Potential of the Private Sector in Providing Water to the Urban Poor: A Case Study of Mumbai Slums

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While allowing great real estate profits, Mumbai's market liberalization reforms failed to address the low-income housing shortage, causing the growth of slums which are now home to nearly half of Mumbai's residents. The marketization of land rights led to the improvised construction of unplanned buildings, causing a mismatch between the over ground landscape and the deteriorating underground water infrastructure. In 1995, an electoral promise established a cutoff date which determines slums' eligibility to rehabilitation schemes. Settlements built after this cutoff date are "unauthorized" and deprived of legal connections to the municipal water supply. While access to municipal water in most Mumbai slums is inadequate in terms of reliability, quality and quantity, the situation is worse for these unauthorized neighborhoods which represent nearly half of Mumbai's slums. With little access to water through legal connections, slum dwellers turn to the informal sector for their daily supply, and have to pay up to 15% of their income on water which is often contaminated. According to a joint study by the World Health Organization and UNICEF published in 2009, « some 386,600 children die in India every year of diarrhea, with contaminated water being the main source of contamination ». Considering the public sector's failure in providing sufficient access to clean water to millions of slum dwellers willing to pay for better service, this report argues that the private sector can contribute to providing sustainable solutions for decentralized distribution models and household level purification systems, while contributing to the adoption of hygiene practices through social marketing.

Keywords: Mumbai slums, Private sector, Water governance, Bottom of the pyramid, Poverty alleviation

Summary

INTRODUCTION

Today, we are facing a water situation now commonly referred to as a global water crisis. Fresh water resources are under high pressure to provide enough water to sustain all sectors of our economy as well as basic needs for a growing population in the context of climate change. Most of the water present on earth is seawater, which cannot be used directly without desalination treatments that are unaffordable for the great majority of countries. Only 2.5% of the water on Earth is fresh water, of which 1% is accessible to us in rivers, lakes and aquifers. Though the fresh water available to us is a small portion of the total water present on Earth, its quantity is theoretically fully sufficient to both meet the population needs and the needs of industries. The *so called water crisis* is therefore not a global resource issue, but a crisis in how water is managed and distributed geographically and within populations. Inefficiencies cause huge waste and unsustainable use of water, for example in the agriculture sector, which represents 70% of all fresh water use and loses significant quantities of water because of irrigation system leaks, inefficient irrigation system where most of the water evaporates and water-hungry plants in dry areas. Poor management of water and waste also causes irreversible contamination of water with heavy metals, pharmaceuticals, PCPs, phosphates nitrates and other bacterial pollutions. The Ganges river for example is particularly polluted by local industrial activities which pour huge quantities of chemicals (chrome, arsenic) into the river and do not have the technical capacity to treat these waters. Priority being given to economic development, the government is not reactive enough and the sanitary and environmental situation is alarming.

Regarding water usage for individual needs, resources are also distributed unequally. Today, 1.1 billion people in 80 countries don't have access to clean drinking water, and water is a limited resource for nearly 2.7 billion people at some point during the year. Populations' access to water is not directly correlated to the local availability of water. Saudi Arabia for example, is in water shortage meaning the country's availability in water is less than 1000 square meters/inhabitant/year. But thanks to water import and investment in desalination, 97% of its inhabitants have access to an improved drinking-water source.

Beyond quantity and fair distribution, the quality of water is a major challenge as well. Lack of basic sanitation, hygiene practices and drinking water treatment is an issue impacting 2.6 billion people who are consequently affected by water borne diseases like cholera or dysentery. Diarrheal disease is often due to contaminated water and kills 2.2 million people globally, most of them being children in developing countries. Since the launch of the Millennium

Development Goals in 2000, the target to « halve access to safe drinking water » (Goal 7, target 10) was met in 2010 five years ahead of schedule. Yet, access remains a global issue especially in developing countries where millions suffer the consequences of insufficient or contaminated water both in rural areas and in cities. Sustainable management of water resources is considered as one of the major challenges of sustainable development, but the complexity of related issues and the number of factors to take into account require coordination efforts and innovation. Acknowledging that technology and infrastructure alone cannot fully address the issues, the concept of water governance emerged in the 1990. As mentioned in a 2003 UN report « The World is facing a serious water crisis. All of the signs suggest that it is getting worse and will continue to do so, unless corrective action is taken. This crisis is one of water governance, essentially caused by the ways in which we mismanage water ». Water governance refers to all political, social, economic and administrative systems involved in the development and management of water resources, as well as delivery services at all levels of society (Global Water Partnership 2000). The concept of governance is based on the recognition of the fragmented nature of water management between sectors and institutions and global lack of consideration for social objectives (e.g. poverty alleviation, health), economic and environmental objectives which can be contentious.

There is a consensus both in the literature and policy circles that « water crisis is essentially a crisis of governance » (Global Water Partnership 2000). This applies equally to both the water sector as a whole as well as its main subsectors, irrigation and urban water supply. Governance issues in urban water supply are most visible in some developing countries' big cities, under increasing pressure from a growing population, rapid urbanization and wealth disparities. This is the case in India, where urban poverty is a major issue leading to a significant proportion of its inhabitants living in informal settlements, also referred to as slums.

In 1994, the NGO WaterAid released a report entitled *Mega-Slums: the coming sanitary crisis* for the UN second global conference on human settlement, warning on the «potential sanitary crisis that could emerge from modern urban growth ». That same year, a pneumonic plague epidemic broke in the Indian city of Surat, caused by carcasses of livestock washed up in the slums by a heavy monsoon and rotting in the clogged open sewers. The spreading of the disease made relatively few victims, but caused nearly a quarter of the city residents to flee and created national and international panic with flights to India being cancelled. This event evoked

the importance of the 'brown agenda'[1], the increasing pressurized environment of urban settlements and the fact that growing urban population required new considerations in how space and amenities should be managed to provide healthy and livable habitat (Wateraid report 1996). There are several factors contributing to unhealthy living conditions in cities' poor neighborhoods, including inadequate sanitation facilities, poor drainage and poor waste management, which can result in negative health outcomes and contribute to acute respiratory diseases, diarrheal diseases and a wide array of other infectious diseases (e.g., tuberculosis, hepatitis, dengue fever, pneumonia, cholera and malaria) (Montgomery and Hewett 2004). Access to safe drinking water is a vital requirement for healthy, sustainable livelihoods.

Beyond the direct impact of drinking contaminated water on health and morbidity, the broader socio-economic consequences of poor access to clean water need to be considered to fully comprehend its impact on populations. For instance, chronic diseases lead to work loss, queuing at public water taps or walking miles for access to water leads to waste of time, productivity and opportunities, especially for women and children who are usually in charge of collecting water. Poor access to water for drinking and hygiene has a major impact on people living in slums, and is one of the factors that make slums a poverty trap for millions, negatively impacting their education, income, health and livelihood.

Water shortage and water governance have been at the heart of social unrest and major protests in India. As the country faces water stress and droughts due to climate change, fear of water riots is rising. In rural areas, farmers are suffering major crop loss. Due to increased hunger, some migrate to the cities to find more reliable water sources. In cities like Mumbai, insufficient monsoon can lead to imposed water cuts, increasing tensions for access and political conflicts. Since the early 1990s, the Indian Government has put in place public-private partnerships in an attempt to improve water networks performance in cities, including 3 projects in the Maharashtra district in the cities of Nagpur, Latur and Aurangabad (World Bank 2013). Public-private partnerships have led to massive movements against the involvement of private actors in the water sector, and strong opposition to the concept of gradual « water privatization » in India as well as internationally.

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[1] Refers to the range of environmental problems experienced by Third World cities

This report will focus on the urban water supply crisis affecting the urban poor in the city of Mumbai. The case study presents interesting paradoxes that show the limitations of infrastructure and economic growth when it comes to providing basic services to the poor. Since 1991, year of India's liberalizing economic reforms, Mumbai (then called Bombay) was announced to become a World Class City. The private sector and market mechanisms were expected to put an end to political conflicts over access to land, and effectively led to decades of urban development and huge economic growth. Today, the city contributes to more than 6% of the total Indian economy with a gross domestic product of 209 Billion USD[2] and is the financial, commercial, fashion, and entertainment capital of India. The city is known to be home to the country's richest people, counting the most ultra-high-net worth individuals[3] in India. Economic growth has attracted populations from rural areas looking for jobs, and now counts 13 million people, making Mumbai the most populous city in India.

But Mumbai's transformation has come with a cost. Urban poverty is soaring, especially in the urban periphery. According to the 2011 Census report, more than 40% of city residents live in slums, which is a significantly higher proportion that in any other million-plus Indian city. With over 6 million people living in informal settlements, Mumbai has the largest slum population of any city in the world by some estimates (Subbaraman and Murthy 2016).

The high price of land and the city's low-income housing crisis contributed to the emergence and growth of slums. Different strategies have been explored over the years to address the slum « problem », but slums have continued to grow, earning the city the nickname of « Slumbai ». Mumbai's transformation has also come with the deterioration of the water infrastructures. The city's water system has been outstandingly unreliable and chaotic despite efforts to improve it. Mumbai is served with a continuous and reliable flow of water that comes from rain fed lakes. The overall water supply being sufficient to the city' needs in terms of quantity and quality at source, the issues in accessing clean water across the city and neighborhoods therefore reflects the urban supply governance issues. The water supply situation is a huge problem for Mumbai's residents, especially the poor living in slums, as well as for the city's sustainability and attractiveness. Mumbai's water system was created around the same time as the public systems

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[2] PricewaterhouseCoopers. 2009. *UK Economic Outlook November 2009*. [ONLINE] Available at:
https://web.archive.org/web/20110504031739/https://www.ukmediacentre.pwc.com/imagelibrary/downloadMedia.ashx?MediaDetailsID=1562. Accessed 13 August 2016
[3] Ultra-high-net worth individuals are people with net assets of over $30 million

of New York, London, and Paris (Gandy 2004) . Yet, while the utilities of those cities only initially privileged the upper classes with their services, the public system in Mumbai continues to be restrictive as to whom it serves (Anand 2011). The urban water supply crisis and exclusion of some slum neighborhoods from the distribution network have forced slum dwellers to mobilize different strategies to get access to water on a daily basis, including households organizing and sharing taps, illegal connections, water kiosks and distribution of water by small scale vendors. The forces and dynamics in play in underserved slums demonstrates the multidimensional aspects of access to water.

Increasingly aware of their « right to water », slum dwellers organize with the support of NGOs to raise their voice and claim their rights, pointing out the city's failure to provide water to all its citizens. The right to water for slum dwellers recently got a lot of attention through the court decision on the case *Pani Haq Samiti & Ors. Vs. Brihn Mumbai Municipal Corporation* in 2014. The court's ruling reinforces the status of access to water as a human right which the city is responsible for providing to *all* citizens.

Another critical urban issue that is interlinked with access to water and has a major negative affect on slum population is the lack of access to sanitation. Open defecation is often the only option and commonly practiced by young children. Women are forced to wait until sunset to relieve themselves, at which point they are vulnerable to the routine violence and rapes. These practices and lack of any sewage system contribute to water contamination and spread of disease. Though access to water and sanitation is often considered as one indivisible issue, justifiably, this report will focus on water to access exclusively.

