the sampling method defined as a nonprobabilistic accidental sample, where those who responded to the survey were the people present at the time when the survey was conducted and who agreed to be surveyed. This is to say that the study interviewed one person for each dwelling and, therefore, one representative sample per household. We established five sampling areas, 25 questionnaires being implemented in each of the PROSAMIM residential parks (table 1).

Table 1. Residential Areas (RAs) Built by the PROSAMIM and the Quantity of Housing Units (HU) per RA

RAs	HUs	Program Phase
Manaus I	567	PROSAMIM I
Manaus II	252	PROSAMIM I
Jefferson Péres	150	PROSAMIM I
Mestre Chico	498	PROSAMIM II
Giberto Mestrinho	372	PROSAMIM II

The research was restricted to these specified parks primarily since these were the areas where homes have already been delivered and because they were in the center of Manaus, which was relevant for our study while providing us with greater ease of access to the area. The study took place in the summer of 2012. In addition to the questionnaires, the survey consisted of informal conversations with people. For statistical analysis of the questionnaires and survey, a comparative analysis was employed (Tipple 2000).

EXAMINING USER-INITIATED TRANSFORMATIONS

The significance of understanding the design of a house from its extensions is that it allows us to see beyond the problems of a spatial and physical nature. This is especially true when one observes that the current problems

that social housing programs face seem to be particularly related to the individual nature of residents. Thus, the breakdown of this study focuses on the user-initiated transformations made to the housing units, which ultimately turn out to be descriptive vectors of the residents' own needs. Outcomes allow us to affirm that the design of the building and houses directly influences the behavior of residents and has a direct impact on the web of social relationships, status, and integration into the city, while explicitly the product of government choices. Understanding the dimensions of the residents' conduct after the distribution of the houses, and the impact that different typologies may have on them, allows us to begin understanding what should be the role of the government in a resettlement project of this nature.

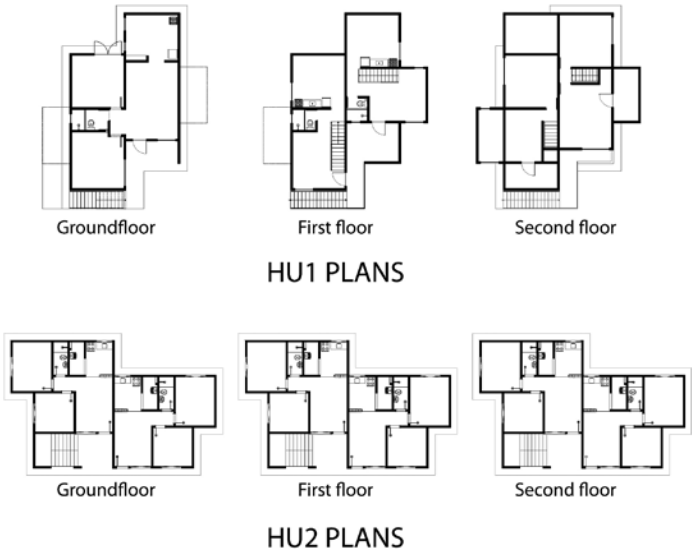
Housing Typologies

The design of the housing blocks from PROSAMIM I (HB1) comprises three HUs, a ground floor and two duplex apartments on the top floor. Each HU has a similar plan, with slight variations; among them, the most prominent is a 180-degree rotation from floor to floor to create a cantilever to produce shaded areas on the ground floor and balconies (cantilever roof) in the duplex units. What ultimately results are two patios on the ground floor, one near the entrance and another at the back of the house. The duplex units on the upper floor also gain two balconies, one that provides access to the households and an additional one on the second floor of the duplex in one of two rooms found there.

The housing blocks from PROSAMIM II (HB2) are three-story walkup buildings of six apartments (two per floor), horizontally stacked on top of each other, with a floor area of 48 square meters apiece. All the apartments have the same plan layout. Access is through a common staircase, and there are no additional balconies or patios.

Despite the differences, the two typologies have a number of interesting features and share common elements; both are built of ceramic brick, load-bearing walls and have a fiber cement roof. None of the mentioned materials could be considered local or traditional, but a new industry had been created to supply the work being done for PROSAMIM. In order to meet budgetary constraints imposed by the available funds, the internal finishes were the exclusive responsibility of the residents. Given the social character of the project and existing budget, there is a consensus that material options were adequate thermally and formally.

Figure 1. Housing Units (HUs) Plans from Both Phases of PROSAMIM

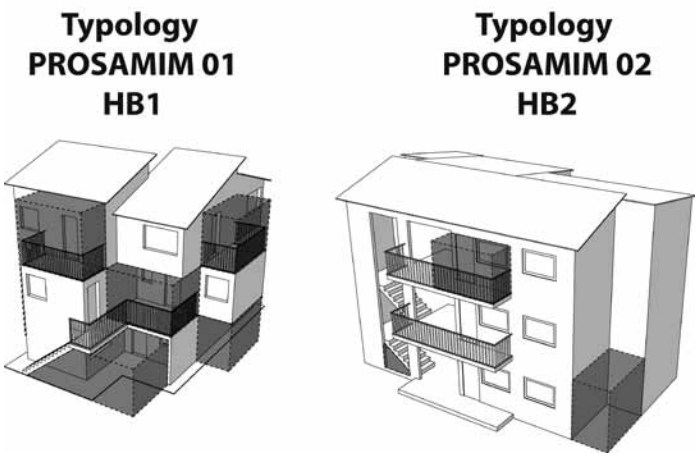


With regard to the layout (figure 1) of the interior spaces, both phases are well designed with a good functional configuration. All HUs have a kitchen, a bathroom, a living room, and two bedrooms. Entrance to the interior of the dwellings is gained through the balconies or patios.

There are some aspects that have been improved from the first to the second typology, particularly in the roof of the HB1, which was relatively weak and responded poorly to the unforgiving heat and rain of Manaus. There were also some improvements in the services and bathroom organization. However, the main reason for the change was essentially linked to governmental requirements rather than resident desires.

It is interesting to perceive that the prime reason that led the government to opt for a different typology in the second phase is directly linked with the appropriation of the adjacent spaces in the initial project. In the opinion of those responsible for the program, the building design urged residents to expand their homes and occupy spaces that were appointed to be open spaces for communal leisure and circulation. The government has chosen to create a more rigid model, where the housing units are stacked on each other, and with less communal circulation space. While the HB1 has some

Figure 2. Habitation Blocks (HBs) from the Two Phases of PROSAMIM



Note: HB1 is the typology from the PROSAMIM I phase; HB2 is the typology from PROSAMIM II. Areas in red are the opportunities for expansion in both HBs.

extra communal circulation space, in the HB2 the vertical and horizontal communal space was reduced to its minimum. This amendment, in addition to being highly inflexible with respect to extending the apartments, directly affects the sociability among neighbors. The extra communal area that we can find in HB1 generates spaces that also serve to encourage residents to eat, talk, relax, and increase their sociability in the neighborhood as a whole. Something felt instantly upon initial contact with either neighborhood is a tremendous difference between how the two neighborhoods socialize. Even though we have no quantitative data to substantiate such a claim, we can confirm this same fact through observation and daily contact with both neighborhoods during our fieldwork (figure 2).

When reflecting on the ability of this project to integrate and blend within the rest of the city, we feel that despite the fact that there is some typological variety, particularly in the HB1, ultimately one is unable to avoid drawing a monotonous urban picture. Even if the quality of urbanization was quite satisfactory, the quality of the project follows a strong and recognizable pattern, which ultimately reflects the social condition of its residents. In this program, the design and scale of houses or blocks are very

Table 2. Survey Results for the Question "What Is the Best Feature of the New House?" (percent)

Best Feature of HU	HB I	HB II
Natural light	8	1
Ventilation	2	0
Material quality	11	21
Electricity	16	12
Area	23	5
Sanitation	37	39
None	3	22

Note: HU = housing unit; HB = habitation blocks (HBs) from the two phases of PROSAMIM.

Table 3. Survey Results for the Question "What Is the Worst Feature of the New House?" (percent)

Worst Feature of HU	HB I	HB II
Natural light	1	4
Ventilation	0	2
Material quality	5	11
Space to dry clothes	38	26
Area	3	34
Services	32	10
Rear of the building	0	13
None	21	0

Note: HU = housing unit; HB = habitation blocks (HBs) from the two phases of PROSAMIM.

simplistic. This is not necessarily flawed, but produces a repetitive urban landscape, which differs from the expected assortment of a city and highlights visual prejudice and segregation against this new context (Magalhães and Villarosa 2012) (table 2).

With the aim of developing a more consistent profile of both typologies, we developed two forms (table 3; also see table 4 below), where residents identify the best and worst qualities of both, so that we could shape a diagnosis of the connection between the built environment and its residents.

There is a general dissatisfaction about how the HUs are arranged, which is different from the preceding arrangement in the squatters and unlike the traditional practice of Amazonian culture, which is the vertical stacking of the units. There is also some disappointment concerning the areas of the HB2 typologies. The HB1 typologies have additional 8 square meters

of area per unit. But if we consider just what useful space is, this does not have great relevance, particularly in the duplex units, whose interior stairs ultimately subtract that portion of extra space.

Residents were unhappy with the inflexibility of the HB2 plans. The HB1 had two extra balconies per HU and additional communal space, these additional spaces allowed its residents to do amplifications and make improvements to the houses. Conversely, in the HB2, despite the fact that there were also communal spaces, they were reduced to a bare minimum, which make it difficult to extend and transform the households without directly interfering with the neighbors from the same block.

The lack of space to dry clothes is also a common protest in both typologies. In general, residents were happy with the quality of construction materials, but it is interesting that most of the people who identified materials as the worst feature lived on the third floor, due to the heat retention on the roof. Although not significant in percentage, some residents mentioned natural light as the best feature of the house. The units have proper glazed areas as fenestration, particularly in the HB1, which have large glazed walls next to the entrance, adding to the two balconies for each duplex unit. This generates pleasant natural interior lighting and provides opportunities for natural ventilation in all HUs. Ventilation seems to have little significance for the tenants. However, there is a curious fact that we should highlight: The 2 percent who specified ventilation as the most positive aspect resided on the ground floor.

The most significant feature for both typologies was sanitation. Residents of both units reported that the greatest improvement from being resettled from the *palafitas* was access to basic sanitation, such as clean water and a sewage system. Adversely, there were also many complaints concerning services by both typologies. This particularly happened as residents were commenting on different aspects of the services. The criticisms had more to do with the quality of services than with the service itself—even though the houses were new, they posed several problems of infiltration and a degradation of materials. The percentage that identified electricity as the most positive feature referred particularly to the capacity to purchase appliances, air conditioning, and multimedia devices.

A gap between buildings in the HB2 was identified by 13 percent as a negative feature. The way in which buildings had been organized in the residential areas created a dark alley between the rear of one building and the next one, leading residents to complain that these hidden alleys commonly

Table 4. User-Initiated Transformations in the Habitation Blocks (HBs) and Habitation Units (HUs), Total and Percentage

User-Initiated Transformations	Parque Igarapé Manaus		Parque G. Mestrinho	
	Total	Percent	Total	Percent
Total HBs	273	100	62	100
Total HUs	819	100	372	100
Total extensions, HBs	174	64	24	38
Total extensions, HUs	193	24	76	20

attract illicit activities. Residents disliked the insecurity manifest by this spatial adjacency. Despite the fact that this was more of an urban problem than a housing concern, residents reported that the issue is emphasized by the fact that the HUs do not have a back door in the ground floor, which is found in the original typologies of HU1. This makes it impossible to monitor what goes on in that space, since access to it is limited. In addition, it obstructs the appropriation of that space by the residents, an area that could be used to dry clothes, as recreational space, or for the expansion of the units.

Characterization: User-Initiated Transformations

The residential area Igarapé Manaus has a total of 277 HBs, and each of these blocks holds 3 Hus, with one ground floor unit and 2 duplex HUs. From the 273 existing HBs, 174 had already been changed by their residents, which amounts to 64 percent of present HB. In the residential area Gilberto Mestrinho, there are 372 HUs, with 76 (20 percent) having undergone some sort of transformation resulting in 38 percent of HUs transformed (table 4).

As mentioned above, the HB1 offers more "opportunities" for extensions of units; the verandas, balconies, communal space, and courtyards have been extended in a wide variety of designs (see figure 2 above), and have proportions ranging from the simple extension of a veranda to the expansion of about 25 square meters of the house. Yet it is clear that there is a desire to expand and transform in both typologies. Where space allows, there is an obvious tendency to create additional rooms, particularly on the ground floor and especially for commercial purposes. In some cases, this is simply achieved by erecting a boundary fence with an entrance to the street.

An initial analysis of the objectives of PROSAMIM to improve the quality of life for squatters of the *palafitas* through the establishment of residential areas was clearly achieved successfully. However, the program did not anticipate the settlement of 127 micro and small businesses (PEPAC 2007), which were previously sources of income for some of the residents. Moreover, it is interesting to understand the benefit of mobility in relation to the contractual clause that prevents homeowners from selling the new property during a period of ten years.

We have identified three main triggers for the propagation of user-initiated transformations in the new households. Most transformations are related to informal trade purposes, followed by the creation of additional living space and, last, storage requirements (table 5).

Room renting and the establishment of small private businesses are strongly preferred for the transformation and expansion of the space of the households; the dwelling is one of the few resources that they have for generating income. If we take into account the prime localization, we easily recognize that renting is not just convenient but also very profitable for local standards. Yet the main reason for expanding the area of the dwelling is the establishment of illicit home-based enterprises (HBEs); thus, in the Manaus residential area, 62 percent of houses have been extended to make room for a diverse number of services, ranging from catering and minimarkets to teaching and bicycle rental. These activities have a critical relevance for many of the residents, who without such services would be forced to spend more time and money on journeys to adjacent neighborhoods—which would result in undercapitalization in a context that by itself suffers from numerous financial difficulties. Most important, these activities generate many jobs, which are cheaply created, absorbing a number of residents who probably would otherwise be unemployed and a burden to society.

Table 5. Percentage of Expansion Types in the Settlements Igarapé Manaus and Gilberto Mestrinho

Types of Expansion	Parque Igarapé Manaus	Parque G. Mestrinho
Home-based enterprises	62	38
Living space	28	41
Storage	10	21

Table 6. Wall Materials Used in Extension Construction, in Percentage

Material	Parque Igarapé Manaus	Parque G. Mestrinho
Cement blocks	4	0
Bricks	37	27
Corrugated metal	0	2
Metal bars	59	49
None	0	22

Extension Materials

Most of the HB1 transformations followed the same selection of materials used to construct the buildings. This created some difficulties for recognizing some of the transformations in the houses, such was the degree of formality, so we had to resort to the original plans numerous times to survey the extensions. On the contrary, the extensions in the HB2 often resorted to cheaper materials or were extended without permanently closing the space, as can be seen in the 22 percent of additions without walls—which we ended up classifying as extensions, because residents paved the ground, conquered space by placing their personal items in it, or added metal or plastic covers. In any case, the major conclusion that can be drawn by observing table 6 and the other tables below is that there is a clear difference of formality in the materials nominated to extend the houses in both typologies.

The HB1 presents a far more formal arrangement and superior finish as opposed to the HB2. Even though it is risky to establish a direct link between the design of the houses and the behavior of residents, we dare to say that the preference for cheaper materials and unpretentiousness in the HB2 has mostly to do with an understanding that the houses where they live were specifically designed to abolish transformations, which means that residents who do choose to extend their houses tend to do so using a more ephemeral approach, perhaps anticipating that sooner or later someone will remove them, or, as a preventive measure, by not making it clear that they can be classified as extensions of the house (tables 7 and 8).

These differences between materials also affect market perceptions of house values. Some households come out valued higher, but others were

Table 7. Roof Materials Used in Extension Construction, in Percentage

Material	Parque Igarapé Manaus	Parque G. Mestrinho
Corrugated metal	71	15
Plastic	4	2
Fabric	0	24
Roof tiles	8	0
None	12	59

Table 8. Floor Materials Used in Extension Construction, in Percentage

Material	Parque Igarapé Manaus	Parque G. Mestrinho
Fabric	3	1
Concrete	68	86
Ceramic	29	13

Table 9. Size of Extension, Range, and Average

Measure	Parque Manaus	Parque G. Mestrinho
HBE range	3–25	0–6
HBE average	14 square meters	3 square meters
Living space range	5–25	3–15
Living space average	15 square meters	9 square meters
Storage range	3–16	0–4
Storage average	9.5 square meters	2 square meters

devalued due to the cheap materials and low-cost extensions. Even if both occupy the same area with extensions, materials play a very important role in perception not only in terms of value but also of status.

Increase in Size and Value by Transformation

Another aspect of user-initiated transformations in the built environment is that they also express the personality and socioeconomic status of each resident. Indications lead us to consider that the house represents the image of the owner himself or herself, and therefore it also constitutes a classification of status and social values. It is important for social groups that inhabit a particular place to build reference values and sociocultural meanings around their households. The house represents to its occupants a conception of social status, which is supposed to make them different while approaching their near social environment. Through the construction and transformation of their houses, residents show their competence to climb the ladder of socioeconomic growth, which has an impact on their neighborly relations, their contacts, and their reassurance about personal and social identities. The home is an expression and symbol of personal and social identity, of the realization of their desires and their projects, while it is also concerned with the protection of the bodily self.

In the last five years, the housing market has shown progressive growth in Manaus. With the rise of the construction industry and competition in areas for the deployment of new residential developments, the market value of land in the capital has risen. A significant change has been in the price per square meter in Manaus, which is valued among the most expensive in the country (Oliveira 2012).

This ultimately makes the residents even more engaged with transformations in the house, because now is not only utilitarian issues that lead residents to expand their homes; there is a second variable, in that each square meter conquered from the public space happens to be a commercial valorization of the house itself.

Looking at table 9, there is an obvious disparity between the expanded areas of the two typologies. In large part, the difference in sizes of the expansions ends up being legitimated by the physical form of both HBs. The HB1 provides more opportunities for growth, which end up inadvertently inviting users to take possession of the balconies and spaces that can be found under the cantilevers to create additional space in their houses. The

HB2 also has balconies and communal space, but it would be impossible to close that space since it would interfere with the access to personal space and also access to the neighbors' houses. In the HB2, most of the storage spaces were highly informal, where the owners would make a fence of cardboard boxes or fabric in order to close that space. Similarly, in most HBEs in the HB2, it was impossible to increment the ground floors as in the HB1, where users could go up to 25 square meters closed with bricks, metal bars, and fiber cement roofing. In the HB2, users had to give up their living rooms to have microbusinesses. Users also appropriated the exterior spaces by covering the space with a textile roofs.

DISCUSSION

Typically, resettlement and social housing projects are conceived based on cost/benefit studies, often excluding the assessment of indirect social costs. These costs are frequently neglected, but they have a substantial relevance, particularly if the house is intended for more than merely providing shelter. Assuming that there is also an urgent need to improve the social condition of the inhabitants, such a study may be far more significant than a simple cost/benefit analysis. Our investigation has shown that a better understanding of the value given to design elements and a detailed study of the inhabitant's desires can point out opportunities for the introduction of policy improvements while reducing the cost per dwelling unit. Therefore, we recommend a constructive approach to encouraging and supporting transformations in the built environment. A division of responsibility for the construction and development of the dwellings between the government and residents, and an approach that allows for gradual investments in improvements to the house, are important steps that include the occupants in the conception of their own spaces and avoid unjustified investment from the government. A structured and transparent decisionmaking process is needed in social housing programs to provide a link between design criteria and user desires, giving voice to end-users and avoid inadequate solutions (Kowaltowski and Granja 2011).

Based on the research work presented in the preceding chapters, we conclude with a set of strategies that should be taken into account when drafting the already approved third phase of the PROSAMIM resettlement

effort. We offer strategies with application in two major sectors: policy, and the built environment.

POLICY FOR INCREMENTS

Along the various interviews we undertook with officials of PROSAMIM, we realized that there is no policy to address the changes that have occurred in the buildings delivered, nor take into account future changes. It is clear that the program and the local government do not support the practice of an incremental policy and that their approach has a strong resistance to change. Soon, we confirmed this position in our first meeting, where we were told that there were no changes to any of the housing blocks. However, even before embarking on any survey, we could easily detect that this did not match reality. Regardless of this opposition, changes occurred in fact, and in such magnitude that the government was forced to silently consent. It was impossible to monitor all the dwellings, or to proceed with all the heavy bureaucracy involved in demolishing the illegal extensions, and officials did not want to cause general dissatisfaction among residents. Thus the program opted to overlook the changes in the first typologies built, and to build housing blocks with a far more rigid structure and with fewer opportunities to "increment" in the second phase of the program. This was an incorrect approach, according to our analysis, because it not only failed to inhibit the transformations but also resulted in several extensions with an informal character, causing a condition that they were indeed trying to avoid. Consequently, our proposal begins precisely by appealing to a policy that considers the genesis of the residents. If the reality of their original settings lies in the flexibility and adaptability of the built environment, the local government and the program should devise a special policy and incentive plan to support it legally, financially, and technically. All three components should be integrated in one policy.

Legal Condition

The first step should be to improve the legal condition of the extensions and transformations to the HUs. Essentially, the illegal status of the increments to the house makes it unmanageable for the government or program to monitor and support the changes. Without clear legal guidance regarding

what is allowed and what is not, the residents will never be encouraged to report their upgrades to the built environment. Especially if residents feel that the changes made are at permanent risk of being demolished or are not legally recognized, this makes it harder to expect them to invest in good-quality and lasting transformations. Consequently, extensions may result in informal structures, as seen in the HB2 example.

Financial Sustenance

The units from PROSAMIM were offered for free, and this ends up influencing the behavior of the occupants toward their houses. They are not only highly unsustainable as investments but also result in permanent dependence on the government, since residents never really feel like homeowners. They revealed that they are unable to take initiative and carry out maintenance to their houses because they feel it should be a program duty. This can be avoided with an approach in which residents become legally responsible for the completion and expansion of their homes, stimulating a sense of identity and ownership among them while sharing the cost per unit built. This additional cost can be further supported through various types of public-private solutions. Our study clearly indicates that families are perfectly able to increase the value of their residences through personal investment; nevertheless, in situations of a lack of personal currency, alternatives can be generated. Solutions like housing subsidy programs and microloans have been used successfully for similar projects (Ferguson and Smets 2009). The poorer population normally has difficulty getting formal housing finance support, but through a coalition between the government, banks, resident associations, and tenants an agreement can be established to support incremental house improvement. By means of microloans for house extensions, the upgrading of the houses can be done in a faster and more permanent way than through residents' own investment.

Also, the integration of HBEs is an additional aspect that should be taken into consideration as a solution. The HBEs were excluded from the built environment planning (PEPAC 2007) of the previous phases of the program, which has not prevented residents from setting up their micro-businesses, but there is no reason for the absence of legal status as a part of the housing program. The HBE is a main trigger for upgrading social conditions, and thus an excellent resource to generate income and foster sustained finance. Therefore, it is essential to facilitate the establishment of

a diverse microeconomy and encourage economic activities. Local entrepreneurship should have more economic viability and operate formally.

Sense of Ownership

Finally, implementing this new policy results in an enhanced sense of ownership and gratification. It strengthens occupants' sense of belonging, and they feel that the changes made are secure, a consequence of their own effort and investment. This ultimately results in improvements to the spatial quality of the built environment and will lead to healthier living conditions for all residents (De Soto 2003).

THE BUILT ENVIRONMENT: A DESIGN TO ENABLE INCREMENTS AND ANTICIPATE TRANSFORMATIONS

A housing design is so contingent on other factors that it is not possible to provide a single solution but rather a set of guidelines that can drive the elaboration of a residential block. The design role in terms of adaptability should be more of a facilitator as opposed to determiner. The starting point for the habitation unit process should consist of defining a base unit to provide what homeowners cannot do for themselves—that is, the building frame, sewerage, electricity, and the like. The next step is to then establish an approach to simplify what residents can in fact do on their own. A possible solution may perhaps comprise a single multiuse room with a vertical distributed sanitary core plus electricity connections, coupled with one or more adjacent spaces providing solutions for the increment of housing space. To increase housing density, three or six units could be coupled to a main frame serviced with staircases and balconies to generate housing blocks. Such an approach would allow future homeowners to finish their house at their will, pursuing their own possibilities while reducing the cost per unit and allowing the government to increase the number of units built. The design of HB1 is a good example of how one can design a building with a degree of flexibility for change. These blocks, even if unintentionally, had a number of voids on their structures that could be understood as hints for an incremental process. The truth is that the extensions we observed never exceeded the perimeter of these voids, which leads us to conclude that these areas are not only important because they invite residents to expand,

but also they allowed setting subliminal limits to the transformations. An important aspect is then the integration of such voids in the design of an HB—a space that is suggestive of how it may be changed and tailored to multiple uses. Per unit and with the areas equally dispersed, the design should intentionally provide spaces for appropriation, without determining their exact use or configuration. Thus, this would create visual clues in the building form of how expansion over time can be accomplished. Both HB1 and HB2 have load-bearing walls, which leaves little room for flexibility beyond the annexed areas. Also, the use of non-load-bearing exterior and internal partitions might facilitate the alteration of the original design to other possible layouts from which future tenants could choose. Last, the foundations should also anticipate an increased load from the expansions.

THE SUPPORT SYSTEM FOR TRANSFORMATIONS

A housing support system should be created in order to assist with the transformations of the houses. A support system is a physical space with the tools and equipment needed to support the implementation of the transformations. Such system would be responsible for giving the permission to build, offering advice with design and structural problems, assisting throughout the process of construction, and guiding the method of sponsoring. The aim would be to ensure that changes are made with a formal character and with the best quality possible. Consequently, quality will attract more economic opportunities to the area and will lead to higher densities. This space should be created not only to facilitate the implementation of transformations but also to ensure that homeowners can learn and acquire both personal and professional skills. The space should be supervised by trained professionals capable of supporting and teaching construction techniques. The system ultimately benefits both the government and the residents, since it ensures that buildings are well monitored and executed while teaching new skills to the inhabitants. This generates education and job creation, two important social dimensions that need to be integrated into the social structure of the residents of the housing. This technical support should focus on finding the right methods to build the house extensions at affordable prices, with easy maintenance, sustainability, and local employment opportunities. Such support aims to contribute to a better infrastructure that will not

only enhance the economic value of the area but also help to close the gap between the poor and the middle class. The support system should not only promote the use of good-quality building technology that is suitable for the local context, but also facilitate the transfer of available, more traditional knowledge on house construction to individual families, mutual building groups, and local communities. Finally, it also may help to change the public's perception of the resettlement housing areas.

CONCLUSION

There are three questions that we wanted to answer that make this research paper unique. First, we aimed to understand the resistance against an incremental approach in the built environment. Why should a user be hindered from taking control of his or her space and identity? Second, what were the benefits of a new design conceived precisely to prevent the first signs of expansion in the first units of the program? And third, where can we find a consensus between government objectives and the beneficiaries of the houses? If this understanding can be achieved within a flexible approach that considers the identity of residents, the role of those affected most heavily in the project is emphasized.

From the interviews and conversations we had with the different stakeholders, the conclusion that can be drawn is that the instinctive opposition to any kind of flexibility or expansion of the houses has to do with the concern that it might lower the standards that they have set for the housing projects and that ultimately they could be backing the erection of a new slum. However, we feel that the flaw starts in the delineation of these same preset standards. The fact is that this definition of what is standard in social projects ultimately results in dwelling units designed with the minimal acceptable conditions. It could even be argued that this specific project was above that minimum, yet the inability to improve or expand their future houses lead the owners to a perpetual condition of resettled from the *palafitas*. The development of monotonous standard housing blocks repeated adjacent to each other differs from the diversity we are supposed to appreciate in cities, leading to preconceptions and visual segregation against the so-called residential areas. It was easy to anticipate what would happen in these areas and that the new residents of these units would feel the need to expand and

readapt the granted houses, especially if we take into account that Manaus is a city with a large and rapidly growing low-income population and with an accelerated birthrate. These could be considered the main triggers for the house expansions: the absolute need to improve the financial situation of its inhabitants and family planning, in which the house and its flexibility have the important role of encouraging entrepreneurship—plus, in a city like Manaus it is critical to project the number of houses needed, anticipating that the number of inhabitants per household will necessarily be changing, especially when they cannot afford to seek other alternatives. And so it does not seem surprising that in such a short time of existence, there are already so many clandestine expansions being made to the houses. Neither it is surprising to see houses overcrowded with people, either because the family has grown or they rented one of their rooms for subsistence.

This research demonstrates that none of the inhabitants of these areas enjoys living in informal lodgings, and that the former dwellings were only informal due to a lack of practical and financial conditions. In fact, the ability to build formally was unequivocally confirmed through our research; in many of the extensions we analyzed, it was nearly impossible to distinguish between the original building and the extensions, which looked like they were part of the original design itself—such were the construction precision and the quality of materials selected. Given the facts that we observed, we believe that a fairer model should allow the residents to be able to deliberate and develop their own space according to their resources and will, and that the government's role should be to guide, support, and establish the rules of how it could be done. Providing many different ways of accomplishing the same end, this abolishes the latent lack of identity of the allocated houses and promotes better integration within the city—especially when considering the prime location of the residential areas. And it is here that we seek to intervene, in defining a framework that helps policymakers to establish a support system for a different and more flexible approach. Because we consider that every problem has more than one solution, and that one beginning could have a number of ends.

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Pathways for Progressive Planning through Extending Water and Electricity Networks in the Irregular Settlements of Lima

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ABSTRACT

The spatial and physical dimensions of extending water and electricity networks in irregular settlements are rarely analyzed. Conducting works in unplanned areas, however, appears to be a technical and political challenge. This research looks at the practices and tools actors use to build Lima's infrastructures. Utility firms create mechanisms to overcome planning deficiencies, which offers new perspectives to rethink planning aims and methods. Sociotechnical, informational, and institutional innovations are revealed that actually could be considered as strategic options for developing cities. Their spatial impact argues in favor of preserving rights-of-way for progressive servicing in order to face unpredictable growth.

INTRODUCTION: PLANNING AND CITY BUILDING IN THE SOUTH

The reversed urbanization process in the South—occupation, building, servicing, and planning (Baross 1990)—challenges the capacity of conventional planning to deal with irregular settlements. Planning inadequacy in developing cities and the reasons why it has failed to keep pace with urbanization have already been extensively analyzed (Watson 2009). This consensual

account has led to a call for urban planning renewal, both theoretically and practically (Blanco et al. 2009). Irregular urbanization, however, has until now been mainly addressed through the poverty or illegality prisms, entailing socioeconomic, political, and managerial analyses (Devas and Rakodi 1993). These approaches do not allow the spatial dimension of urban growth in the Global South to be considered; besides governance, people, or land issues, urbanization is also a process of material city making. Planning alternatives have largely overlooked the physical processes of building the urban environment, while they are definitive and tangible manifestations of growth and sprawl (Mattingly 2001).

To look at irregular urbanization in that physical perspective allows some specific challenges of the material fabric of Southern cities to be grasped. Indeed, irregularity is twofold; obviously it does not abide by the planning rules and building norms set by official plans (Roy 2011). But these settlements are also morphologically irregular: the layout and built-up environment are haphazard and do not a priori respect technical and physical conditions for proper consolidation and upgrading with infrastructures. The existing built-up framework and the demand from a settled population thus challenge the conventional planning methods and service provision processes (Baharoglu and Leitmann 1998). Nevertheless, irregular urbanization constitutes the bulk of urban growth, which is progressively taken into account by planners and service providers. Operationally, irregular urbanization forces them into a catching-up and demand-driven logic of intervention.

Water and Electricity Sociotechnical Networks

Indeed, on the ground, the deficiencies of planning do not paralyze the urban fabric. Utility firms in particular do extend their networks in irregular settlements, whether to fulfill their universal service objectives, to increase their customer base, to reduce theft, or to obey political demands. Considering the structuring physical impact of laying down infrastructure networks, it is an interesting phenomenon to consider issues of territorial functioning and management. In the absence of an operational planning framework, basic services utilities have to muddle through the built-up space by creating new ad hoc techniques and rules to meet the unplanned demand (Connors 2005). This means that the mechanisms that help actors elaborate projects in uncertain contexts are outside the realm of official

planning. The purpose of this research is to identify some of the devices and tools that utility firms actually use to work in irregular settlements, and thereby to uncover some of the processes at stake in actually producing urban space. Our hypothesis is that these could serve as an opportunity to renew the thoughts and practices of urban planning (Marvin and Guy 1997).

Infrastructure extension is undeniably a material, social, and political process that is decisive for reducing urban poverty, enhancing cities' competitiveness, improving the living environment, and, last but not least, shaping future spatial sprawl. In the last decade, the insufficient access to basic services in cities of the South has been mainly explained by insufficient investments and inefficient management of public utility firms (World Bank 2003). Liberal reforms and privatization have thus been favored, and the academic literature has largely focused on the issue of financing basic services (Gassner 2003; Batley 1996). But this bias has largely omitted the physical dimension of service infrastructures, while they have a key role in consolidating the city, integrating irregular settlements, and mobilizing a large array of stakeholders (Jaglin 2008). Fulfilling these functions is very close to planning; however, the articulation between urban planning and electricity and water infrastructure networks is weak (UN-Habitat 2009). We argue that they often are a starting point for urban development and consolidation. But the modus operandi of utility firms and the impact of their interventions on the urban space is still poorly documented (Dupuy 1991).

Analyzing water and electricity network extension is a means to look at city building. In that perspective, we will not here consider the political economy or the governance system of extending services. Rather, our purpose is to look at the implementation on the ground of the decisions and the physical embeddedness of service extension. Despite some inefficiencies and difficulties, managers and engineers do work every day at installing new pipes and poles. Focused on the inability of utility firms to provide services, policies and research have ignored their positive attempts to extend service coverage and the techniques they use to make their way through irregular settlements (Connors 2005). To assess the daily, pragmatic, and effective strategies of utility firms working in irregular settlement, we consider service networks as sociotechnical systems (Graham 2000). Their development is thus here analyzed as a threefold locus for planning innovation: first, institutionally, by creating knowledge and coordinating actors; second, physically, by modifying

and consolidating the urban layout; and third, strategically, to find new ways of dealing with unplanned urban growth.

Utilities in the Irregular Settlements of Lima

Due to rural-urban migration, Lima grew at an average of 5 percent a year in the 1950s and 1960s; in the last two decades, annual growth rates have stabilized at about 2 percent. Incapable of providing sufficient housing and in the absence of an urban plan, the Peruvian government accepted state land invasions by the urban poor (Calderón 2005). In 1961, an innovative law was passed that promoted the integrated physico-legal development of marginal settlements through the extension of public amenities combined with tenure regularization.[1] Since then, the sequence "progressive occupation, housing, upgrading, titling" has become the major pattern of urbanization in Lima (Matos Mar 2012). This unusual approach has inspired the self-help trend promoted by J. F. C. Turner (1976), and later H. De Soto's (1986) theories on informality. Whatever their estimated and sometimes controversial success, it shows a flexible and reactive attitude toward urbanization patterns (Bromley 2003; Fernández-Maldonado and Bredenoord 2010). This pragmatism seems to have permeated to network extension techniques. Indeed, we can observe that service providers have developed in the last twenty years several kinds of innovations that try to cope with both the uncertain and physical characteristics of irregular settlements.

Utilities were extensively reformed in the 1990s, during the neoliberal turn of Alberto Fujimori's government (Ioris 2012). The electricity distribution sector has been privatized; Lima is now divided into two concession zones, exclusively contracted out to Edelnor in the north and Luz del Sur in the south. The two private companies' tariffs are set by OSINERGMIN, an independent regulatory agency. The water sector was opened to private capital in 1994.[2] In Lima, however, sociopolitical resistance prevented privatization (Fernández-Maldonado 2008). Sedapal (Servicio de Agua Potable y Alcantarillado de Lima—the Peruvian state-owned water utility that provides water and sewerage services to Lima and neighboring Callao) thus remained a public company under the central Ministry for Housing and Sanitation's authority and controlled by the

1 Ley 13517, Ley orgánica de barrios marginales o barriadas.

2 Ley 26338, Ley general de servicios de saneamiento.

regulator SUNASS. In 2011, the regulators' official connection rates for Lima's population were 85.6 percent for water, 85.3 percent for sanitation, and 95.3 percent for electricity.

Though widely studied until the 1980s, Lima is now largely off the map of both academic research and international interest. But the focus of this research on daily street-level practices reveals undocumented mechanisms of ordinary city making (Robinson 2002). The strategies of electricity and water utility firms have been studied during a six-month field research in Lima. Around a hundred semistructured interviews with engineers, social workers, local government employees, and community leaders have been conducted to identify their professional practices. Besides, several visits in irregular settlements, especially during the phase of infrastructure works, helped explain the field constraints and challenges actors face in their ordinary work, and assess what positively happens on the ground and the reality of city making beyond official discourses.

COPING WITH PLANNING DEFICIENCIES: INSTITUTIONAL ADJUSTMENTS

Being informal, the irregular settlements are by definition off the map: Properties and plots are not registered, streets and roads are not labeled, and the registry of inhabitants is missing. People cannot provide conventional documentation or proof of residence either. Planning rules are here irrelevant; in this context, actors actually look for alternative institutions that will generate knowledge and help them elaborate a strategy (Baharoglu and Leitmann 1998). In Lima, institutional adjustments come from two main sources: one is the adaptation of the national law, the other is the "institutional bricolage" to which stakeholders resort (Cleaver 2001).

Adaptation of the Regulatory Framework

Utility managers generally blame the lack of urban planning to explain their difficulties in extending infrastructure to the peripheries. However, this deficiency can be considered in Lima as a facilitating factor: the absence of an operational urban plan makes the national framework preponderant. Laws have been frequently adapted to support service extension by experimenting with regulatory options in a very result-oriented attitude.

In the early 1990s, as per the progressive development approach then favored, service provision and land-titling were independent processes; there was no need to have a formal title to demand infrastructure extension (Calderón 2005). But in 1996, with financing from the World Bank and on the basis of H. De Soto's theories, a central agency for the regularization of informal property is created, thereby making an official land title a prerequisite to access basic services. Utility firms were not allowed to extend their networks in irregular settlements anymore, and nongovernmental organizations (NGOs) reckoned a growing social discontent. By 2006, this legal approach of urban development had proven ineffective in improving living conditions (Ramirez Corzo and Riofrío 2006), and the outgoing government decided to abandon the land-title criterion. In order to facilitate the application process for basic services, a law[3] created a new tool: the "certificate of possession." This certificate is directly delivered by the district municipality, according to simplified procedures, and is only valid for requesting basic services, without entailing any other property right. The application procedure for services is subsequently modified by the application decrees; the certificate and a boundary plan are from now on enough for utilities to examine the feasibility of a project.

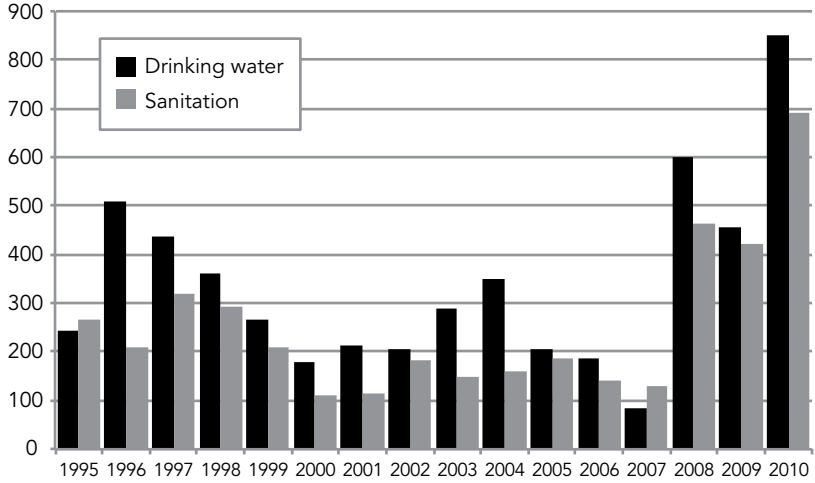
Besides, in 2000, Peru adopted a new system for public investments aiming at improving the efficiency and sustainability of the public spending system that applied to Sedapal. However, the complexity of the procedures delayed water projects' approval (Garrido-Lecca 2010). Therefore, in 2006, too, the system was simplified for water and sanitation projects in order to accelerate the mobilization of funds. This adjustment specifically aimed at supporting the quick implementation of the national program Agua Para Todos, which was launched by the newly elected government. Service extension to peripheries was enhanced thanks to these political, institutional, and financial supports (figure 1).

As for electricity, two specific decisions facilitated the extension of services. The law that privatized the sector[4] created an obligation of universal service for electricity companies. This was combined with the authorization of technical options for faster and cheaper electrification, namely, allowing

3 Ley 28687, Ley de desarrollo de la formalización de la propiedad informal, acceso al suelo y dotación de servicios básicos.

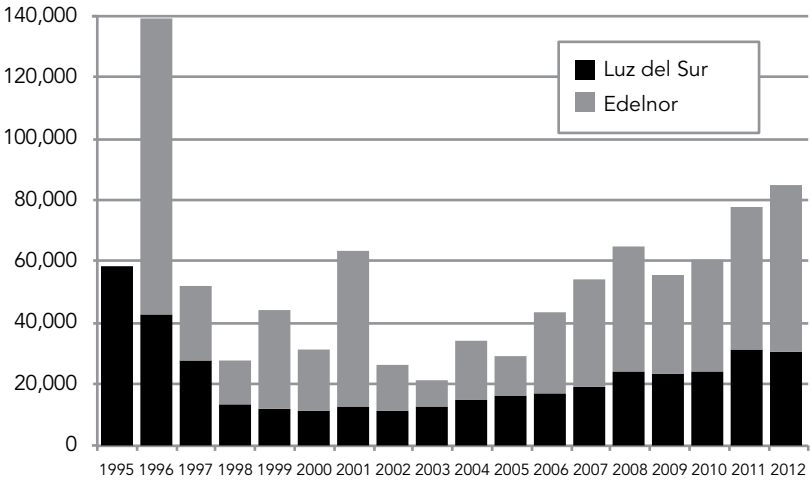
4 Decreto Ley 25844, Ley de concesiones eléctricas.

Figure 1. Additional Kilometers of Pipes in Sedapal's Network



Sources: SUNASS; Sedapal.

Figure 2. The Number of New Residential Electrical Connections



Sources: OSINERGMIN; Luz del Sur and Edelnor.
Note: The 2001 increase for Edelnor is due to the extension of its concession zone.

the installation of aerial lines and a system of provisional bulk connection for irregular settlements. Within the first two years, electricity companies conducted massive electrification, connecting more than 200,000 households. But in 1996, the policy of land-titling as a precondition for servicing hampered the impetus. Constrained by the law, electricity companies shifted their strategy to improving their primary network instead of the distribution segment (interview in Edelnor). The 2006 law opened a new period when the firms could catch up with the accumulated backlog of demands (figure 2). Moreover, a 2009 emergency decree aimed at promoting electrification in marginal urban areas. This decree clarified the rules for using the certificate of possession, canceled the previous criteria of being 40 percent inhabited for an area to be electrified, and temporarily subsidized connection fees. This financial help has since then been maintained at the firms' request (interview in Ministry of Energy).

The combination of these changes in the regulatory framework has been helpful for service extension. But utility firms not only took advantage of the legal adjustments; they also adapted their own norms and procedures to intervene in irregular urban areas.

The Creation of a Strategic Urban Tool

As per sectoral laws, utility firms keep their prerogatives on defining their own criteria for infrastructure development. The regulators and ministries decide on the minimum standards, and then set utility firms free to establish the procedures that best fit their specific constraints. To elaborate a project for water or electricity network extension, what managers and engineers mainly need is information related to the urban physical layout, which is generally missing or inappropriate in irregular settlements. The lack of information is a source of uncertainty for planning infrastructures that they need to compensate (Christensen 1985).

Helpful as it is, the certificate of possession is, however, insufficient for actors to stabilize knowledge on irregular settlements. Therefore, either for municipalities to deliver it or for utility firms to estimate the technical feasibility of project, the certificate of possession is used, accompanied by a layout plan of the settlement. According to all the stakeholders, this plan has become a key tool to consolidate irregular settlements, for several reasons. This layout plan is a legacy from the land-titling methods; it was a map with plots, roads, and public spaces to be integrated into the official

land registry. The 2006 law does not explicitly mention this layout plan as a prerequisite for service extension, but a simple location plan of the area, which does not necessarily detail the internal mapping. However, in practice, the layout plan is required in the application procedures for the certificate of possession and for service connection. This plan is stamped by the district municipality. Urban departments mainly verify that the streets are coherent with the transportation plan of the metropolitan municipality, and thus that there is no risk of road relocation. Hence, utility firms can trustfully use these plans to draw their infrastructure lines along the approved rights-of-way. On the basis of that map, utility firms can estimate the needed human, financial, and material resources, and minimize the risk of ex-post relocation of the network. Asking for the layout plan, they get the knowledge they need on their work environment and stabilize their previsions on future development. Cooperation can thus emerge from that *bricolage*.

Besides, in the meantime or afterward, people and local governments reuse these plans for conducting other urban public works. Indeed, for Lima—being in a seismic zone, and with irregular settlements encroaching steep hillsides—the building of stairs, roads, and retaining walls are crucial for consolidating the city. With their layout plan, inhabitants explain that they can go to different NGOs, social institutions, international donors, and public financing schemes to get additional works done. The providers will align their projects on the layout plan, which in practice becomes the base map through which the city is incrementally built up. Besides facilitating actors' cooperation, the layout plan thus serves as an institution to spatially coordinate independent sectoral interventions and actors. Moreover, its elaboration is a participatory process of cartography that entails community mobilization (Patel, Baptist, and D'Cruz 2012). Inhabitants themselves are in charge of presenting the layout plan to municipalities; the leaders gather the residents, contract out an engineer or architect, levy the money, and follow up the topographical survey (figures 3 and 4). The exercise of mapping is a strategic moment, when people also decide where to locate streets and reserve public spaces for yet-to-come collective amenities, a process that several local NGOs accompany. The layout plan helps draw the environment in which people ultimately will live, foresee future equipment and infrastructures, and, consequently, participate in modeling the urban fabric.

Figure 3. Settlement's Information Board Announcing the Delivery of the Certificate of Possession

Figure 4. Private Topography Services Right in Front of the Entrance of the Municipality of Carabayllo

The Spillover Effect and Its Limits

The ultimate aim of the inhabitants is actually to get basic services because of the obvious threshold it constitutes for environmental improvement and integration with the rest of the city (Fernández-Maldonado 2008). Rather than expecting a title that would not bring any change, people favor demanding and pressuring the state for services (Matos Mar 2012). They consequently prioritize getting a certificate of possession and a layout plan, a process that generates its own political and spatial effects: First, the community mapping is a form of coproduction that creates political mobilization and confidence among the population in interacting with public authorities (Mitlin 2008). Second, it is an institutional tool on which all stakeholders rely and that compensates for the planning deficiencies in irregular settlements. Third, it is a starting point, which has some irreversible effects on the urban morphology and consolidation. In all these dimensions, the layout plan in Lima emerges as a strategic tool for urban development that proves to be effective and efficient (Davidson 1996). Layout planning for basic services can thus be considered unconscious strategic planning; it is indeed "selective, relational annex inclusive, integrative, visioning and action orientated" (Albrechts 2006). Moreover, it has some spillover effects on the general urban physical fabric and governance arrangements.

Nevertheless, being used by the actors outside the official realm of urban planning, its scaling up, registration, and formalization are limited. Because the layout plan is cheap, geo-referenced, and adequate to the actual built-up situation (i.e., it is a gold mine for working in irregular settlements), it is completely ignored by the planning institutions of Lima. It remains at the *bricolage* level: Actors create an institution halfway between official and informal to solve their uncertainty problems (Cleaver 2001). Its recognition by policymakers is the challenge. But in Lima, it is limited to being a working paper; as operational and efficient as it may be to conduct works and thus build the city, it remains a draft that is not considered relevant within the "metropolitan philosophy of planning" followed by municipal planners. The disconnection between official planning and the actual mechanisms of the urban fabric is blatant.

WORKING IN UNPLANNED SETTLEMENTS: SOCIOTECHNICAL INNOVATIONS

Once the intervention context has been clarified and the project has been elaborated thanks to the information gathered, challenges for utility firms shift to the implementation phase. Here, too, being irregular, the settlements do not by definition respect the building norms or the planning standards; the haphazard built-up areas are not a priori adequate for laying down infrastructures lines. Therefore, to actually construct the infrastructure works, utility firms' workers need to muddle through at the street level (Connors 2005). Whether it is in public or private, an electricity or a water company, engineers innovate daily to adapt to specific sociotechnical environments.

Massive, Rapid, and Innovative Electrification

Along with the privatization of the sector, the norms for electrification were technically diversified to facilitate coverage extension. At the beginning, utility firms extensively used the option of the provisional bulk connection; the settlements were provided with a collective macro-meter at the end point of the existing network, from which the residents were responsible for installing wooden posts and wires on their own. They were billed collectively by the company, but the engineers were not involved in any internal arrangements. This option is still valid today, and it permits the most recently settled neighborhoods to get electricity even if they are not yet recognized. Later on, the utility engineers officially conduct definitive electrification; the macro-meters are converted into substations and definitive posts, and wires and individual in-house connections upgraded. Public lightning is done altogether using the same poles as for wiring. This approach is thus progressive; instead of immediately servicing only a little portion of Lima, electrification was done everywhere but incrementally in a two-step process, as per the companies' technical capacity and commercial strategy.

In 1995–96, engineers massively electrified all the "obviously consolidated parts of the city," without any map of the area. In order to quickly extend the consumer base, they explain they laid the network lines on the basis of a simple sketch they did while visiting the area. The managers, and inhabitants, now regret the disturbances it creates. Indeed, being erected without any map, electric poles are in the middle of what has now become a staircase or a street lane. Thus, either the inhabitants have to bypass them

every time they go home, or the utility firm has to relocate them at its own cost when required by the municipality. With the progressive consolidation of Lima's settlements, these queries for post-relocation are more and more frequent. This is one of the technical reasons why utility firms now elaborate all their projects on the basis of the confirmed layout plans.

Finally, the search for technical and technological efficiency has spurred innovations that facilitate the extension of electrical network in the most remote and haphazard settlements (Pérez-Reyes and Tovar 2010). The topographical constraints of Lima's irregular settlements on rocky hillsides make it difficult to work with machines. Additionally, because of the frequent earthquakes, respecting safety distances is particularly important. But according to the engineers themselves, there is no technical constraint they cannot overcome! For instance, in the last few years, Edelnor has started using fiberglass electrical posts instead of conventional concrete ones. Weighing only 50 kilograms, they can be carried up to the hills by only four men, where trucks cannot go (figure 5). The additional cost entailed by this new material is compensated for by the reduced costs of the security, labor, and machinery necessary to install them. Edelnor also expects the market for fiberglass materials to expand, thus lowering the price. Less innovative but as useful are the single-post elevated transformers that require less security space around them in dense areas, or an electric switch for streetlights with solar cells to reduce the collective energy charges for residents.

A Short History of the Water and Sanitation Network Options

Since the 1990s, Sedapal has implemented a series of large-scale programs to expand water coverage, with financial support involving international cooperation. More or less successfully, all these policies have tried to depart from the conventional network approach, and have generated intense debates within the water and sanitation sector on the appropriate use and acceptation of technological changes.

The first program was Agua Para los Pueblos Jóvenes, which was financed by the European Union from 1994 to 2001. Conceived as an emergency measure to cope with the cholera epidemic of 1991, it was rapidly converted into a strategic solution of progressive autonomous networks. In order to bring safe drinking water to settlements that would not be connected in the short term, Sedapal built for each settlement a reservoir, public standpipes,

Figure 5. Installing Fiberglass Electrical Posts in Hilly, Remote Settlements without Machines

Figure 6. Public Standpipe, Proximity Tanker for Cooking, Overhead Tanker and Hosepipes for Bathing

and the main distribution pipes in between. A standpipe delegate distributed the water through safe and clean hosepipes to individual polyethylene tankers above houses (figure 6). The innovations in that system were both social and technical: On the one hand, the population organized itself in committees for the construction, distribution, management, and payment for proper functioning of the mini-network. The appropriation of the system by the people has then been identified as the key factor in successful and sustainable implementation (Bonfiglio 2002). On the other hand, the mini-network could easily be later on connected to the main network at low cost once technical feasibility was approved; canceling the reservoir and standpipes, the engineers only had to plug the entry point to its main pipes and then connect each household individually. This option was conceived as a long-term strategy to progressively incorporate the peripheries into the main network, taking into account the inability of the company to extend its conventional infrastructures all at once. The technical assistance from the utility's engineers guaranteed the compatibility between the mini-networks and main lines.

From 2002 to 2006, the World Bank helped Sedapal experience the condominial system in Lima. Condominial networks rely on the idea of servicing a block as a unit, connecting them to each house with small pipes going through backyards instead of direct connections to the main networks (Melo 2007). Condominial pipes are shallower, cheaper, shorter, and smaller than conventional ones; they proved to be particularly adequate to the accidental zones of Lima (Macedo and Conza 2004). Technically, condominial systems constitute a new type of network that departs from conventional techniques. Additionally, the dedicated team of sociologists made its case for integrated "technico-social" intervention; NGOs provided both technical assistance for installing pipes and facilities, and capacity building for maintenance and operation by the people. However, the innovation of condominial systems has since then been abandoned—social, technical, and political resistances have discredited the technique, despite its operational efficiency (Ioris 2012).

Indeed, in 2006, the newly elected government launched the program Agua Para Todos, promising universal and uniform access to water for all, thereby silently condemning differentiated provision systems, a general trend in the water sector (Jaglin 2008). A law announced nine projects on the large peripheries of Lima, to be financed by a "shock of

national investments." This policy was a return to a more conventional and technical way of approaching water issues; it followed the internationalized trend for subcontracting, it focused on the augmentation of supply and pipeline infrastructure instead of demand management (Ioris 2012), and it relapsed to the conventional centralized network. Several interviewees gave diverging accounts of this shift; but anyway, the political discourse of progress and equality permeated the engineering culture and discredited the condominial systems as an inefficient and discriminating technology. Abandoning the sociotechnical innovations of the previous programs, this policy instead took advantage of the regulatory facilitating adjustments related to land status and financing (Garrido-Lecca 2010). The failure of this innovative transition sheds light on the social and political issues at stake in extending networks; the sociotechnical regime of the water and sanitation sector in Lima proved to be change-adverse and highly resilient (Truffer et al. 2010).

The Sociocultural Conditions for Successful Technological Change

The physical techniques for network extension works are not neutral instruments; for their new devices to be used and efficient, utility firms have to secure their social acceptance internally and by the users (Ostrom 1996). In the last decades, Sedapal has increasingly promoted inhabitants' participation and involvement. Some extensive maintenance and hygiene education workshops took place; hygiene promoters, standpipe delegates, and financial managers were trained to ensure sustainability. The acceptability of new technologies was enhanced when the inhabitants knew and participated in their design, construction, and maintenance (Sedapal and World Bank 2006). According to the NGOs and sociologists involved, this form of coproduction was also crucial in building people's political, technical, and social capacities. The diffusion of participatory planning methods also entailed some organizational changes; Sedapal relied on NGOs as social facilitators. The importance of NGOs was actually exponential—from "annex" partners in the first years, they became the unique operator for both the social and technical works in irregular settlements from 1998 (Bonfiglio 2002). While launching the condominial program, Sedapal set a condition in its call for tenders; to be eligible, construction firms had to be in a consortium with an NGO. Technical and social professionals now acknowledge both the difficulties but also the success of such collaboration.

These partnerships created accountability and new organizational forms that were decisive in improving service performance (Caseley 2003).

However, the tensions around the use of the condominial system show that social acceptation by the people and organizational reforms are not enough. Some of the difficulties that emerged in the diffusion of innovative networks came from within the company itself. Engineers still today debate the pros and cons of the technique; some left the firm when it was abandoned, some keep on defending the supremacy of conventional networks. This dispute was also fuelled by the political use of the slogan "technology for the poor" and by the alleged lobbying from the construction sector, in favor of using the more work- and materials-intensive conventional systems (Ioris 2012). Though condominial systems proved to be technically efficient, the innovation challenged some well-entrenched professional skills, habits, and training (Watson 1995). The reluctance of some engineers to publicly promote this alternative may also have influenced the people's resistance in a vicious circle. Shifting to new technologies and practices requires a fundamental change in work culture and practices (Connors 2005). Even though Sedapal updated its norms to include the condominial option, that did not guarantee that conventionally trained engineers would accept it (Watson 1995). Beyond social acceptation, the success of sociotechnical innovations relies on professional acceptance by street-level practitioners. Appropriation of technological innovations is thus a sociotechnical process; it requires a move away from the powerful vision of uniform centralized infrastructures (Jaglin 2008). Being flexible and adaptive is not self-evident; the successful promotion of innovations supposes to change not only the rules and standards but also the social and cultural regimes in which they are embedded (Truffer et al. 2010). This analysis can easily be transferred to urban planning, and the planners' culture and reluctance to change their professional practices and identities (Roy 2011; Watson 2009).

PREPARING FOR URBAN EXPANSION: PROGRESSIVE SERVICING

For the last few decades, Peru has adopted a series of experimental and innovative approaches in housing, and by extension in the urban sector (Fernández-Maldonado 2008). This pragmatic and operational approach relies on political will, with some international inspirations and support,

and pressure from a strong civil society (Matos Mar 2012). Furthermore, it appears that utility firms have managed to take advantage of the institutional and urban context to innovate and make their way through the irregularity of the settlements. Institutional, informational, technical, and social innovations have succeeded in overcoming urban planning deficiencies.

In order to extend services in unplanned settlements (i.e., to improve living conditions in forthcoming settlements), three principles emerge from the Lima case, which help renew thinking about planning methods and aims in the context of uncontrolled urban growth. As to the procedural dimension, the key words are adaptation and progressivity. As to the content of urban action, the urban layout, for its role in both structuring space and reducing uncertainty, definitely appears as the crucial element of the urban fabric.

Adaptive and Incremental Methods

In Lima, interesting perspectives are opened by the continuous adaptation of the legal framework, of the institutions used for coordinating interventions, of the technologies and forms of service networks, and of relations with the population. Despite some difficulties and drawbacks, it is the sign of a dynamic approach that echoes pragmatic claims and social learning in planning (Healey 2008). This adaptation is a multidimensional process that is well illustrated by service extension practices; far from being pure physical entities, infrastructure networks combine political and social elements. Consequently, utility firms' strategies, too, rely on an array of technical, institutional, and social tools. Nevertheless, infrastructures are embedded in sociotechnical regimes; the diffusion of innovations thus requires long-term strategic planning to change perceptions and culture (Truffer et al. 2010).

The adaptive approach goes hand in hand with the progressivity of network development. The incremental character of housing consolidation can also be applied to infrastructure improvement (Choguill 1996; Wakely and Riley 2011). Starting with collective bulk connections, services can then be upgraded and extended in house if and when utility firms enhance their capacity to approve technical feasibility. But incrementalism is not limited to the extension of services; it can also be more broadly applied to the urban fabric and the planning process (Lindblom 1959). Lima's experience shows that as long as the rights-of-way are properly defined, services can be extended and consolidated in a phased manner: electricity, then water and sanitation, and finally roads and pathways. To ensure the coherence of

incremental development, to respect people's wishes and needs, and to minimize the disturbance of works, the phasing of utility firms' interventions is here important. This intersectoral coordination cannot be done by utility firms, which follow their own strategies and capacities. It is therefore up to the local government to take care of the progressivity of infrastructure extensions. The layout plan is here a promising base in building mechanisms that are useful for all stakeholders. It provides the necessary information to reduce uncertainty, and it offers a platform for aligning public works.

The Layout, the Grid, the Street

The counterexample of the still-unconnected areas of Lima illustrates the importance of roads as the key element to deal with urban growth (Angel 2012). Regardless of the land status and investment capacities of utility firms—both constraints have been minimized since 2006, the unserviced areas are today the most recent and remote settlements. Contrary to older invasions that respected the basic urban norms (Calderón 2005), Lima is now growing in a piecemeal manner through small-scale encroachments (figures 7 and 8). This settlement pattern is haphazard, and the morphologically related technical challenges for utilities are important. Catching up with growth will thus require more and more adaptive practices. Pushing the technological and social frontier is, however, as we have seen, a difficult and lengthy process.

This focus on the urban layout refers to the idea of the arterial grid on one hand, and to the street as a public space, on the other. The importance of preserving regular rights-of-way for utility firms reinforces the case for the "making-room paradigm" (Angel 2012). Whatever the standards that are locally set, the preparation of an arterial grid of roads as a local infrastructure corridor is facilitating enough; what engineers in utility firms ask for is actually some spatial certainty (i.e., physical path dependency). It is also a plea for going "back to the basics": streets and incremental development (Clos 2011). But departing from comprehensive upgrading or sites-and-services approaches, incremental planning should allow progressive infrastructure extension. This approach helps prepare for future urban expansion in contexts of unpredictable growth and spatially constraining environments: it requires minimum initial investments, substantially reduces uncertainty for actors, takes into account the utility firms' capacities, and offers the possibility to levy land values for development (Mattingly 2001).

Figure 7. Land Invasion Respecting a Standard Layout

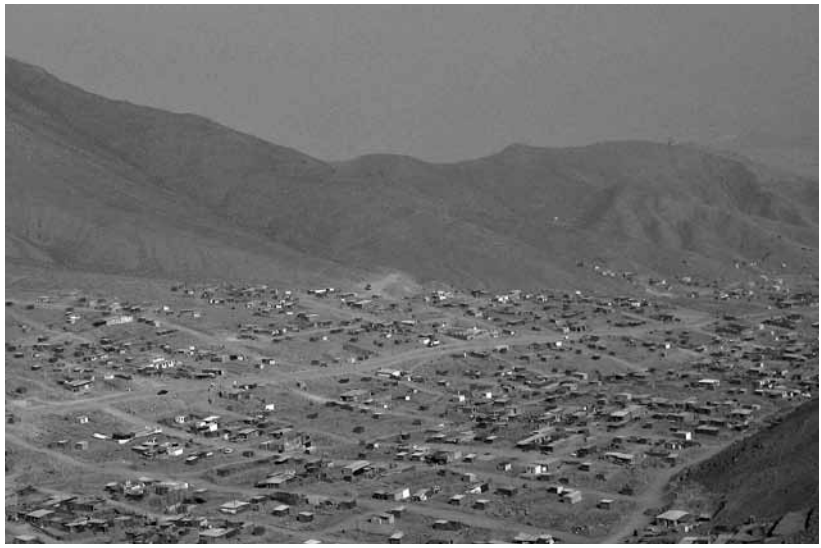
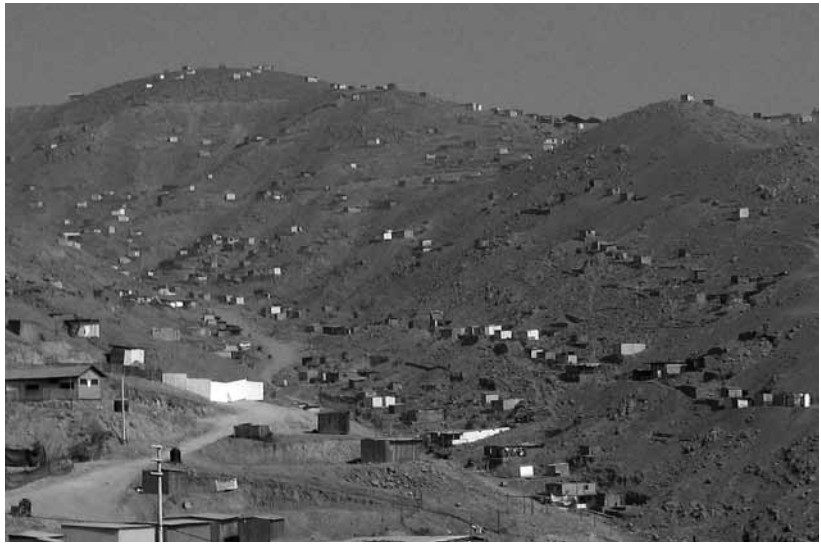


Figure 8. Piecemeal Encroachments on Hillsides



The innovations in rules and techniques developed by utilities help to identify new procedural, institutional, and knowledge creation tools for planning; departing from traditional views and keeping an open mind to unconventional innovative solutions is decisive. But this change relies on a deeper shift in the way planners, engineers, and policymakers think of irregular urbanization. Rather than an uncontrolled and challenging process, it could be considered as an opportunity for pragmatic action. More generally, urban planning may shift from land-focused tools to mechanisms that ensure public space for infrastructures—hence, spatially and strategically, paving the way for an eased-up extension of services in the long term.

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Rethinking Informal Housing and Land Ownership Debates from Local Actors' Perceptions: A Sociological Understanding of the Failed Eviction of Thapathali Informal Settlement, Kathmandu

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ABSTRACT

This paper explores the sociological understanding of the meaning of land ownership and its consequences for incremental housing policies using discourse analysis as a method of investigation of local actors' perceptions following the eviction of Kathmandu's Thapathali slum area in May 2012. Establishing what is meant by forms of tenure arrangements—legal and customary—demonstrates the benefits of studying a situation in which incremental housing failed as an alternative to eviction, informs traditional planning approaches through innovative recommendations related to legal instruments that create effective rights, and emphasizes the need to anchor housing policies and incremental housing approaches in the social and political context with which local authorities are dealing.