Through the information gathered on Mumbai's water supply history and issues, and on current practices to access water in slums, this report will analyze the role and potential of the private sector in providing solutions for slum dwellers' access to clean water in Mumbai, based on the following hypothesis.

- The public sector (BMC Water Department) has shown its inability to manage the Mumbai water supply effectively. The water supply performance would benefit from the expertise and management principles of the private sector.
- As a World Class City, Mumbai should move to a continuous (24x7) water supply for the benefit of all its residents including slum dwellers. A successful shift from intermittent supply to continuous supply should involve the private sector.

- Slum dwellers have been excluded from urban planning and the status of slums make the provision of water politically sensitive. Full access to clean municipal water being unlikely in the near future and considering the poor are already paying the high price for water through informal distribution, market-driven approaches could bring the entrepreneurship and innovation necessary to serve the BoP, meet the Millennium Development Goals and create innovative pro-poor business models in the sector of urban water supply.

In the context of failures of the water supply network managed by the public sector, traditional top-down aid strategies have also shown their limitations in improving slum populations' livelihoods and offering sustainable solutions for access to water. These past years, there has been both increasing hope and skepticism in the contribution of market-based initiatives to innovate and bring solutions to poor communities, through the theories of popular influencers like Paul Pollak[4], Bill Gates, C. K. Prahalad and Stuart L. Hart[5] or Mohammed Yunus. Diverse mechanisms and models involving the private sector aim to use the market as a catalyzer to design and provide pro-poor solution and services that can both generate profit and address issues affecting the poor, including access to loans through microcredit, combining business objectives and social impact through social entrepreneurship, injection of capital and technology through impact investing and corporate social responsibility programs.

Based on an analysis of the current water supply network situation, water governance crisis and discourse around water privatization, and considering as well current practices for access to water in slums, this report questions the impact and the potential of a market-driven approach in providing sustainable pro-poor water services to slum dwellers in Mumbai.

In order to apprehend the role of the private sector in providing water to Mumbai slums, research was first focused on understanding the origins of slums and urban poverty from both a descriptive perspective as provided by the UN-Habitat report and from urban theories'

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[4] Author of Best seller « Out of Poverty », and co-founder and CEO of Windhorse International, a for-profit social venture
[5] Co-Authors of « The Fortune at the bottom of the Pyramid », 2002

perspective, analyzing the impact of the neoliberal restructuring of developing countries since the 1970s. The paradoxes of the Mumbai megacity, India's business and financial center and home to millions of slum dwellers, reside in the city's infrastructure as well.

Lisa Bjorkman's work provides valuable insight into the impact of market liberalizing reforms and the politics of the city's infrastructure on access to water, as well as some understanding of the sociotechnical dimension of water flow in Mumbai, controlled through a complex choreography of valves, pressure, tankers and plumbers. Understanding the materialities of Mumbai's piped network and the forces underpinning water flow allow to comprehend the origin of the city's water governance crisis and the water poverty affecting slums. In particular, the many anecdotes narrated by Lisa Bjorkman provided invaluable appreciations on how everyday social and political practices affect water access, in both providing it and depriving of it. Insight and sources from many disciplines were mobilized to identify the factors influencing access to water in slums, and to elaborate on the potential of a market approach to tackle the issue.

Alexia Michels, Head of the Water for Slums program at Suez Environnement, Julien Eyrard, WASH[6] Adviser at Action Contre la Faim and Julien Ancele, CEO of 1001 Fontaines kindly dedicated some time to share their experience in Mumbai and their knowledge of water supply businesses, which gave access to relevant recent information about the water access situation in Mumbai's slums.

The first part of this report provides historical background elements to better understand the prevalence of slums and the living conditions slum dwellers face. We will review how Mumbai implemented top-down strategies to address the slum « problem » through several schemes and how these policies have resulted in Mumbai's current divide between the legal and illegal settlements, conditioning different levels of deprivation. The city's recent history will shed some light on how liberalization and ideological driven policies have also participated to the slow deterioration and obsolescence of the water supply system, providing some context to apprehend the Mumbai water governance crisis causes and symptoms. As a vital common resource, theories on how water provision should be controlled and by whom to ensure equity

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[6] Water, Sanitation and Hygiene

are debated through which appear to be conflicting ideological considerations, defining water as both a human right and an economic good.

In the second part, we will analyze who are the actors involved in water provision and how the private sector is getting involved in urban water supply through different public-private partnerships. Private sector interventions are encouraged by the Indian governments to improve efficiency, reduce cost and allow cities to shift to a continuous water supply. Though network upgrades and managerial processes improvements are urgently needed in many cities including Mumbai, debates on the legitimacy and effectivity of private actors' interventions are receiving close review. We will analyze the strategies used by underserved slums to access water and the impact of current practices on populations. In the light of the limitations of water supply in slums, the potential of a market-driven approach to improve adequate access will be discussed.

PART I: MUMBAI SLUMS AND WATER POVERTY

Introduction Part I

The history of Mumbai's development into the city it is today allows to apprehend how urban poverty grew, leading to the prevalence of slums. In particular, understanding the impact of the reforms passed during India's liberalization years provides some elements to explain how the low-income housing crisis was exacerbated by the vision of transforming Mumbai into a World Class City, and how slum rehabilitation schemes created a divide between authorized and unauthorized slums, and by extension, between slums that receive municipal water and those who are deprived of it. The use of market mechanisms to build the city and implement slums schemes led to improvised constructions and a mismatch between the overground and underground water infrastructure. Weakened by years of speculation over a pending privatization of the water supply network, the BMC Water Department is criticized for the chaotic water supply in the city and the deterioration of the network. A closer analysis of the challenges of the supply network and issues of Mumbai residents to access water in slums reveals a complex nexus of political powers and social practices that affect everyday life in Mumbai. The developments affecting the water department's performance and the reforms affecting service to slums opens the debates on water privatization and on commodification of water threatening 'the right to water'. These debates highlight the different dimensions of the Mumbai water governance crisis.

Chapter 1: Symbols of Urban Poverty: Origins and Persistence of Slums

Paragraph 1: The Origins of Urban Poverty

By many estimates, more than half the global population is now urban, a trend driven mostly by rapid urbanization in developing countries[7]. According to the UN, over 54% of the world population lives in urban areas, a proportion that is expected to reach 66% by 2050. The planet

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[7] Oxford University Press, Jo Beall & al. 2010. Urbanization and Development: Multidisciplinary Perspectives.

has urbanized even faster than predicted by the Club of Rome in its famous report *Limits of Growth* published in 1972. Urban growth is due to both natural population growth and to migration from rural areas to cities. Cities offer economies of scale in terms of public investment and attract investors and capital, which is good for the overall economy growth and poverty reduction. Cities also provide better job opportunities, easier access to services and an alternative to rural traditional way of life. However, cities can also present conditions of overcrowding, unemployment, inequality and criminality, as well as environmental degradation, issues that are at the heart of development. Sustainable urbanization is therefore key to successful development. Considering the pace of urbanization and growing urban poverty affecting millions, adequate and inclusive urban planning is a major challenge and needs to be addressed more aggressively.

Megacities with more than 10 million people are increasing in number. Of today's 28 mega-cities, 16 are located in Asia, Mumbai ranking as the 5th largest megacity after Tokyo, Delhi, Shanghai and Mexico City. The slums of Mumbai appeared as early as the mid-19th century through a variety of push and pull factors including industrial growth, political conflict and caste persecution. Since the 1980s, Mumbai has suffered massive plant closures and deindustrialization. As a result, the size of its economy has little relationship to its population size or to employment opportunities. Over time, formal and informal political networks have developed, integrating slum residents into the city's system of power and politics, and its economic activities.

Like in other developing countries' cities, urbanization continued in Mumbai in the 1980s and 1990s despite soaring land prices and unemployment. As developmental economist Nigel Harris wrote in 1990, « It appears that for low-income countries, a significant fall in urban incomes may not necessarily produce in the short term a decline in rural-urban migration ». The exodus of labor from rural areas in India, and in other countries subject to structural adjustments plans during the debt crisis, can find some explanation in policies encouraging agricultural mechanization imposed by the World Bank and the International Monetary Fund as loan conditionality. National market deregulation pushed producers into the global market, making it difficult for small producers and poor peasants to compete especially when confronted to any shocks like droughts, illness or inflation. In the context of structural adjustment plans and public expenditure cut down, urban population growth was due mostly to push factors in rural areas rather than pull factors from cities.

Since 1970, rate of urbanization has outpaced industrial growth in big cities, leading to over urbanized cities with the inability to provide for the population in terms of employment and housing, leading to the growth of slums. The estimated 45,000 formal housing units' annual deficit in Mumbai translates into as many informal settlements (Davis 2006). Despite experiencing rapid economic growth, Mumbai, like most developing countries' cities, is marked by huge inequalities made visible by the emergence and expansion of mega slums. Many of the problems of urban poverty are rooted in a complexity of resource and capacity constraints, and inadequate government policies. As described in Part I Chapter 2, Mumbai's ambition to be a World Class City contributed to neglecting its citizens' needs and led to failed urban planning and management.

Paragraph 2: The Definitions of Slums

In 2003, the United Nations Human Settlements Program (UN-HABITAT) published the first global assessment of slums and urban poverty, a result of the collaboration of over a hundred researchers. Following the World Bank prediction that urban poverty would become the « most significant, politically explosive, problem of the next century » back in 1990, this report provides a strong warning about the worldwide catastrophe of urban poverty. While recognizing that slums are too complex to define according to one parameter, and that the concept of slums is relative and will depend on countries and cities, the report recommends an operational definition of a slum for international usage as an area that combines the following physical and legal characteristics, excluding the more complex social dimensions:

     (1) Overcrowding
     (2) Poor structural quality of housing
     (3) Security of tenure
     (4) Inadequate access to safe water
     (5) Inadequate access to sanitation and other infrastructure

(1) As detailed in the report, each of these characteristics are measured according to indicators. For example, overcrowding is reached where there are proportionately more than 2 persons per room for a household, or less than 5 square meters per person.

(2) The structural quality of housing refers both to the permanency of the structure, based on the quality of the construction material used and compliance with local standards, and to the proximity with hazardous sites, including hazardous zones (risks of

landslides, floods, and earthquakes), garbage mountains, high-industrial polluted areas or unprotected high-risk zones (e.g. railroads, energy transmission lines etc.).

(3) The poor often occupy insecure public or private land as it is their only option, and a direct consequence of overurbanization. This is a result of poorly functioning land and housing markets, and the lack of planning for urban development and growth. Insecurity of tenure puts the urban poor at constant risk of eviction, hampering them from building up assets and accessing credit (Davis 2006). Though commonly referred to as *illegal* settlements, the technical definition of a slum according to the 1971 Maharashtra Slum Areas Act clarifies that is allowed to be « declared » a slum « any area that is or may be a source of danger to the health, safety or convenience of the public of that area or of its neighborhood, by reason of the area having inadequate or no basic amenities, or being in sanitary, squalid, overcrowded or otherwise ».

In many cities including Mumbai, slums fall into different categories, which define the residencies' status and the policies applying to each neighborhood. As detailed in the 2011 Census, slums are categorized as notified, recognized and identified slums.