INFORMAL HOUSING AND THE SOCIAL CONSTRUCTION OF LAND OWNERSHIP MEANINGS

The *informal housing-urban poverty* nexus has faced various developments in recent decades, as cities in developing countries such as Nepal have been coping with rapid urbanization patterns and limited resources regarding the institutional framework in which they implement urban planning strategies. In the case of Nepal, responding to housing needs is a recent challenge as the shortage in low-income housing has been pressured by fast paced urbanization in the Kathmandu Valley over the past decade. The various forms of informal housing and their influence on the Nepalese land ownership debate bring the study of the social construction of informal housing and land ownership meanings to a new and central focus.

Forms of Informal Housing

Informal housing has been characterized by insecurity of tenure and an absence or low standard of infrastructure and services. In terms of its manifestations, informal housing encompasses important regional and local diversity in developing countries, as well as in more developed ones. Informal settlements are mainly defined by their land tenure status, or absence of status (Tsenkova 2009), and forms of informal housing have been largely explored in relation to the forces generating these settlements. Payne (1989), Satterthwaite and Hardoy (1989), Arche (1992), and Kombe and Kreibich (2000) have produced abundant studies from diverging academic standpoints—geography, urban planning, sociology, political economy, architecture, and anthropology. Interestingly, some aspects of informal housing emerged as central and revealed misconceptions regarding how illegality had been established as a central pillar of housing informality. According to Gelderblom and Kok (1994), squatting can be defined as "the unsanctioned and illegal use of land or dwellings belonging to other parties for shelter" (Gelderblom and Kok 1994, 277), which differs widely according to local representations. Whereas the "illegality" aspect of informality plays a role in most informal housing area designations, the phenomena of self-produced housing and squatting encompass different meanings on the irregularity/illegality spectrum. In recent decades, urban land tenure has fallen beyond the traditional legal/illegal or formal/informal dichotomy, as suggested by (1) settlements lacking any legal status in which large populations have lived securely for several decades,

versus (2) neighborhoods where formal titles do not guarantee protection from eviction. Ownership and occupancy legitimacy therefore take different meanings, with property rights ranging from de facto to de jure rights along a spectrum. Slum areas for which inhabitants possess formal titles; adverse possession of buildings on land not recognized by the authorities; or low-income rental housing rules excluding certain age or ethnic groups—all help explain the production of informal housing.

Forms of informal housing therefore tend to influence land ownership debates in various ways as *ownership* is increasingly shaped by both formal and informal rules. Social meanings related to housing and ownership are being embedded in social roots, which are difficult to disentangle from informal housing production. The notion of the "choices" that city dwellers exercise in opting for one form or residence over another has been questioned by Gilbert and Varley (1991), acknowledging the idea that forms of informal housing conveyed crucial information related to life-cycle-related decisions, migration trends and drivers, and local representations related to informality, the right to the city space, and the influence of social status on perceptions of illegal occupation.

The Social Construction of the Land Ownership Debate

The study of the social construction of *ownership* meanings benefits from a sociological approach, in the sense that the legitimacy of land occupation is not systematically coupled with the existence of formal property rights, especially in the developing world. The debate therefore lies in the identification of who, among a broad range of social actors and their respective social representations, defines the *legitimacy* of occupancy—who draws the line between formality and informality, and between de facto and de jure rights? Defined as a gray area, a continuum, tenure security tends to be increasingly linked to occupiers' views of their right to informal city spaces. As underlined by Sindzingre (2006, 3), there is a clear "difficulty in establishing criteria of formal and informal institutions and contracts. Criteria such as the *credibility of rules* and *enforcement capacity* have greater explanatory power. Together with the distinction between the forms and contents of institutions, these features more accurately explain the structure and transformation of activities and institutions, which are described through the formal-informal duality." Focusing on land ownership perceptions and the processes through which they are socially constructed by actors with

conflicting views offer an alternative approach to the formal and informal occupation of city spaces, and goes beyond the substitutability of the formal/informal housing debates.

In most of the economic literature related to land ownership, the focus has been highly directed toward rural areas and agricultural income; while informal housing tends to have a separate body of literature dealing mostly with urban dynamics, leaving aside the rural-urban nexus. Establishing a link between rural land ownership and the production of informal housing in cities can be achieved through a sociological approach, using social actors' perceptions of both rural and urban meanings attached to occupancy. To a large extent, land ownership in rural areas has been seen as a productive asset, a safety net ("safety net or insurance function which is made more valuable through retaining ownership rights than through sale"; De Janvry et al. 2001, 26), guaranteeing agricultural income and a wide range of risk-coping strategies, and acting as a major determinant of temporary migration decisions (VanWey 2003). In the context of developing cities, rapid urbanization patterns have been increasingly linked to low agricultural returns or unequal land distribution in rural areas, resulting in migration waves to urban areas where housing markets affected by the rising cost of urban land over the past decades (Jones and Ward 1994) could not capture and respond to the increasing low-income housing needs of the migrant populations, which started to establish illegal settlements on available informal city spaces. Observing this phenomenon from a sociologist's angle, the *right* to informal city spaces has no established meaning and does not respond to any written rule or law system; perceptions about informal spaces and informal housing are built through local actors' representation of illegality, and the extent to which illegality and informality are considered *legitimate* is intrinsically linked to how migrant populations are perceived as having no other choice than occupying land illegally. The *legitimacy of illegality* therefore draws upon various social views—those of political leaders, local authorities, urban middle-class and elites, the media, and so on—and the processes attached to arbitrating *who* is entitled to informal city spaces has become increasingly linked to perceptions of rural life, agriculture, and rural livelihoods and, to a wider extent, to land ownership in rural areas. In societies where unequal land distribution has been a central issue, being a landowner in rural areas has had a considerable impact on social representations regarding urban informal land occupancy by rural migrants.

Land ownership meaning therefore calls for an in-depth study of its social construction and an identification of the social factors influencing these meanings. In order to broaden the understanding of informal housing dynamics in developing cities, the role of leaders, political parties, community groups, and government officials in authenticating and registering land rights, in arbitrating land disputes, and in regulating land-use development requires a new focus on socially controlled—formal and informal—regulatory mechanisms and on the social representations related to urban informal housing, land ownership, and the legitimacy of illegality.

Definitions of Eviction and Its Social Meanings

In a context of uncontrolled urbanization and sprawling informal settlements, governments and local authorities in developing cities have been faced with increasing pressure on urban infrastructures, resulting in highly contested city spaces. The lack of institutional capacity to either upgrade existing settlements or relocate squatting populations has given rise to various urban planning strategies aiming at coping with migrant populations settling in informal areas. Eviction has mainly been carried out in inner city areas, where the cost of land and high demand for formal housing from wealthier households has created an atmosphere of tenure insecurity in informal settlements, while other strategies to discourage consolidation, such as the nonprovision of basic services and infrastructures, have been common alternatives to eviction (Ahmed 2007).

Social meanings attached to eviction and their impact on representations linked to the legitimacy of informal settlements are increasingly shaped by international perceptions of forced eviction as a last resort option, and thus are regarded as a traumatic experience entailing urban social fragmentation. For these reasons, informal land regularization and incremental housing approaches are slowly becoming the preferred option when dealing with informal settlements—although, in some contexts, forced evictions with no alternative options offered to the evicted are still common practice.

An interesting entry point to the understanding of eviction and the extent to which it affects the perception of tenure security and the legitimacy of squatter settlements can be found in an analysis of housing as produced by individuals as a concrete manifestation of their intentions, aspirations, and motivations to make an informal space theirs. Symbolic attachment to land and places in the context of rural-urban migration can be understood

as the meanings and values assigned to informal housing *within* a specific social context. The meaning of squatting for households grows out of the ways in which local actors act toward them and their identity as *squatters*, with theories of Symbolic Interactionism (Blumer 1969) being at the core of a sociological understanding of what informal housing means to migrant populations. Meanings are therefore social products formed through social representations of informality and the social interactions of slum dwellers with the rest of the urban population—which are to shape the mechanisms leading to successful incremental housing approaches, or, in the case study presented here, to unclear urban planning policies resulting in eviction processes.

Informal Land Regularization and Incremental Housing: Land Ownership Meanings as an Entry Point

Incremental housing policies draw upon a wide range of options, either by upgrading and regularizing the informal settlements where they were first established (referred to as "in situ upgrading") or by relocating informal settlers to places where they are offered tenure security and access to basic infrastructure (known as "relocation"), with the common aim of providing improved access to housing. Various pros and cons have been found regarding both approaches, notably the benefits of maintaining the community structure versus difficulties in providing basic services in encroached inner city spaces (in situ upgrading); distance from the city and its employment opportunities, difficulties linked to living on the edge of the city economy (Choguill 1993), and disrupted social and economic networks ("relocation").

Land ownership meanings take a significant importance in conceptualizing incremental housing approaches as understanding that households' motivations behind the production of informal housing is essential for the success of such urban planning policies. Values, norms, and procedures regarding tenure are constantly renegotiated through informal land regularization processes, and studying these through the lens of local actors' perceptions is one potential contribution to the understanding of the success factors that accompany incremental housing. A key assumption in this debate relates to ownership as a motivator for housing consolidation and the extent to which the choice of ownership as the preferred tenure option by slum dwellers is having an impact on urban planning strategies.

Advocating for regularization entails a shift in perceptions toward considering informal tenure as a social change approach, as making legitimacy into legality involves the idea that the informal housing subsystem can complement the formal system, with governments and local actors shifting from hostility toward the production of informal housing to acknowledging informal house producers as "real builders and designers of large parts of cities" (Cheema Shabir 1993). To a large extent, regularization policies have been conceptualized based on the Peruvian economist Hernando de Soto's idea that urban informality had to be faced through legalization processes, arguing that economic benefits could be achieved by linking the informal economy to the formal economic system: "Most of the poor already possess the assets they need to make a success of capitalism. But they hold these resources in defective forms. They lack the process to represent their property and create capital. They have houses, but not titles.… It is the representation of assets in legal property documents that gives them the power to create surplus value" (Mammen 2001, 45).

As a result, the room for a sociological understanding of land ownership meanings and its consequences for incremental housing policies lies in the establishment of new tenure policy instruments, which recognize the need for legal instruments that create *effective rights*, and for socially oriented urban planning laws. Using *ownership* as an entry point will allow regularization programs to take account of historical, cultural, and local contexts while incorporating various social actors' perceptions of what is meant by forms of tenure arrangements, both legal and customary. As explained by McPherson (2004, 309), "Ownership describes and prescribes a certain set of social relations surrounding the object that is supposedly 'owned.' Ownership constitutes a relationship between the owner and other agents and demarcates relational rights instead of absolute ones."

Legality and legitimacy in respect of the plurality of laws regulating the housing market and its land tenure aspects could therefore be informed by the social meanings and perceptions assigned to the production of informal housing. A large number of studies has considered the role of perceptions of housing forms in the expression of slum dwellers' identity (Duncan 1989; Holston 1991; Hummon 1989; Pratt 1981), demonstrating the need to anchor housing policies and incremental housing approaches in the social context with which local authorities are dealing.

THAPATHALI SLUM SETTLEMENT'S FAILED EVICTION IN KATHMANDU: A CASE STUDY ILLUSTRATING THE LIMITATIONS OF INFORMAL NEIGHBORHOOD REGULARIZATION

Fast-Growing Urban Agglomerations and Urban Housing

The urbanization dynamics of the Kathmandu Valley have followed different phases, beginning in the 1970s. The valley is composed of three main cities—Kathmandu, Latipur, and Bhaktapur—with Kathmandu being the largest with over 1 million inhabitants. A large increase in population (from half a million in 1970 to over 3 million in 2010) occurred during the past decades in the 600-square-kilometer, bowl-shaped valley, as rural migrants came looking for new opportunities near the capital city. This led to a denser urban fabric, which gradually replaced any agricultural activity in the Kathmandu Valley (an annual decline of 7.4 percent between 1984 and 2000), creating an important divide between traditional and clustered villages and cities, where land prices increased considerably during the same period (Toffin 2007). As little planning intervention took place during the urbanization process, the growth of informal settlements has been largely detached from infrastructure provision logics, and inadequate water supply and sewage systems resulted in some urban areas lagging far behind others in terms of economic development.

Migration patterns have a large influence on demographic growth, which reached over 4 percent per year. Immigration dynamics are from different regions of Nepal, mainly the rural regions, and also from Northern India. Among migration drivers is the fact Kathmandu concentrates economic opportunities, political power, and also a large part of the tourist industry, creating further employment opportunities. Other drivers for migration involve large movements of internally displaced people due to the Maoist insurgency, which lasted from 1996 to 2005. As a result of migration dynamics and increasing population pressure, slum settlements in the Kathmandu Valley have emerged in different locations, mostly in Kathmandu Metropolitan City (Hada 2001), and are largely composed of diverse ethnicities and castes, with multilingual populations originating from different parts of rural Nepal.

High housing needs in the Kathmandu Valley create a paradoxical situation in which migration is driven by employment opportunities in

the construction sector, although this booming sector has failed to provide cheap housing for all. Consequently, the problem of illegal settlements is growing and is reaching its limit, with about 1.5 million landless households demanding access to and ownership of land (this was a 2010 estimation by the National Land Policy Consultation Workshop). The lack of a clear government policy to regulate the land market has been questioned by political parties, and land is also considered one of the root causes of the decade-long insurgency, along with growing tension between urban and rural land uses, environmental deterioration, and housing development that depends solely on private initiatives. The continued lack of progress on land reform is causing significant problems (1) to the development of sustainable rural livelihoods and (2) to the settlement of migrants in the Kathmandu Valley linked to the increasing internal migration for better employment opportunities.

Slum Formation Dynamics

Of the 75 settlements identified in the city region (Hada 2001), 65 are located in Kathmandu Metropolitan City along the riverbanks of the Vishnumati, which crosses the city from north to south, and of the Bagmati, which flows south of Kathmandu. As the number of such squatter settlements rose (2,134 inhabitants in 1985, reaching 15,000 in 2005), the issue of urban poverty started to gain prominence in Nepal, in spite of the country still being seen as having a predominantly rural poverty.

Some settlements date back to the beginning of the 1950s, although a large majority of them formed in the last two decades, and the historical and political contexts are powerful explanatory factors of slum formation: "Slum formation mostly happens when the government is weak or when governance is unclear. People take advantages of these positions. Following the 2005 political crisis, settlements in squatting areas appeared during election times. It happens in no time, a group of people come and build shelters all of a sudden. It is not one house after the other" (Muzzini and Aparicio 2013). The case of the Thapathali squatting area illustrates the slum formation process. Following a political demonstration in 2005, small shacks were built in a couple of days on government-owned land along the Bagmati River. Slum formation is also intrinsically related to migration dynamics and the demand for low-skilled labor in Kathmandu. Economic opportunities, along with expectations of higher living standards, are a major driver. However, slum formation is more specifically linked to the increasing

pressure on low-income segments of the urban housing market, as migrants from the rural areas tend to settle in rented rooms first, before acquiring informal knowledge about squatting areas through relatives or friends. Because living conditions in rented rooms are almost equivalent to living conditions in slum settlements, rural migrants choose to move to squatting areas where they can increase their consumption levels as they save on rent.

Thapathali Slum Settlement and the Eviction Rationale

In the Kathmandu metropolitan area, most slum settlements are inhabited by permanent slum dwellers, expanding to two or more generations after the first settlers came, in spite of the uncertainty regarding eviction. As a result, such squatter areas tend to foster a sense of identity and belonging for slum dwellers who develop local ties through informal committees and self-help groups. Incremental housing approaches, along with informal settlement upgrades, therefore seem like a potential option for the Government of Nepal in order to incorporate informal neighborhoods into a fasting-growing city context. The basis of incremental housing policy lies in a common understanding between households and the government, in which the government coordinates infrastructure and service provision while households engage in constructing affordable dwellings that meet their priorities in a more efficient way than if the government had had to design and subsidize formal dwellings. Furthermore, the social, political, and economic benefits of engaging illegal settlers in consolidation and housing upgrade plans are nonnegligible, especially in the context of political uncertainty and limited confidence in Nepalese government.

The case of Thapathali slum settlement differs from the majority of Kathmandu's squatter settlements in various aspects, which might explain the failure of incremental housing approaches in the area. Situated along the riverbank, the 400-meter area encroached illegally from the Bagmati bridge in Thapathali to Buddhanagar and occupies a strategic and central location, close to economic opportunities. As opposed to other squatter settlements in Kathmandu, the Thapathali area is visible to most of the urban population as the Bagmati bridge offers a clear view of the small huts. Another specific feature of the area is linked to its status as floodable land, the latest major flood dating to 1993. Due to sand mining activities, the area has been less subjected to flooding, although it remains classified as a river flood plain by the local authorities. Finally, first settlers arrived on the

land only seven years ago, which makes it a new and heterogeneous community. The forced eviction itself took place on May 8, 2012, as the local authorities deployed 2,000 personnel from the Nepal Armed Police Forces with bulldozers. As resident families were not informed in advance that the eviction would take place, they were unable to gather their belongings, including citizenship papers. Households making a living from small shops or vegetable carts saw their income-generating assets destroyed in the eviction.

As a result of a three-year-long process, the Nepalese government announced its intention to evict the Thapathali community for development purposes, with the deputy prime minister and home minister, Bijay Kumar Gachhadar, insisting on removing the landless squatters at any expense. The minister for land reforms and management, Bhim Prasad Gautam, announced late in 2011 that a consensus with the United National Landless Squatters Front had been reached to form a High-Level Landless Squatters Problems Resolution Commission to explore solutions and alternatives for the landless squatters. After a ten-day-long process, the commission did not reach an agreement, and it was decided in December 2011 to resort to force to conduct the eviction.

A couple of months before the eviction, the government had informed the resident families that it was prepared to provide lump sum housing allowances to cover a three-month rent period. As this compensation was sought by only one-fifth of the families living in Thapathali, Prime Minister Bhattarai held the squatters responsible for the eviction as they listened to local nongovernmental organizations (NGOs) and international organizations instead of accepting the financial compensation offered by the government. As a result of the May 8 eviction, the government further announced that a relocation program would be arranged for the evictees in the south of the city, although host communities had already been demonstrating against the relocation plan.

METHODOLOGY: DISCOURSE ANALYSIS OF LOCAL ACTORS' PERCEPTIONS

Approaching local actors' perceptions using discourse analysis enables one to gain an in-depth understanding of the epistemological and ontological assumptions behind a set of statements through the use of a system of

classification, the point of which is to highlight the hidden meanings and motivations of actors. As postmodern theories give a conceptualization of the world that allows a meaningful interpretation of belief systems, recent social science research has drawn closer to deconstructing concepts, social values, and various assumptions embedded in socially constructed actors' discourses. According to MacLure (2003, 43), "Analyzing texts involves much more than attending to whatever is in those texts.… The point is not to get the text to lay bare its meanings (or its prejudices), but to trace some of the threads that connect that text to others." The result aims at expanding the researcher's knowledge of unacknowledged agendas and motivations of individuals.

Discourse analysis for social research therefore is composed of different stages in order to unpack agendas and unconscious assumptions of the discourse (table 1). Discourse codes expressed in spoken words encompass argumentative strategies, figurative meanings, presuppositions, and expectations, along with individual and group identities, social structures, and power relations. Discovering patterns can be achieved using word frequencies and semantic prosody, as well as themes quantification though text annotation. Beyond recurrent themes and content words, the structure of the text itself and markers of logical progression provide information about the conceptual frames that give the actor a foundation for making sense of the world. Lakoff (1987) describes frames as being structured around four principles: propositional structure, image schematic structures, metaphorical mapping, and metonymic mapping.

A collection of semistructured interviews is presented and analyzed in this paper as evidence of a coherent set of meanings about a specific topic area, providing insights into the different socially constructed meanings that local actors attach to informal housing and land ownership in Kathmandu's urban areas. Fieldwork research was conducted from January to April 2013 and gathered the perceptions of various local actors in the aftermath of the Thapathali slum eviction that took place in May 2012. Evidence presented in the following section reflects information collected using semistructured interviews with forty-six local actors, transcribed in a written collection of texts. Shortcomings related to language and translation from Nepali to English have been addressed as far as it was made possible by keeping the level of language and vocabulary set of the interviewees. A typology of actors involved is presented the annex to this chapter.

Table 1. Discourse Analysis Methodology

Categories	Practical methodology
Content words and recurrent themes	Quantitative analysis, occurrence of specific words and descriptive statistics of main themes
Image schemas, scenarios, stories and salient examples	Textual evidence for *conceptual patterns* refers to analogies, categorical hierarchies, quotations, sourcing, references, stories, pronoun reference or participant role description, definitions and expression of expectation
Metaphorical mapping	Textual evidence for *metaphor* involves markers (metaphorically speaking, literally), intensifiers (actually, almost, in fact, regular), hedges (in a way, technically), metalanguage (in one sense), causal similies (as if, though, like, as), perceptual, cognitive and other processes (seemed, sounded, looked)

FINDINGS

Using the analysis described above, this section aims at disentangling the different themes associated with slum eviction, informal housing, and land ownership, and informing the debate around the role of social actors' perceptions and failed incremental housing approaches. These points are distilled in the following five findings.

The first finding is that the multiplicity of actors and the resulting diversity of standpoints related to squatter settlements can be identified as a mechanism leading to the failure of informal neighborhoods to be incorporated into a fast-growing city. Discourse analysis operates as a revelator for embedded meanings. As shown in tables 2 and 3, evidence of differentiated understandings of informality, housing, land, and ownership outlines the multiplicity of actors and their shape of thoughts regarding squatter settlements as a spatial component of a fast-growing city.

Academia tends to define slum areas as the sum of individuals gathered in one place, following a migration decision linked to either political issues or economic opportunities. The idea of marginalization as a defining criterion for slum populations is strong, as the emphasis in academic discourse is highly dependent on enumerating the determinants and factors that contributed to the establishment of the slum. The slum therefore emerges as a

patchwork of individuals, from diverse origins, geographically or ethnically, with differentiated views and a lack of proper political power due to the variety of geographical origins, castes or ethnicities—according to academia: "There is no community spirit per se in slum areas, as some people are politically displaced, more connected to the city, and the other are just the marginalized, with no purchasing power and less access to state facilities"; "in terms of economic resources, they have a similar economic status. What is different is culture, ethnicity, religion; beyond this, the living status is the same amongst groups."

Local NGOs point out the difficulty to find economic opportunities, and offer a view of slum dwellers as migrants with no other choices: "Those who are landless, if they migrate from rural to urban areas, they usually try to find somewhere where they can stay for a long time, because they know they cannot go back." Slum settlements are about "finding a place," fitting in a social fabric which is not prepared to include migrant populations. "In some cases, newcomers rent very small rooms in Kathmandu. This is one type of settlement. Otherwise they go to slum areas. But it is difficult for the newcomers; when you come from a village, you have difficulties finding a place to occupy in slum areas." The urban social fabric has a network of its own, which is difficult to enter: "in slum areas, poverty is not linked to religion or ethnicity. It depends on linkages with outside, with other parts of the city, with rural areas, with the family."

Using visual representations of the words and content of actors' discourse, the patterns presented in tables 2 and 3 are highlighted in figures 1 through 4 (these figures were compiled by the author using word count and a stop list of frequent/short words—"and," then," and the like—on the discourse of academia and so on). It stands out that academia uses a political angle to describe squatter settlements and their rationale (government, displaced, political, conflict, Maoist), as opposed to local NGOs' discourse, which is highly centered on the social and economic aspects of what constitutes a slum area (work, opportunities, getting a job, caste, Dalit, poverty). International organizations seem to assign more importance to what makes the slum area a functional place, or the extent to which squatter settlements can be improved through targeted policies (training, services, employment, solution, rented room). Journalists' discourse, on the other hand, is logically centered on the slum settlement as an entity existing through events and how these are perceived by urban

Figure 1. Academia's Discourse

Figure 2. Local NGOs' Discourse

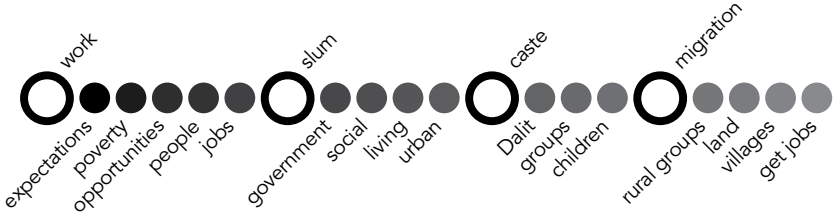

Figure 3. International Organizations' Discourse

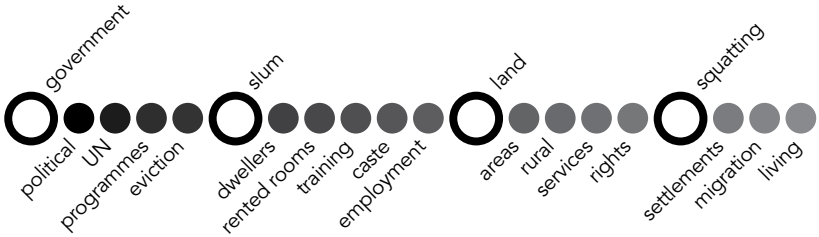

Figure 4. Journalists' Discourse

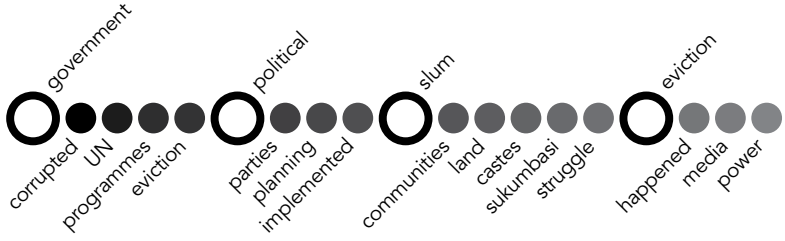

Table 2. Image Schemas and References by Type of Actor

Image schemas and references	Analogies, stories, salient examples	Sentiment words and adjectives	Quotations, sourcing, references, concepts
Academia	Descriptors of informality and housing involve 'dual policy', 'protests', 'displaced', 'land status', 'legal', 'processes'—revealing academic preference for interpretive focus and categorization of facts.	Low occurrence of sentiment words. Academia uses 'distance' as a position towards events.	Conceptualized signifiers such as 'employment', 'displaced', 'migration dynamics', 'conflict', 'poverty' showing the extent to which academia has a pre-structured and ideologico-political (unconscious) interpretation of reality.
Local NGOs	Local NGOs' discourse privileges collaborative ways of engaging with subjects, with frequent reference to pronouns. The NGOs standpoint is overly expressed as an 'active' vs. descriptive approach to the situation, with the enunciation of strong views about 'facts', 'what happened' and 'what's next' on the agenda for evicted populations.	Discursive tensions in participant role description, as NGO's discourse is tainted with inherent contradictions and an intense focus on the micro-level society represented at the level of the slum.	The understanding of deeper dynamics and concepts is left to the academic interpretive speech. NGOs' interpretive speech relates to their expertise as human rights NGOs, caste discrimination approach, or basic services delivery NGO type.

Image schemas and references	Analogies, stories, salient examples	Sentiment words and adjectives	Quotations, sourcing, references, concepts
International NGOs / International organizations	International NGOs portray themselves through discourse as filling a governance gap, with an emphasis on 'modes of engagement' as an approach to slum settlements and related situations. The 'bargaining model' is expressed as a step forward to the implementation of policies that would satisfy all actors.	Tend to be more neutral and descriptive with a policy-making focus.	Global-view interventions and recurrent references to similar international contexts.
Journalists	Strong power aspects of journalists' speech in the field of discursivity.	Journalists' discourse tends to privilege adverse subject positions, under the vocabulary set of 'threat', 'power', 'social function' of agents and their relation to 'politics'.	Salient concepts involve 'struggle', 'power' and 'political sphere'—all encompass dimensions of journalistic style, with the aim of striking the audience.

Table 3. Metaphorical Mapping by Type of Actor

Metaphorical mapping	Markers and intensifiers (metaphorically speaking, literally, actually, almost, in fact, regular)	Hedges (in a way, technically), metalanguage (in one sense)	Causal similies (as if, though, like, as), perceptual, cognitive and other processes (seemed, sounded, looked)
Academia	*Medium occurrence*—which shows the multifunctional aspects of discourse markers, less used for their communicative function in academic speech (informs, warns, suggest, disagrees); but mostly used to create the conditions of a linear explanation for facts.	*Medium occurrence*	*High occurrence*—meaning-making among academics shows preference for the logical connectives of addition and consequence, preference for ideas that escalate to a level where all arguments previously listed add up to a tangible explanation.
Local NGOs	*Medium occurrence*—relates to how local NGOs use markers as a way to emphasize logical connections between two ideas which do not easily connect or articulate. NGOs often try to link their discourse with the wider context (urbanization, world economy) using markers and intensifiers.	*High occurrence*—hedge discourse markers act as linkages between one idea to another, although coherence of meaning is not always achieved. Tendency to over-use logical markers to emphasize salient examples and create aspiration for engagement.	*Medium occurrence*—causal similies are supporting the signifier set of 'engagement', with markers functioning as signifiers of NGOs' will. NGOs tend to use and identify (as if, like) with salient images and a social justice discourse to describe and engage with a situation.

Metaphorical mapping	Markers and intensifiers (metaphorically speaking, literally, actually, almost, in fact, regular)	Hedges (in a way, technically), metalanguage (in one sense)	Causal similies (as if, though, like, as), perceptual, cognitive and other processes (seemed, sounded, looked)
International NGOs / International organizations	*Medium occurrence*—wider discourse on international contexts. Use of markers and intensifiers shows ability to directly and indirectly participate in policy making.	*Medium occurrence*	*Medium occurrence*—highlights the normative function of International Organizations in using cognitive processes to describe an eviction event.
Journalists	*Low occurrence*	*Low occurrence*—journalistic stance tends to make use of stylistic markers in order to assert the veracity of facts. These are linguistic devices that support both apparent discourse neutrality (stating the facts as they 'happened') and biased-assertiveness (facts presented in relation with 'power struggles').	*Medium occurrence*—field of persuasion.

dwellers and politics as a whole (happened, eviction, government, political, parties, struggle, power, different), granting the slum area an existence through external representations.

The multiplicity of actors engaged in shaping slum representations therefore resulted in a diversity of standpoints related to squatter settlements. It can be found that the regularization and incorporation of these settlements in Kathmandu, a city with contested spaces, could have benefited from a more homogenous approach regarding (1) what constitutes a slum area and how slum dwellers organize their living; (2) the social function of the slum in a complex urban fabric; and (3) the extent to which political parties, the government, and power struggles gave rise to a specific understanding of the slum area as shaped by events and external representations expressed by the rest of the population.

The second finding is that the land tenure discourse in the context of Nepal incorporates a strong social stigma associated with the landless, which, in the context of the changing agrarian economy and rapid urbanization patterns, results in highly contested city spaces. Actors' perceptions reflect a crucial aspect of how social representations of slum areas and slum dwellers emerge in the context of Nepal's capital city. The land tenure discourse indicates a strong social stigma around being landless (landless in rural areas, landless in urban areas), which underlines the complex relationship between rural areas and rural/urban migration dynamics. Ownership of land, namely agricultural land, is associated with several social representations in the present socioeconomic structure: first, land ownership is regarded as a major livelihood generation source in the Nepalese context, with a high proportion of Nepalese society still being engaged in agricultural activities (Central Bureau of Statistics 2008); second, the land tenure discourse regards land as a primary indicator of socioeconomic status (Dhakal 2010). In the same vein, Sen states, "Landlessness is similar to an instrumental deprivation. A family without land in a peasant society may be deeply handicapped.… But whether or not a family attaches direct value to its relation with its own land, landlessness can also help to generate economic and social deprivations. Indeed the alienation of land has been—appropriately enough—a much discussed problem in the development literature" (Adhikari 2008, 93–94).

Social stigma therefore anchors the poverty debate in land ownership, rather than in social exclusion or low income levels. Poverty is depicted in

local actors' discourses as being highly and almost exclusively related to housing, housing conditions, and rural landlessness as a reason for migration, which highlight the linkages between rural and urban populations. While being landless in the rural areas is associated with low social status and poverty, being landless in urban areas is marked by a similar social stigma, because reasons for migration generally implied rural landlessness ("people in villages have a certain amount of land, assets, but it is not enough. So they migrate to the city—except that there, they have nothing" (local NGOs). Landlessness in rural areas is associated with forced migration dynamics, referred to as "internal displacement": "'*Sukumbasis*' [the landless] represent a large part of the slum population. We call them *sukumbasi*, the landless people. They are from different parts of Nepal. They find a better living in city areas, they squat on riverbanks and public land. They move here for jobs; life in rural areas is difficult, there are droughts, floods, erosion, landslides" (academia).

As a result, spatial dynamics in the Kathmandu Valley appear to be shaped not only by the socioeconomic structure of the urban population—low-income populations having no other choice than settling in squatter areas—but also by landlessness as a social marker of poverty, which equally applies to rural and urban contexts: "Urban poverty is only becoming distinct nowadays, urban livelihoods are new issues. There are distinct factors pulling the migrants from rural to urban areas: the productivity of land is not very high, so that men in villages migrate first and then they try to settle in Kathmandu and bring other members of their families" (local NGOs).

With a changing agrarian economy and rapid urbanization patterns resulting in highly contested city spaces and slum formation in the time frame of a decade, Kathmandu has witnessed a radical change in the use and occupation of its informal spaces, which has been interpreted from the lens of land ownership and related debates. The resulting social stigma around squatters and slum settlements has evolved toward a complex system of social representations and perceptions, which—under the pressure of various structural factors—has turned actors away from incremental housing strategies.

The third finding is that the polarization of the land ownership debate between "fake" landless urban slum dwellers still owning land in the villages who came to Kathmandu for better livelihood opportunities, and the actual landless population has led to differentiated representations about informal housing and

its function in a fast-developing city. An interesting aspect of the informal housing debate in Kathmandu relates to an uncommon perception of slum dwellers as being the "fake" landless—"opportunistic"—and reinforces the idea that the right to the city and its contested spaces is only granted to those at the bottom of the social ladder, the "actual" landless people: "In order to get help from the government, slum dwellers claim that they are landless, even if some of them do have land in the villages. And it is difficult for the government to find out about their land. So people become opportunistic. With the open border situation with India, even Indian people come to Kathmandu and claim they are landless Nepali people" (academia); "a couple of years ago, the government found out that there were real slums and fake slums. They decided to offer financial help to slum dwellers who would come and prove they had poor living conditions. And only 40 percent of the total slum population came to claim assistance" (local NGOs).

The notions of choice and preferences have been partly evicted from the land tenure debate, as stated by several actors: "It is not because you have land that you should stay a farmer. Many people come even though they are well off in the villages, even though they have land and property over there. People still want to come to Kathmandu, maybe for facilities, schools, health centers. They do not want to work in agriculture anymore so they come to the city area" (academia).

As a result, contested city spaces in the context of high-priced land in the Kathmandu Valley have led to differentiated representations about informal spaces and their use: "In some slum areas, people tell these stories that some people are actually rich and they rent houses to the poor in order to get access to the land" (local NGOs); "the issue is that some slums are not really slums. The idea of a slum is a set of small houses with land for agricultural purpose. But since land is very costly in Kathmandu, people pretend they have no money, they go live in slum areas though they have a house elsewhere. They stay there and they obtain the land" (local NGOs). Incremental housing approaches are therefore part of the debate, as slum dwellers, but to a larger extent some other fringes of the Kathmandu population as well, try to put pressure on the government in order to get land titles in the occupied areas. The right to the city for slum dwellers—either owning land in rural areas or being landless—therefore brings the landless debate to a paradoxical situation, in which informal city spaces have a limited incorporating function for rural migrants, especially in the case of

forced migration due to civil conflict: "With the insurgency, many people have had the feeling that rural areas were less safe than the urban areas. Even those who were better off in the villages migrated to Kathmandu, but most of them could not sell their lands before migrating, so they came to Kathmandu and were as poor as the ones migrating for economic reasons. They settled in slum areas as well" (local NGOs).

The power struggle between slum dwellers and local authorities is therefore central in defining *who* has the "right" to occupy informal city spaces. The eviction process and the resulting social trauma are anchored in this dichotomous vision of landlessness, which has also been used by political parties to put pressure on the government: "Eviction was not a new policy from the government, the government asked them to leave a long time ago. The media exposed this as inhumanity, but it is a power struggle between slum dwellers and the government. Political parties have trade unions and they relate to slum dwellers. But political parties are using this to show they have power in the power struggle" (journalists). For these reasons, slum areas in Kathmandu have become more than a simple land dispute: "Slums are a political topic, they show the limits of law enforcement. It is a very fragile space" (journalists).

The fourth finding is that the rationale of the Nepalese government for eviction of visible slum areas questioned the logic of informal housing as a means of incorporating migrant populations to the city space. Understanding the rationale behind the eviction process has proven a difficult task in the context of Thapathali slum settlement. Reasons given by various actors and the government itself for using forced eviction as the last resort option range from the threat of river pollution caused by slum dwellers organizing their living along the Bagmati riverside: "In Thapathali, the government tried to evict the people living there because it is government land, and mostly because it is located next to the river and slum dwellers pollute these areas" (local NGOs) to the government's lack of information regarding the slum population and the resulting social unrest it could provoke ("The government wants to get rid of the slum areas and register these populations. Especially since there have been a couple of issues with the people living there, some of them were not exactly poor people and they were owning land over there"—local NGOs). As local actors' discourses indicate, relocation and incremental housing approaches were part of the debate ("Eviction and relocation are difficult though, because people living in the areas where slum

dwellers should be relocated are usually unhappy with having newcomers. A couple of months ago, these people organized a protest and they managed to stop a relocation program initiated by the local authorities"—local NGOs), although the lack of a clear urban planning strategy and the absence of official documents outlining the rationale for eviction created confusion among the slum population and various actors involved in designing relocation alternatives.

Reasons for eviction become more evident as one regards the Thapathali slum area as a space where the political stakes are considerable: "The Thapathali case has multifolded interests. The government wants to have infrastructures along the riverbanks, but the riverbanks are encroached by the squatter settlements. Thapathali is a recent settlement, dated back to 2007 or 2008. But it is not solely about infrastructures, government is also concerned with the visual pollution, since people can see the squatting area from the Bagmati bridge. Other settlements in Kathmandu are behind the main roads, most of them are concealed" (international organizations). Another key component of the eviction rationale lies in the government trying to settle its legitimacy as a planning authority and the extent to which local authorities have a say in defining the legitimacy of illegality: "The government does not want to provide health facilities or any type of facilities to slum dwellers, as it would make the slum look almost like a legal place, a formal place of residence for the families living there" (academia); "they [government officials] established the fact they can evict anytime anyplace" (international organizations). Political stakes encompass even wider concerns, mainly due to the fact that the slum area was populated following a political demonstration in 2005, during which small shacks where built in a couple of days on government-owned land. Thapathali's recent status as a squatting area made it an attractive space for political parties and political strands opposed to the government to enroll slum populations: "They [slum dwellers] always try to find political protection from political parties, and political parties need them as well. It is a convenient situation" (international organizations). A consequence of the politicization of slum dwellers and their involvement in meso-level politics has been the confusion around what slum populations' interests were and to what extent they could negotiate with local authorities: "There was no proper relocation program organized for them. The government offered a three-month rent allowance but that is not sufficient, this was not a permanent solution.… The government

tried to find out who had land and asked people *who* did not have land property to come and fill forms, and if they filled the requirements they could get help from the government. But what happened is that some community leaders asked people not to go and fill these forms, because some people do have land. After that, government decided on the eviction. There was a communication gap here, and there were divisions within the community as well. It weakened their positions" (international organizations).

Incorporation of migrant populations in rapidly urbanizing Kathmandu therefore took the shape of a power struggle between slum dwellers, political parties, and governmental authorities, while social fragmentation grew between the different socioeconomic groups after the eviction took place.

The fifth finding is that uncertain living conditions following the eviction process and the convoluted dynamics of incremental housing processes were the main factors behind the troubled negotiations between the government and slum dwellers. Kathmandu city planning became difficult to manage, especially after the migration waves linked to conflict in 1996 and between 2001 and 2003. Beyond this push factor, there is also a pull factor related to the education and income for which migrants are looking in Kathmandu, the combination of which gives little incentive or alternatives for migrants to move back to the rural areas: "In slum areas, some people stay hoping for the government to give them land rights, even though there are not exactly landless since they have land in the countryside. Government sometimes gives them land or constructed houses in some areas" (academia). In the aftermath of the eviction, several aspects of the legitimacy of informal settlements became a central concern regarding the uncertain future of Thapathali slum dwellers. As the evicted populations stayed on the land, they started to build temporary huts with plastic and cardboard materials, following the idea that most of the slum dwellers cannot or do not want to go back to the rural areas ("Kathmandu was a sort of promised land"—academia) and claim a form of legitimacy over the occupation of the Bagmati riverbanks. In this sense, the eviction of the Thapathali area did not succeed in expelling the slum population: "It shows the government has no strong or clear policy. It is very unclear, there are no plans for slum people" (local NGOs).

The lack of communication between the different stakeholders and uncertainty regarding the living conditions of the roofless slum dwellers have turned the eviction situation into a situation of inertia, of do-nothingness,

which is worsened by the uncertain political situation of the government. Different government offices are involved in urban planning, and ministries are constantly reorganized, which makes the designation of responsible bodies difficult and contributes to the immobilism strategy.

CONCLUSION

As shown through an in-depth study of local context, the diverse social representations associated with Thapathali slum settlement and meso-level dynamics of eviction in a fast-growing city, limitations to incremental housing approaches in developing city contexts remain largely influenced by land ownership meanings and patterns of informal space, such as illegal occupation. Interestingly, the *legitimacy of illegality* draws upon various social views—those of political leaders, local authorities, the urban middle class and elites, the media—and the processes attached to arbitrating *who* is entitled to informal city spaces have crucial consequences for incremental housing policies.

Innovative ideas related to housing therefore lie in the establishment of new tenure policy instruments, which should reflect the need for legal instruments that create *effective rights*, and are part of socially oriented urban planning laws. As a result, the future agenda for research on regulating land uses and occupation should encompass a new focus on (1) socially controlled—formal and informal—regulatory mechanisms, and (2) social representations related to urban informal housing, land ownership and the legitimacy of illegality.

Annex: Typology of Actors

Type of actor	Function	Affiliation
Academia (10)	Senior Researcher	South Asia Regional Coordination Office, National Centre of Competence in Research North-South (NCCR)
	Lecturer in Sociology	Tribhuvan University (TU)
	Director	HERD
	Professor	Resource Himalaya
	Lecturer	Tribhuvan University (TU)
	Lecturer	Tribhuvan University (TU)
	Fellow on Public Life and Public Knowledge	Martin Chautari
	Senior Researcher	Centre for Population Studies, Tribhuvan University (TU)
	Researcher	IIDS
	Environmental Economist	SANDEE, ICIMOD
Local NGOs (20)	Team Leader	Children and Women in Social Service and Human Rights (CWISH)
	Director	Global Action
	Director	CWIN
	Program Manager	Mitrataa Foundation, Dream Catchers Nepal (DCN)
	Program Manager	Stichting Veldwerk
	Director	Loo Niva Child Concern Group
	Program Manager	Janaki Women Awareness Society (JWAS)
	Director	Micronutrient Initiative
	Director	Child trafficking Initiative
	Director	Child Nepal
	Program Manager	Next Generation Nepal
	Program Officer	Lumanti
	Director	Creating Possibilities

Type of actor	Function	Affiliation
Local NGOs (20)	Director	WOCAN
	Director	Nepal National Dalit Social Welfare Organisation (NNDSWO)
	Director	Equal Access
	Lecturer	Tribhuvan University (TU)
	Director	Seeds for Change
	Country representative	Asia Foundation
	Program Manager	ISIS Foundation
International NGOs / International organizations (11)	Program Officer	South Asian Regional Office, International Commission for Dalit Rights (ICDR)
	Program Manager	World Vision International
	Country Office Director	Planet Finance
	Program Officer	Practical Action
	Program Officer	ILO
	Program Officer	ILO
	Country representative	UNESCO
	Health adviser	DFID Health
	Senior Economic Advisor	UNDP
	Habitat Programme Manager for Nepal	UN-Habitat
	Program Officer	UNICEF
Journalists (5)	Journalist	Independent / Former affiliation to Martin Chautari
	Journalist	Independent
	Director of Parliamentary Programs	NDI
	Film maker	Independent film maker
	Representative	Joint national slum commission

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Tenure Formalization, Tenure Security, and Housing Investment: The Relevance of Self-Help Housing in India Reexamined

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ABSTRACT

This paper reexamines the relevance of self-help housing strategies in India, where government agencies implement slum notification policies, by which they officially recognize slum settlements and ensure the occupancy rights of residents. Taking advantage of a nationally representative data set, it finds that a significant portion of households in slum settlements invest in their houses. However, housing conditions and households' investment behaviors are found to differ between notified and other slums, a situation that must be attributed to the difference in the level of tenure security afforded by slum notification. The paper considers several policy implications.

INTRODUCTION

Since John F. C. Turner's research advocating for the so-called self-help housing approach four decades ago (Turner 1967, 1968, 1976; Turner and Fichter 1972), various types of in situ slum-upgrading programs have been implemented in the developing world. The key assumption of the strategy is that the urban poor are willing to improve, and capable of improving,

their living conditions, and that they thus strategically invest in housing by weighing changing priorities throughout the course of their lives. With a supportive regulatory environment and the assurance of tenure security, self-help housing construction by slum residents is expected to gradually bring physical improvement to their communities in the long term.

Academics and professionals have been paying growing attention to tenure security—that is, the protection of residents from forcible eviction without due legal process and compensation—as a driver of investment by slum households. Formalizing slum residents' informal land tenure by providing them with legal property rights is commonly referred to as implementing a "titling" policy. Although this legalization approach is touted to stimulate physical improvement in slums by ensuring tenure security and thereby spurring investment (World Bank 1993; De Soto 2000), some doubt its effectiveness and point out its negative social effects on the lives of poor slum residents (Payne 2001; Gilbert 2002; Varley 1987; Davis 2006; Woodruff 2001; Payne, Durand-Lasserve, and Rakodi 2009). Instead, some of the recent literature advocates for improving their de facto tenure security (Van Gelder 2009; Reerink and van Gelder 2010; Kiddle 2010; Sjaastad and Bromley 2000). In India, local governments "notify" settlements as slums in order to legally protect residents from forcible evictions. Investigating the differences in households' investment behaviors between these "notified" and other "nonnotified" slums logically should offer an insight into how the assurance of occupancy rights, instead of full legal property rights, affects investment.

The central government of India recently started implementing a national slum policy plan, the Rajiv Awas Yojana, that aims to achieve a "slum-free" India. The initiative espouses in situ slum upgrading, in addition to slum redevelopment, as the primary means to improve living conditions in existing slums, in tandem with the provision of property rights (Government of India 2010, 2011; Kundu 2013). This in situ upgrading could, however, end up as nothing but an ineffective top-down, public-housing-type approach, as with previous upgrading programs in India. Patel (2013) criticizes the fact that, except for a few successful projects, private contractors rather than residents have an initiative in the Basic Services for the Urban Poor programs.

Against this backdrop, the purpose of this paper is to reexamine the relevance of the theory of self-help housing in the Indian context, and in

so doing to suggest a policy direction for improving housing conditions in slum settlements. To achieve this objective, the paper investigates the following five hypotheses derived from the theory of self-help housing, tenure security, and tenure formalization: First, younger and/or poorer households prefer to live in rental housing in slum settlements because they prioritize job opportunities and affordable rent over housing quality. Second, the quality of slum households' dwellings gradually improves as their financial capacity expands. Third, households in notified slums and/or with larger financial capacity are more inclined to invest in their houses. Fourth, they would also invest larger amounts of money in their houses. And fifth, slum households rely on their own resources, rather than borrowing from formal or informal lenders, in order to invest in their houses. By exploring these five hypotheses, this paper seeks to clarify the context in which slum policies should be developed. And to examine these hypotheses, the paper takes advantage of a valuable nationally representative data set collected by an Indian government agency.

This paper is structured as follows. The second section introduces the five hypotheses based on the review of key literature on the theory of self-help housing, tenure security, and tenure formalization. The third section discusses the data and methods used in this study. The fourth section empirically examines the five hypotheses. And the fifth section concludes with a brief summary and policy implications.

THEORY AND HYPOTHESES

Self-Help Housing Construction

Prescribing a policy to support self-help housing construction by the poor requires a solid understanding of how they decide to invest in their dwellings. Turner's classic model illuminates the changes in the priorities of the urban poor as they move up the economic ladder throughout their lifetimes (Turner 1976; Turner and Fichter 1972). Based on his observation of slum dwellers in Peru, Turner conceptualizes how households' vital needs (e.g., identity, opportunity, and security) and housing needs (e.g., proximity to unskilled jobs, freehold ownership, and modern standard shelter) change, corresponding to the rise of their income levels. According to Turner's conceptualization, the priority of tenure security is low for the members of the

poorest households, who are desperate to make a living. Living near the workplace is more critical for their survival than secure tenure and housing quality. The members of low- or lower-middle-income households who have successfully escaped from such tough situations begin to aspire for secure tenure, with which they can gradually improve their living conditions. Ensuring the tenure security of households in this situationstate might boost their degree of investment in their houses. Turner's theory provided a rationale for the slum upgrading and sites-and-services projects that were widely implemented in the 1970s and 1980s. In India, for instance, the World Bank supported large-scale upgrading programs in Mumbai and Kolkata (Buckley and Kalarickal 2006; Werlin 1999).

Since the theory of self-help housing has become a widely accepted perspective, a number of studies have investigated the motivating and constraining factors of housing investment by households in slums.[1] Specifically, one needs to consider what motivates slum households to invest in their houses. The motivation for housing investment might stem from either (1) dissatisfaction or (2) economic incentives. In the theories of residential satisfaction, the degree of a household's satisfaction with its housing and neighborhood is measured by the difference between actual and desired situations (or situations to which they aspire) (Galster 1987; Galster and Hesser 1981; Lu 1999). The theory of housing adjustment posits that such dissatisfaction pushes households into adjustment activities, such as altering their houses or relocating (Bruin and Cook 1997; Morris and Winter 1975; Morris and Jakubczak 1988). As with Turner, who points to the importance of slum households' satisfaction in housing activities, this line of reasoning emphasizes the role of psychological aspects in explaining housing activities.

By contrast, economists generally view housing investment as an economic activity, by presupposing that households invest in their houses as long as their expected return is positive (Besley 1995; Demsetz 1967; Sjaastad and Bromley 2000; Arnot, Luckert, and Boxall 2011). Slum households might capitalize on their houses by renting out to tenants (Struyk and Lynn 1983; Kumar 1996; UN-Habitat 2003), using them as a workplace (Tipple 2005; Benjamin 2004; Strassmann 1987), or holding them as economic assets until bequeathing them to their children. In reality, slum

1 For the criticisms of Turner's conceptualization, see Ward (1982) and Mathey (1992).

households' residential dissatisfaction and economic motivation are closely related and change throughout their life span.

The Link between Tenure Security and Housing Investment

The nexus between tenure security and housing investment has been one of the primary topics in the literature on informal settlements, given that this link rationalizes the approach of enhancing the tenure security of the urban poor as a means of upgrading their living conditions in the long term. As mentioned above, economic theory generally presupposes that people invest in their properties as long as their expected future benefits exceed the costs. Higher-tenure security would encourage their investment by reducing the uncertainty about whether they will be able to fully retrieve the expected benefits in the future (Besley 1995; Demsetz 1967; Sjaastad and Bromley 2000; Arnot, Luckert, and Boxall 2011). Economists often associate such tenure security with individual freehold property rights. By contrast, an increasing number of researchers in other fields suggest that improving the de facto and perceived tenure security of the urban poor is more effective in stimulating their investment than providing full legal titles (Gilbert 2002; Kiddle 2010; Payne, Durand-Lasserve, and Rakodi 2009; Reerink and van Gelder 2010; Sjaastad and Bromley 2000; Van Gelder 2009). According to their observations and reasoning, slum households invest in their houses, regardless of their legal status, as long as social or political situations mitigate the risk of eviction, or they feel secure.

Tenure Formalization

One of the objectives of formalizing informal land tenure is to enhance the tenure security of slum dwellers.[2] Tenure formalization, by integrating informal tenure into a system recognized by public authorities, is a common practice used to improve the tenure security of slum dwellers in various parts of the developing world (Durand-Lasserve and Selod 2009). In practice, a set of property rights is provided to slum households, ranging from the provision of occupancy rights to freehold land tenure. Even granting a minimum level of legal tenure, such as occupancy rights or mere recognition by public authorities, might greatly enhance the perceived tenure security of

2 For some politicians, tenure formalization is a cheap way to gain votes from slum dwellers, the number of which accounts for a significant portion of the population in many cities.

slum residents (Payne 2001). Slum notification in India is one such policy that officially recognizes slum settlements and ensures their residents' occupancy rights (Banerjee 2002; Risbud 2009; Sharma and Barman 2006).

Tenure formalization is also expected to facilitate slum households' investments in their houses by (1) expanding their financial capacity, (2) improving their access to infrastructure and services, and/or (3) influencing their motivation to invest in their housing. According to economic theories, the provision of individual property rights to slum households would expand their financial capacity by enabling them to capitalize on their assets by accessing formal credit sources (World Bank 1993; De Soto 2000; Deininger 2003; Besley 1995; Demsetz 1967). A body of literature, however, offers a counterargument and contrasting evidence (Gilbert 2002; Payne, Durand-Lasserve, and Rakodi 2009; Field and Torero 2006; Galiani and Schargrodsky 2010). For example, in Bogotá Gilbert (2002) observed that low-income households with legal title still borrow from informal credit sources because legal title alone is not credible enough for lending agencies, and the poor are not willing to risk their properties. Formalizing a slum settlement is often followed by the installation of infrastructure and services by government agencies, which would otherwise be reluctant to do so to illegal squatters. In India, for instance, households in notified slums are entitled to infrastructure and services provided by local municipalities. Assurance of security and the expectation of the provision of services in the future might motivate construction activities by slum households that aspire to rent out the newly built spaces and thus gain a new source of steady income.

Hypotheses

Drawing on the theoretical framework above, I derived the following five hypotheses to be tested in the Indian context. First, younger and/or poorer households prefer to live in rental housing in slums because they prioritize the proximity to workplaces and affordable rents over housing quality. Second, the quality of housing gradually improves as households become older and/or their financial capacity grows. This is because they come to prioritize housing quality and are capable of investing. In addition, slum residents come to think of their tenure security as high when a certain amount of time passes without facing the threat of eviction. This is a corollary of the third and fourth hypotheses. The third hypothesis is that households in notified slums and/or with larger financial capacity more

frequently invest in their houses than do other households. Fourth, not only the propensity to invest but also the amount of resources invested by these households is larger. In other words, notification status and financial capacity are the critical factors for the propensity and amount of housing investment by slum households. Fifth and finally, I hypothesize that slum households rely on their own resources rather than borrowing from banks for housing investment. In the pages that follow, I examine whether these hypotheses hold true in Indian slums.

DATA AND METHODS

Data

This empirical analysis relies on the National Sample Survey (NSS) fifty-eighth housing condition unit data set, collected by the National Sample Survey Organisation (NSSO) between 2002 and 2003. The household survey was carried out based on a stratified multistage sampling covering the entire country. The original data include 5,818 households that were reported to live in slums at the time of data collection. Among them, this study uses 4,975 households (1,911 in nonnotified slums and 3,064 in notified slums) whose duration of residence in the slums is less than forty years.[3] Table 1 reports the descriptive statistics for the variables used in this study.

According to the NSS, the proportion of households that engaged in construction work (i.e., any types of remodeling, renovation, and repair work) to improve their houses during the last five years is higher in nonnotified slums (9.7 percent) than in notified slums (8.8 percent), and the average amount of money they spent for the investment is larger in notified slums (Rs. 32,737) than in nonnotified slums (Rs. 21,252). The average duration of residence in the slums is approximately fourteen years both in nonnotified and notified slums. Since information about household age is not available in the data set, households' duration of residence in slums is used as its proxy in this study. A household's average monthly per capita expenditure (MPCE) is calculated by dividing the number of household

3 This paper excludes households with a duration of residence longer than forty years because they are quite different from others in the level of tenure security and the motivation for housing investment.

members into the average monthly expenditures of the household, excluding housing rents. The average MPCE is slightly higher in notified slums (Rs. 2,723) than in nonnotified slums (Rs. 2,521). Roughly two-thirds of households own their houses in Indian slums. In this study, the types of housing structures are used as an indicator of housing quality. In India, *pucca* refers to permanent materials, such as brick, stone, and cement. *Katcha* refers to temporary materials, such as mud, bamboo, and wood. *Pucca* housing is housing with both a roof and walls built with *pucca* materials; semi-*pucca* housing is housing with either a roof or walls built with *pucca* materials; and *katcha* housing is housing with both roof and walls built with *katcha* materials. Whereas more than 80 percent of houses in notified slums are *pucca* housing, the proportion remains at 65 percent in nonnotified slums.

In examining hypotheses one, two, and three, I present figures with two lines representing the proportion of housing owners, *pucca* housing, or investment for housing improvement in nonnotified and notified slums.[4] For the statistical test of the fourth hypothesis, I apply ordinary least squares (OLS) regression to the sample households in nonnotified slums and notified slums separately, and then apply another model with interaction terms with notification status and some covariates to the total sample.

EMPIRICAL EVIDENCE IN INDIA

Hypothesis 1

As discussed above, the underlying idea of the self-help housing strategy is that early settlers prioritize the proximity to employment opportunities and affordable rent over housing quality. I examine whether younger and/or poorer households tend to live in rental housing in slums in India by looking at how the proportion of households that live in rental accommodations changes as their duration of residence in slums (the proxy of household age) and MPCE increases, as shown in figure 1. The graph on the left in figure 1 clearly illustrates, as expected, that the proportion of owner households increases as their duration of residence in slums becomes longer. This pattern

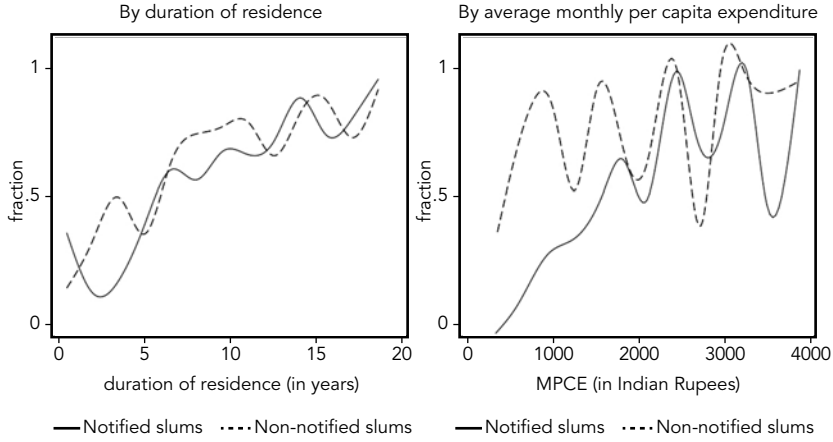
4 I created the charts by using the *twoway mspline* command in *Stata 11* (StataCorp 2009), which divides the *x* axis into equal-width intervals, calculates the medians of *x* and *y* values in each interval, and fits cubic spline to the cross medians as knots.

Table 1. Descriptive Statistics

	Nonnotified Slums (*N* = 1,911)		Notified Slums (*N* = 3,064)		Total (*N* = 4,975)	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Housing investment						
New building (yes = 1; no = 0)	.111	.314	.094	.292	.099	.299
Improvement (yes = 1; no = 0)	.097	.296	.088	.283	.091	.287
Cost of investment						
New building (in Rs.)	28,839	69,822	47,892	91,915	40,713	84,167
Improvement (in Rs.)	12,923	22,639	16,516	28,431	15,216	26,515
Duration of residence (in years)	14.453	10.318	14.726	11.041	14.634	10.801
Average monthly per capita expenditure (in Rs.)	2,521	1,395	2,723	1,539	2,658	1,495
Housing tenure (1 = owned; 0 = rental)	.678	.467	.631	.483	.647	.478
Housing structure						
Pucca housing (1 = yes; 0 = no)	.658	.475	.836	.370	.776	.417
Semi-*pucca* housing (1 = yes; 0 = no)	.206	.404	.114	.318	.145	.352
Katcha housing (1 = yes; 0 = no)	.136	.343	.050	.218	.079	.270
Social group						
Scheduled caste (1 = yes; 0 = no)	.285	.452	.256	.436	.266	.442
Scheduled tribe (1 = yes; 0 = no)	.040	.197	.040	.196	.040	.196
Other backward caste (1 = yes; 0 = no)	.289	.454	.283	.450	.285	.451
None of above	.385	.487	.422	.494	.409	.492
Flood experience (1 = yes; 0 = no)	.263	.550	.095	.330	.152	.425
Benefit (1 = yes; 0 = no)	.064	.245	.147	.354	.119	.324
Population of the city						
Size (< 0.1M)	.279	.449	.215	.411	.237	.425
Size (0.1M–0.5M)	.138	.344	.218	.413	.190	.393
Size (0.5M–1M)	.025	.156	.056	.230	.045	.208
Size (> 1M)	.559	.497	.511	.500	.527	.499

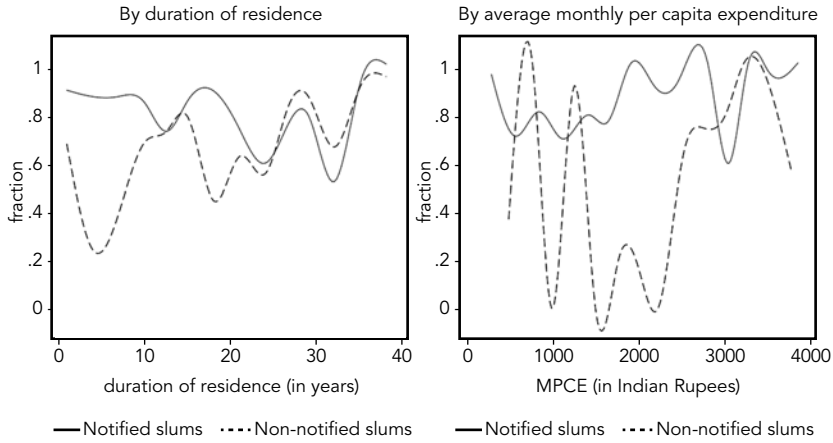
Note: SD = standard deviation. The sampling weights that were provided in the original data set have been applied.

Figure 1. Proportions of Slum Households That Are Housing Owners



Note: The *y*-axis indicates the fraction of households in nonnotified/notified slums that live in owned houses (as opposed to rental housing), given the duration of residence or MPCE.

Figure 2. Proportions of Pucca-Housing Owners in Slums



Note: The *y*-axis indicates the fraction of housing owners in nonnotified/notified slums that live in *pucca* housing (as opposed to *katcha* or semi-*pucca* housing) given the duration of residence or MPCE.

is similarly observed for nonnotified slums (dashed green line) and notified slums (solid orange line). The graph on the right shows that the proportion of housing owners becomes higher as their MPCE reaches Rs. 2,000 in notified slums. By contrast, no clear trend is observed in nonnotified slums. That a smaller proportion of low-income households lives in rental housing in nonnotified slums is an indication of a mismatch; rent is not affordable enough for residents, whereas renting out rooms with such low rent is too risky and economically unfeasible for landlords.[5]

Hypothesis 2

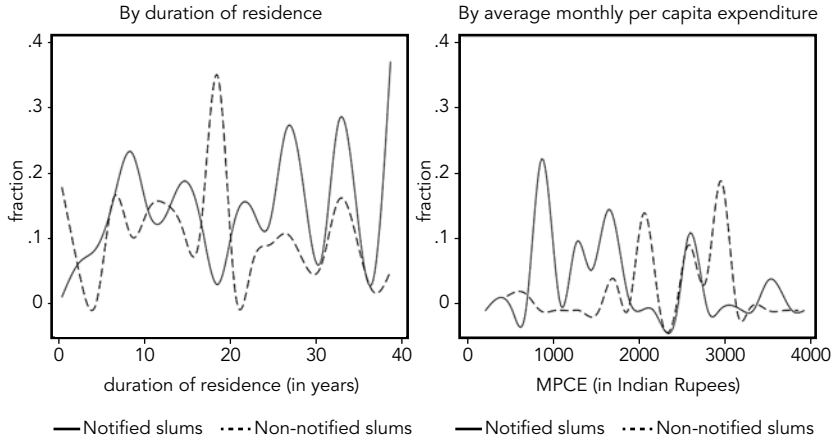
The critical assumption of the self-help housing approach is that slum households gradually improve their houses. I examine this hypothesis by investigating whether the quality of housing improves as people stay longer and/or their income grows in Indian slums, as shown in figure 2. The graph on the left in figure 2 illustrates that the proportion of *pucca* housing rises as households' duration of residence becomes longer in nonnotified slums. On the other hand, no clear trend is observed in notified slums; most housing is structured with *pucca* materials in notified slums. Interestingly, even poor households live in *pucca* housing in notified slums, as illustrated in the graph on the right. Except for the poorest strata, the proportion of *pucca* housing and expenditure level is positively correlated in nonnotified slums.[6] By contrast, the proportion of *pucca* housing is high irrespective of households' expenditure levels in notified slums.

There are three possible reasons for the observed difference between nonnotified and notified slums. First, households in notified slums must have invested more enthusiastically in their houses than those in nonnotified slums. Enhanced tenure security due to notification could be the driving factor for the increased investment. I examine this perspective by exploring the third and fourth hypotheses. Second, housing conditions are better in notified slums because of government intervention. Government agencies

5 According to the NSS data, the distributions of monthly rent of rental housing are almost similar in nonnotified and notified slums (the average rent is Rs. 258 in nonnotified slums and Rs. 262 in notified slums).

6 The irregular shape of the line for nonnotified slums with MPCE lower than Rs. 1,500 is caused by some households living in pucca housing. They were probably supported by nonprofit organizations, or government agencies have "denotified" their settlements after the completion of upgrading or resettlement programs.