- All **notified** areas in a town or city notified as « Slum » by State, Union Territory Administration or Local Government under any Act including a 'Slum Act'
- All areas **recognized** as « Slum » by State, Union Territory Administration or Local Government, Housing and Slum Boards, which may have not been formally notified as slum under any act
- A compact area of at least 300 population or about 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities (**Identified**)

Notified and recognized slums are accorded a legal status, and are entitled to have access to some civic amenities. Identified slums, though unfit for human habitation, are kept devoid of any legal protection and municipal services. Insecurity of tenure is also a major constraint to investing in infrastructure and services in slum areas (Bakker 2008).

(4) (5) Access to basic services and infrastructure such as water and sanitation is measured in terms of quantity of water available per person per day, and in terms of number of people per latrine for sanitation. According to UN-Habitat, drinking water supply is considered inadequate « if less than 50% of households have an improved water supply, including a household connection, or access to a public stand pipe, or to rainwater

collection, with at least 20 liters per person per day available within acceptable collection distance ». Inadequacy in access to water should also consider that the World Health Organization has established that 50 liters of clean water per person per day would be required to maintain personal hygiene. The minimum requirements for access to water to be considered adequate by the UN-Habitat definition do not mention other aspects of access to water that are critical to slum populations health and livelihood: reliability, quality and affordability.

Finally, access to sanitation is considered inadequate if less than 50% of households have improved sanitation (public sewer, septic tank, pour-flush latrine, ventilated improved pit latrine), and the excreta disposal system is considered adequate if it is private or shared by a maximum of two households. Despite some progress, 2,4 billion people still do not have access to improved sanitation facilities, including nearly a billion who practice open air defecation[8].

Slum dwellers have also suffered from the deep rooted common perception of slums being a place of criminality and violence. The UN-Habitat report addresses the negative views of slums by public policy-makers, declaring « slum dwellers are now seen as more exposed to organized crime than non-slum dwellers as a result of the failure of public housing and other policies that have tended to exclude slum dwellers, including in matters of public policing. The result is a growing belief that most slum dwellers are more victims than perpetrators of crime ». Despite the realization that slums are not as crime ridden as imagined, the perception that slum dwellers are socially dysfunctional, and responsible for some issues affecting the broader community persists, including disrupting the municipal water distribution through illegal connections to the network.

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[8] World Health Organization. 2015. *Lack of sanitation for 2.4 billion people is undermining health improvements*. [ONLINE] Available at: http://www.who.int/mediacentre/news/releases/2015/jmp-report/en/. Accessed 13 August 2016.

Paragraph 3: Building a Slum-free Mumbai

Urban poverty was for a long time underestimated (Wateraid report 1996) and was expected to disappear once the city had reached a certain level of economic growth, and disparities between the rich and the poor would decrease, making slums part of history as was the case in Western cities like New York and London. But the scale and velocity of urbanization in developing countries today is much higher compared with that of Victorian Europe (Davis 2006). Governments and the World Bank have been trying to put in place effective strategies to address this issue for decades, with more or less success.

Around the middle of the 20th century, the strategy to manage slums in Mumbai was focused on demolition and redevelopment, primarily by disdain for slum dwellers and secondly for possible profit made with redeveloped real estate (Mukhija, 2003). These efforts were globally ineffective in eradicating slums. The slum dwellers were often re-established in remote locations, far from public transportation and job opportunities hence disrupting social networks and communities that had built over decades. Under increasing criticism that this strategy was making the housing shortage worse and was inefficient in preventing slums from reappearing, the government started adopting strategies that enabled communities to « alleviate themselves » in the 1960s.

The subsequent strategy therefore aimed at working on successful resettlement for demolished slums and improvement for the remaining slums. The Slum Areas (Improvement, Clearance and Redevelopment) Act, was introduced in 1971. Recognizing it didn't have the capacity to resolve the slum situation in the near term, the state strove to ensure the slums did not represent a danger for its inhabitants and for Mumbai residents in terms of health and safety. Incrementally built popular neighborhoods were treated as a solution to the housing problem, and efforts were focused on improving slum dwellers' livelihoods *in situ* by providing basic services and amenities. Though the 1971 was quite promising on paper, the improvements expected did not fully materialize, with less than half the sanitary facilities planned for actually provided, for example. During that period, the state also carried out some aggressive slum clearances, violating several international human rights in the process. One of the

Conventional Strategies

1971. Slum Improvement Program
1985. Slum Upgrading Program

Privatization of Slum Rehabilitation

1991. Slum Redevelopment Scheme
1995. Slum Rehabilitation Scheme

most famous clearance was the 1976 bulldozing of the Janata Colony under the Emergency[9].

In 1985, the Slum Upgrading Program was initiated in Mumbai. After being criticized for encouraging infrastructure projects that let to eviction and land grabbing, the World Bank adopted a project-by-project approach in the 1980s, promoting governments to act as a facilitator in the housing of the poor. The World Bank's efforts, and therefore the spirit of the Slum Upgrading Scheme, was that communities should take the initiative of upgrading their own housing improvement, and the government should be less involved. The Slum Upgrading Scheme provided tenure to eligible slum dwellers and based efforts on the philosophy of affordability, cost-recovery and replicability (UN-Habitat 2003). The scheme aimed to promote self-help attitude in slum dwellers, to end any subsidies from the government and had the ambition to be scalable to address the slum upgrading problem entirely. Existing slum land was leased to cooperative groups and slum dwellers, and loans were given for housing improvements (Jagdale 2014). Like all other schemes, the Slum Upgrading Scheme had pitfalls. Amongst them, some families obtained land worth much more than others and large acquisitions of private land were full of complications.

It was only in the 1990s that the State of Maharashtra developed its unique cross-subsidizing model of *in situ* redevelopment schemes, using capital from the private sector. Starting in 1991, India experienced a wave of privatization taking over substantial market share of almost all industries, including construction and then slum rehabilitation with the 1991 Slum Redevelopment Scheme.

The Slum Rehabilitation Scheme was then introduced with the election of Shiv Sena[10] in 1995. Under democratic pressure from slums, who represent a huge vote bank, the Shiv Sena promised to provide free housing to the estimated 4 million slum dwellers, using the already existing bold market-oriented regulation for rehabilitation projects. Building on the 1991 Scheme, the 1995 slum policy innovation was to remove the profit cap on slum redevelopment and extend the cutoff date for slums to be eligible for rehabilitation to include all existing slums.

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[9] The Emergency was set in motion by the Indira Gandhi government on June 25, 1975 and was in place for 21 months till its withdrawal on March 21, 1977. The order gave Ms. Gandhi the authority to rule by decree wherein civil liberties were curbed.

[10] Also known by the name Sena, is an Indian far-right regional political party.

This extension abolished controverted eligibility criteria and provided benefits to pavement dwellers for the first time. The policy promised great real estate profits and free housing for all slum dwellers through cross subsidies. In order to discourage additional migration to the city, Shiv Sena leaders promised to prevent any new encroachments by excluding any post-1995 settlements from the Slum Rehabilitation Scheme and by disallowing provision of civic amenities to any area not meeting the cutoff date, laying the foundation of authorized vs. unauthorized, legal vs. illegal dichotomy now characterizing slums' status. In this spirit, the government of Maharashtra issued a circular in 1996 prohibiting water supply to unauthorized settlements, i.e. post-1995.

The 1971 Slum Act was unclear as to whether rehabilitation in the event of demolition applied to houses or families. With the 1995 shift in policy from upgrading to demolition and resettlement, each family represented a fixed amount of development rights the builder was compensated for in exchange for the resettlement (Bjorkman 2015). Each family had to prove their eligibility with photo-passes, ration cards or election lists to prove they met the cutoff date (Jagdale 2014). The process of sorting eligibility was linked the pursuit of valuable development rights by builders. The high-stakes construction marketization and the need to obtain consent from 70 percent of slum dwellers to proceed with demolition made the execution of the 1995 Slum Rehabilitation Scheme difficult. Though efforts to address the issue of slums grew in effectiveness, especially after 1985, and this scheme was recognized as more efficient than previous ones, the Slum Rehabilitation Scheme didn't meet expectations with only 3486 units redeveloped in the period of 1991- 2000 (Jagdale 2014).

The Slum Rehabilitation Scheme launched by the Shiv-Sena government in 1995 is still active in Mumbai. It is enacted by the Slum Rehabilitation Authority. Certain minor modifications have been made to the scheme, however the fundamental model remains the same. The cutoff date was extended from 1995 to 2000. Currently, only households who settled on state or city government-owned land in Mumbai prior to 2000 can obtain notified status. Those who settled after 2000 do not benefit from this policy, nor do those settled on private land (which represent 50% of all slum-occupied land in Mumbai) or on central government (including land owned by the Indian Railways, the biggest land owner in India) even if they were established prior to 2000. Of the approximately 6 million slum dwellers in Mumbai, nearly

half live in non-notified slums[11], leaving them with no protection from eviction and no right to municipal water connections.

Conclusion Chapter 1

Like most cities in developing countries, Mumbai faces rapid urbanization due to population growth and a high rate or rural-to-urban migration. The population expansion combined with a low rate of industrial employment growth has led to high urban poverty. The over urbanized city is characterized by a housing crisis, forcing nearly half of its population to live in slums. As a megacity in one of the fastest growing countries, both demographically and economically, Mumbai is overwhelmed by the growth rate of these informal settlements, and hosts one of the largest slums in the world, Dharavi. In 2003, UN-Habitat published the first global assessment of slums and urban poverty. While acknowledging the differences and variations in what is considered a slum in different countries, the report provides basic but useful indicators to define slums, and a thorough analysis of the root causes and symptoms of urban poverty.

In Mumbai, despite the implementation of different schemes to address the issue over the past decades, insufficient low-income housing has led to the growth and persistence of slums, now home to nearly 6 million people. Poor urban planning and insecurity of tenure contribute to slums having no adequate infrastructure, and poor access to clean water and sanitation. To secure votes from slum dwellers, political parties have put in place schemes with a cutoff date, with the intention of both assisting existing slums without creating policies that would encourage the settlements of more slums. This cutoff date, recently extended to 2000, creates the distinction between notified and non-notified settlements, and by extension the authorized vs. non-authorized, legal vs. illegal dichotomy that not only conditions slum dwellers' eligibility to benefits and schemes, but also their protection from eviction, and their access to basic services including access to water.

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[11] Indian Ministry of Statistics and Programme Implementation. 2013. Key indicators of urban slums in India. [ONLINE] Available at: http://mospi.nic.in/Mospi_New/upload/KI_SLUM_report69round_24dec13.pdf. Accessed 13 August 2016.

Chapter 2: Mumbai's Water Governance Crisis

Paragraph 1: Mumbai Water Supply Network: Particularities and Challenges

The Brihanmumbai Municipal Corporation (BMC) also known as the Municipal Corporation of Greater Mumbai is the civic body that governs the capital city of Mumbai in the state of Maharashtra. It is the largest local government in Asia and India's richest municipal organization. The BMC Hydraulic Engineering Department (hereafter referred to as BMC Water Department) is one of the 8th largest supply body in the world and has been in charge of providing drinking water to the Mumbai people from source to distribution for nearly 150 years. The water supply for Mumbai is sourced from 7 lakes and is treated at 4 water treatment plants as per drinking water standards specified in IS 10500: 2012[12]. The water is distributed from 2 master balancing reservoir, 27 service reservoirs across the city of Mumbai and through the maze of 6000 km long distribution network spread all over the city.

With 268 liters of water per person per day available (BASF 2015), there is no aggregate water shortage in Mumbai. Like the great majority of water distribution networks in India, the water supply in Mumbai is intermittent, as opposed to continuous 24x7 supply. Most users receive water supply for 2 to 5 hours every day, 24x7 supply being available only in a few areas. As specified by the BMC Water Department, « the complex water supply system of Mumbai has a unique feature that almost the entire water supply distribution is by gravity due to typical terrain geography »[13]. To provide water to Mumbai's 13 million residents through nearly 400,000 connections, around 1000 valves are operated on a daily basis by water works laborers called *chaviwallas* (key men), making water flow to the 250 water supply zones according to schedule[14]. Despite good quality and sufficient quantity at source, and « state of the art » treatment plants, Mumbai's water network experiences persistent issues. The complexity of the Mumbai water system and intermittent supply makes its distribution difficult to control, with some areas or households receiving insufficient or close to no water. Distribution can be better

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[12] MCGM Water Department website. [ONLINE] Available at:
https://aquaptax.mcgm.gov.in/aqua/citizenportal/uboutUs Accessed 12 July 2016
[13] Ibid.
[14] Ibid.

in some areas than others, with the dynamics of which areas get better service shifting in time as the network experiences maintenance, breakdowns or necessary valve manipulation for a variety of reasons. A same tap can produce water for years and suddenly run dry with no identified reason, making access to water unreliable. Since water is needed for domestic purposes all day long but the taps supply water only a few hours a day, each household must collect water when available and store it for the rest of the day. Collect and storage can be difficult in poor neighborhoods which are usually underserved and where each household doesn't have its own connection. Considering the many challenges faced by the water distribution system, the BMC Water Department has to make up for the networks' unpredictability with tanker truck water deliveries wherever needed, delivering water to slums and luxury hotels alike.

Since the water network isn't pressurized, many households or hotels need to circumvent limited supplies with illegal booster pumps, especially homes elevated or in high-rise buildings. The use of booster pumps enables more water to be extracted out of the system, intensifying existing inequalities in access at the local level. The vibrations produced by the booster pumps further deteriorate the already ageing or corroded pipes, creating more leakage. Leakages on non-pressurized pipes allow infiltrations which contaminate the water. The water meets drinking water standards at the source, which means almost all of Mumbai's water quality problems stem from the tertiary network, at the service reservoir level (Suez Environment 2015). End users therefore have to treat their water themselves, using filters. For the poor, proper treatment of water isn't always done, leading to serious health issues affecting children especially.

A big issue all water systems have to manage is reducing the level of Non Revenue Water (NRW). A high level of NRW is detrimental to the financial viability of the water network, and negatively impacts the quality of water as well. NRW is the volume of water « lost » and is caused by the physical loss of water due to leakage and by apparent loss through water being consumed but unintentionally unbilled, and water being consumed but intentionally unbilled (e.g. for fire fighting). The level of NRW is an estimate and is a sensitive topic subject to debates (Bjorkman 2015). To have a rough idea of where the Mumbai water supply network stands on this crucial indicator, we can mention that estimates seem to range from 20% to 60% depending on who provides the figure, and the "official figure" communicated is 27%, which seems to be unrealistically optimistic in comparison to other big cities.

Leakages are unavoidable and driven by many factors, some of which are beyond the control of the utility, such as « population density per kilometer of network, the type of distribution, and the length of the network, which are largely the result of urbanization and settlement patterns in the localities that the utility serves » (Van den Berg, 2014). The environment in which the water system performs has an important impact on NRW, and reducing NRW is part of ongoing maintenance and improvement interventions. Any program to reduce NRW requires a thorough understanding of the system and its environment.

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption (including water exported)	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water (NRW)
			Unbilled Unmetered Consumption (e.g. fire fighting)	
	Water Losses	Apparent Losses	Unauthorized Consumption	
			Metering Inaccuracies	
		Real Losses	Leakage on Transmission and/or Distribution Mains	
			Leakage and overflows at Utility's Storage Tanks	
			Leakage on Service Connections up to the measurement point	

Source: Pilot Wards Presentation, WDIP, Suez Environment internal document, 2015

NRW is sometimes also referred to as Unaccounted-For Water (UFW). While the two terms are similar, they are not identical, since NRW includes authorized unbilled consumption (e.g. for firefighting or, in some countries, for use by religious institutions) while UFW excludes it.

Although Mumbai enjoys a sufficient flow of clean water from its 7 nearby lakes, the complex distribution system has its limitations. The Mumbai's water network poor performance has been blamed on the lack of investment to upgrade the system, as well as on the BMC poor management and corruption. To better understand the issues the Mumbai water system is facing today, it is necessary to consider its history, and in particular how the liberalization era has shaped both urban planning and the water system.

Paragraph 2: Mumbai's Economic Liberalization and City Transformation

Following the reforms initiated in 1991, India has engaged in economic liberalization with new policies aimed at attracting foreign investment and expanding the role of the private sector by shifting to a market-oriented economy. From that point on, neoliberal policies have influenced many sectors, shaping Mumbai into the city it is today. In particular, they contributed to the expansion of slums through a low-income housing crisis and ideologically driven interventions have profoundly impacted water infrastructure. As explained here both the issues of persistent slums and access to water are historically linked to market mechanisms that have shaped and challenged Mumbai's urban planning.

Effects of the Private Sector on the Landscape

Since the 1990s, the government has worked towards transforming Mumbai into a financial global center. This required attracting foreign investment and transforming the urban landscape to encourage global firms to set up their offices in the city. This reconfiguration project, and the fact that full power was given to market mechanisms to transform the city, was criticized by some for building spaces that were designed in priority for global finance and businesses, neglecting the needs of its citizens. The city's transformation led to sociospatial segregation and deepening inequality (Bjorkman 2015). By shifting to a new economy and with real estate value skyrocketing, Mumbai's evolution resulted in a significant proportion of factories and housing becoming obsolete, further accelerating the working class displacements to informal settlements on the periphery of the city. A solution was needed to reconcile high land values with spaces dedicated to social purposes like low-income housing and amenities. Urban planners, experts and landowners agreed to put the market logic to work to settle this problem by using development rights. While the markets of development rights exist in other cities, New York being the first to implement them, this mechanism was used to an unprecedented extent to resolve Mumbai's land puzzle with the passage of the 1991 reforms. This mechanism creates an incentive for private land actors to build amenities for social purposes by offering them compensation with *rights* to develop above the heights normally authorized by the city's 1967 Development Plan.

Before the 1991 reforms, a builder could purchase slum land, obtain the consent of 70 percent of the slum dwellers in the community, clear the land and rehouse the eligible slum dwellers free of cost in multistory-building tenements. The land owner could then build high buildings,

but only on the *remaining* land from the space he partially transferred over to authorities[15]. But post-1991 reforms, development rights could be used in *another location* as Transferrable Development Rights (TDR). Through this model, some of Mumbai's most prominent real estate development projects have been built on former slum land. For example, the Imperial Twin Towers, a twin-tower luxury residential skyscraper complex in South Mumbai and one of the most expensive real estate projects in India was built on former slum land through this market based incentive.

Builders were also granted additional development rights in exchange for carrying out development on behalf of the public sector. In the event that these additional development rights cannot be used on site, for example if the freed-up land is already zoned for public purposes, the « Reservation TDR » provision allows the builder to use the rights generated elsewhere in the city as well as to buy and sell those rights in an open market. As noted by urban planner and former chief of the Maharashtra Metropolitan Regional Development Authorities V.K. Phatak, this was « the first time development rights were brought out of thin air, not related to land in any fixed proportion » (Bjorkman 2015).

The 1991 reforms were a manifestation of a longer-term slow shift toward market-led development that began in the 1970s, when the central government of Delhi reconceived the role of the state in low-income housing from direct provider to « facilitator » (Bjorkman 2015). This led to a sustained real estate market that has attracted domestic and foreign luxury property seekers. In 2015, Mumbai ranked 12th on the list of most expensive cities in the world with an average price per square meter of $9, 783, just between Stockholm and Tel Aviv[16]. On the other hand, Mumbai also provides the least affordable housing based on India's per capita income[17]. Development rights have not provided sufficient housing for low-income families as promised, with only a tiny fraction of the hoped-for tenements built, leading to the expansion of slums that now characterize Mumbai. Creative arrangements and tricks were used by builders to make the most profit through this mechanism, contributing in part to the overall failure of the scheme

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[15] Urban Sustainability Laboratory, Yue Zhang. 2016. *Building a Slum-Free Mumbai.* [ONLINE] Available at: https://www.wilsoncenter.org/article/building-slum-free-mumbai. Accessed August 11 2016

[16] World's most expensive cities. [ONLINE] Available at: http://www.globalpropertyguide.com/most-expensive-cities. Accessed July 26 2016.

[17] Bloomberg, Pooja Thakur & al. 2012. *Mumbai Is the World's Least Affordable Home Market*. [ONLINE] Available at: http://www.bloomberg.com/news/articles/2012-04-10/mumbai-is-world-s-least-affordable-home-market-chart-of-the-day. Accessed 26 July 2016

in addressing the issues of housing and slums. For example, builders can arrange to earn development rights as TDR, which is preferable on a low-value land. Lisa Bjorkman reports from her interviews with Mumbai builders that they sometimes intentionally built space-inefficient rehabilitation buildings loaded with extra-wide corridors and staircases which are very cheap to build and earn valuable TDR. They can then use these TDRs at a much greater rate of profit in higher-value areas. These types of practices from builders, projects that never got finalized and intimidating interactions with non-consenting dwellers all contributed to gradual mistrust. Eventually, the marketization of development rights led to a low-income housing crisis and rapidly reshaped Mumbai's built space unbundled from city planning and therefore severed from the logics governing its water infrastructure.

Speculation of Privatization on the Water Infrastructure

Looking back to the main market reforms under the liberalization-era helps explain the mismatch between above ground buildings and the underground infrastructure, and provides historical insight to understand how the piped network became so unpredictable. Indeed, the market reforms have led to built spaces and geography of water demand that differ wildly from what the city had projected and authorized in Mumbai's Development Plan. The hydraulic challenge is therefore to make the water flow to changing locations that are not part of the original plans, resulting in improvised and often unreliable configuration.

For decades, the BMC Water Department managed mapmaking and record keeping. The decline of its mapping practices occurred in the 1980s and 1990s, when development policies extolled market logics and encouraged private sector involvement in municipal services, while accusing government-run systems of corruption and inefficiency. In the context of these market driven reforms, and in order to prepare for a potential hand over of the water distribution to the private sector, high-tech tools were introduced to the city's infrastructure to produce data that would be required to establish a privatization contract. But the information produced by the high-tech measurement tools was fundamentally incoherent with Mumbai's actual complex historical infrastructure. The data-producing project failed, causing the decline of a labor-intensive, human-centered yet functioning formal mapping practices, monitoring and recording (Bjorkman 2015) and ultimately, the *unmapping of* Mumbai's water infrastructure.