Figure 3. Proportions of Owner Households That Improved Their Houses during the Last Five Years



Note: The *y*-axis indicates the fraction of owner households in nonnotified/notified slums that invested in their houses during the last five years (as opposed to those that did not invest) given the duration of residence or MPCE.

have installed infrastructure and services and implemented various social policies in notified slums. Households in nonnotified slums are usually not eligible for such public programs. Among the sample households, 14.7 percent have received the allotment of tenements or land from the government in notified slums, as opposed to 6.4 percent in nonnotified slums (table 1). Third, government agencies have notified slums in which a majority of houses were already *pucca* housing. The government has an incentive to do so because of the expectation that the financial obligation is low for installing infrastructure and services to those settlements. This paper leaves this issue for future studies.

Hypothesis 3

When and how often do households in slums invest in their houses? On aggregate, no clear difference exits in the proportion of housing owners who invested in their houses during the last five years between nonnotified and

notified slums, as shown in figure 3. While 12.3 percent of owner households in nonnotified slums invested in their houses between 1998 and 2003, 13.4 percent of households did so in notified slums. As the graph on the left in figure 3 exhibits, setting aside the types and amount of investment, housing owners constantly invest in their houses throughout their spans both in nonnotified and notified slums. On the other hand, the availability of financial resources seems to influence households' propensity to invest. The graph on the right shows that households with lower expenditure levels are inclined to invest in their houses in notified slums, while the rate is low in nonnotified slums.

Hypothesis 4

Next, I examine the extent to which households' duration of residence, MPCE, notification status, and other factors are associated with the amount of housing investment (i.e., the cost of housing construction). I apply OLS models with the indicator for the cost of housing investment as a dependent variable and household and housing characteristics as independent variables to the sample of owner households in nonnotified slums and notified slums separately, and then apply another model, which additionally includes notification status and the interaction terms between notification status and other covariates, to the total sample. The two models are expressed as follows:

$$Y_i = \alpha_1 + \beta_1 X_i + \varepsilon_1 \quad (1)$$

$$Y_i = \alpha_2 + \beta_{21} NOTIFICATION_i + \beta_{22} X_i + \beta_{23} (NOTIFICATION_i * X_i) + \varepsilon_2 \quad (2)$$

where the dependent variable Y_i is the log of the amount of money that the ith household invested in its houses during the last five years; X_i denotes household and housing characteristics, including duration of residence, the log of MPCE, social groups, the hazardous status of residential location, benefit status, population of the city, and housing structure; α is the constant; and ε is the error term. Model 2 additionally includes $NOTIFICATION_i$ as the indicator of the notification status of the settlement where ith household lives, while $(NOTIFICATION_i * X_i)$ is the interaction term of notification status and other covariates. In model 2, the effects of X_i are estimated in β_{22}

for nonnotified slums and ($\beta_{22} + \beta_{23}$) for notified slums.[7] In both models, I choose two dependent variables: the cost of new construction of housing, and the cost of construction work on existing houses. Table 2 reports the estimation results for these linear regression models.

The models with the cost of new building as the dependent variable overall fit well, as indicated by the fact that their adjusted R^2 is greater than 0.6.[8] The estimated coefficients of the log of the duration of residence and benefit status show opposite signs for nonnotified and notified slums in model 1, so I add their interaction terms with notification status in model 2. According to the estimation result of model 2, MPCE, housing structure, and benefit status are found to be the most influential factors. As expected, higher-income households spent more in housing construction; a 10 percent increase in MPCE results in an 8.4 percent increase in the construction cost. Controlling for all the other variables, a household would spend 62 percent more for building a new house in notified slums.

The models with the cost of housing improvement fit moderately with their adjusted R^2 varying from 0.26 to 0.33. Based on the results of model 1, model 2 incorporates the interaction terms of notification status and the log of MPCE and social groups. Interestingly, households' expenditure levels affect the cost of housing improvement only in notified slums. While a 10 percent increase in MPCE results in an 8.1 percent increase in the cost for housing improvement in notified slums, it leads to only a 1.7 percent increase in nonnotified slums, and the estimation is not statistically significant at the 5 percent level. This result suggests that households might hesitate to spend large amounts of money for housing improvements without notification of their settlements. A possible reason is that the physical condition of the land in nonnotified slums tends to be unsuitable (the model controls for only flood proneness) or, more important, the lack of tenure security discourages them.

In addition, it is found that living in *pucca* and semi-*katcha* housing significantly increases the amount of investment. According to the estimation, households in *pucca* housing would spend more than 2.5 times as much

7 E.g., a 1 percent increase in a household's MPCE is estimated to result in (β_{22}/100) times increase in the amount of money for housing investment in nonnotified slums.

8 This means that the models explain more than 60 percent of variations of the dependent variables.

money for improving their houses. The other side of this story is that the available amount of money for investment in *katcha* housing is very limited, probably due to physical constraints. Thus, although housing structure gradually improves in nonnotified slums, it might be effective to support the upgrading of housing structures to spur housing investment by slum households. Controlling for all the other variables, notification status has no significant influence on the cost of housing improvements.

Hypothesis 5

Finally, I explore the fifth hypothesis by examining how households financed their investment for housing improvement. Did they use their savings or borrow from their relatives/friends or from lenders? I first compare the primary source (i.e., the source accounting for more than 70 percent of the total cost) of housing investment. The data show that approximately 54 percent of households rely primarily on their own sources, as opposed to 43 percent in notified slums. Approximately 17 percent of households rely on moneylenders (i.e., persons who lend money on interest) in nonnotified slums, as opposed to 23 percent in notified slums. Only 2.6 percent of households in nonnotified slums borrowed from financial institutes as a primary source. None borrowed from banks in notified slums. This is probably because slum households prefer not to borrow from banks and/or they lack collateral. Since slum notification ensures only the occupancy rights of the residents, it does not necessarily render their properties mortgageable.[9]

DISCUSSION AND CONCLUSION

Since Turner's theorizing of and advocating for self-help housing four decades ago, incremental housing has become a widely accepted strategy for promoting physical improvement in slum settlements. How to best support their construction, however, has produced prolonged debate. A critical question is what kinds of land rights are really beneficial for protecting slum

9 In some cases, the right to mortgage is provided. E.g., in Andhra Pradesh, the government provides a *patta*, a certificate of occupancy, to those who have stayed on state land for more than five years (Banerjee 2002). The *patta*, awarded in the name of the woman of the household, is heritable but not alienable and can be mortgaged in order to obtain housing loans.

Table 2. Estimation Results

	New Building			Improvement		
	Model 1		Model 2	Model 1		Model 2
	Non-notified	*Notified*		*Non-notified*	*Notified*	
log (Duration)	–0.338** (0.115)	0.202** (0.071)	–0.256* (0.101)	–0.068 (0.186)	0.176 (0.152)	0.115 (0.118)
log (MPCE)	0.732 (0.383)	0.850*** (0.192)	0.844*** (0.171)	0.193 (0.368)	0.824*** (0.221)	0.174 (0.315)
Housing structure						
Pucca	2.421*** (0.358)	1.863*** (0.431)	2.289*** (0.259)	1.701*** (0.380)	1.537*** (0.220)	1.579*** (0.211)
Semi-*pucca*	1.488*** (0.379)	0.769 (0.520)	1.311*** (0.311)	0.655 (0.357)	0.745* (0.329)	0.712** (0.254)
Flood	–0.425 (0.280)	–0.168 (0.142)	–0.248 (0.128)	0.414 (0.249)	0.140 (0.146)	0.258 (0.140)
Benefit	1.039** (0.324)	–0.333 (0.191)	1.182*** (0.309)	–0.030 (0.263)	–0.157 (0.214)	–0.101 (0.173)
Social groups						
SC	0.235 (0.549)	–0.301 (0.298)	–0.158 (0.253)	–0.416 (0.428)	0.263 (0.298)	–0.566 (0.356)
ST	–0.500 (0.688)	–0.106 (0.360)	–0.053 (0.322)	–0.370 (0.438)	0.943* (0.401)	–0.401 (0.380)
OB	0.589 (0.378)	0.237 (0.281)	0.303 (0.221)	–0.490 (0.392)	0.436 (0.329)	–0.478 (0.364)
Population of town/city						
Size (0.1M–0.5M)	–0.426 (0.380)	–0.119 (0.233)	–0.147 (0.201)	0.223 (0.304)	–0.253 (0.297)	–0.155 (0.224)
Size (0.5M–1M)	0.476 (0.597)	–0.303 (0.304)	–0.249 (0.252)	–0.318 (0.385)	–0.344 (0.366)	–0.316 (0.283)
Size (>1M)	–0.646 (0.456)	–0.749** (0.246)	–0.760*** (0.210)	–0.146 (0.308)	–0.026 (0.327)	–0.048 (0.232)
Notification			0.623** (0.210)			–0.636 (0.347)
Notification × log (Duration)			0.452*** (0.115)			

	New Building			Improvement		
	Model 1		Model 2	Model 1		Model 2
	Non-notified	*Notified*		*Non-notified*	*Notified*	
Notification × log (MPCE)						0.643 (0.370)
Notification × Benefit			–1.547*** (0.364)			
Notification × SC						0.845 (0.437)
Notification × ST						1.364* (0.556)
Notification × OB						0.914 (0.467)
Constant	7.983*** (0.539)	9.376*** (0.472)	8.283*** (0.310)	7.738*** (0.466)	7.324*** (0.335)	7.891*** (0.345)
N	158	205	363	240	327	567
adjusted R^2	0.639	0.609	0.641	0.335	0.264	0.299

Note: Standard errors in parentheses. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. MPCE, average monthly per capita expenditure; SC, scheduled caste; ST, scheduled tribe; OB, other backward caste. *Katcha* housing is the reference for housing structure; None of SC/ST/OB is the reference for social group; Size (< 0.1M) is the reference for the population of the city.

households and thereby encouraging their housing investment. In India, although planning has moved from slum clearance to in situ upgrading and redevelopment, its dominant policies still take an ineffective top-down approach. In this context, this paper has reexamined the relevance of a self-help housing strategy for India in light of its interaction with formalized land tenure and tenure security.

The findings from the examination of the five hypotheses are summarized as follows. First, this paper confirms that new settlers tend to stay in rental housing and gradually move into ownership as they stay longer in the slums. Contrary to expectations, lower-income households in nonnotified slums preferred owned housing to rental housing. Second, only in notified slums did the quality of housing gradually improve as households' duration of residence and MPCEs increase. By contrast, the quality of housing was constantly high in notified slums. Third, this paper does not support the hypothesis that households in notified slums and/or with a larger amount of financial resources are more inclined to invest in their houses. The data instead suggest that households in both nonnotified and notified slums invested throughout their life course. Setting the types and amounts of investment aside, even lower-income households enthusiastically invested in their houses in nonnotified slums. Fourth, the regression analysis reveals that MPCE is influential on the cost of housing improvement only in notified slums. Households in *pucca* housing spent more both in nonnotified and notified slums. As for new housing construction, households with higher MPCEs and/or in notified slums are found to spend more money. Fifth, this study observes that households relied on their own resources for housing investment. Roughly half the households financed more than 70 percent of the investment cost with their own resources. Borrowing from banks has been limited.

Finally, this paper offers several policy implications. First, notifying slum settlements could open renting options to poorer households. Slum policies tend to pay less attention to rental housing or to deem it negatively, though new settlers often view it as an affordable and attractive choice (Kumar 1996; UN-Habitat 2003). Second, increasing households' available financial resources would lead to a higher amount of housing investment only with secure tenure. Thus, policies to enhance slum households' tenure security and to expand their financial capacity need to be pursued in tandem. Third, support for upgrading housing structures would be effective in

prompting housing investment because the type of structure determines the available improvements.

In conclusion, this paper finds that the theory of self-help housing is still relevant in India, where significant numbers of households have invested in their houses in slum settlements. Housing conditions and households' investment behaviors are found to differ between nonnotified and notified slums. Since the analysis of this paper was cross-sectional, it did not fully capture either the complex social, political, and market conditions in each city or the causal impact of slum notification on housing outcomes. Having said that, this paper has offered empirical evidence to imply that the recognition of slum settlements and the assurance of occupancy rights for slum residents could make a significant difference in tenure security and housing outcomes.

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Slum Rehab Flats: A Happy Living? The Subjective Well-Being of Rehabilitated Residents and the Impact of the Slum Plan in Mumbai

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ABSTRACT

This research provides a balanced and thorough approach to assessing the Slum Rehabilitation Scheme (SRS) in Mumbai, by taking the subjective concept of well-being as a central parameter. It seeks to determine the pathways through which the SRS makes an impact on the well-being of its participants, either positively or negatively. The work presents quantitative and qualitative data that were collected over a period of four month in two communities in Mumbai in early 2013. This paper found rehabilitated residents to have a higher satisfaction with life, if they are rehabilitated correctly. Many slum residents face hardships induced by irregularities in the plans, affecting their well-being negatively.

INTRODUCTION

Near the end of 2011, the earth's human population reached a staggering 7 billion. The population of urban areas has also grown significantly in comparison with rural areas (UNFPA 2011). Forecasts are that the global urban population will keep increasing until approximately 2050. The inability of governments to keep up with the rapid pace of urbanization and

provide affordable housing has led to an increase in the number of slums. Already, one-third of the world's urban population is living in slums and squatter settlements (Ooi and Phua 2007, 29). Estimates suggest that there will be 2 billion informal settlers worldwide by 2030 (UN-Habitat 2003, 18). It is a priority for local governments to improve housing conditions in slums, which are strongly associated with poverty (Restrepo Cadavid 2010, 1). Approaches have shifted from neglect and eviction to upgrading, redevelopment, and rehabilitation. But success stories have been meagerly documented, resulting in a need for a systematic impact analysis of slum upgrading and rehabilitation practices (UN-Habitat 2003, 27). This research is an attempt to carefully outline the effects of slum rehabilitation practices in Mumbai on the well-being of its residents.

Mumbai, with its estimated 10 to 12 million informal settlers, has the dubious reputation of being the global capital of slum dwelling (Jain 2010; Davis 2007). Mumbai's Slum Rehabilitation Authority (SRA) currently operates the Slum Redevelopment Scheme (SRS), which facilitates slum rehabilitation. The SRS allows private developers to bid for redevelopment projects for land where informal settlers reside. In exchange for relocating informal settlers in purpose-built, in situ multistory residential buildings, the developer is allowed to use the space left vacant to build apartments, offices, hotels, or other commercial buildings for the private market. This is profitable because of Mumbai's high land prices (Nijman 2008, 76). The SRS is currently being implemented across the city, and it will have a profound impact on the lives of millions of people. Strong support for and opposition to the SRS coexist within the slum community itself; some have formed committees to press for eligibility of their slum under the plan and have lauded its benefits, while others decry the poor quality of the new buildings, high maintenance fees, irregularities, and difficulties when it comes to obtaining formal tenure documents after they have moved in.

The literature indicates that improvements in housing conditions are expected to lead to a higher satisfaction with life (Bookwalter and Dalenberg 2004, 343). However, it is debatable whether the benefits of living in these SRS rehab flats would outweigh those of living in a slum. In recent years, various construction scams have been discovered in Mumbai, and corruption has often led to the construction of unsafe spaces (Vyas 2012). Furthermore, the houses are assigned based on a lottery system, which leads to the uprooting of communities that were established over decades. At the

same time, it has been argued that rehabilitation has a negative economic impact on households because it changes the economic environment by formalizing the neighborhood. This paper explores the impact of SRS by presenting analysis of data that were collected during four months of fieldwork in Mumbai in 2013.

The prevailing scholarly approach to the SRS had a policy and community organizational focus, providing us with a picture of a highly controversial and exclusive plan (e.g., Anand and Rademacher 2011). Doshi's (2012) ethnographic study of dispossession and demolishment that took place under the SRS provides the reader with insight into the political practices to counter these irregularities. Anand and Rademacher found that many slum residents who are eligible or might be eligible for rehabilitation in the future aspire to SRA housing. It has been demonstrated that the SRS coexists with practices of eviction, suggesting that rehabilitation only reaches a selective group. Further, Nijman (2008) concluded that the neoliberal approach to housing is unlikely to be conducive to large-scale success. However, little is known about the impact of rehabilitation on the lives of the participants in the SRS, while thousands of households have been rehabilitated and more are awaiting work. Conventional impact assessments typically assess slum upgrading and redevelopment programs by examining changes in the physical attributes of the constructed homes. These measurements are proxies and are based on assumptions about what allows people to live a satisfying life. To gain insight into the lived experience of slum rehabilitation, this paper follows the body of literature (e.g., Diener 2009) on subjective well-being (SWB) by taking SWB as a parameter for living conditions. Using SWB as a metric allows for impact analysis based on participants' own understandings of happiness. It also gives fair insights, given that people are considered to be good judges of their own well-being (Stutzer and Frey 2010). Thereby, it complements merely objective evaluations. Furthermore, this paper distinguishes three domain-specific satisfaction indicators to identify through which domains slum rehabilitation has an impact on the well-being of its participants, either positively or negatively. By examining these three domains of housing satisfaction, community satisfaction, and discretionary income, this paper brings together different approaches to analyzing the SRS and provides the reader with a wider overview of the effects of the plan on its participants.

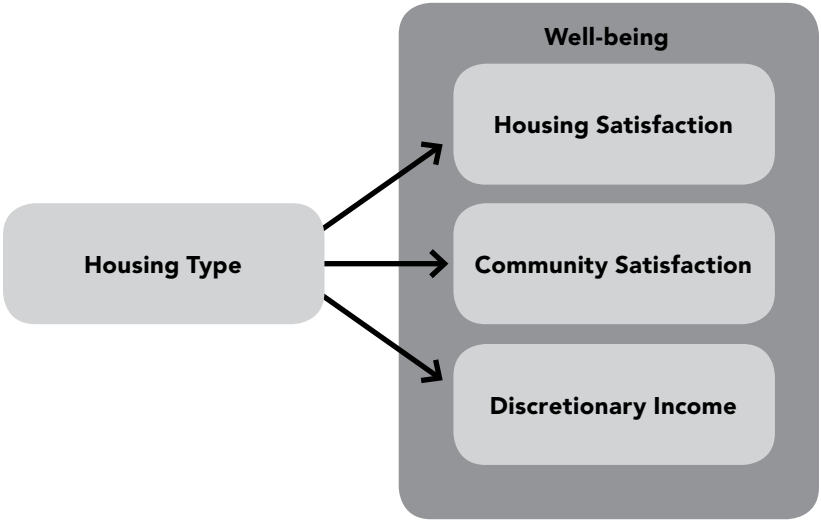
The paper is organized as follows. The second section presents the theoretical framework used to analyze and present the empirical work. The third

section describes the methods used to gather the data. The fourth section presents results and discusses the effects of rehabilitation on the well-being of the participants in the plan. The fifth section concludes.

THEORETICAL FRAMEWORK

This section lays down the framework on which this paper relies to analyze the impact of slum rehabilitation on the SWB of its participants. The framework is based on the well-being, housing, and slum upgrading literature. The framework (figure 1) starts with the grouping variable of this study: "housing type." A study by Campbell (1981) found the following domain satisfactions to be correlated with life satisfaction: the self, standards of living, family, work, income, health, and community. Canfield, Choudhury, and Devine (2009) studied the well-being of poor people in Bangladesh and found that material needs and social relationships are both important contributors to well-being. Because the Mumbai rehabilitation

Figure 1. Theoretical Framework



plan is meant to change housing conditions, I decided to focus on the material domains of housing satisfaction and discretionary income. Income is found to be essential for survival in an urban setting (Rakoldi and Jones 2012, 11). In the social domain, the rehabilitation plan affects community; therefore, this was chosen as a domain satisfaction indicator as well.

This study compares the well-being of slum residents and rehabilitated residents to understand the impact of slum rehabilitation on the life of the residents. In this study, two housing types are distinguished: (1) slum and *chawl* houses[1]; and (2) SRA flats (i.e., multistory buildings).

To assess the change of quality of life of SRS participants, SWB is taken as a parameter. SWB has been defined by Shin and Johnson (1978, 478) as "the global assessment of a person's quality of life according to his own chosen criteria." In this paper, SWB is denoted for short as simply "well-being." By using objective measurement, we can gain insight into housing attributes, but this does not allow us to understand the lived experience of individuals, households, and neighborhoods. Assessing overall well-being broadens the evaluations' scope and enhances the insights into the overall performance of the SRS (Veenhoven 2002).

Housing satisfaction has been positively associated with well-being (Cox 2012; Biwas-Diener and Diener 2001). A study by Bookwalter and Dalenberg (2002) on SWB and household factors in South Africa found that housing and transportation are the strongest determinants of the well-being of the poor. Housing has a strong impact on satisfaction at the lowest income levels. Upgrading from shack to hut and from hut to apartment leads to a higher experienced well-being. Ownership of a house was also found to have a positive impact on well-being (Bookwalter and Dalenberg 2002). Furthermore, objective housing quality is positively and significantly correlated with housing satisfaction (Biwas-Diener and Diener 2001).

Community satisfaction measures the feelings of the residents toward their community, including community bonds, relationships with neighbors, and social support. Informal urban settlements tend to have structures that are similar to those of a village, which allows for interaction among the residents. Changes in community satisfaction are related

1 Initially, *chawls* were compact modules of village homes. They can consist of several stories. A *chawl* home typically consists of a single room tenement with a kitchenette. The dwellings usually face a shared courtyard (Rane and Barde 2012).

to well-being, as human beings are essentially social. Along these lines, Bradburn (1969) found that changes in the frequency of social contacts were positively associated with well-being. Furthermore, Biswas-Diener and Diener (2001) found that satisfaction with life in the slums of Calcutta was not merely associated with material domains of satisfaction but was also found in social domains.

Higher income and poverty reduction are stated as a benefit of slum upgrading (Restrepo Candavid 2010, 2). Moreover, income has consistently been found to be positively correlated with well-being (Diener 2009; Frey 2008). Especially for the lowest economic groups, an increase in income can have large effects on well-being. Maslow (1954) developed the basic needs theory, stating that basic needs need to be fulfilled before one can attain self-actualization. Maslow's idea has been further theorized by Veenhoven (1991), who argued that income has the largest effects on SWB for those at the lowest economic levels because it increases their ability to fulfill basic needs such as those for food, water, and shelter. The relationship is one of decreasing marginal returns; once one is beyond the level of basic need fulfillment, an extra unit of income will only result in a small amount of additional happiness (Biwas-Diener and Diener 2001, 330–31). In this study, we look at discretionary income, which is total income minus taxes and the payments necessary to meet current bills. Since we are interested in changes due to rehabilitation, the bills that are accounted for are housing costs, consisting of utility and maintenance costs.

HYPOTHESES

Hypothesis 1: Rehabilitated residents have a higher housing satisfaction compared with slum residents.

The slum rehabilitation program, as described by the SRA, is meant to increase living standards through housing: "It is imperative to enhance their standard of living and for which an authorized dwelling unit is a first step in the right direction" (Slum Rehabilitation Authority 2012). Based on the objective of improving housing quality, one would expect SRS to lead to increases in housing satisfaction.

Hypothesis 2: Rehabilitated residents have a lower community satisfaction compared with slum residents.

Public-private partnerships, on which the SRS relies, provoke the rise of multistory buildings and gated communities (Doshi 2013). This is fundamentally different from the community structures in Mumbai's slums and *chawls*, which evolve around the concepts of sharing and living together. Therefore, a change in the neighborhood assets from an open to a gated community is expected to have an impact on the community's level of satisfaction. Further, rehabilitation increases the population density in places that are already extremely densely populated (Nijman 2008). Moreover, the houses are assigned based on allotment, creating new communities and uprooting communities that were established over decades.

Hypotheses 3 and 4: Rehabilitated residents have a lower average income compared with slum residents. Rehabilitated residents face significantly higher housing costs compared with slum residents.

It has been argued that slum residents cannot afford the maintenance costs of their new flats, resulting in 10 to 30 percent of rehabilitated residents moving out of the flats (Restrepo Cadavid 2010; Bhide, Shajahan, and Shinde 2003). It is also important to consider whether rehabilitated residents face only an increase in housing costs or if they also experience changes in income. The economic impact of slum rehabilitation is particularly interesting, as views on the impact on income differ. Some researchers have found that slum rehabilitation can lead to higher incomes (Restrepo Cadavid 2010, 4). That said, with the slums being intertwined with the informal sector, slum rehabilitation may inhibit access to the informal sector and destroy the income possibilities of the urban poor. With mills and industries having closed down, the informal economy has seen tremendous growth and been a significant source of employment for the urban poor (Bhide 2009), which I expect to lead to lower incomes.

Central hypothesis: Rehabilitated residents have a higher satisfaction with life compared with slum residents.

The overall effect on satisfaction with life is expected to be positive. I expect the positive impact of housing satisfaction to outweigh the negative effects on community satisfaction and discretionary income.

DATA AND METHODS

To measure the changes in well-being due to slum rehabilitation and minimize memory bias, I compared the well-being of rehabilitated residents with the well-being of slum residents. I selected a treatment group consisting of residents who had already participated in the in situ rehabilitation plan of the SRA. They have already been relocated to the newly built flats. The control group, a group of slum residents who were eligible for rehabilitation, was used as a baseline measure.

Areas that get declared as slum land are very diverse and can include well-settled communities such as fisherman's villages, the municipal corporation, and private *chawls* (Bhide 2009). Also, the structures and facilities differ among the slum communities that get rehabilitated. A difference in the baseline situation may influence the impact the rehabilitation program has on participants' lives. To provide a balanced account of the impact of slum rehabilitation, two research sites were selected with the help of the National People's Movement, a progressive people's organization. The research sites were Golibar and Siddarth Colony. Both are within 10 minutes' distance from the city's main business district, along the Western express highway, and are relatively close to the airport, so the land on which they are built is highly valued. Golibar housed 26,000 slum households, and Siddarth Colony was home to approximately 260 *chawl* households before rehabilitation. Both Golibar and Siddarth Colony consist of several societies, of which some are already rehabilitated and others will be rehabilitated, because the necessary consent has already been given.

Rehabilitation is a long process, often taking more than a decade, and not everyone gets rehabilitated at the same time. Noticing that the neighboring community gets rehabilitated considerably faster might influence the residents' view of the rehabilitation plan and might result in bias. Often the pace of rehabilitation depends on the willingness of the people residing in the area to move to the flats, a process that gets delayed when people protest. Protests to stop the rehabilitation process and or, conversely, to speed up slow rehabilitation processes can be found in many settlements in Mumbai.

In an effort to get a relatively representative sample, a judgment sampling method was used for collecting the data for the control group, the slum residents. This was done for practical reasons, because sampling based

on family name or house numbers is not viable in these areas. As women and elderly people are more often at home, in an attempt to avoid overrepresentation of women, I specifically targeted men and younger households. The data were also collected so as to obtain generational representation. I approached people within the age group twenty to thirty-five years, as they were at first underrepresented in my sample. For the data collection in the SRA buildings, permission from the housing committee was needed, as those communities were gated. Two buildings, one on each research site, agreed to participate, leaving the research assistant and me with complete freedom to ask residents whether they wanted to participate in the study or not. All households were personally requested to participate. In total, eighty-three households were interviewed—fifty rehabilitated residents, and thirty-three slum residents.

The interviews were done on a voluntary basis. The interviews of the rehabilitated residents were conducted in their homes. The interviews with slum and *chawl* residents were mostly conducted in the open space in front of the houses, as many of the houses had been (partially) demolished. The interviews usually lasted for 45 minutes to an hour, during which time the structured questionnaire was filled out and a topic list regarding well-being and the rehabilitation plan was discussed in an open interview style to complement the quantitative data.

The topic list was designed after a month of exploratory research. The survey consisted of three parts. In the first part, the SWB of the respondent was measured using the satisfaction-with-life scale (SWLS); a short measure of global judgments of satisfaction with one's life (Diener at al. 1985). The SWLS allows for distinctions between different domains of satisfaction with life to be made and "asks respondents to make a cognitive assessment of their overall life satisfaction using a 1 to 7 rating" (Biswas-Diener and Diener 2001, 337). The second part of the structured questionnaire concerned housing attributes and housing satisfaction. Facilities in the house and neighborhood were measured by the availability of various housing assets. Housing satisfaction and community satisfaction has been measured as on a 1–10 Likert scale. Further, residents were asked about perceived changes in their living conditions. The third part of the structured questionnaire consisted of livelihood measurements. The themes covered were income levels, livelihood activities, expenditure patterns, and access to social capital. Both the second and third parts of the structured questionnaire

were heavily based on the existing Living Standard Measurement Surveys of the World Bank.

The collected data were analyzed with the statistical software SPSS, performing tests for internal consistency, independent sample *t*-tests, and nonparametric tests. Furthermore, partial correlation analysis was performed to measure the degree of association between well-being and the domain variables: housing satisfaction, community satisfaction, and discretionary income.

RESULTS AND DISCUSSION

This section explains the results in the following order: satisfaction with life, housing satisfaction, community satisfaction, and economic utility. Table 1 gives an overview of the main results that are discussed in this section.

Satisfaction with Life

An analysis of internal consistency was conducted to determine if the SWL scale is reliable. The Cronbach alpha was 0.74, which indicates a high level

Table 1. Descriptives and t-Values and Correlations of Satisfaction Indicators

Descriptive	All Mean (SD)	Slum/ chawl Mean (SD)	SRA Mean (SD)	t-value	Correlation with Satisfaction
Satisfaction with life	4.87 (1.593)	3.97 (1.596)	5.44 (1.312)	–4.357*	—
Housing satisfaction	7.26 (2.734)	6.97 (3.326)	7.44 (2.296)	–.702	.329*
Community satisfaction	7.77 (2.284)	8.34 (1.842)	7.40 (2.474)	1.852***	–.255**
Discretionary income (INR)	16,467 (13,348)	14,438 (17,834)	17,834 (13,818)	–1.096	.120

Note: SD = standard deviation; * significant at $\alpha = 0.01$; ** significant at $\alpha = 0.05$; *** significant at $\alpha = 0.10$.

of internal consistency. As shown in table 1, the mean score of SWL for slum residents (M = 3.97) and rehabilitated residents (M = 5.44) was shown to differ significantly. The average score of 5.44 for rehabilitated residents tells us that they scored high on life satisfaction. They feel that things are mostly good in their lives. This score is higher than the average score in developed countries. Scoring 3.97 on the SWL scale means that the slum residents scored slightly below the average global level of life satisfaction. In general, scores below average life satisfaction call for reflection. Temporary dissatisfaction is a common phenomenon (Diener 2006).

Respondents in the slum and *chawl* often referred to happier times, suggesting that the dissatisfaction is a recent phenomenon. Numerous respondents associated their dissatisfaction with the SRS destroying their neighborhood: "Before when all the houses were still there, we were happy. We used to organize festivals together, but now we don't do that anymore because of the demolitions." The rehabilitation and the resulting demolition lead to uncertainties within the community, one respondent explained: "My daughter asks me every day when the bulldozers will come. What will I tell her?!" The rehabilitation, which is controversial and unwanted by the majority of the residents who wish to remain in their current dwellings, is a constant threat to their houses and often interrupts people's daily routines. The relatively negative score for those living in the slums could be because of the negative events they experienced during the period of the interviews. Nevertheless, these negative events, when people get evicted from their homes after refusing to accept the rehabilitation, are common throughout the city and also happened in Ram Nagar, Indira Nagar, and Koliwada.

Housing Satisfaction

The data show that rehabilitated residents are more satisfied with their housing than slum residents. The high average ratings of housing satisfaction in both groups, 7.0 (SD = 3.326) for slum residents and 7.4 (SD = 2.296) for rehabilitated residents suggest that both groups are satisfied with their houses, despite the big difference in the objective quality of their houses. Moreover, satisfaction with housing was found to be positively associated with well-being, suggesting that a higher satisfaction with housing also results in higher levels of well-being.

The structured questionnaire that was conducted included questions on housing attributes to be able to reflect on objective housing quality. This

Table 2. Housing Attributes

Attribute	Slum Residents	Rehabilitated Residents	*t*-value	x^2 value
Average size of the dwelling	171 sq. ft.	238 sq. ft.	–6.328*	
More than one room	50%	16%		10.527*
Private water pipeline connection	78%	100%		11.958*
Reliable and sufficient water supply	81%	78%		0.125
Private toilet	44%	100%		11.402*
Average hours of electricity available	24	24		

Note: SD = standard deviation; * significant at $\alpha = 0.01$.

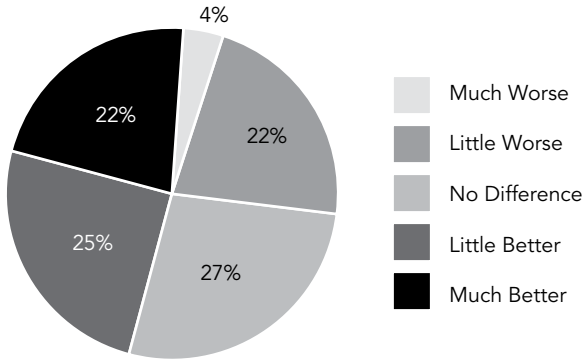
included questions regarding size, number of rooms, water pipe line connection, toilet, and electricity. The findings are presented in table 2. Slum residents lived in *pucca* and *chawl* structures, which are bricked houses with concrete structures. Most households did not have private bathrooms and would use the community toilets, where one has to bring one's own buckets of water. These living conditions are very different from what I found in the SRA flats. Objective improvements in housing quality once rehabilitated are private toilets and private water pipeline connections. Rehabilitation therefore leads to a big improvement in hygienic conditions for most slum residents. Notably, both slum residents and rehabilitated residents had 24/7 electricity in the last month. The slum residents have electricity through Reliance, one of India's main power suppliers. This is remarkable, as many slums in Mumbai or elsewhere do not have access to this facility. The rehabilitated residents were found to have bigger houses on average. Evaluating the quality of housing, one should also look at the quality of construction. During the fieldwork, various cracks were observed in the construction of new SRA buildings in Siddarth Colony. Furthermore, one of the buildings

that was already occupied did not have sufficient emergency exits. An extra staircase was under construction, but seemingly it was not built on a strong foundation; it was merely attached to the existing structure. The weakness of the construction of the SRA buildings is cause for concern, and better monitoring is highly desirable.

Rehabilitated residents say they are happy about the improvements in their housing conditions. One resident commented: "It was very congested in the *chawl*. Here there is more personal space, which I am happy about." Another resident also feels they should not complain as it is an improvement compared with their previous living conditions: "Earlier life was difficult in the slum, we did not have proper bathrooms and ventilation. Whatever they have constructed we should be happy with." Though the majority of the people who reside in the flats indicated that they have no plans to move out of the building, those in some households said they were thinking of it, because the houses are small for extended families. However, on average, the flats were found to be significantly bigger than the houses in the slum. This is based on the research of Biwas-Diener and Diener (2001), who in a study on satisfaction in slums in Calcutta found objective housing to be significantly correlated with housing satisfaction. Unexpectedly, no statistically significant difference was found in my data, which is attributed to the already high level of satisfaction of the slum residents.

The qualitative data collected show that slum residents often feel very attached to their house. Their families have been living there for generations, which leads to feelings of attachment: "I've been happy and was attached to this place, but last January they demolished my house. No matter how big my future house will be, I won't be happy." Housing satisfaction was measured as a Likert item and did not distinguish emotional attachment. Therefore an adjusted housing satisfaction measure was calculated by excluding slum residents who rated their housing satisfaction with the highest score of 10. This would result in a lower average housing satisfaction of 4.9 (SD = 2.807) for the group of slum residents. It appears that some slum residents are more satisfied with their houses than we would expect based on the objective housing conditions. The bimodal distribution of housing satisfaction of slum residents and the normal distribution of the housing satisfaction of rehabilitated residents explains why housing satisfaction is not significantly different between the two.

Figure 2. Perceiving Community Bond



Community Satisfaction

Community satisfaction was found to be lower for rehabilitated residents than for slum residents. On average, rehabilitated residents rated their community satisfaction with a 7.4 (SD = 2.8), while slum residents rated it almost one point higher, with a 8.3 (SD = 1.8).

When we asked the rehabilitated residents in what ways community bonds had changed since the rehabilitation, 22 percent said it had gotten much better, while 26 percent said it had become a little or much worse (figure 2). One of the rehabilitated residents clarified: "The degree of solidarity decreased after moving." Furthermore, residents have stated that the nature of their interaction has changed. Housing activist Simpreet Singh from Ghar Bhachao Ghar Banao Andolan (Save Homes Build Homes Movement) also recognized this view in an interview when he said: "It is also an important change in terms of privacy. In a slum you are always in the public space. Having a private space may add to change in perceptions. However, public space may create social support systems, which are absent in private space." A total of 68 percent of the slum residents said they would ask their neighbors to lend them some money if they needed some. In the case of rehabilitated residents, only 28 percent indicated they would do so.

One of the signs of a decrease in community bonds is decreased frequency of interaction among neighbors in the community after rehabilitation. The data show a significant association between the type of housing and frequency of interaction with neighbors; χ^2 (2) = 4.07, $p < 0.01$.

A longitudinal study by Bradburn (1969) has found that changes in the count of social contacts are positively associated with changes in well-being. A decrease in the frequency of interaction can lead to a decrease in community satisfaction. Nevertheless, the percentage of rehabilitated residents said to have daily interaction with their neighbors still remains relatively high.

In terms of access to open community space, no difference can be found between the two groups. When distinguishing between slum and *chawl* residents, a difference can be found because open space is inherent to a *chawl*: "If I need emotional relief, I come here [the open space between the *chawls*]. We cannot do without each other. We talk a lot and look after each other's kids." Rehabilitated residents linked the gated nature of the flats and the decrease in community bonds: "The community bond was stronger there, as the *chawl* was an open area where people used to interact more and hence the unity was much more there as compared to this place." Further, it should be noted that the system of allotment may also contribute to lower community satisfaction. However, this was only mentioned in relation to transit camps, where people from different societies with different religious background lived together in the same building. This caused communal tensions and riots at the beginning of this year, when both Hindus and Muslims disrespected each other's religious symbols. In this neighborhood were also mixed SRA flats, but their residents refused to participate in this study. This might have altered the results, as the rehabilitated residents I interviewed stayed with people from the same society with whom they used to stay previously.

Discretionary Income

Rehabilitated residents have a higher discretionary income than slum residents because of lower utility costs. The average monthly discretionary income of rehabilitated residents was found to be INR 17,834 (SD = 12564), in comparison with INR 14,438 (SD = 13818) for slum residents. Discretionary income was positively, but not significantly, associated with well-being (r =.120), which can be explained by the high variation within both groups.

Income in itself did not show significant difference (alpha = 0.1) between slum residents and people who reside in an SRA flat. So rehabilitation has no significant effect on the income levels of the participants. Most participants hold regular wage employment outside their community, so their source of income has not been under threat from the rehabilitation

plan. This is confirmed by the rehabilitated residents, of whom 31 percent said they find no difference in the ability to continue work. The remaining 69 percent felt they had better opportunities to continue their work. On the topic of work opportunities, the vast majority of rehabilitated residents said they were positive; only 4 percent said they now have fewer job opportunities than they used to. It is important to stress that the results might be different in the case of ex situ rehabilitation or the rehabilitation of Dharavi, where working and living are strongly intertwined.

Rehabilitated residents faced significantly lower utility costs compared with slum residents. The average spending on gas, water, and electricity in the slums was INR 1,990 (SD = 637). Rehabilitated residents on average paid INR 1,657 (=852). The lower utility costs might be induced by saving strategies of the rehabilitated residents. In interviews, rehabilitated residents said that the price of living had increased since rehabilitation: "The cost of living went up. Some people have a difficult time to pay their bills. The maintenance costs, costs of water, it all keeps going up." The extra costs of living in a flat, raised in the form of maintenance cost, are on average INR 619 (SD = 231). This would make the average housing cost for rehabilitated residents INR 2,230 (SD = 841). Hagelund (2009, 87) performed a study on the welfare effects of slum rehabilitation in Mumbai; 40 percent of respondents stated that they had a tighter economy after rehabilitation due to maintenance costs.

CONCLUSION

Given the findings described above, rehabilitated residents were, on average, more satisfied with their lives than slum residents. Objective housing quality has improved in terms of hygiene. Rehabilitated residents all have private bathrooms and private water connections. Though they have bigger houses, they miss the comfort of the multiple rooms they enjoyed in the slums. Surprisingly, no significant difference was found in the levels of housing satisfaction between both groups, while one would expect major differences based on differences in objective quality. Contrary to the view that income has a large impact on the well-being of the lowest economic levels, discretionary income was not found to be significantly correlated with well-being. One of the reasons might be that the respondents in this

study are not among the poorest and make up a diverse income group. This leads to a paradox: If no relation has been found in the domains of housing satisfaction and community satisfaction, while community satisfaction has been found to be negatively correlated with well-being, what makes rehabilitated residents happier than slum residents?

This study suggests that if one is among those who get rehabilitated, improvements in well-being are experienced. However, the plan has also led to many scams, and irregularities are frequent. Also, in Golibar and Siddarth, this has led to uprooting and dispossession for many. The improvement in well-being is therefore a partial reality as there is the other group that suffers tremendously: the slum residents who see their houses taken but are not given a flat, the ones who spend seven years in transit camps not because of their opposition but because of malpractices by developers. And these include a large number of people in Mumbai. A longitudinal study could provide insights in the changes over time and track the well-being of the same group of participants during the entire rehabilitation process. This would lay out how SRS affects the well-being of both rehabilitated and evicted communities over time.

The effect of rehabilitation on the well-being of residents can only be interpreted by taking a closer look at what happens before rehabilitation. Many slum residents find their well-being affected by the prospects of rehabilitation, as they are attached to their houses. Furthermore, residents who do not consent are given no choice and are helpless. While they fight the rehabilitation, they often stay in demolished or partly demolished structures that are dangerous and open to the elements, resulting in the lowest levels of well-being. The bias induced by this negative feeling resulting from the plan is likely to have influenced my results. Moreover, the alternatives to public-private partnerships, such as community-based upgrading under the operational Rajiv Awas Yojana plan, should be evaluated. This assessment would be a significant addition to the literature, given that community-based redevelopment might be able to secure similar results in the field of housing satisfaction without the drawbacks in the community domain.

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Understanding the Evolution of Slums in Ahmedabad through the Integration of Survey Data Sets[1]

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ABSTRACT

This paper seeks to explain the evolution of slums in Ahmedabad City through the integration of various publicly available surveys that were carried out between 1990 and 2012 to observe the trends and growth patterns. The paper also highlights the challenges in comparing the slum surveys done by various agencies and establishes the need for a standardized database of all slum surveys. This is one of the first attempts to integrate survey data from multiple sources into a single database. The paper concludes with how such a database could be very useful for evidence-based planning and policymaking for effective slum redevelopment.

INTRODUCTION

Slums are a manifestation of the two main challenges facing the development of human settlements globally: rapid urbanization, and the urbanization of

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poverty. Over 900 million people all over the world live in either slums or squatter settlements, and this number is projected to increase to 2 billion by 2030 (UN-Habitat 2003a). Slums are plagued with numerous issues and today constitute one of the fundamental global challenges for all planning bodies dealing with equitable urban development. Many development plans implemented over time have laid substantial stress on adaptive approaches at the cost of proactive approaches, and thus have not been able to address the subtleties of slum development. For an effective and coordinated policy for development and rehabilitation of slum dwellers, an important requirement is to have comprehensive spatiotemporal information and data on slums, as has also been emphasized by the Government of India in its recent planning initiatives.

The Report of the Committee on Slum Statistics (Government of India 2008) stated that the advent of Jawaharlal Nehru National Urban Renewal Mission (JNNURM), an urban modernization project launched in all the major cities by the Government of India in 2005, has led to a realization that the database for undertaking such a huge program is grossly inadequate. Due to nonavailibility of authentic statistics on states' slum populations, there has been faulty planning and the financial requirements for JNNURM have been underestimated in the absence of an accurate understanding of the extent of the problem due to lack of data on slums. Preparation of city development plans requires a strong, extensive database. In the absence of such adequate and reliable data, the plans for the development of cities and towns have not adequately addressed the concerns of the urban poor, especially slum dwellers. Preparation of municipal-level action plans will require a considerable amount of data on the actual number of existing households, availability of infrastructure services (or lack thereof), and many other such parameters (Government of India 2008).

For the effective implementation of slum development policies, a large amount of slum-related data needs to be collected in the cities of India. There is a need to develop a national information system and knowledge base with a focus on urban poverty and slums for better planning, policy-making, project formulation, implementation, and monitoring and review, especially in the area of slum development. This is in accordance with the objective of the Eleventh Five-Year Plan, which adopted the concept of "inclusive growth" as the key development pattern for the country.

Moreover, inclusive growth requires proper planning to improve the living condition of the urban poor. Since slum dwellers constitute the major

Table 1. Increase in the Slum Population of Ahmedabad

Year	City Population	Total Population in Slums	% of Slum Population	No. of Slums	Total Slum Households
2001	3,520,085	439,843	12.40	708	68,994
2011	5,568,695	798,206	14.30	772	182,239

Sources: AMC 2011; Census of India 2011.

segment of the urban poor, there is a vital need to have a reliable estimate of the number of people living in slums. The development of correct and accurate estimates of the country's slum population would help in better targeting government funds allocated for programs such as JNNURM.

AHMEDABAD CITY: A CASE STUDY

Ahmedabad is the financial and industrial capital of Gujarat State. With a city population of more than 5.5 million and an extended metropolitan population of 6.3 million, it is the fifth-largest city and seventh-largest metropolitan area in India (Census of India 2011). The increase in population from 3.52 million in 2001 to 5.58 million in 2011 was fueled by natural growth as well as an increase in the jurisdiction from 190 square kilometers to 466 square kilometers during the period 2001–11. The slum population has also witnessed tremendous growth in Ahmedabad. According to the Census of India data, the city's slum population increased from 439,843 in 2001 to about 800,000 in 2011, accounting for 14.3 percent of the city's population, as shown in table 1.

However, it needs to be noted that the census data did not consider the *chawls* (i.e., low-income residential units originally built in the mill premises for workers) and their population in accounting for the slum population. Considering both the slums and the *chawls*, the total slum population of Ahmedabad increased from 0.9 million in 2001 to 1.5 million in 2011 (AMC 2011). However, the slum survey done by Nirmal Gujarat Sanitation Program in 2006 indicated that there are 359,625 slum households in the

city (including both slums and *chawls*), with a total slum population of approximately1.8 million people, accounting for about 36 percent of the city's population living in subhuman conditions in 1,750 pockets spread all across the city. It is imperative to note that such differences in estimates are arising from the differences in the slum definitions used for enumeration.

With the goal of making Ahmedabad slum-free, in the past the Government of Gujarat, the Ahmedabad Municipal Corporation, and the Ahmedabad Urban Development Authority have undertaken many initiatives, such as slum clearance, slum upgrading, and the Slum Networking Project. From the initial slum clearance approach, the thrust of such efforts has moved to environmental improvement, slum upgrading, and the slum-networking approach, whereby communities, nongovernmental organizations (NGOs), and the local authorities cooperate to improve conditions within the slums.

ANALYSIS OF SLUM SURVEYS

The first slum survey of Ahmedabad City was undertaken in 1976 as part of a survey of all class I cities of the country including Ahmedabad at the behest of the Census of India, and the results were published along with 1981 population census results. With the expansion of the Ahmedabad Municipal Corporation (AMC) city limits in 1986, it became essential to update the census data, leading to a survey that was done by Ahmedabad Study Action Group (ASAG) in all the slums in 1990. The results from this survey were incorporated into the 1991 population census results.

The most extensive survey to date covering all the slums and *chawls* was done in 2001 by AMC in collaboration with two NGOs actively working with slum communities in Ahmedabad, SAATH (meaning "together, co-operation, a collective or support" in Gujarati) and the Mahila Housing Trust (MHT)–Self-Employed Women's Association (SEWA) listing of 1,668 slums and *chawls*. Since 2001, many NGOs, mainly SAATH and MHT-SEWA, have been actively working to upgrade many slums across the cities, and they have been keeping a record of all the slums in which they are working.

These surveys and ongoing monitoring of slums have generated big data sets that help in understanding the current scenario of slums. Various

organizations, institutions, and NGOs have carried out slum surveys across various slum pockets in Ahmedabad during this period. These detailed data sets exist in isolation, but the integration of such data done for this study will provide additional insights into the evolution of slums and changes that have taken place due to the implementation of various slum policies in the past. This study attempts to undertake such integration and to our knowledge, it is the first attempt to integrate these isolated data sets. The study provides an accurate understanding of growth of the slums in Ahmedabad City and the change in its dynamics can be better understood by analyzing the integrated data that these survey sets provide.

The various data sets that have been used for the analysis in this paper are:

- 1990 ASAG AMC Slum Survey
- 2001 Census of India Slum Survey
- 2001 AMC-MHT Slum Survey for 1668 slums and *chawls*
- 2007 SEWA Slum Survey for 75 slums and *chawls*
- 2012 SEWA Slum Survey for 120 slums and *chawls*
- 2012 SAATH Slum Survey for 98 slums and *chawls.*

The slum surveys done by AMC and MHT-SEWA in 2011 for implementation of Rajiv Awas Yojana in Ahmedabad could provide the most recent information that covers all the slums and *chawls* of Ahmedabad. However, two years after the completion of the survey, the data have still not been released for public access; and despite several requests to officials of the AMC, these data were not made available for this study.

In order to get an approximate idea of the growth of Ahmedabad's slums from 1990 to 2012, slum survey data were collected from government agencies such as AMC and from NGOs such as SAATH and MHT-SEWA that are actively involved in slum development in the city. Because these NGOs work at the grassroots level, their data provide the most updated and reliable estimate of number of households and information on availability of infrastructure facilities in the slums. However, information from NGOs is

limited in its coverage since it is only available for slums where these NGOs have ongoing programs.

The data sets have been analyzed and compared at the zonal, ward, and slum levels to explain the evolution of slums in Ahmedabad at various levels.

ZONAL- AND WARD-LEVEL COMPARISONS

When surveys conducted by different agencies are compared, differences in slum population estimates was observed between two data sets in the same ward for a given year, as shown in table 2.

With such huge differences in the number of households for some wards, as shown in example wards in table 2, it is really difficult to ascertain which survey set is to be believed and used for analysis, given that both the survey sets have been done by well-established agencies and are widely used for research and administrative slum improvement purposes. For example, the Census of India reports that there were 2,004 slum households in Shahpur ward in 2001, whereas AMC-MHT reports 17,525 slum households in the same ward in the same year. Similarly, Bapunagar ward had 4,638 households according to the census data, whereas AMC-MHT listed only 115 households. It is difficult to determine whether the census has underestimated the slum population or AMC-MHT has overestimated it.

Comparing the 1990 ASAG data with the 2001 census data, the zone with the greatest increase of slum households from 1990 to 2001 was the East Zone, with a 189 percent increase in the number of households, whereas the zone with the greatest decrease of slum households was the West Zone, with a 15 percent decrease in the number of slum households (Ahmedabad is distinctly divided into five zones: North, East, West, South, and Central). When comparing 1990 ASAG data with the 2001 AMC-MHT survey data, the zone with the greatest increase in slum households from 1990 to 2001 was the Central Zone, with a 380 percent increase in the number of slum households, whereas the zone with the greatest decrease in slum households was the South Zone, with an approximate 15 percent increase in the number of households.

As showed in table 3, the differences in trends are stark, particularly for the West Zone, for which one study reports a decrease in slum households (Census) while the other study reports an increase (AMC-MHT).

Table 2. Differences in Household Data estimates between the 2001 Census and AMC-MHT Survey in the same year 2001

Ward Name	2001 Census	2001 AMC-MHT Survey	Difference
Bapunagar	4,638	115	–4,523
Wadaj	8,603	6,689	–1,914
Vatva	1,507	5,693	4,186
Girdharnagar	2,246	6,460	4,214
Naroda road	2,474	7,358	4,884
Shahpur	2,004	17,525	15,521

Sources: 2001 Census of India; AMC-MHT survey data for some wards.

Table 3. Slum Household Growth in Ahmedabad's Zones, Comparing 1990 ASAG Data with 2001 Census and 2001 AMC-MHT Data

Zone	Case 1: Comparing 1990 ASAG and 2001 Census	Case 2: Comparing 1990 ASAG and 2001 AMC MHT Data
Central	+90.68%	+380.43%
East	+188.79%	+61.63%
West	–14.87%	+44.40
North	+42.73%	+85.71%
South	+46.84%	+14.80%

The overall percentage increase in the number of households, comparing the 1990 ASAG data with the 2001 census data, was 70.83 percent, whereas an increase of 117.34 percent was observed comparing the 1990 ASAG data with the 2001 AMC MHT survey data.

SLUM-LEVEL COMPARISON

For the purpose of comparing individual slum communities, data from the AMC-MHT Slum Survey conducted in 2001 were used as a baseline. Out of 1,668 slum communities from that survey, 133 could be linked with other data sets using names and addresses. Most surveys focused only on estimating the number of slum households, and hence the focus of this analysis is on the growth or decline of individual slums over time. At the same time, the availability of infrastructure services—such as the presence of water supply, sewerage, and the presence of individual toilets over the years—has also been shown in order to study the relationship between the growth of slums and improvements in infrastructure services in those slums.

Given that the survey sets done by the respective agencies each had their different individual statistical codes for slums, it was necessary to manually identify the slums that could be compared from all the data sets using the name of the slum, its address, ward name, and the like, and assigning a unique slum code to it that could act as the key for combining all the data sets. If all future surveys were to use these standardized slum codes, it could be useful to study changes in a slum over time.

There were 67 slums that could be linked across all the data set, and most of them were in the South and West zones. The comparison revealed that in those 67 pockets, the number of slum households increased from 9,401 in 1990 to 20,076 in 2001; that is, they had an annual growth rate of 6.3 percent, which is much higher than the general population growth rate of 3.15 percent in Ahmedabad during that period (GIDB 2006). However, the growth rate declined sharply from 2001 to 2012 at a negative rate of 0.3 percent, with 19,355 households living in those 67 pockets by 2012. Such a reversal in trends after 2001 can be attributed to the fact that since most of the slum projects in Ahmedabad implemented after 2001 were developed in the West and South zones, the number of slum households has decreased.

Looking at the overall picture, the number of households in the 67 slums has increased at a rate of 3 percent from 1990 to 2012.

However, the 1990 ASAG covered only the notified slums recognized by the 1956 Slum Act, primarily in the walled city, the South Zone, and the West zone, while the slums in the East and the North zones were not covered because they were outside the Ahmedabad City boundary limits in 1990. Thus, this survey does not reveal the complete growth trend. After discussing this issue with the experts, it was concluded that the AMC-MHT survey is more appropriate to consider as the baseline.

Analyzing the change for 93 slums that could be compared from 2001 to 2012, the number of households decreased from 41,541 to 29,107, showing a negative growth rate of 2.92 percent. While the South Zone and the East Zone showed the maximum decrease in the number of households, with a decrease of over 40 percent, the North Zone and the Central Zone do not show any considerable change in household numbers. The maximum decrease in the number of households in the South and the East zones can be justified with the fact that most of the slum relocating and upgrading plans have been implemented in those zones.

If we use the growth rate of –2.92 percent, the number of slum households for the year 2012 is projected to be around 180,791, which is much lower than the figures that have been quoted by the Census of India or by the AMC. At the current rate of decline in slum population of –2.92 percent, one can estimate that the city will not be slum-free before 2036. However, it should be noted that this analysis is based on estimates from the 93 slums that could be compared across surveys done in 2001 and 2012. There may be many slums whose residents have been completely evicted or new slums that have emerged at new locations, but these are not considered in this analysis due to the lack of availability of such data.

With respect to trends in the availability of infrastructure services for these slums and improvements over the years, it was observed that the AMC-MHT 2001 Slum Survey was very liberal with regard to rating of infrastructure services in slums and *chawls*. It was observed that more than 70 percent of the slums and *chawls* showed the presence of basic infrastructure services like the availability of water supply, a sewerage network, and the presence of individual toilets, which was not reflected in the site-level discussions with people associated with NGOs such as SAATH and MHT working on the grassroots level. The absence of a proper rating system used between various agencies

leads to the variation in values shown in the survey data. This explains the occurrence of various cases where certain slums showed the presence of infrastructure services in the 2001 AMC-MHT list but have been shown as lacking these services in surveys done at a later date (i.e., in 2007 and 2012). It is not plausible that a slum had infrastructure services in the past (i.e., in 2001) but does not have them currently (i.e., in 2012).

In order to explain the trends in the growth of slum households all across the city, slums showing the greatest changes were assigned to one of three categories: slums showing the greatest increase; slums with the greatest decrease; and exceptional cases, where slums have observed a reversal of growth trends after a certain period. The possible reasons behind such trends have been studied in detail.

While some slums showed a distinct trend of increase or decrease in the number of households over the period, some exceptional cases were observed where the growth trend of a slum reversed after few years for specific reasons. Further analysis of these trends in discussions with experts working in these fields and personal visits to the slums and interactions with the people living in the slums led to interesting inferences that one could relate to the observed trends. Some trends can be attributed to natural factors unfolding in the due course of time, while some trends were due to developmental changes and policy implications that affect the city. Based on the analysis done, the most important inferences that have been related to the increase or decrease in the number of slum households in the city are as follows.

Disintegration of Chawls to Slums

There was a considerable increase in the number of *chawls* from 1990 to 2001 in many wards, especially in the East Zone of the city. *Chawls* that were thriving until the 1990s started becoming dilapidated with the closure of the textile mills. Whereas the city once had a concentration of sixty-four cotton textile mills, the closure of these mills led to layoffs of about 80 percent of the city's workforce (Unni, Jeemol, and Rani 2007). With the absence of a source of livelihood for the mill workers and the disintegration of communities, the *chawls* started being degraded to slum-like conditions, and over a period of time they have become full-fledged slums. Kasai ni chali in Behrampura ward and Sanjaywadi in Amraiwadi are only two examples of *chawls* that have declined into slums over time.

Encroachments on the Greenbelts

The development plans for Ahmedabad City prepared in 1986 and 1995 had proposed a greenbelt all along the eastern part of the city from Naroda to Vatva. As a result, large parcels of land were kept vacant as a greenbelt on the city's eastern periphery. But the presence of mills and factories along this belt led to widespread encroachment of it by immigrants, leading to a sudden increase of the number of slums, especially in the East and South zones in the 1990s. These slums are still occupying the AMC-owned land originally planned to be the greenbelt, and in fact are growing at rapid pace (e.g. Momainangar in Odhav, and Dahyajinagar in Narol).

Based on a focus group discussion with the MHT, its representatives provided a close estimate of 75 percent of slums on private lands. As per MHT's study, most of this land has been sold by the original owners to the existing residents on the land. Due to the notification of the majority of this land for various other uses (primarily the greenbelt) under the development plans prepared by the Ahmedabad Urban Development Authority (AUDA), none of the land transactions have been registered and hence do not provide clear titles for these lands.

Policy Implications

With a plan to build 200,000 housing units for slum families through JNNURM, AMC has been able to build around 30,000 houses so far under the Basic Services to the Urban Poor (BSUP) plan for the economically weaker sections. Under this plan, the slum dwellers have been evicted and made to relocate to reinforced cement concrete (RCC) housing colonies developed by AMC at sites distant from their original location. This was further verified in the analysis, where many wards showed an abrupt decrease in the number of households living in slums. Also, many of the old slums did not exist in the latest survey data, possibly due to evictions. Bhavaninagar in Odhav is one example of slums whose residents were evicted and the families resettled on housing estates under BSUP near the Satellite area in the western part of Ahmedabad.

Mr. Niraj Jani, associate director of SAATH, who has been working on slums in Ahmedabad for many years, stated that around 60 percent of the government-allocated housing that relocated slum dwellers to a distant site has been rented out (Author's interactions with Jani in 2013). A decline in the slum population in one place could result in an abrupt increase in slum

households in some other location, also putting pressure on the minimal level of infrastructure services that might exist at that location.

The method of the lottery system that was adopted by AMC to allocate economically weaker section (EWS) housing has often resulted in slum families from different areas of the city that belong to various communities coming together to live in an area that is far away from their individual areas of sustenance. Slums, despite having an informal structure, have a strong sense of community and oneness that gets broken up when they are separated from their communities and made to live in a remote location amid people from other areas facing the same problems. Because of this situation, they often tend to move back to the same area or to nearby locations.

The Implementation of Development Projects

Large-scale development projects implemented in a city often displace large numbers of slums. Development in the name of the progress should not only include the construction of huge infrastructure projects but also consider how to develop and uplift those at the lower levels of society. Apart from the violent demolition of slums, evictions also affect slum dwellers' access to livelihoods, and to social and public health services. The affected slum families become welfare-seeking dependents instead of the self-organized and self-employed households that they once were (Banerji 2011).

According to Mahadevia and Brar (2008), about 28,000 slum dwelling units were demolished in the city in the period 2006–8, and another 2,000 households received eviction notices for a range of infrastructure projects. Projects like the Sabarmati Riverfront Project led to the eviction and resettlement of 19,000 families from the riverfront to thirteen new housing estates built under the BSUP plan (Mahadevia and Brar 2008). However, while the housing estates are spread throughout the city, evidence showed that the allocation of housing has been highly selective with regard to distance from the eviction sites. The minimum distance between an evicted family's previous riverbank home and its resettlement site is 5 kilometers, the average distance is about 9 kilometers, and the farthest distance is 16 kilometers (Patel 2012). Not only do these distances break links between the families and work, food security, education, and health amenities, but they also disturb the long-established community relationships and networks.

Even other projects implemented in Ahmedabad—such as the Bus Rapid Transit System (BRTS) corridor started in 2007, the 132-foot ring road

developed in 2001, Kankaria Lake in Ahmedabad, and GIDC Industrial estates—have led to massive evictions and resettlements of slum dwellers. Krishna-nagar in Stadium and Maganram Jagliram ni chali near Kankaria are examples of slums where many households have been evicted for implementation of projects such as BRTS and Kankaria Lake.

There were several challenges for integrating these isolated data sets into one for comparison; some of the major challenges are discussed below.

1. Variation with respect to slum definition. One of the challenges in combining the various data sets for comparison pertains to the varying definitions of slums use. As UN-Habitat (2003b) suggests, there are multiple reasons for the nonexistence of a universally accepted and quantifiable definition of a slum:

- Slums are too complex to define according to one single parameter.
- Slums are a relative concept, and what is considered a slum in one city will be regarded as adequate housing in another city—even in the same country.
- Slums change too fast to render any criterion valid for a reasonably long period of time.

Different organizations use their own definitions to identify a slum based on several parameters. As shown in table 4, the UN-Habitat definition is the only one that covers the maximum number of parameters that have been listed. All other definitions use subsets of theses parameters. This variation in defining slums leads to huge differences in how agencies determine the number of households in a particular slum.

The Census of India (1991) followed the slum definition given by the Government of India (1956). Until then, only notified slums were included in the slum census. It should be also noted that in the 1991 census, only those slums with a population of 50,000 or more according to the 1991 Census were covered for slum demography. This led to an underestimate of the total slum population, since smaller slums were not counted. The Census of India in 2001 used a new definition for slums, whereby, in addition to the notified slums, all areas recognized as a "slum" by the state or local government and the Union Territories (UT) administration that have not been formally notified as slums under any act and constitute a compact

Table 4. Comparison of Slum Definitions

Definitions Provided by:	Lack of Sanitation	Access to Safe Drinking Water	Structural Quality	Over-crowding	Living Area	Security of Tenure
Slum Area Act 1956	✓	✓	✓	✓	×	×
UN-Habitat	✓	✓	✓	✓	✓	✓
UN Development Program	✓	✓	×	×	✓	✓
Cities Alliance	×	×	×	✓	✓	✓
Census of India 2001	✓	✓	✓	✓	×	×
NSSO	✓	✓	✓	✓	×	×
Central Statistics Organization	✓	✓	✓	×	×	×
Slum Census 2011	✓	✓	✓	✓	✓	×

area of at least 300 population or about 60 to 70 households of poorly built congested tenements, in unhygienic environments, usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities, were defined as slums.

The Census of India in 2011 later modified the definition of slums as any compact housing cluster or settlement of at least 20 households with a collection of poorly built tenements that are mostly temporary in nature with inadequate sanitary and drinking water facilities and unhygienic conditions will be termed slums. Therefore, one can see how the variation in the words and parameters used by each definition can play a deciding factor in the inclusion of slums or not for survey purposes, and because of this why a correct picture would be very difficult to identify.

2. Variation in values for the same year in different data sets. With the availability of survey data sets for a particular slum for a particular year from two different organizations, for several slums there was a huge variation in the number of households between the two data sets. While any variation having a 10 percent difference could be considered tolerable for analysis, there were many slums where a difference of over 100 percent in values was observed for the same slum in a particular locality in surveys taken by different agencies.

One possible reason for this variation could be the lack of official slum boundaries. Given that slums are entities that cannot be defined in a fixed area, it might be possible for a particular agency to use its own parameters to define the boundaries of a slum for their surveys that might be very different for another agency. The absence of a slum boundary makes it difficult to confirm the number the households in the particular area. The other reason for variation would be differences in the definition of slums used by agencies, as was explained in the previous point.

3. Mismatch in the naming of slums / changing the names of slums. There were several slums with the same address and ward but with different names. When this was discussed with Ms. Verma of MHT SEWA, she explained that slums are often named after the headman or the elected representative for the locality. After few years, when the representative is replaced by another, the slum is renamed for a new data set according to the convenience of the new headman, who prefers to name the slum after himself. These changes could result in a slum recorded under two or more different slum names in different time periods. Such discrepancies make it really difficult to identify slums while comparing two data sets from two different time periods.