Coincidentally, with the speculation on outsourcing water distribution activities to the private sector, the Indian government started pushing for pension laws amendments in response

to the increase in life expectancy among labor classes. To avoid paying pension funds to public sector workers for a lifetime unnecessarily, instructions were given by the central government to not fill any vacant engineering and labor posts unless absolutely necessary. In this context, the World Bank approached the BMC, informing them of an unutilized loan from a sewage department project that could be used to appoint a « world-renowned consultant » to conduct an overall assessment of the water department's management structure. The assessment concluded in the department's « inefficiency » because of overstaffing, much to the BMC's surprise. The conclusion of the assessment was criticized by the water department staff as focusing solely on figures and world norms, without taking into account the reality of Mumbai. For example, the report compared the number of workers per connection in Mumbai (40 workers/connection) and in Singapore (2 workers/connection), building the case to conclude that the Mumbai water department was overstaffed. This superficial (and biased?) comparison failed to take into account that some Mumbai connections serve entire buildings or housing societies, unlike Singapore's which serve individual apartments or houses. On this aspect, the report was criticized for not taking into consideration the million liters of water supply per worker instead, for instance, which would have drawn a very different picture of the water department staff performance. Yet, the consultant's assessment contributed to legitimizing the water department staff-reduction policy. Between 1999 and 2009, the Mumbai population grew by 20%, and the supply system by 30%, yet the department staff gradually reduced as engineers and laborers reached retirement.

Staffing shortage challenges pushed senior water managers themselves to consider subcontracting some water distribution activities to private sector actors. The National Water Policy in 2002 discussed « various combinations of private sector participation in building, owning, operating, leasing and transferring water resources facilities ». The rationale was that privatization would ensure better water management, efficiency, better services, and reduced or no corruption.

Over the years, the combined issues of staffing and information erosion increased interest in private sector involvement and led to the pilot study in the K-East Ward, which was in essence a privatization experiment in which several aspects of the distribution system would be subcontracted to a private operator. Again, the department had to first gather the data required to establish a scope of work and a privatization contract, precisely reporting how much water residents, industries and commercial activities consumed. Until the 1980s, the department used to routinely audit each zone using a low-tech system known as pito-gauging to measure pressure

and quantity of water running through mains, but this practice was abandoned because of staffing shortage and the introduction of high-tech (inadequate) systems. Department's engineers' decision to pursue a pilot project in the K-East Ward thus required a significant budget to purchase new high-tech equipment from overseas, and produce meaningful data. Not having enough foreign currency for the purchase at that time, the BMC contacted the World Bank in 2001. This coincided with the World Bank International Water Year of 2001, with seminars in Delhi extolling the virtues of continuous supply, high-tech equipment, and increased private-sector involvement. The World Bank was naturally enthusiastic in helping with the pilot project, but instead of providing the BMC water department with a loan to purchase the equipment, the World Bank offered to manage the audit in-house, encouraging private sector expert hires to draft a management contract for the whole pilot area. Before this was implemented though, the 2002 departments billing system improvements increased the available budget significantly, at which point the BMC Water Department decided to move on with the pilot project with its own budget. Because of internal opposition to the project from senior staff having had a « bad experience with privatization » the project was further stalled until the World Bank approached the BMC again in 2003, now proposing a grant for hiring a bank-appointed consultant to conduct, audit and prepare the contract, no strings attached (Bjorkman 2015). Internally, some BMS staff opposed to using the grant but eventually the available « free money » was too tempting especially considering this came in the form of an unconditional grant, with no obligations from the department to act on the consultant's recommendations (Casumm 2008). A grant was finally provided by the World Bank's Public-Private Infrastructure Advisory Facility[18] for the Water Distribution Improvement Project (WDIP) in Mumbai in 2004[19]. After years of discussion on increasing the involvement of the private sector, the arrival of World Bank appointed consultants in 2006 seemed to establish that privatization was inevitable.

The consultants' assessment led to the 2007 Castalia report, which conclusions and recommendations created a heated debate among department engineers, activists, politicians, NGOs and the media (Bjorkman 2015). Amongst the many conclusions and figures that spurred

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[18] PPIAF, a multi-donor trust fund originally established by the governments of Japan and the United Kingdom in collaboration with the World Bank.

[19] PPIAF Case Study - Mumbai, India. Afsar Jafri. [ONLINE] Available at: http://vakindia.org/pdf/ppiafmumbaicasestudy31052007.pdf. Accessed 19 August 2016.

debates, the percentage of water « unaccounted-for » in particular led to some opposition. Because of the gradual decline of established measuring and monitoring practices in the water department, including pito-gauging, and because of the phasing out of the dual-billing system[20] as a condition of the World Bank in the 1990s, the water department was unable to estimate and pinpoint leakages. The percentage of leakage is still a sensitive topic today, and an agreement on its estimate is difficult. The percentage of leakage is indeed an important figure in the context of a potential contract with a private company. Not only does it translate how efficient the system is and gives some indication on the water department competencies, it also has a direct impact on the potential profits the private actor can hope to make. If the estimation is higher than the actual NRW, the private operator can bring no improvement at all and still collect the profit. The decision to select the K-East Ward for the pilot was highly contested by activists and the media, accusing the World Bank of intentionally selecting this already highly profitable area so the pilot would necessarily be considered a success[21]. For the consultants, the missing data and updated maps of the distribution network presented significant financial risks that had to be offset by guaranteed payments from the BMC. And for the BMC engineers, the Castalia report's figures and conclusions were the proof of their lack of knowledge and understanding of socially embedded networks which, combined to their profit orientation, made their involvement pointless (Bjorkman 2015). Further reforms were later announced based on the Castalia report, under the initiative of a new pro-reform municipal commissioner, which, on top of Castalia report's recommendations, added the introduction of prepaid metering for slums that did not meet the cutoff date. Activist strongly opposed the introduction of prepaid meters, highlighting they were:

> « The expression of this commitment to profit above the needs of people. In addition to entrenching the logic of payment for basic resource, the prepaid meters individualize the relationship of people to water and makes any notion of individual right dependent on individual ability to pay. « Responsibility » also becomes individualized (away from the state and society) as water provision is

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[21] Focus on the Global South, Afsar Jafri. World Bank Attempts to Privatize Mumbai's Water Runs Underground: Citizens Reject Report. [ONLINE] Available at: http://focusweb.org/node/1209. Accessed July 13 2016.

made the responsibility of a private company to a paying individual » (Coalition against Water Privatization 2004).

Ultimately, the WDIP became entangled in politics and the project ended in part because of activist and media opposition to the introduction of prepaid meters in slums in the context of the growing transnational anti-privatization movement.

Paragraph 3: Is the BMC Water Department Stuck in Inertia?

In addition to facing the issues of fragmented knowledge and staff shortage, the BMC's performance is also hampered by the heavy bureaucratic nature of municipal processes in India. With nearly 7000 employees, the BMC Water Department functions based on a clear hierarchy (Annex 1). As a bureaucratic structure, the BMC Water Department is perceived negatively for its apparent inefficiency due to complex, slow procedures. For example, in case additional water is needed for offices, or schools, people will usually turn to private tankers instead of BMC tankers, even though the water provided by the BMC tankers is cheaper. First, people in these structures do not necessarily know that getting tanker deliveries from the BMC is an option. Second, getting water delivered by a public tanker requires navigating through the application process, securing the proper approvals, making payment and ensuring delivery which entails running around to four different locations in the city (Bjorkman 2015) basically using up an entire day for each delivery. These kinds of overbearing processes do not only affect residents, they also affect the BMC staff directly, with a complex hierarchy of authority to approve even small expenditures, for example[22]. Another reason for the apparent inertia of the BMC water department is corruption, and by extension, the presumption of corruption. The events following the 2000 labor strike are a good illustration of the corruption-related obstacles the BMC face when making decisions. When unionized laborers went on strike, Mumbai's water supply faced true chaos. Without the hundreds of operators orchestrating the complex valve opening and closing choreography needed to bring water to the entire city (operators known *chaviwallas* or the « key men »), angry residents protested by blocking roads, trains and by besieging the BMC

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[22] Municipal Corporation of Greater Mumbai. *Chapter – 3 (Manual – 2) Powers and Duties of Officers and Employees*. [ONLINE] Available at: http://www.mcgm.gov.in/irj/go/km/docs/documents/MCGM%20Dep artment%20List/City%20Engineer/Deputy%20City%20Engineer/RIT%20Manuals/City%20Engineer%20Depart ment_RTI_E03.pdf. Accessed 13 August 2016.

headquarters[23] This event demonstrated to the BMC engineers that the *chaviwallas* intimate knowledge of the network and of each valve was critical to ensure the city's water flow, bringing to their attention the fact that the valves were all different and had to be manipulated in their own unique way to produce the intended water flow. The BMC Water Department thus decided to replace all valves by an identical valve model, so they could be operated by a machine. Because the BMC's budget is public money, the department could not choose the model they wanted but had to go with the cheapest available, which eventually proved to be dysfunctional (Bjorkman 2015). A water department engineer recalls another example of inefficiencies due to the suspicion of corruption:

> « For example, because I'm the government, I can't decide what kind of pipes to use. A few years back I wanted to switch to ductile iron pipes; we were using cast iron pipes, not ductile iron. The world over, no one uses cast iron anymore! It cracks too easily. But the problem is that there was only one manufacturer in Mumbai. And I couldn't depend on just one manufacturer, because we'd have a political problem; the current manufacturers of cast iron pipes would accuse the ductile pipe manufacturers of corruption, monopoly, etc. So I couldn't do it. The department couldn't make these decisions, but maybe a private operator could. » (Bjorkman 2015)

Corruption is indeed a major issue in India, especially in government departments with a monopoly on goods and services delivery. According to a 2011 study by Transparency International, 62% of Indians had firsthand experience of successfully paying bribes or using a contact to get a job done in a public position. While individuals easily admit to have engaged in corrupted actions, they also overwhelmingly identify themselves as the victims of a « higher level » corrupted system. Joseph Nye's classic definition of corruption is a « behavior that deviates from the formal duties of a public role because of private-regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain private-regarding influence ». Corruption does not necessarily mean illegality, but rather a transgression of a boundary, a morally charged and popular imaginary divide between public and private, legal and illegal, right and wrong.

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[23] Focus on the Global South, Afsar Jafri. World Bank Attempts to Privatize Mumbai's Water Runs Underground: Citizens Reject Report. [ONLINE] Available at: http://focusweb.org/node/1209. Accessed July 13 2016.

Some of the main causes of corruption are acknowledged to be excessive regulations and authorization requirements. While some scholars have studied the negative impacts of corruption on social and political trust, others have pointed to ways corruption can facilitate economic and political efficiency by circumventing bureaucratic ineptitude. Corruption can refer to both public officials' actions to exploit their offices for private motivations, or to the mobilization of resources (connections, knowledge, and financial means) to *manage* the pre-existing corruption from public officials. Considering the unpredictability of water flows, corruption narratives can also be analyzed as a means of making sense of water flow mysteries (Bjorkman 2015). The discourse on corruption may or may not be disproportionate compared to actual corruption of water department officials. Nonetheless, the idea of corruption is part of the common conception of why and how the water flows in Mumbai. Corruption is therefore *expected* from the water department, preventing it from making any decision that *might* be perceived as corruption, contributing to its inertia.

Paragraph 4: Water Politics in Slums

Despite the bureaucratic nature of the water department's functioning, we must keep in mind that actions and decision affecting water distribution in Mumbai also reflect individuals' and officials' decisions. The term 'bureaucrat' tends to convey the idea of somebody routinely applying fixed rules. Bourdieu highlights that bureaucratic actors are not machines that mechanically apply rules and regulations. They will instead do things in a manner that they think works best as learned through their experience, their judgement being based on various considerations like conflict minimization or career advancements (Bourdieu, 1977). Rules and regulations are rather resources in the hand of state actors, who enforce them only if the interest to enforce them outbalances the interest to make an evasion (Zimmer and Sakdapolrak 2012). Acknowledging how rules can be used or discarded by water department officials and staff, allows to consider how water can be a tool for politics, to improve one's status or increase their power. Water service provision becomes a resource used by politicians to seek political profit, and electoral support including from slum dwellers who represent a huge vote bank. Water governance processes can be seen as negotiated practices, where politicians aim to use access to water to gain votes.
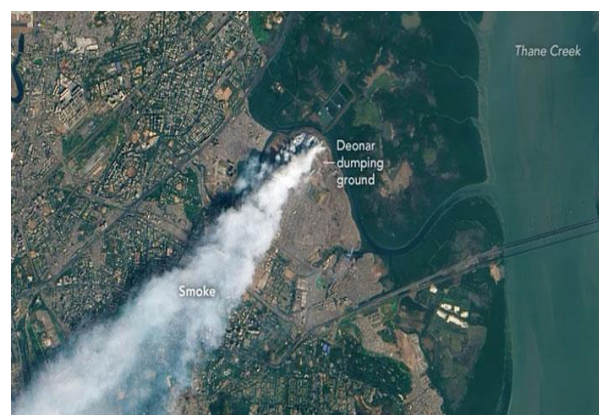
However, slum dwellers are no passive subjects to governing practices. They, in turn, try to influence state representatives' conduct as well (Zimmer and Sakdapolrak 2012), using their votes to negotiate. This system also allows for the perpetuation of a patron-client relationship

(Galli 2013). As services are never delivered on the basis of 'rights', the municipality can always take them away again at will, hiding behind the rules and regulations. Politicians' solutions and interventions remain extremely piecemeal, showing voters they rely on their personnel mercy to act on their behalf (Zimmer and Sakdapolrak 2012). Thus, despite small successes, residents are not able to address long term solutions to water access problems.

The neighborhood of Shivaji-Nagar Bainganwadi in the M-East Ward is considered an area where water supply poses problems, and is locally described as an illegal slum. Because it's recognized as an illegal slum, it is by extension considered as unplanned for, which is the reason why the water supply infrastructure does not serve this area. This perception of the neighborhood reflects the international theories converging to the notion that slums arise from lack of planning, and should therefore be prevented and upgraded using planning-related tools. As proclaimed by the United Nations 2009 Global Report on Human Settlements, planning «will have to play a significant role in providing alternatives to the formation of new slums; given the anticipated doubling of the urban population over the next generations ». These notions have been the foundation of Mumbai's efforts to plan, bulldoze and rebuild towards a slum-free city with the support of the international development community. The Shivaji-Nagar Bainganwadi's neighborhood history, though, illustrates that slums are not necessarily the result of unplanned, illegal settlements. Indeed, Lisa Bjorkman's investigations to understand the slum's water supply issues revealed that this specific neighborhood was planned (See gridded pattern of the neighborhood).
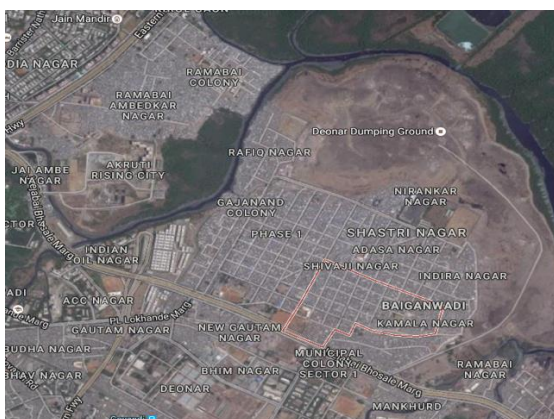
Source: Google Earth, August 2016   Source: NASA, February 2016

The history of Shivaji-Nagar Bainganwadi as reported in an article published in 2014 in the International Journal of Urban and Regional Research provides an interesting perspective on how water governance can affect poor populations in Mumbai (Björkman 2014). As it today has the reputation of being an illegal slum, Shivaji-Nagar Bainganwadi's past as a planned

municipal housing colony in the 1970s has been forgotten. Maps and reports show that the plans for the neighborhood was subject to contradictory information. While the 1964 plan labeled the area as a « marshy land », the same area became a colony in the 1970s, while also being described in the report on the Development Plan as a dumping ground. At the time the plan was approved, the land, which had been considered sufficiently remote to receive the city's trash, had already received 60 years' worth of Mumbai refuse. Although mentioning the area might not be used as a garbage dump for much longer, the report provided indications for different possible conflicting future use of that piece of land. The opportunistic and brutal demolitions that occurred under the Emergency Era through the process of demolition, resettlement, and migration created the enormous colony at the edge of the Deonar dump in 1976. The gridded layout, and the fact that water pipes were installed at some point indicate that the neighborhood must have been planned, but time has made any other evidence of planning disappear. The majority of families who were allotted plots there never actually settled and left their empty plots behind, preferring to go back to the city where they had business or stay with family instead of living next to the city's dumping ground, the smell of which was horrific. Despite the presence of legal water pipes, which in the 70s used to provide 6 hours of pressurized supply, getting water soon became challenging as well. By the 1980s, many of the municipally supplied taps ran dry and were abandoned. One of the reasons for the pipes running dry was that the water department built their plans for the two following decades based on the 1967 Development Plan, and on projected population's estimates. But with the Emergency-era demolitions and migrations in 1976, population growth and density changed. A second factor contributing to the pipes running dry was that another populous settlement, Kamla Raman Nagar, managed to arrange for connections on the Shivaji-Nagar Bainganwadi network, despite having closer access to mains. This further reduced pressure and supply for Shivaji-Nagar Bainganwadi. People created more connections in the hope that some would produce water and used increasingly powerful booster pumps to try to suck out water from drying pipes. These practices were necessary but illegal, slowly pushing the population of Shivaji-Nagar Bainganwadi towards informality and illegality, and ultimately being considered as a slum.

Conclusion Chapter 2

The Mumbai water system, one of the eight largest water supply bodies and run by the BMC Water Department, faces many challenges to supply water to its residents despite a steady flow of water coming from 7 nearby lakes. The water flow meeting both quantity needs and quality
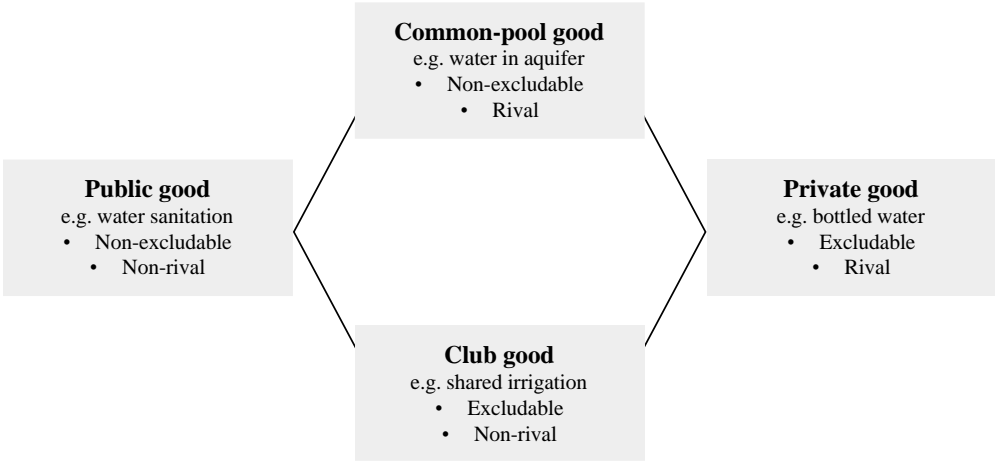
standards at source, the Mumbai water problems arise at the distribution level. The intermittent supply provides water only four hours of water per connection per day on average, and the leakage leads to contamination of water in non-pressurized pipes and to a high Non Revenue Water percentage. Residents practices, including the use of booster pumps and illegal connections in some areas, further contribute to the system's deterioration. The unpredictability of the water network can be better understood by considering how market mechanisms were mobilized during the liberalization era to build the city, leading to a mismatch between the over ground and the underground infrastructure, and also to the obsolescence of the Development Plan the water infrastructure maps were built from and were being built towards. Two decades of anticipation of privatization amongst bureaucrats, policy makers and engineers concluded with Mumbai's water infrastructure staying in the public domain, but had deep and lasting effects on the water department and its ability to do its job. A historical perspective on the BMC Water Department internal struggles helps understand the forces that shape the Mumbai's water network as a complex *system*. While Mumbai's dysfunctional water infrastructure has its roots within the liberalization era reforms and city transformation, it's poor performance has been exacerbated by overurbanization[24], corruption, politics and a bureaucratic mindset. Slums' poor access to water supply is commonly explained by the fact that these unauthorized settlements are unplanned, therefore the existing water infrastructure hasn't been designed to reach these areas. The case of the Shivaji-Nagar Bainganwadi neighborhood illustrates how that explanation might be over simplistic, and « how politically mediated deterioration and criminalization of its water infrastructure (…) have transformed a zone from municipal colony to illegal slum » (Björkman 2014). In this case, illegality is an *effect* of people's practices to access water rather than its cause.

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[24] Mike Davis: Urbanization without industrialization

Chapter 3: Commodity or Human Right?

Paragraph 1: Water as a Private and Public Good

Neoclassical economics tends to classify goods in four groups: common-pool goods, public goods, private goods and club goods. Water in its natural state is usually considered as a common-pool resource, as it doesn't have clearly defined property rights. As a « rival » resource, meaning that the use of the resource reduces the amount for others (at least locally), the lack of ownership can lead to the resource overuse. Water in its natural state is also « non-excludable » which means users cannot prevent others from using the resource.

Common-pool good
e.g. water in aquifer
- Non-excludable
- Rival

Public good
e.g. water sanitation
- Non-excludable
- Non-rival

Private good
e.g. bottled water
- Excludable
- Rival

Club good
e.g. shared irrigation
- Excludable
- Non-rival

Source: Adapted from "Water as a Private and Public Good", Global Water Forum, 2015

Water infrastructure projects are usually non-rival and non-excludable, making them public goods. In theory, increasing the number of people who benefit from the infrastructure doesn't affect the availability of the resource. In the case of Mumbai's municipal water supply for example, defining the infrastructure as a public good can be debatable, as the water supply capacities are challenged with network extensions.