4. Lack of a common slum code for verification. Surveys done for slums by various agencies use their own sets of slum codes in order to identify a particular slum. With each slum in a survey set having its indigenous survey codes, and in addition to the factors described above, much manual work is necessary to individually search a single slum from a data set to compare with another set with all the limiting factors constraining the parameters for identification. It is essential that the city government create a central database for slums with a unique code for each slum, which can then be used for future slum surveys. That way, all the data sets could be linked with each other to study trends.

5. Absence of common procedure for rating infrastructure services. All individual extensive survey sets have their own way of rating the infrastructure services in the slums. While some survey sets measure the percentage of households that have access to infrastructure services in a particular slum, some survey sets only indicate the presence or absence of infrastructure services. Such a dichotomous measure cannot provide the micro-level details of whether all the households are deprived of infrastructure services. For example, a slum having only 10 percent of households covered by infrastructure services is considered as having infrastructure, and so is a slum having 90 percent of households covered by infrastructure services—which is misleading.

6. Redefining and reshaping ward boundaries. Various development plans prepared for Ahmedabad City over the last three decades from 1986 to 2011 have brought many changes in the ward boundaries. Due to these boundary changes, several slums are categorized under one ward in one survey data set, but are then assigned to another ward in the later surveys. In the absence of clear demarcations of changes in ward boundaries, it becomes a challenge to combine multiple data sets for ward-level analysis.

CONCLUSION

Slums are an integral part of a city in most developing countries. Unless efforts are made to understand the growth patterns of slums, it is very difficult to discern how to suggest a developmental approach to improve the livelihood of people living in the slums. In order to understand the growth of the slums, the foremost requirement is to have comprehensive information and data essential for devising effective and coordinated policies. An authentic database is essential to assess the magnitude of the problems existing in the area in order to formulate planning and policies that effectively target potential beneficiaries. To implement plans and policies for slum development, it is critical to develop a detailed database on slums and to gain a definitive understanding of the size of the problems and their distribution across cities and areas in a city. The vision of a slum-free India can be achieved only on the foundations of sound plans of sound data.

There should be a central database for all slum-related information collected by different agencies. This database should hold information about

each and every slum, its structure, the availability of services, and the growth trends from all credible sources that have worked on the site, on the basis of which policy formulations are to be made on the type of action necessary for a particular ward or a zone. All the slum details should also be kept in the public domain under the "Open Data Movement" initiated by the Ministry of Statistics and Programme Implementation (MOSPI), so that researchers interested in working on the growth of slums and understanding the change in the dynamics of a city's slum development can have access to all available data collected. A committee set up under the chairmanship of the secretary of MOSPI in 2009 talked about evolving a sustainable and viable methodology for conducting slum and other surveys between successive census surveys and at the same time suggested measures to build an Urban Information Management System on Slums and Urban Poverty, Housing, and Construction, duly taking into account the data collected by agencies such as the National Sample Survey Organization (NSSO), various NGOs, and so on (Government of India 2008).

As discussed above, each slum in the city should be assigned a unique slum code, which should be used by all agencies—government and private—for slum surveys. This unique code will help to identify the slum and will allow comparisons of different databases for various study purposes that could be useful for policymaking. Other important factors—such as the use of a common procedure for rating infrastructure services, the use of the English language for recording all survey data, and the proper training of people entrusted to administer surveys in the field—will also help in creating an accurate and comprehensive database that can be useful for evidence-based policymaking and in the decisionmaking process for slum redevelopments by urban local bodies and the state government.

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Optimizing Property Rate Returns for Urban Development in Ghana, Using Geographic Information Systems

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ABSTRACT

Ghana, in an attempt to promote the use of geographic information systems (GIS) in urban planning, initiated the Land Use Planning and Management Information System under the Land Administration Project in 2008. This paper argues that the top-down and nationwide approach adopted poses great limitations for GIS use at the local level. The study utilizes responses from fifteen district assemblies to establish current GIS and property rate collection status at the local level and within this context proposes an incremental bottom-up approach that uses existing national systems to promote GIS use in urban planning and property rate collection at the local level in Ghana.

INTRODUCTION

For most developing countries, technology and for that matter GIS use is almost a new phenomenon despite advancement in global technological evolution. As the monitoring of urban growth and management

continue to remain a daunting challenge, one would think that with advancements in technology, the urban planning process will yield to the potential of these support systems. Unfortunately, the advent of new urban planning support systems such as GIS that facilitate the tracking and documentation of urban activities continue to elude developing countries. One potential reason is that the approaches to developing such support systems have been excessively mega in nature. With weak institutional systems, implementation capacity and sustenance have continually remained a challenge.

In Ghana, the formulation of the National Land Policy in 1999 and the Land Administration Project (LAP) with World Bank support in 2003 set in motion the development of a nation-wide GIS. The LAP through the Land Use Planning and Management Project (LUPMP) established a Land Use Planning and Management Information Systems (LUPMIS) in 2008. The aim was to provide a comprehensive direction to build the capacity of urban planning departments and planners in the use of GIS to track urban growth and land development patterns. Though some successes have been achieved, the use of GIS in urban planning practices in Ghana still remains underdeveloped.

This paper argues that the challenges exist because of failures in the design and implementation approach which does not utilize several national potentials and programs to comprehensively develop an incremental approach to developing a community, district, regional and national area GIS. This paper therefore suggests a new design and a bottom-up approach that incorporates academia and youth programs that will develop technical and vocation skills on an incremental basis with greater prospects for efficiency, cost effectiveness, time-relevance and sustainability. The paper argues for a strong synergy between academia and practice to develop this capacity on an incremental basis. Using property rates as a case in point, the paper demonstrates how the new design can enhance the LUPMP to provide the needed urban and land development planning information to inform the relevant policies and programs for urban development in Ghana.

URBAN PLANNING AND PROPERTY RATES IN GHANA

The State of Urban Development

According to the 2010 Census Summary Report, the majority of Ghana's population was rural until 2009–10. In 1931, the proportion of urban population was only 9.4 percent. By 2000, the proportion was 43.9 percent (Ghana Statistical Service 2002; Songsore 2009). Currently, the proportion of urban population is estimated at 50.9 percent (Ghana Statistical Service 2012). This rapid rate of urbanization is similar to trends found in other developing countries. Indeed, urbanization at the beginning of the twenty-first century has been a major development challenge for Ghana due to high national population growth rates (2.7 percent) and urban growth rates (4.2 percent). Rural-urban migration, natural increases in towns and cities and reclassification of villages and towns as urban areas have contributed to these urbanization trends.[1] Unfortunately, national and local responses to urbanization in Ghana have been inadequate and sometimes, mostly absent (Ministry of Local Government and Rural Development 2010). It was not until April 2013 that the first-ever National Urban Policy was launched in Ghana.[2] Today, this challenge still persists and the absence of a definite response has resulted in traffic congestion, uncontrolled growth and sprawl, flooding, slum development, and poor accessibility to social services such as water, sanitation and health (Owusu and Afutu-Kotey 2010; UN-Habitat 2009).

Currently urban planning in Ghana takes place within the new local governance system of decentralization which came into being in 1993. Chapter 20 of the 1992 Constitution of Ghana, Local Government Act, 462, 1993, National Development Planning (Systems) Act, 480, 1994, and the National Development Planning Commission Act, 479, 1994, support decentralized planning processes that allow for grassroots participation, accountability and transparency. District assemblies

1 In Ghana, any settlement with population of 5,000 and above is classified as urban according the Ghana Statistical Service in the 2000 Population and Housing Census.

2 Cities Alliance reported on their website the launch of Ghana's first-ever National Urban Policy that provides a national governance framework for urban development. See http://www.citiesalliance.org/node/3748.

(DAs) subsequently became the "planning authority" at the local level (Republic of Ghana/Local Government Act, Part 1, Section 12, 1993).[3]

Two planning entities are currently part of this existing local governance structure. The first is the District Planning Coordinating Unit (DPCU) and the second, Physical Planning Department. These are present in all districts. In Section 7 (1a-e) of the National Development Planning (System) Act, Act 480 (1994), the DPCU serves as the secretariat that advises the DA on planning issues, coordinates all "the planning activities of sectoral departments," provides a "comprehensive and cohesive development framework," updates "the district development plan," and provides data to the National Development Planning Commission (NDPC). The activities of the Physical Planning Department are consolidated by the Town and Country Planning Act, Cap. 84 (1945), and are mainly responsible for the spatial planning of districts, municipalities and metropolises. They perform functions such as declaration of planning areas, prohibition of development, preparation of schemes and the overall control of land use development in urban areas.

Since 1993, the implementation of the new local government system has focused mainly on promoting social and rural development. Land and urban management and control systems have been inadequate resulting in poor growth strategies and haphazard urban development. Physical plans and urban development in most areas have remained divergent and the ramifications have been poor land administration and land use practices at the local level. There are several challenges affecting the current local government system including poor capacity to design, implement, and monitor growth and development at the local level. The capacity issues include human resource, finance, logistics as well as the political and legal environments within which local development takes place (Ministry of Local Government and Rural Development 2010).

3 According to the National Development Planning (Systems) Act, Act 480 (1994, 3), Section 2(1a), planning authorities are responsible for initiating and preparing "district development plans and settlement structure plans in a manner prescribed by the Commission and ensure that the plans are prepared in full participation of the local community." In Section 2(1a) to 2(g), the planning functions of district assemblies include policy formulation, programming, budgeting, implementation, monitoring and evaluation which among other things are dependent of adequate and reliable spatial and aspatial data and information. In Part 1, Section 3 of the Local Government Action, Act 462, the act delineates three types of local planning jurisdictions—districts, municipalities, and the metropolis—which is in accordance with Article 241 of the 1992 Constitution of Ghana.

Urban Development Finance: Issues Affecting Property Rate Collection

As planning authorities, DAs are responsible for generating revenue to support development and administrative expenditures at the local level. Unfortunately, efforts in this direction are inadequate leading to heavy dependency on central government. Two main sources of funding characterize the operations of DAs. The first is popularly referred to as IGF, Internally Generated Funds. The internal revenue generated is from two main sources namely local level taxes and user fees and charges. These user fees and charges include licenses, permits, market fees, land revenues, and the like (Institute of Local Government Studies 2010). The second source is from external entities such as central government,[4] nongovernmental organizations (NGOs) and international donor agencies.

The NDPC (2012) identifies that central government transfers to DAs—DACF (50 percent), IGF (21 percent), HIPC Fund (4 percent), donor partners (12 percent), and other grants such as from governments programs (13 percent)—were the main sources of fund for DAs. This demonstrates the continual dependence of local governments on central government for local level development. The challenges of this dependence have often resulted in delays in project and program implementation at the local level as a result of their erratic nature and delay. Though IGF has been increasing, rising at 11 percent per year, this is not enough to compliment central government transfers. Property rates hold a great potential for internal revenue generation but rates are set at lower prices (Farvacque-Vitkovic et al. 2008). This is in part because databases to support the valuation of property are mostly absent. This has made the collection of property rates difficult in many districts.

Part IV, Section 94, of the Local Government Act, 462 (1993) establishes DAs as the "rating authority." Act 462 also confers on DAs the types of rates, the method of rating, and many other guidelines to institute a rate regime. Section 102 of the Act explicitly refers to property rates and delineates that "the amount of a general or special rate due in respect of any premises is a

4 The central government transfer is from a general fund known as the District Assembly Common Fund (DACF), which is distributed to the various assemblies using a centrally determined formula. The 1992 Constitution of Ghana mandates such act and is consolidated by the District Assemblies Common Fund Act 1993 (Act 455). This was also part of the process to consolidate the new local government system on decentralization. Factors that inform the DACF allocation formula are need, responsiveness, service pressure, and equality (Banful 2008; NDPC 2012).

charge on the premises until it is paid, and that charge shall have priority over other claims against the premises except claims of the Government." Yet this potential has not been utilized in many districts to its full potential. Per Act 462, it can be inferred that land registers, cadastres, master plans, divisional plans, block plans, property record sheets, and valuation lists are critical conditions that influence the processes. According to Farvacque-Vitkovic and colleagues (2008, 17), property rate collection requires the preparation of a "Valuation List which is a list of all properties valued, with their rateable values." This has ultimately become the challenge of DAs who lack the capacity to generate first the lists of all properties in the District, the type of property, location and their improvements, and the value of these properties. As such, most of these assessments have remained subjective and sometimes do not represent the true values of properties. Currently, two main types of collection mechanisms exist; collection by revenue task forces and by contracting out to a private agency as indicated in table 1.

Table 1. Overview of Property Rate Collection Situation in Case Districts

Aspect of Situation	Number (*N*)	Percent
Collection of property rates	*N* = 15	
Yes	14	93.3
No	1	6.7
Method of collection	*N* = 14	
Collected by DA field agents	10	71.4
Outsourced to a private agency	4	28.6
Estimated coverage rate	*N* = 13	
Less than 20	3	23.1
20 – 40	2	15.4
41 – 60	5	38.5
61 – 80	2	15.4
80+	1	7.7
Existence of property rate database	*N* = 14	
Yes	8	57.1
No	6	42.9

For instance, in the Sissala East-Tumu District, the DA has compiled a property list for the Tumu Township. "This was compiled together with the lands Valuation Officer. Unique codes are given to all the property within the catchment area of the township. With the list, rate collectors collect property rates and return with ticks of properties visited."[5] Currently, there is an emerging trend. With limited capacities, property rate collections are now being privatized with DAs outsourcing the valuation and collection processes. In the Builsa District, the key respondent at the Town and Country Department indicated that "the assembly sublets it (*property rate collection*) to a private consultant to do the rate assessment and collection. But basically, the property rate being covered and collected is for telecommunication mast."

Unfortunately, the absence of a reliable database leaves room for undervaluation and reporting by the collection agencies which may deprive DAs of huge sums of revenue. Koney and Akwensivie (1995) for instance identified high levels of corruption associated with property rate collection and allude to the issue of subjectivity in the assessment and collection of the rates as well as embezzlements of rates collected. Although the Local Government Act, 462, 1993, delineates clearly the administrative framework for property rate implementation, Adem and Kwateng (2007, 53) argues there are deviations "with regards to timing, quantum and in some cases apathy to the application." In addition, DAs do not have rolls of all properties and the rates paid to date. The absence of such a database makes collection and retrieval of unpaid rates difficult and at times impossible. In addition to poor permit regimes for land development, many DAs are also not even aware of the number of new properties that have emerged to be rated.

GIS can offer such potential. The software will offer DAs the opportunity to capture, document, and map the various properties and offer opportunities for updates as the location can easily be determined. The areas where property rates bring in the most revenue can easily be identified and prioritized to inform strategic local economic development. Nonetheless, all these depend on the capacity to utilize and manage the potential of the software. In urban planning and management, the need for GIS skills has

5 This is from the assistant town planning officer at the Department of Physical Planning, Sissala East-Tumu District.

become imperative for numerous reasons. As part of planning intelligence and support systems, GIS technology facilitates the collection, organization, analysis and dissemination of information in urban planning processes (Brown and Brudney 1993; Budić 1994; Nedović-Budić and Godschalk 1996; Huxhold and Levinsohn 1995; Nedović-Budić et al. 1999). These are the reasons why the LAP was introduced to facilitate the development of a Land Use Planning and Management Information System (LUPMIS). This project is the focus of the subsequent section.

THE LAND ADMINISTRATION PROJECT

Overview of the Project

The LAP is part of an ongoing land reform process to streamline land registration, administration and management in Ghana. The reform began with the formulation of the National Land Policy in 1999. The long-term goal of the "land policy is to stimulate economic development, reduce poverty and promote social stability by improving security of land tenure, simplifying the process for accessing land and making it fair, transparent and efficient, developing the land market and fostering prudent land management" (Yankson, Asiedu, and Yaro 2009, 2). In 2001, the Government of Ghana initiated processes to prepare and implement LAP and in 2003, the World Bank provided financial support for the implementation of the first phase of the project. There have been several implementation challenges. The complex structure of the project led to a restructuring in 2008. This led to an extension of the project deadline by two years (Ministry of Lands and Natural Resources 2011). LAP-1 ended in 2011 and in the same year, LAP-2 commenced with four main components (World Bank 2011). There is not much difference[6] aside from the reduction in project components of LAP-2 because it builds on the foundations laid in LAP-1. LAP-2 subsequently aims to "to consolidate and strengthen urban and rural land

6 LAP-1 had five components: (1) harmonizing land policy and regulatory framework for sustainable land administration; (2) institutional reform and development; (3); improving land titling, registration, valuation, and information systems; (4) the land titling program; and (5) project management, monitoring, and evaluation. In LAP-2, component 4 of LAP-1 was dropped as part of the restructuring of the program; and probably because it was part of component 3 of LAP-1.

administration and management systems for efficient and transparent land service delivery" (World Bank 2011, 6).

Land Use Planning and Management Information System (LUPMIS)

In component three of LAP-1 and LAP-2, the emphasis is on integrating information systems into land registration and titling because "both land administration and management involve land registration and it has been recognized that improvements to land registration systems and the establishment of land information systems (LIS) or geographic information systems (GIS) are important catalysts for development in less developed countries" (Karikari, Stillwell, and Carver 2002, 1). In the National Land Policy and LAP, LIS are to facilitate a move from paper based filing systems to automated land administration database systems. The LUPMIS is an outcome of LUPMP. This was initiated and implemented between 2007 and 2011 to provide the foundation for a comprehensive GIS for land administration and planning. LUPMP was funded by the government of Ghana and the Nordic Development Fund aimed at developing "a coherent, streamlined and sustainable land use planning and management system which is decentralized and based on consultative and participatory approaches in order to manage effectively human settlements development."[7] The project components are:

1. Development and testing of pilot decentralized land use models in selected high priority areas;

2. Policy studies and the reform of the legal and institutional framework for land use planning and management;

3. Implementation of an information system for land use planning and management; and

4. Pilot plan making and the implementation of plans at regional, district and local levels.

7 The discussions were based on a Town and Country Department document that provides an overview of the LUPMP; see http://www.tcpghana.gov.gh/index.php?option=com_content&view=article&id=70:the-land-use-planning-and-management-project-ghana-&catid=23:news-a-events&Itemid=157.

Project Achievements

Since the implementation of the project in 2007, there have been achievements attained in relation to the four components of the project:

1. Human settlement studies have been initiated and integrated into the national development agenda including the Ghana Shared Growth and Poverty Reduction Policy framework (2010–13) and the National Urban Policy.

2. Through this project the LUPMIS was established. Manuals, guidelines, standards and permit procedures were reformed and integrated into local level planning in Ghana.

3. Personnel from Town Country and Department have been trained after personnel needs assessments in project management, participatory planning, communication skills, and the use of GIS in local planning processes.

4. Pilot projects have been launched in Ejisu, Takoradi, Asankragwa, Cape Coast, Awutu-Senya, Tamale, Savelugu, Dodowa, and Agona Nkwanta, where computer and GIS equipment have been provided to support a three-tier Spatial Development Framework at the top, a structure plan, and community-based local plans.[8]

The aim of LUPMIS was to promote efficiency, sustainability, appropriateness, and easy to use and compatible GIS to support local planning activities, especially zoning, land use planning and urban development. The outcomes encompass spatially oriented community plans, definition and layout of sector maps, preparation of development and building permits, and land use maps. This system identifies community orientation and GIS as complementary. Indeed, this helps link the information system to urban policy and development interventions. It thus becomes a tool and not an end from this perspective. The structure of LUPMIS implementation process is top-down. There are three levels in this structure with all activities concentrated at the

8 These were derived from the Town and Country Planning Department program page, which presents the achievements of the project since 2007; see http://www.tcpghana.gov.gh/index.php?option=com_content&view=article&id=71:the-land-use-planning-and-management-project&catid=20:lupmp&Itemid=156.

Town and Country Planning Department (TCPD). There will be a national headquarters, ten regional headquarters and district offices of the TCPD which will collect and document spatial data for land administration and urban planning. As indicated in the concept paper,[9] training of personnel to manage these centers is done in five ways: outsourced formal training courses, in specialized trainings institutes; in-house, formal training; in-house, informal training; on-the-job-training and supervision; and, manuals and guidelines, both in hardcopy and online.

There is a strong disconnect in this approach with how urban planners are trained in Ghana. Most of the personnel that perform planning tasks are graduates from the various universities in Ghana, most especially the Kwame Nkrumah University of Science and Technology (KNUST). Though the LUPMIS approach offers critical on-the-job training and in-service training for current local planners, it has significant implications for sustainability and continuous development of national and local GIS capacity building in Ghana. GIS education at the main universities in Ghana—namely University of Ghana, KNUST, University of Cape Coast, and University of Development Studies—offer inadequate and mostly no GIS courses for majority of students. The Department of Geography and Resource Development and the Centre for Remote Sensing and Geographic Information Services at the University of Ghana offer short courses in GIS. There is also a GIS Center at KNUST's College of Engineering. These avenues do not offer a comprehensive path to a GIS professional career. This thus limits the ability of graduates to use and apply this skill to a real life work environment. For planning education in Ghana, GIS use is inadequate. Though respondents are aware of GIS and its relevance for planners, they explained that they would not be able to use GIS in their planning tasks. Table 2 summarizes the state of GIS capacity in the various districts studied.

The use of GIS in planning activities is almost absent at the local level and this is due to low human resource and organization capacity. As such there is no link between GIS and property rate collection in these districts, even in districts with GIS databases. The guide that GIS provides in terms of efficiency in collection rates and the tracking of new developments in local areas to inform the collection of property rates from new

9 The concept paper for LUMPIS is available at http://www.gerhardbechtold.com/LUPMIS/Concept.php.

Table 2. GIS Capacity and Usage at the Local Level

Aspect of Capacity or Usage	Number (*N*)	Percent
Ability to use GIS	*N* = 15	
Yes	5	33.3
No	10	66.7
Existence of GIS database	*N* = 15	
Yes	1	6.7
No	14	93.3
Rank in department GIS expertise	*N* = 15	
One	7	46.7
Two	2	13.3
Three	2	13.3
Four	1	6.7
Five	2	13.3
Seven	1	6.7
Rank in department GIS use	*N* = 15	
One	11	73.3
Three	1	6.7
Four	2	13.3
Six	1	6.7

developments subsequently eludes many DAs. The TCPD where LUMPIS focuses is not the only agency that needs GIS integration at the local level. The nationally oriented nature of the project makes it difficult for incremental integration and diffusion of GIS to other departments as districts wait on national and regional projects to be completed. Karikari (2006, 7) asserts that "there is need for organizational reform, the 'big bang' approach cannot be a viable option, technically."

GIS units can take shape at the various DAs without the complex national implementation structures. The rationale for this nationally oriented approach has been informed mainly by harmonization and data sharing principles. Nonetheless, these principles can still prevail if GIS integration and diffusion are approached from bottom-up, influenced by local actions

and partnerships between the various decentralized departments at the local level and national agencies. For instance, for property rate collection, GIS integration and diffusion will be feasible as DAs are the planning and rating authority. This is one exciting local potential that needs to be tapped effectively to harness property rate collections. In the next section, the suggested framework for such a bottom-up approach and recommendations for how other existing national systems can support this framework are articulated.

SUGGESTED APPROACH

Incremental Design for Integrating GIS into Local Planning and Property Rate Collection

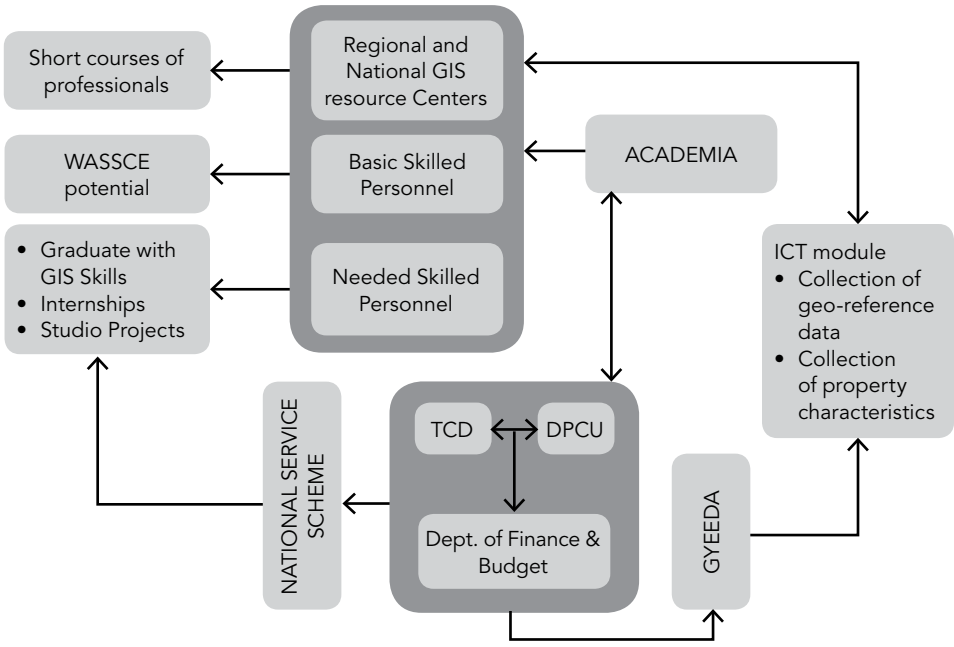
In this framework, GIS diffusion should begin from the various local government agencies in an incremental fashion with the development of local level GIS units or departments. Currently, emphasis of GIS development is captured at Customary Land Secretariats (CLS) that concentrates mainly on land deeds and title registration in pilot areas. National and regional offices and regulatory frameworks have been the main focus with the aim of reducing land conflicts and stress in land registration. Indicators achieved in LAP-1 relate to policy and legislative reviews, policy on land compensation, assessment of land rights and vulnerability, and establishing of CLS (World Bank 2011). As critical as these indicators are for urban development, at the same time they limit the planning function related to land and urban development.

The LUPMIS has been completed and operational. It is envisaged that it would be linked to the LIS under LAP-2 (World Bank 2011). However, the diffusion process that is top-down will limit easy adoption and will not promote sustainable GIS usage at the local level without a conscious link to academia and existing national systems. The skills set and training provided by on-the-job and in-service training is at risk of human resource turn-over at the various planning units. While Karikari (2006) suggested the dedication of the first three years of GIS implementation to training of core staff abroad and providing a LAN to all agencies along with in-house training, this approach will be expensive in the long run and possibly lead to loss of key staff members whose skills may be sought by NGOs and mining companies. In addition academia must be a key component to any approach. A model based on academia that supports locally developed GIS units would provide

a sustainable stream of skilled GIS personnel. It would also allow more direct use of GIS for urban planning and development tasks rather than the current systems which places greater emphasis on land registration and titling.

In this approach, local authorities can start developing GIS databases for existing land uses, community by community, within their jurisdictions, and in the long run these can be merged with the databases of CLS. The difference is that here land issues would be directly framed within planning tasks and not merely as land titles and deeds. Property dynamics would be captured on an incremental basis from block and divisional plans to master plans for property rate relevance. The national potentials of universities and polytechnics would offer training possibilities after the development of these resource centers while national youth programs such as the National Service Scheme, GYEEDA, and senior high school graduates could provide basic human resources for collecting these physical and geo-reference data for local authorities at reduced costs. These dynamics and their connections are presented in figure 1.

Figure 1. Proposed Model Using Incremental Approach and Existing National Systems



Available National Systems

The Role of Academia: Public Universities and Polytechnics. There are eight public universities, ten polytechnics, thirty-eight colleges of education and fifty-five accredited private tertiary institutions in Ghana (NDPC 2012). Wikle and Finchum (2003) and Wikle (1998) note that tertiary institutions play critical roles in GIS trainings and development by providing certificate and academic degrees in GIS. Yet for Ghana, such motivation is minimal and the potential of tertiary institutions is not realized. All fifteen respondents are aware of the use and relevance of GIS in urban planning. Thirteen respondents have attained a bachelor's degree in a program related to urban and development planning and two have a master's degree. All received their first degree in Ghana. For those with a master's degree, one earned the degree outside of Ghana and the other within the country. All respondents (66.7 percent) who could not use GIS have had some experience with GIS during their undergraduate degree education. Those who could use the software gained the skill through self-teaching (20.0 percent), in-service and on-the-job training through LAP (20.0 percent)[10] and NGO programs (20.0 percent).[11] The rest (40.0 percent) emphasized their undergraduate education. The respondents who could use the software however intimate that there was a strong divergence in GIS education and its planning application; thus the experience only performed the role of awareness creation and was not sufficient for practical skill training. Typically, Development Planning and Human Settlement Planning students who graduate from the Department of Planning, KNUST, lack such critical skills. In addition, geography students at universities in Ghana do not have these skills. GIS education has been limited sparingly to engineering students who vaguely develop these skills with limited application in the real world.

10 According to the respondent from Sissala East-Tumu District, he was part of training on LUPMIS and Mapmaker, and assessments of the software needs have been done.

11 It was also realized in the Bibiani-Anhwiaso-Bekwai District, that the U.S. Agency for International Development is promoting the use of GIS software called Mapmaker, which has been used in the preparation of local plans or layout, street address maps and others in the district. According to the respondent, "every property located in the district capital is being captured on a map. Every street linking these properties has been named and the properties too being numbered using the street addressing principle which is sequential numbering. Data has been collected on all these properties and this has been linked to the map in GIS." This has created a database that is informing the collection of revenue in the district.

In our proposal, we see public universities and polytechnic institutions as critical avenues for establishing GIS resource centers that will provide regional training and capacity building in GIS for students and professionals. The initial cost of establishing these centers can be daunting but this offers a cogent and sustainable national effort toward developing GIS skills for local level planning and other application of the skills in public discourse. Certificate and degree programs will offer vocational and technical know-how for both public and private institutions.

This will eliminate the proposed crash courses that deprive DAs of planning time as well as the high costs associated with contracting out such services. It will also take away the vacuum that will be created when planners migrate from DAs to other agencies as their replacements will not need to have to go through crash courses in order to be able to use GIS in planning activities at the local level. University of Ghana, KNUST, University of Cape Coast, University of Development Studies and the ten polytechnic institutions can serve as these regional resource centers. The universities can serve as national and subcontinental resource centers in GIS capacity building while the polytechnics will provide regional services.

This training would provide the needed skills in land registration, cadaster, master plan, divisional plans, block plans, property record and valuation list preparation that are critical for enhancing effectiveness and efficiency in property rate collections. Aside from using this for property rate collection, these skills can be applied to enhance other planning tasks at the local level. Universities and polytechnics can also develop studio-like courses to facilitate the community based GIS systems. Such systems can form the basis for integration into district-wide GIS systems. These tertiary institutions can also develop internship opportunities and partnerships with local authorities such that the GIS skills of students can be harnessed in updating and developing GIS databases.

Graduates of West African Senior Secondary Certificate Examinations (WASSCE). Graduates from senior high schools in Ghana are another academic resource that can be used. Most of these individuals wait for a year, and sometimes more than a year, to get into tertiary institutions to further their education. Many of these individuals have backgrounds in accounting, economics, geography and science. High school graduates can be trained and used in collecting field data on new developments within their neighborhoods. The NDPC (2012) estimates a total enrollment at the senior high

school level of 728,076 students in the 2010–11 academic year. Though not all these students graduate, this gives a sense of the number of individuals who wait to attain tertiary education—a huge untapped resource that can help in tracking changes in the urban space on an annual basis.

National Youth Programs

National Service Scheme. Similarly, another potential that can be harnessed is the national service scheme which require citizens of eighteen years and over to undertake a mandatory one year work-related service in an agency of the various sectors of the economy, including local government agencies. An objective that bears relevance for this discussion is that the Scheme is designed to help "develop skilled manpower through practical training" (National Service Scheme, n.d., 1). These national service personnel include graduates from tertiary institutions possessing such skills as accounting, data management, and building and land valuations. This potential can be harnessed in developing valuation lists and tracking changes in land use in the districts. Their skills can be shaped through initial crash courses at the district level and their efforts framed in a project oriented structure directed at enhancing property rates at the local level. As regional and national training centers emerge, GIS skills would be utilized within the local government structures framed as project-oriented tasks to complete GIS databases that support planning and property rate systems at the local level.

Ghana Youth Employment and Entrepreneurial Development Agency. The National Youth Employment Program is an empowerment program started in 2006 in Ghana. This was reshaped to incorporate entrepreneurial components and is now known as Ghana Youth Employment and Entrepreneurial Development Agency. The aim is to offer employment to the Ghanaian youth, offer requisite work experience to post-national service personnel, and provide Ghanaian youth with employable skills (Ministry of Manpower, Youth, and Employment 2006).[12]

12 Initially, the program offered the following modules: Youth-in-Agri-Business; Youth-in-Trades and Vocations; Youth-in-ICT (Information, Communication and Technology); Community Protection System; Waste and Sanitation Management Corps; Rural Education Teachers Assistants; Paid Internships and Industrial Attachments; Vacation Jobs; and Volunteer Services (Ministry of Manpower, Youth, and Employment 2009). Four more modules were later added: Youth in Eco Brigade; Youth in Afforestation; Youth in Road Repairs and Maintenance; and, Youth in Film Industry (Gyampo 2012).