Water being a vital necessity, we all have a right to access water as a basic human right. From that viewpoint, it is difficult to exclude people from accessing it. In reality though, and as demonstrated in slums, it is technically quite easy to exclude people from accessing clean drinking water (unlike other common goods like air or sunlight). For example, a lack of investment in water infrastructure and privatization of wells can allow water to be bottled and sold a high price, or can make people depend on water tankers. Tap owners in slums who

organize water distributions to their neighbors, or « members » are managing water as a **club good,** which is, as described by James McGill Buchanan, something displaying characteristic that are somewhere in between public and private good categories (Ostrom 2010) In the case of club goods, it is not one user or the public who access them, but a group of users. Buchanan concluded that the core of the debate about goods was about « the sharing arrangements », whether these are organized by the state or by individuals in cooperation. From this perspective, excludability or non-excludability of water would be produced by social processes, and a result of society's choice to make the good common, or to use the market as a coordination device (Guesnerie 1996) to resolve the conflicts over terms of exchange. Recognizing water as a commodity through its marketization, for which a price can be agreed upon, comes to identifying a particular *situation* of exchangeability (Bjorkman 2015). It is only this decision that determines whether water should be allocated to the group of common goods, or club goods or private goods. The complexity of that choice lies with particular characteristics of water. Scarce natural resources, like oil, fish, or crop are typically determined by trade in markets. But water's specific characteristics could lead to inequitable allocation if left to traditional market mechanisms[25]. One of the main uses of water is for domestic purposes, like drinking, showering etc. These uses can be described as rival, because individual A drinking a glass of water prevents individual B from drinking that same glass, and excludable, because once consumed no one else can drink that glass. Such a good is described as a **private good,** which are typically traded in markets so they are allocated at their higher value uses[26]. Unlike other private goods, like clothes, or cars, water is unique in that it is also a human right. As such, water cannot be treated the same way as other private goods because selling water to those who value it most may exclude others from the basic amount of water needed to survive, which would be morally unacceptable. But once the basic needs in water are met, the additional water is no longer a human right and can be best allocated through markets (Green 2003). Another particularity of water is that when allocated as any other private good through a competitive market, the use of water can have impacts which are not taken into account in the costs to the user, e.g. overexploitation of aquifers, damage made to biodiversity. As these externalities are not reflected in the cost, the user does not take them into account when withdrawing water, which

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[25] Global Water Forum, Chris White. 2015. Understanding Water Markets: Public vs. Private Goods. [ONLINE] Available at: http://www.globalwaterforum.org/2015/04/27/understanding-water-markets-public-vs-private-goods/. Accessed August 11 2016
[26] Ibid.

contributes to water being undervalued and overused[27]. Therefore, some aspects of water can be allocated efficiently by the market, but only if the unique characteristics of water are taken into account and strong legislation is in place to avoid inequities.

During the 1992 United Nations International Conference on Water and the Environment in Dublin, water was declared an « economic good » under principle 4. As an economic good, a price is attributed to water to reflect its value and scarcity for consumers, and to allow to recover the « full costs » of water provision.

- **Principle 1**: Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
- **Principle 2**: Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- **Principle 3**: Women play a central part in the provision, management and safeguarding of water.
- **Principle 4**: Water has an economic value in all its competing uses and should be recognized as an **economic good.**
  - *"Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources"* (The Dublin Statement on Water and Sustainable Development).

The National Water Policy published by the Indian Ministry of Water Resources in 2002 echoes the Dublin Statement by arguing that « low consciousness about the scarcity of water and its life sustaining and economic value results in its mismanagement, wastage, and inefficient use ». This provision was adopted with a disapproval from many states, and with criticism for terming water as an economic good and for suggesting that water should be priced so as to « fully recover the costs » of operation and administration of water-resources projects[28].

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[27] Global Water Forum, Chris White. 2015. Understanding Water Markets: Public vs. Private Goods. [ONLINE] Available at: http://www.globalwaterforum.org/2015/04/27/understanding-water-markets-public-vs-private-goods/. Accessed August 11 2016

[28] The Hindu, Gargi Parsai. 2012. *Water Policy draft favours privatisation of services*. [ONLINE] Available at: http://www.thehindu.com/news/national/article2820794.ece. Accessed 02 August 2016.

Since water services are considered essential, their provision and pricing are politically sensitive and questions the accountability and legitimacy of the actors involved.

Paragraph 2: Transnational Anti-Privatization Discourses

Marketization of water is the framing process by which water, as an economic good, is set as a commodity to be managed by market logics and principles. This can be achieved by changing the legal environment and reduction of state subsidies for example. Privatization, on the other hand, refers to *who* may be involved in the various elements of marketization (Bjorkman 2015). Privatization in the water sector in particular can describe a multitude of different arrangements, ranging anywhere from a short-term contract outsourcing some maintenance operations to a full divestiture of the utility to a private entity. The different kinds of arrangements involving a private actor to any degree without resulting in a full divestiture fall under the umbrella term of public-private partnerships (PPP). With water being declared an economic good, international financial institutions advocate PPPs as a way to extend and rationalize services. As pointed out by Bakker, the policy framework promoted by the World Bank shifted from who should provide water to the « rationality underpinning its delivery: from a state-hydraulic model of infrastructure development planning to a logic of marketization » (Bakker 2005). While debates on privatization were going on, some cities became laboratories for policy experimentation.

In 1999, the signing of a forty-year concessional contract for the municipal water operations in Cochabamba, Bolivia, was one of these experiments which led to high-profile privatization debacles. The joint venture Aguas del Tunari, including a subsidiary of the Bechtel Corporation, was the only bidder and tried to implement a full-cost pricing scheme which provoked huge price hikes. In the goal to protect corporate interests from any financial risk, Aguas del Tunari was given the right to seize the property of delinquent customers and impose charges even on rainwater collected in local wells[29]. This led to massive protests in the streets, violently repressed by the police and military and causing the death of a 17-year-old boy. The Bolivian

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[29] The New York Times, Finnegan. 2002. *"Leasing the Rain"* [ONLINE] Available at:
http://www.newyorker.com/magazine/2002/04/08/leasing-the-rain. Accessed July 29 2016.

government was forced to withdraw the contract and the Cochabamba privatization became a symbol of anti-privatization activism.

In India, the anti-privatization activist movement translated in the acquisition by activists of documentation regarding negotiations between the Delhi Jal Board and the World Bank, using the new Right to Information Act. These documents revealed irregularities in the bidding process and led to the withdrawal of the Delhi government's loan application. PPPs have been implemented in cities all over the world, with nearly 600 projects (World Bank 2013). The PPP arrangements being different in all cities, it is difficult to assess PPPs performance and efficiency compared to publicly run water distribution systems. Unlike other sectors that have involved private actors like energy, water infrastructure has the particularity of requiring a huge and ongoing infrastructure investments. The seek for profit of the private sector, while aiming for efficiency and system improvement, doesn't necessarily translate into the investment and improvements that are really needed for the community's access to clean water in the long term. According to the World Bank's own project database, private participation in infrastructure for water and sewerage contracts registered a 34% failure rate between 2000 and 2010, compare to only 6% for energy, 3% for telecommunication and 7% for transportation for the same period.

Water being a vital common resource, an economic good and a human right, the debate over privatization raises fundamental questions on the responsibilities of the government and the markets in providing water, and how distribution should be managed to ensure sustainability and equity.

Paragraph 3: Water as a Human Right

After the withdrawal of the private sector from the Cochabamba water provision project, Bolivia nationalized all natural resources, such as gas and oil, and the constitution has been modified to specify that no natural resources can be privatized. Article 349 declares, « Natural resources are the inalienable and indivisible property and direct dominion of the Bolivian people and will be administrated, in the collective interest, by the State ».

In response to the Castalia report on the privatization pilot in the K-East Ward, NGOs and civil society representatives united under an anti-privatization group called Mumbai Pani (Mumbai Water). The proposal for prepaid metering led to Mumbai Pani members being arrested during a stakeholder meeting that turned violent in 2007, when accusing the BMC of

being « World Bank agent ». Echoing the transnational anti-privatization discourse, the Mumbai Pani movement was opposed to water being managed as a commodity, and claimed it was a human right, covered by the constitutional right to life, as it had been recognized in the *Bhash Kumar vs. State of Bihar* case in 1991 by the India's Supreme Court.

The international claim for the right to water was turned into reality in 2010, when the UN General Assembly formally recognized the right to water and sanitation. The Resolution was initiated by the Bolivia UN Ambassador. Though this declaration has no legal implications, it is a strong political message to the world. In 2012, the NGO Pani Haq Samiti challenged the State Government Circular dated 4th March 1996 which provides that the local authorities shall ensure that the water supply is not released to any unauthorized construction, prohibiting water connections to 3 million people in Mumbai slums. Contesting the BMC Water Department decision to not supply water to slums settled after the 2000 cutoff date, Pani Haq Samiti took the matter to the Bombay High Court by filing a public interest litigation on behalf of the slum dwellers from various parts of the city. The following information on the developments and arguments leading to the ruling are sourced from a 2012 Bombay High Court document and made available online by the International Environmental Law Research Centre.

The BMC Water Department defended its position in not providing water to post-2000 slums, highlighting that providing water to these slums will encourage the construction of settlements in ecologically sensitive areas and irreparable damage will be done to the environment, and that the « law abiding tax payers cannot be penalized by providing the water to the occupants of illegal slums ». The court, while reminding that these slums are not authorized and that its occupants have no right to retain the illegally constructed huts, concluded that they « cannot be deprived of their fundamental right to food and water, which is an integral part of the right guaranteed under article 21 on the ground that they are in occupation of an illegal constructed hut ». The Court also highlighted that slums are due to the authorities' failure in providing housing for its workers, pointing out that none of the Public Authorities in Mumbai are able to provide residential quarters to its employees. Indeed, information provided under the Right to Information Act showed that the occupants of post-2000 slums include employees of the government itself, as well as employees of the Municipal Corporation and other Authorities. These considerations support the fact that the authorities are failing to house their own staff, and show that « the notion that the criminals or anti-social elements are occupants of these slums is without foundation ».

The case also highlights an obvious but fundamental point which is that thousands of people live in these slums, and people need water to survive every day. Therefore, alternative strategies for access to water are without doubt being employed. The methods of access to water are simply described as those who « one can imagine ». This suggests that the Court is being pragmatic, understanding that the realistic question at stake is not if these people should get water, but rather if the municipality should provide it or if people should be left unserved, forcing them to turn to alternative and usually illegal solutions.

In this case, the Bombay High Court recognized the right to water for slum dwellers in post-2000 settlements but was also very cautious in defining the limits of this right. In particular, the ruling specifies that while the « right to get water is an integral part of the right to life conferred by Article 21 », it should be noted that a « citizen who lives in an illegal structure or slums *cannot claim the right to get water supply on par* with water supply made available to a law abiding citizen ». It is therefore left to the BMC to decide in what manner the water can be supplied which may « not be necessarily by providing water supply lines to the individual slums ». One of the options that can be considered as proposed by the Court is prepaid cards. The decision also specifies that the BMC « may provide for payment of water charges at a higher rate than the rate which is charged for water supply to the authorized constructions ».