The information and communications technology module can be harnessed to develop youth skills in GIS that can form the basis for the development of GIS professions in Ghana. GIS is a technical skill set that is relevant for nation building. Since most of these modules are implemented at the local level, beneficiaries can be identified and career paths developed in line with GIS to support local level GIS capacity building through short courses in the summer at the proposed GIS Centers. These individuals will be trained in geodata collection and property mapping within districts. After the courses, they will attain basic GIS skills in database collection and management to support planning tasks. In the long term, through recurrent courses they would receive a certificate in GIS and can use these skills to support planning tasks at the district level.

CONCLUSION

The proposed idea holds great potential. Further studies are needed to consolidate the proposed strategy and integrate the challenges and lessons in the implementation of LUPMIS into the suggested strategy. Nonetheless, academia offers great untapped potential for promoting national, regional and local GIS capacity in Ghana. For the current LUPMIS to have any sustainable relevance for urban planning and inform property rate collection, there is a need to develop resource centers that can provide various local planning agencies with human resource to promote development. Without this, the program faces high costs for training and maintaining skilled planning personnel at the local level.

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Navigating the Global City: Gender, Mobility and the Case of Bangalore's IT Economy

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ABSTRACT

This paper situates research on gender and mobility within the context of the information technology economy in Bangalore in order to investigate how this economy influences both urban space and the literal mobility of female workers. Are these women more likely to choose personal transportation over public transportation in order to better access socio-economic opportunities spread far and wide across the city? Transportation policies that favor personal mobility often increase socio-economic inequalities and threaten the long-term environmental sustainability of our cities. As more women enter Bangalore's formal labor force, it is important to address gender-based barriers to accessing public transportation and develop policies that mitigate these barriers in order to achieve inclusive and equitable mobility. It is this author's argument that everyone stands to gain from transportation policies that emphasize universal accessibility, connectivity, and equitability.

INTRODUCTION

As incomes rise, it is predicted that individuals will choose personal over public transportation because the efficiency of personal transportation becomes more valued than the higher monetary cost to use it (Sabapathy 2012). Higher incomes are also correlated with longer commuting distances

between home and work (Blumenberg 2004). Evidence of both exists in Bangalore, where the growth of the international information technology (IT) sector has led to a rise in individual incomes and a unique spatial distribution that locates most high-income jobs on the periphery of the city. The result is a "'many-to-many' travel pattern" (World Bank 2005, 53), with "software workers' morning commute to work…tak[ing] up to two hours" (World Bank 2005, 1). In *Building Bangalore*, John Stallmeyer argues that "the installation of a satellite uplink brought Electronics City closer in space/time to distant regions of the developed world than to less developed areas only minutes away." Bangalore might have the physical and economic components of California's Silicon Valley (Stallmeyer 2011, 12), but what about the mobility patterns of its residents?

The literature on gender and mobility in the context of developing countries cites three common barriers that women face when using transportation: (1) personal security (e.g., risk of sexually harassment); (2) cost (e.g., women tend to make less than men); (3) time poverty, or a general expectation that women will engage in roles of both care giving and economic earning. Although Bangalore is considered a "world-class city" and beyond "developing world" discourse, the recent attention given to a series of disturbing rape cases occurring on public transportation in India suggests that security remains a key concern for urban women, regardless of socioeconomic class, caste, and/or religion. My purpose here is to begin thinking about how concern for one's personal security as well as the need to access many places throughout the day (work, day care, shopping) affect the transportation choices of Bangalore's women who earn moderate incomes. Like the polycentric configuration of Bangalore, this paper navigates through a conglomeration of topics in order to arrive at an intersection between gender, transportation mobility, the IT-business process outsourcing (BPO) economy, and the city's built environment. I believe this destination illuminates why more research on factors influencing women's transportation decisions is required and how such research can lead to a more equitable, cohesive city fabric. I map this journey as follows:

1. First I provide an overview of Bangalore's IT sector and the way in which this sector not only reconfigures the physical space of the city but also economic opportunities for women.

2. In a detour to a larger, more general body of literature on gender and mobility, I home in on safety, cost, and time as three major barriers women face when accessing transportation.

3. We take a shift to the rise of two-wheeler ownership in developing countries around the world, highlighting why this mode of transportation appeals to a diverse range of socioeconomic groups and, more specifically, to the residents of Bangalore.

4. I offer a discussion of Bangalore's road-related infrastructure financing, the increase in two-wheeler sales, and the connection between private mobility and global city ideologies.

5. I arrive at my destination: the question of how women's mobility issues can further influence the tendency to use private modes of transportation and the possible implications of this for the city's long-term sustainability.

LOCATING THE GLOBAL CITY

The relationship between investment, growth, and privatization is hard to disentangle in the context of the global city. Investment (e.g., foreign direct investment, governmental, private) stimulates economic growth, which can increase jobs in any number of sectors (e.g., construction, services, manufacturing), which in turn draws more people into the city. As populations increase, resources may become strained; this can lead to a taking over of goods and services by the private sector, along with implicit and explicit attitudes and behaviors that emphasize individual benefit over the collective good. As Castells (1983, 2003, 2010), Sassen (1990, 2001), Soja (1983), and others have argued, such patterns of urbanization exacerbate preexisting sociospatial segregation, creating more pronounced inequalities among residents.

In a city like Bangalore, patterns of sociospatial segregation were first seen in the colonial era; their contemporary origin is largely attributed to the rise of the city's IT sector. Historically, the Bangalore Metropolitan Corporation (BMC) has encouraged low floor area ratios in the most central areas of the city, leading to higher land prices (World Bank 2005, 56). Redeveloping centrally located land was not considered during Bangalore's

early IT sector development (i.e., in the 1980s and early 1990s); first, it was too expensive for the nascent industry; and second, the land was already "imagined" and connected to Bangalore's past as a textile and manufacturing city (Nair 2005). The new economy needed new space, one in which the "self image…is far removed from any concept of a laboring self, emphasizing work as a lifestyle whose goal is enhanced consumption" (Nair 2005, 87). However, locating on the urban periphery made it challenging for the actual laborer to get from their residential neighborhood to their place of employment.

Urban economic models predict relationships between economic activity and land productivity—how land markets respond to changes in relative accessibility. Transportation is an important variable in modeling land productivity and value because it is generally assumed that land that is accessible to markets is more valuable than land that is not (Noland 2012). In other words, transportation modes such as roads and rail lines affect land use and development; and land use, in turn, affects transportation development. Historically, Bangalore has always focused on road over rail transportation. This became a problem in the late 1970s, when land and population growth occurred at a much faster rate than the city's transportation development. Between 1970 and the late 1990s, the city's built-up area increased by 194 percent (Bhat 2010); and from 1981 to 1990, Bangalore's population grew by 50 percent (Reddy 1995). The number of kilometers traveled during this period increased by 68 percent, but the number of public buses per 1 million people only increased from 266 to 280. "That is why," Sudhakara Reddy (1995, 163) concludes in his case study of Bangalore's transportation sector, "private vehicle population increased by 300 percent." When the Bangalore Agenda Task Force (BATF) was established in 1999, one of its first initiatives was a public poll asking Bangalorians to rank their top five concerns. Road conditions ranked number one (Nair 2005). There are a few interesting tensions at play. The BATF was the city's first attempt at city governance through public-private partnerships; roads are not inherently private, they are a public space that, in India is shared by a diverse range of modalities. The concern over road conditions was considered a "public" concern, but what public are we speaking of? According to BATF chairperson and Infosys Technology CEO Nandan Nilekani, the purpose of BATF was "to showcase Bangalore as the gateway to world class city [*sic*] and to strengthen its position as an engine for Karnataka's robust growth"

(quoted by Ditrich 2010, 244).[1] Returning to Reddy's finding, we might conclude that improved road conditions came at the favor of those with access to private, motorized transit at the expense of lesser mobile groups such as women, the poor, and the elderly.

Motivated by the observations of Sassen (2001) regarding the "social polarization" of a global city due to economic factors, Sabapathy et al. (2012) collected data from a total 436 Bangalore employees and used a weighted multinomial regression analysis to measure and compare the commuting patterns between the employees of a large IT employer located on the city's southern periphery and a manufacturing-oriented public-sector unit in a more centrally located part of the city. The authors had two major hypotheses: that increases in income would correspond with an increased expenditure on transportation and that employees of the IT economy would have broader differences of commuting patterns than those in the traditional public-sector unit. As they explain:

> It was expected that higher income employees would be more likely to afford better quality homes at more distant locations leading to greater commute distances…with the limited supply of good-quality housing in central areas and newer residential development taking place at the edges of the city, it would be more likely that higher income employees would be willing to locate further away from their work place in exchange for better housing. This would encourage greater spatial distance between work and home for higher income groups. Lower income groups, on the other hand, would locate closer to work places in less expensive poor quality housing. (Sabapathy et al. 2012, 156)

Decisions about commuting are complex and hard to disentangle. However, in addition to both hypotheses being true, the authors concluded: "Transformations in work travel patterns in the globalizing city of Bangalore have resulted in greater inequalities " (Sabapathy et al. 2012, 165). Although gender is not explicitly addressed in the report, Sabapathy et al. (2012, 159) note that less than 1 percent of the public-sector unit

1 Infosys Technology is one of Bangalore's leading software companies. Along with a main headquarters in Bangalore, Infosys has offices across the globe.

employees sampled were women, while 19.5 percent of the IT employees were female. Furthermore, among married employees, 97 percent of spouses in the public-sector unit were not employed, while 41.3 percent of those in the IT sector were.

There is empirical evidence that the number of women entering India's formal labor economy is increasing, particularly in the IT and BPO industries. As of 2011, women constituted 36 percent of the IT sector (Crest 2011). A 2008 NASSCOM study found that among Indians, the IT and BPO industries are perceived as "safe" and "acceptable" careers for women and "the idea of a working spouse is more widely accepted" (Mercer and Nasscom 2009, 9). This is seen in Sabapathy et al.'s (2012) breakdown of men and women in each employment sector, as well as in the significant difference in households with dual-career spouses between the IT sector and the more traditional public-sector unit.

The last point of interest from Sabapathy et al. (2012) was in the linear regression on daily work trip distances for the IT firm; females had a negative relationship to the dependent variable, suggesting that women were more likely to have longer commutes than their male counterparts. I believe this information adds another layer to the finding that employees of the IT economy have broader differences of commuting patterns than those in the traditional public-sector unit.

MOBILITY

Mobility generally refers to the ease of one's ability to move from place to place. Mobility can be about having somewhere to go (Hanson 2010, 10), or it "may be seen as simply the ability to move, a function of physical and economic resources" (Vasconcellos 2001, 53–54). One problem, the Brazilian transportation expert Eduardo Vasconcellos argues, is "that mobility alone is just a technical computation.… It is therefore a very limited concept for transportation policy analysis because it does not indicate why and how mobility is exercised (or not)" (Vasconcellos 2001, 53–54). In other words, this view of mobility overlooks the way in which an individual's mobility is embedded within social, economic, and cultural relations.

Mobility occurs on a variety of scales; characteristic of globalization is an increase in scale of mobility. We see this in the example of Bangalore,

where a million people enter and leave the city every day. We see it in the IT firms, which are mobile enough to expand the boundary of the city by locating on its periphery. And we see this is in the employees of the IT sector, who, due to higher incomes, are more economically and spatially mobile than their public-sector counterparts. Finally, we see it in the comparison between men and women IT workers, where women seem to have longer, and more complicated, commuting patterns.

Contemporary gender and mobility research argues that women have greater mobility but less accessibility than men. This is largely attributed to (1) gendered experiences of safety and security and (2) gendered experiences of labor—namely, women's attachment to formal and informal economic responsibility (also known as the double burden). While the former restricts access to certain modes of transportation, the latter translates into an increased number of trips per day. Indeed, many research and policy institutions find that safety, cost, and time are the most common barriers women face to accessibility (see, e.g., GTZ 2007; "World Bank Gender and Resource Guide"[2]).

Safety and Security

It is generally accepted that women's perception of safety and security differs from men (e.g., Vasconcellos 2001, 2003; Peters 2001; Tanzarn 2008). The literature consistently shows that women tend to value security over all other factors when choosing their mode of transportation. Security in this case does not refer to road conditions but rather to the perceived safety of the space—be it inside a train or waiting at the bus stop. Safety and security have an enormous impact on women's ability to access transportation, which, in turn, affects women's mobility. In their research on women's experience of sexual harassment while commuting in Chennai, Mitra-Sarkar and Partheeban (2011) found that 66 percent of respondents (from a sample of 274) had experienced sexual harassment. The most common places of sexual harassment were in buses and trains without separate cars or sections for women, and also at bus stops. When asked to rank the best mode of transportation from a safety and security perspective, those surveyed ranked women-only trains as the most desirable; the second choice was a two-wheeler (Mitra-Sarkar and Partheeban 2011, 76–77). Without

2 See http://www4.worldbank.org/afr/ssatp/Resources/HTML/Gender-RG/index.html.

knowing other characteristics of these women—such as income, education, and family composition—this finding suggests that women might not inherently prefer personal over public transportation modes. From a road security perspective, this is intuitive; most vehicle accidents in Indian cities involve two-wheelers (Mohan 2000). Personal safety has many dimensions; the ability to be safe from sexual harassment (by riding in a women-only train), as well as the ability to be safe from road accidents, are two examples—and both are consistently valued by women, even if it leads to a decrease in the speed and efficiency of transit.

Women in Public Space

In the South Asian countries, the term "Eve teasing" refers to sexual aggression by men toward women (Mitra-Sarkar and Partheeban 2011, 75). The word "Eve" is used to suggest that the aggression toward women is provoked by the assumption that women are inherently temptresses. The term was first used in the 1960s to describe a common pastime of male university students, and it continues to be used to describe the common experience of sexual harassment that South Asian woman face in a variety of settings. A 2011–12 survey conducted by Oxfam India found that 17 percent of working women admitted to being sexually harassed in the workplace (Das 2012; Dash 2012). The survey was administered to 400 women; of these 400, 66 reported being subject to over 121 incidents of sexual harassment (Dash 2012). When presenting the findings, Oxfam explained that most women do not admit to or report sexual harassment for fear of losing their job. Women are similarly reluctant to report harassment and teasing that occur in other public places, such as buses and trains.

Responding to the survey, the Indian newspaper *Deccan Herald* included the results of its own research findings: "While for women it may be irritating, for men, the definition of sexual harassment differs. The most common reaction that *Metrolife* [the newspaper section that undertook the survey[3]] encountered from men was: "Until it's physical, it is not sexual harassment. Comments can be passed to tease someone" (Das 2012). The public protests in Delhi that developed in response to the horrific rape and subsequent death of a young medical student who was traveling on a public bus with her fiancé illustrate that for many women, it *is* physical and quotidian.

3 No information was given about the validity of this survey.

Oxfam's survey also found that 26 percent of participants were the sole economic earners within their family, making them even less likely to report harassment. As Mitra-Sarkar and Partheeban explain: "Single working women are primary targets for such attacks because they most visibly signal their independence from male control. Women who resist the definition of them as private sexual property by going out to work suffer the risk of being public sexual property" (Mitra-Sarkar and Partheeban 2011, 75). How do women cope with these experiences? To what extent does sexual harassment become an everyday experience for women moving throughout the city? While fear of job loss is indeed a barrier to addressing workplace sexual harassment, using transportation is something all people do, regardless of being formally employed. Mobility is inherently about making choices. Some women might choose to wait longer for a bus that is less crowded in order to avoid harassment. Or, if it is financially feasible, they could choose private modes of transportation in order to avoid being singled out by men.

Part of the problem in understanding the gender dimension of travel behavior comes from the nature of transportation data, which are usually collected through large, national samples, spread over long periods of time. Traditionally, the data are meant to capture things like traffic flows or passenger volumes. Because most of the data concentrate on numbers as opposed to characteristics, they are virtually impossible to disaggregate, making it hard for researchers to understand not just the mobility patterns of women but also underrepresented groups, such as the disabled and the elderly. Even in Sabapathy et al.'s (2012) incredibly thorough description of commuting patterns of employees in Bangalore, we are left with very little sense of just how varied these patterns are along lines such as age, gender, and education.

The result is that most "evidence" regarding the relationship between gender, mobility, sexual harassment, and dissatisfaction with the experience of using transportation comes from the media. Referencing a 1990 case against the Delhi Transport Corporation in which a woman had to jump out of the bus to avoid being raped, Debnath writes: "In our country, especially in our urban areas, perhaps alienation of the deprived class from the local wealthy contributes to the occurrence of rapes" (quoted in Mitra-Sarkar and Partheeban 2011, 78). There is also evidence that women of higher socioeconomic status are even more likely to experience sexual harassment when using public transportation because of the perceived threat they present not just to gender norms but also to class and caste. We must

think deeply about the implications of this not just for individuals but also for the entire city. If women who can afford personal modes of transportation are at an even greater risk of sexual harassment in public, it seems likely they will choose personal over public transportation. Fewer people using public transportation makes financing it less feasible. When bus services operate at a loss, routes are likely to be cut; this has dire consequences for the urban poor, the disabled, and the elderly.

Mitra-Sarkar and Partheeban's research in Chennai found that women rely on a multitude of coping strategies to avoid being sexually harassed while traveling. A total of 18 percent said that they paid more for "safer" transportation, 58 percent said they traveled in groups, and 28 percent carried a personal weapon such as a safety pin. Most women did not find transit operators or law enforcement such as police officers helpful or sympathetic to their complaints (Mitra-Sarkar and Partheeban 2011, 78). Bangalore ranks number four in terms of number of *reported* rape cases. A recent article in the *Times of India* highlights a university student's dissatisfaction with the police response when she reported an incident of sexual harassment that occurred on a public BMTC bus (*Times of India* 2012):

> When journalism student Ankita Sen Gupta walked into a police station to complain against alleged molestation on a BMTC bus, cops asked her questions she will not forget in a hurry.… Ankita asked joint commissioner of police (crime) Pranob Mohanty: "Where do girls like us go and complain if your policemen are so insensitive? Why are victims treated like culprits? What is the safety for women in this city?"

Similar conclusions were found in Mitra-Sarkar and Partheeban's research in Chennai. If transit operators and law enforcement are perceived as being not only unhelpful but also condescending toward women's security concerns and experiences, these experiences are less likely to be reported, making it even more difficult to assess and measure the extent of the problem.

For women around the world, security and safety are not the only barriers to public transportation. In the Sub-Saharan African countries, subtle but persistent sociocultural attitudes that view women as weak and having insignificant economic influence are "at the root of the discriminatory

practices of passenger vehicle operators who habitually refuse to avail potential female passengers of transport services during peak transport demand periods" (Njoh 1999, 221). The view that women are less desirable passengers can cause bus and taxi drivers to charge women a higher fee than men (Njoh 1999; Sietchiping et al. 2012; GTZ 2007). Revisiting Oxfam's report that 26 percent of those surveyed were the sole economic earners for their family highlights the tremendous pressure women face to provide both economically and emotionally for their family. A woman will pay higher fees to access transportation—regardless of safety and security—because her family relies on her ability to get to where she needs to go. Therefore, if we know that a worker in Nairobi spends 20 to 26 percent of his monthly revenue on transportation (Sietchiping et al. 2012, 186), we must imagine that the transportation costs for women in Nairobi are even higher.

Research on gender and transportation in the developing world typically concludes: "Women's inadequate access to transport infrastructures and services is most frequently related to their *lack of capacity to* pay" (Peters 2001, 6; see also GTZ 2007). But this question of cost must also include the time costs, as in how long it takes to get to a destination and how many modes of transportation are required to get there. Time poverty in the context of gender development alludes to the double burden women face regarding the expectation to engage in formal and informal (e.g., care giving, domestic) labor. For example, it is expected that a woman living in rural Ghana will spend 3,024 hours a year engaged in domestic, agricultural, or service-based (e.g. health, education) transportation tasks, compared with her male counterpart, who will spend 1,158 hours per year engaged in the same type of transportation tasks (Malmberg-Calvo 1994).

Part of the reason women spend more hours in and on transportation is because they have less choice in their mobility (e.g., the decision to wait for a bus that has women-only seating, even if it means waiting 45 minutes longer). In short, women "have less access and tend to have multiple purposes in their trips, since they balance multiple roles of work, household and childcare." Furthermore, they "favor more flexible services that bring them closer to their varied destinations" (GTZ 2007, v). Unfortunately, women generally do not have the same flexibility in options that men have. For example, Peters (2001) found that while 87 percent of women in Bamako, did not have any access to individual transportation, this was only the case for 57 percent of men (Peters 2001, 13).

In 1997, the average door-to-door travel time for one trip in São Paulo was 28 minutes by car and 56 minutes by bus (Vasconcellos 2001, 21). This means that a simple commute to and from work by bus would easily take two hours each day—more or less depending on time of day traveled. Additional trips would require additional time. In other words, these figures do not take into account women's common experience of multitasking by trip chaining. In an urban context, this could be anything from dropping children off to school before going to work; in a rural context, it could be fetching wood and water, returning home, and then traveling to a field for agricultural production. Each woman will experience time poverty according to her own context; however, the experience of being time poor is shared by many women throughout the world, so that even a woman with access to a car is more likely to be more time poor than her male counterpart.

THE CASE OF THE TWO-WHEELERS

A number of factors explain the rise of two-wheelers. The general affordability of these vehicles allows personal mobility—a characteristic usually associated with higher incomes—to transcend class boundaries. The two-wheeler also allows an individual to navigate the congested urban streets with relative ease. Both characteristics prioritize individual efficiency and interest at the expense of the greater good of the city.

In the early 2000s, the typical cost of a two-wheeler in Cameroon was around $1,600; by 2008, the price had dropped to $500 (Sietchiping et al. 2012, 186). Although this figure is still quite high for the majority of people in the developing world, where almost one-third of one's monthly income is spent on transportation, and the average time spent commuting can be as high as five hours per day (Peters 2001), investing in personal mobility does not seem like a bad idea. As Sietchiping et al. conclude:

> The rise [in two-wheelers] is also a reflection of ordinary people's will to address the dire urban transport crises that define their daily lives.… The shortage of urban transport supply, the availability of factors of production and the permissiveness of the regulatory framework are all contributing factors for the attractiveness of this mode of transport. (Sietchiping et al. 2012, 186)

A two-wheeler has other benefits. One two-wheeler might be shared among one's immediate and extended family. In developing countries, it is not uncommon to see entire families on one vehicle. These vehicles are not only utilitarian but also status symbols for lower- to middle-income families.

> Scooters are important status symbols for middle-income families. So rather than criticize women's newly found independence and mobility, husbands in Bamako are actually supportive of their wives' motorcycling.… Women on a motorcycle are not only much more efficient shoppers and caretakers, but they are also moving advertisements of their families' social status and wealth. (Peters 2001, 14)

Sietchiping et al. attribute Cameroon's proximity to Nigeria—a country with manufacturing and assembly facilities, a good spare parts market, and access to cheap fuel—as factors that keep the cost of two-wheelers down (Sietchiping et al. 2012, 186). Bangalore's proximity to Chennai, India's automotive manufacturing city, suggests that parts, fuel, and assembly facilities could also reduce the cost of two-wheelers for those living in the region. In fact, the similarities between Bangalore and Chennai warrant some comparison. Both are located in South India and are among India's five largest cities—in terms of both physical space and population size. Average daily trip lengths in Chennai average 8 kilometers, while in Bangalore they are closer to 9 or 10. Unlike Chennai, however, Bangalore's average commuting distance is predicted to increase to 15 kilometers by 2021 (Bhat 2010). Chennai has higher travel speeds, about 19 kilometers per hour, as compared to Bangalore's 16, and a lower level of two-wheeler ownership, roughly 160 two-wheelers per 1,000 people, compared with Bangalore's 250 two-wheelers per 1,000 people.

Although there are many other interesting comparisons and opportunities for discussion, I would like to suggest two characteristics that distinguish the travel patterns among residents of these two cities. Despite being the automotive capital of India, Chennai has always had a good light rail system, allowing people to transect great spatial distances with relative ease and relatively little cost. This has helped deprioritize motorized road development, which, in turn allows different socioeconomic groups to access similar forms of transportation. We see this reflected in the modal splits for each city. In Chennai, the modal split is divided into the following percentages: walking and bikes, 44; public bus and rail, 42; cars and two-wheelers, 9.5; and others (e.g., auto-

rickshaw), 4.5. In Bangalore, we see a much different pattern: walk and bike, 17; public bus, 41; private bus, 3; cars and two-wheelers, 38; and others, 4 (the source for these data is World Bank 2005, 14; percentages do not necessarily total 100). Although Bangalore has a light rail track left over from the days of the British, it has never been used for transporting people.[4] The second observation I would like to offer is that Chennai is not imagined in the same way as Bangalore. While Chennai might *wish* itself to be a global city, it fails to reproduce the image. The historical conditions of Bangalore's land use—for example, favoring of low density—helped convince IT development firms to locate on the city's periphery. Locating on less developed land allowed architects and planners the freedom to reimagine and recreate the sprawling campus designs found in California's Silicon Valley. This in turn helped further distinguish Bangalore IT economy as well as its workers from the actual space where it was physically located. As described by one Infosys employee:

> Whenever clients come here, they walk in, they walk through this chaos; [and] they are confused because they see…cattle on the road. You see people crossing the road; you see the buses going helter-skelter, you see the road is crowded, you see the dirt on the road, and you are confused.… And they come here, and suddenly they see order, they see beauty and they see aesthetics, they see a lot of well-dressed people moving about. (quoted by Stallmeyer 2011, 60)

The myth of Silicon Valley is the myth of the individual eking out his or her own fortune. Although there are multiple ideas at play here, I would like to highlight two. First, this myth of individual opportunity should, and for good reason, does have high appeal to women who have historically been unable to access employment and other opportunities to the same degree as men. Second, this myth of individual opportunity carries over to the transportation choices of all residents within the city, but particularly those working in IT, an economic sector that is in constant interaction with the other parts of the world. The result is a place that is "not simply a geographical location…[but] a form of 'selling the city' that involves re-creating or inventing its history or tradition in ways that help fulfill the aspirations of

4 As of writing this paper, Bangalore is in the first phase of constructing a metro. I touch on this briefly in my conclusion, but it is, for the time being, beyond the scope of this paper.

its contemporary inhabitants" (Stallmeyer 2011, 24–25). Bangalore is imagined and experienced as a world-class city; it is a city that is based largely on the interests of private, often global, investors. It seems logical that individual travel behavior would mimic the mobility and circulation of the global economy.

ROAD DEVELOPMENT IN BANGALORE

The introduction of two-wheelers in India coincided with the 1985 New Economic Policy, which reduced restrictions on production capacity and opened the country up to foreign investment. Demand for two-wheelers spiked again in the early 1990s, when the country experienced a significant increase in its gross domestic product (George et al. 2002). In November 2012, the world's largest two-wheeler manufacturer, Hero MotoCorp Ltd., announced that two-wheeler sales during India's festival months of October and November were up 7 percent from the previous year (*Financial Express* 2012). A similar article found that the number of registered two-wheelers in Bangalore jumped from 2.72 lakh (roughly 272,000 vehicles) to 3.28 (roughly 328,000) in eleven months (Dash 2012).

During the same month, the Government of Karnataka released 1,663 crore rupees (approximately $377 million) to the Bruhat Bangalore Mahanagara Palike (BBMP)—the municipal body in charge of civic and infrastructural projects—for several infrastructure projects. Of this, 818 crore rupees will be used for signal-free road corridors, seven new roads, and nine multistory parking complexes. An additional 395 crore rupees will go toward the development, asphalting, and widening of roads. And 50 crore rupees will go toward the rejuvenation of twenty lakes within the city boundary (*The Hindu* 2012). The breakdown of BBMP's spending suggests that Bangalore's current infrastructure is biased not only toward road development but also private roads and private transportation. In a global city like Bangalore, decisions about transportation cannot be separated from a larger, global set of institutional arrangements that are tied to the "global city" branding and supported by public-private partnerships. In the same way that IT campuses seek to create environments that are distinct from the rest of the city, investment in high-speed toll roads and mega parking structures ignores the actually existing mobility (e.g., nonmotorized) patterns of the majority of the population.

In his work on road safety, transportation expert Dinesh Mohan argues that the issue of safety is far more complex in lesser motorized countries (LMCs) where, unlike highly motorized countries (HMCs) (e.g., the United States), roads are occupied not only by cars but also by pedestrians, bicyclists, animals, and two- and three-wheelers:

> Indian cities are characterized by heterogeneous traffic and land use patterns.… The road network is used by at least seven categories of motorized and nonmotorised modes.… In the mind of the formally trained planner, it is chaos moving towards total gridlock." (Mohan 2001, 54).

"Formally trained planners," regardless of being in a HMC or LMC, are usually steeped in the ideologies of HMCs, which view development as a linear progression. Road traffic that follows no discernible pattern is thought to be in direct opposition to efficiency, progress, and development. Chaos becomes a disease of underdevelopment, and, in the context of transportation, is treated as barrier to poverty alleviation and a visual sore upon the face of the global city. The biggest losers in this approach to transportation development are those who cannot access motorized transport. A central concern of Mohan's is that transportation planners in LMCs are not acknowledging this reality and, in turn, promote transportation developments that "shun" pedestrians and [bi] cyclists "to inferior paths."

Close to 20 percent of Bangalore's transport mode share is walking (EMBARQ 2005–2007). Although Mohan does not explicitly address the gender implications of motorized road development, Kavita et al. take up the topic in their 2007 study on characteristics and outcomes of injuries among females in Bangalore. During their one year Bengaluru Injury Surveillance Program, the authors found that "more than 90% of the females who died or were injured were either pedestrians or two-wheeler riders/pillion riders" (Kavita et al. 2011, 322). These findings support a more general knowledge that road/traffic injuries and mortalities are proportionally higher for women than they are for men, particularly in India and Africa (Ibid, 320).

FINAL DESTINATION

In her 2010 essay "Gender and Mobility: New Approaches for Informing Sustainability," Susan Hanson expands the agenda of those working on questions about gender and mobility to include the larger question of sustainability. She argues that mobility is "at the core of issues surrounding energy consumption, carbon emissions and settlement patterns" (Hanson 2010, 6). This argument is nothing new. We see this in the Brazilian transportation specialist Eduardo Vasconcellos's ability to connect mobility, social equity, and environmental sustainability, and in Dinesh Mohan's push for roads that support multimodal use and the argument that those who are economically less well off are, by default, more likely to engage in sustainable mobility because they cannot afford private and/or motorized transportation. In his policy recommendation for Bangalore city, Reddy (1995) concludes that "modal shifts to less energy and intensive modes (from two-wheeler to bus) could contribute to energy savings. To achieve this, the government should make the public transport bus system more efficient and also consider seriously the rail transit system" (Reddy 1995, 170). Vasconcellos would probably agree with Reddy, adding that in addition to the positive environmental impact this shift would have, it would also contribute to a more socially equitable system of transportation. Mohan would agree with both, and would add that this shift would also implicitly contribute to safer roads because it would give access to a greater number of people, who would in turn rely on walking or cycling to get to the bus or train stop. However, all three hypothetical arguments overlook the question of usability from a gender dimension.

Various economic, political, and social forces are at play in a city like Bangalore. All these come together and leave a very physical imprint on the city. In keeping with the image of the global city, "the fundamental assumption," then, "is that individuals must work on their own private transportation needs" (Sietchiping et al. 2012, 184). And, as Peters (2001, 14) observes, "With more and more urban women earning their own incomes, many of them are actually in a position to buy their own vehicles."

A recent *Times of India* article announced that "women on two-wheelers may not have to sacrifice style for safety.… Mithula Naik…has come up with a customized helmet for women—complete with removable multi-colored peaks that can mix and match with clothes and accessories." In a city where

35 percent of all two-wheeler users are women, such an accessory will find a success in a growing market of consumers (Prasher 2012). In India today, 45 percent of modern retail is purchased by women; this is expected to increase to 60 percent, representing close to $360 billion per year (Crest 2011).

As a group that has been traditionally underrepresented, women in India are used to going at it alone; this includes figuring out how best to access social and economic opportunities spread far and wide across the urban space. When thinking about future transportation policies for growing cities in India, it is crucial that policymakers consider the unique experiences women face while using transportation. I have highlighted the way in which the image of the global city inherently lends itself to an ideology of self-interest, an ideology that is reflected in the economic organization of the city, transportation policies, and the sociocultural values of the middle class. Although I did not touch on it at length, this tendency toward self-interest has enormous implications for the long-term sustainability of the city—in terms of both social and environmental equity. Again referencing the study on women's experience of sexual harassment in Chennai, Mitra-Sarkar and Partheeban asked respondents to rank their preferred mode choice. The preference among the majority of women was to use women-only trains and buses. The second choice was two-wheelers. I would like to end with that finding because I believe it should be a starting point for the next journey transportation researchers must take. Gender development and environmental sustainability are inherently complementary. Frameworks of capitalism and patriarchy in which individual interests trump the interests of the greater good are a direct threat to both women and the environment. It is my argument that everyone—from individuals to developers to state parties—stands to gain from a city that emphasizes universal accessibility, connectivity, and equitability. Transportation policies that recognize the unique needs of women will in turn complement other transportation users.

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