This decision is historical in Mumbai's slum dwellers' struggle to access water, in establishing that the right to water is an integral part of the fundamental rights under article 21 including for people living in unauthorized settlements. While leaving the decision of the supply method to the BMC, the Court does suggest a few options such as group connections for every 7 to 15 families or the use of prepaid cards. These alternatives to standard connections can be subject to debate, but do show an effort in providing pragmatic solutions. A second important point is that the ruling established that water access should not be tied to the property rights of a slum, thereby disentangling security of tenure from the right to water. These two arguments allow the Court to cut through what were previously considered intractable legal barriers to water access in non-notified slums.

The ruling is a big step forward for non-notified slum dweller's access to water and for the right to water put in practice, but has its shortcomings. First, many slums may continue to be excluded from the water supply because the Bombay High Court does not have jurisdiction over central government land, where many non-notified slums are located (Subbaraman and Murthy 2016). Secondly, the Court does not address the underlying problem of security of tenure in that

it emphasizes that the government remains obliged to eventually remove non-notified slums erected after the year 2000, in accordance with existing law.

Conclusion Chapter 3

Water has specific characteristics that makes it difficult to classify, and the public-private dichotomy doesn't adequately deal with the wide diversity of institutional arrangements that humans craft to govern, provide, and manage public goods and common-pool resources (Ostrom 2010) In 1992, the Dublin Principles established that water should be recognized as an economic good, as a way to achieve « efficient and equitable use ». This terminology was used in the 2002 National Water Policy in India as well. Access to clean drinking water was also recognized as a human right by the United Nations General Assembly in its resolution of July 28th, 2010. These considerations add to the pre-existing ideological debates on the role of public and private actors in the water sector.

With the main objectives of leveraging on private sector's capital and expertise, and of having access to grants, cities around the world have turned to PPPs to improve and manage their water services. In 1999, the Bolivian government privatized the Cochabamba water services. The water tariffs increase and the practices employed by the private company to collect payments triggered a series of protest in the streets of Bolivia, and eventually led to the departure of the company from the country. The Bolivian protests and the Cochabamba project failure became a worldwide symbol of anti-privatization for the general public and for the emerging transnational anti-privatization movement. The Bolivia UN Ambassador played a leadership role in recognizing water as a human right in 2010.

In India, while access to water has culturally been considered a right, Mumbai's residents living in post-2000 slums are excluded from access to municipal water, as established by the circular issued by the government of Maharashtra in 1996. On behalf of slum dwellers, the NGO Pani Haq Samiti took this matter to Court in 2012. The ruling from the Bombay High Court recognized the right to water for slum dwellers in post-2000 slums for the first time, ordering the BMC Water Department to provide water to all regardless of tenure or eligibility to slum redevelopment schemes. Nonetheless, the ruling presents some limitations in effectively addressing the issue of access to water in slums. For example, the obligation for the BMC to provide water doesn't apply to slums on central government land, and the price and method of distribution are not specified. Yet, the ruling is a big step forward in recognizing the right to

water for all slum dwellers, and underscores « the fact that legal, institutional and political barriers are often greater obstacles to expanding water access than monetary or technical challenges, especially for poor urban communities » (Subbaraman and Murthy 2016).

Conclusion Part I

Mumbai is currently the most populous city in India, with nearly 13 million residents. This megacity counts some of the largest slums in the world, home to nearly half of Mumbai residents. The growth of slums in Mumbai like in many other cities in developing countries finds its origin in population growth and overurbanization, defined in simple terms as urbanization without industrialization (Davis 2006). Considered for some time like a problem about to find a solution, or a symptom of poverty that would vanish as the country developed, slums have not been clearly defined and studied on a global level until relatively recently, leading to the 2003 UN-Habitat report. This global assessment provides useful indicators to define and analyze urban poverty and highlights that slums are a consequence of poor urban planning that can only be addressed with adapted inclusive policies.

As Mumbai focused on its vision of becoming a World Class City, poor urban planning and population growth exacerbated the low-income housing shortage. A series of schemes were put in place to try to address these issues under the World Bank's recommendations. In 1991, the private sector entered the slum rehabilitation scheme business via Transfer Development Rights (TDR), a market mechanisms incentivizing builders to provide houses for the poor and public amenities in exchange for the right to build on higher-value land. While using market mechanisms to resolve the city's land puzzle, Mumbai successfully attracted investment and construction of luxury buildings, but the Slum Rehabilitation Scheme outcomes failed to meet expectations. The low income housing shortage remained unsolved and slums kept growing. In 1995, the electoral promise to provide housing to every family living in slums generated laws and policies that differentiate slums according to the date of settlement. Any slum settled before the election could benefit from the scheme (ensuring votes from slum dwellers) while any slum settled after 1995 would not be eligible (in order to discourage more people to settle). This 1995 cutoff date differentiates the authorized from the unauthorized settlements, those eligible to become notified or not, which conditions their access to municipal water supply.

While building the Mumbai skyline, liberalization also had a major impact on the city's underground infrastructure. The Mumbai water system has become a major problem for the city, with unreliable supply, leakages and network breakdowns affecting the whole city. The water infrastructure was rendered obsolete by the marketization of development rights and constructions aimed at building an attractive World Class City. Capitalist urbanization and years of speculation around privatization of the water distribution system in the 1990s and 2000s gradually undermined the BMC Water Department's ability and resources to manage the network efficiently. In the late 2000s, the deterioration of the network and inability of the BMC to 'fix it' became another pretext for privatization. The attempts at privatization eventually failed in part because of the vocal and persistent opposition from civil society and the media, in the context of anti-privatization transnational discourse. But the Mumbai water governance crisis continues, with water being used as a power tool to serve profit, interests and political agendas. It is also used to marginalize communities as shown in the case of the Shivaji-Nagar Bainganwadi neighborhood that was gradually criminalized through access to water practices. The anti-privatization activist groups that participated in derailing the Mumbai water supply privatization found another battle to fight with the recognition of access to water as a human right under the Indian Constitution. In 2012, the Mumbai based NGO Pani Haq Samiti filed a public interest litigation on behalf of slum dwellers and denounced the decision of the BMC Water department to not provide water to non-notified slums. The ruling of the Bombay High Court has limitations but is a first step for the recognition of access to water as a human right which the BMC is responsible for. With this ruling, the Bombay High Court is challenging the cutoff law that proscribes access to water services to some neighborhoods, a law that is peculiar *only* to water services and *only* to Mumbai. The efforts to get water to all slums continues as the BMC's draft policy states that slum dwellers living on central government land, a significant number, are outside of the Bombay High Court jurisdiction, and will therefore need to obtain a no-objection certificate from the central agency before approaching the water department for water supply. In addition to this exclusion, the BMC draft policy also requires slum dwellers who do get water to seek renewal of their water connection every year from the water department. Requesting a yearly authorization contributes to rendering the settlers claim to urban housing invisible. Through these bureaucratic complexities and conditionality, it becomes apparent that « the city officials are anxious about extending water services to settlers because these services can be used by settlers to make a legal claim to the house these infrastructure serve » (De Schutter and Pistor 2015). Cost considerations and water scarcity are not the only reasons for the city's reluctance in extending the network.

In 2014 in the neighborhood of Shivaji-Nagar Bainganwadi, the policy framework preventing some slum dwellers to be eligible for a free connection transfer led to a confrontation between the BMC engineers working on establishing a new network and the slum dwellers fighting to keep the old network, in which they had invested. Frustrated with such policies that prevent efficient water supply planning and needed infrastructure work, senior water engineers urged for the Government of Maharashtra's Urban Development Secretary to review the policy and delink the water supply with the legality of structures[30].

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[30] Mostly Economics, Lisa Björkman. 2015. *History of water supply in Mumbai and BMC's bizarre policy*. [ONLINE] Available at: https://mostlyeconomics.wordpress.com/2015/03/25/history-of-water-supply-in-mumbai-and-bmcs-bizarre-policy/. Accessed 13 August 2016

PART II: THE MARKET APPROACH TO PROVIDING WATER IN SLUMS

Apprehending the role of the private sector in providing water to slum residents requires to identify current actors involved, in both the formal sector and the informal sector. Slum residents tend to be marginalized through both private and public water distribution systems, as purchasing packaged water as a commodity is prohibitively expensive, and the BMC water supply is denied or inadequate to cover all needs. Consequently, the informal sector ensures the provision of water for a huge proportion of slum dwellers. Current practices to access water and its use at household level contribute to higher contamination rates and health issues, especially in the most underserved neighborhoods. We will see how market-driven approaches that meet BoP demands in affordable clean water could help change dangerous practices and facilitate access to water.

Chapter 1: Formal Actors in Mumbai's Water Supply

Since India's independence, it has been implicitly accepted that central and state governments are responsible for providing water[31]. After two decades of anticipation over the privatization of the Mumbai water provision, the long awaited project of involving the private sector was derailed, partially through the mobilization of the Mumbai Pani activist group and the media in the context of the emerging transnational anti-privatization movement. While the BMC Water Department remains in charge of supplying water to the city, an overall understanding of the actors involved in urban water supply in India and the current trends in the water sector is necessary to apprehend how and why the private sector has a role to play, including in access to water for the poor.

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[31] Ritimo.org, Richa Bhardwaj. 2013. *People's Resistance & Struggles against Water Privatization in Mumbai*. [ONLINE] Available at: http://www.ritimo.org/People-s-Resistance-Struggles-against-Water-Privatization-in-Mumbai. Accessed 27 July 2016

The BMC Water Department

Despite the staff shortages discussed previously, the BMC Water Department is nonetheless an impressive organizational structure, including multi-levels of engineers and sub-engineers for each area, the *chaviwallas* operating over 1000 valves on a daily basis, and plumbers running around the city fixing, adding and removing connections.

In India, there is a widespread cultural notion that water, as a human right, should be free. This notion has led to low prices on municipal water with a significant amount of subsidies reaching 0,5% of the gross domestic product in India (OECD, 2007). For residential areas, Mumbai's water prices are between 4.3 and 17.3 rupees per 1,000 liters depending on consumption, on average 50 times less than the price of water in Europe, and 3.5 rupees per 1,000 liters for slum dwellers in notified slums, as of June 2015 (BASF 2015), while the price for the BMC Water Department to supply water is up to 16.11 rupees per 1,000 liters. This is common practice in all countries, where water supply is provided through a centralized network considered as a public infrastructure issue, built by the public supplier, whose users benefit from subsidies on the price of the water. However, this can have some undesired effects. For the country as a whole, this results in cheap public water supply reaching the urban populations, and the rural population outside the network, usually the poor, being underserved. In Mumbai, even though the BMC Water Department is a public utility, cost considerations contributed to the department's reluctance to extend the network to low paying slums (Anand 2011). Also, access to public taps, especially in peri-urban areas, does not guarantee water quality. The water being treated at its source, it often gets contaminated on its way to the end-users' taps because of leaking pipes and contaminated water entering the non-pressurized network during interruptions. Higher prices on water for industrial and commercial purposes allow the BMC Water Department to make significant profit every year (Anand 2011).

The Private Sector

Considering that piped water was never distributed more than a few hours a day, that quality and reliability of service were poor and the cost recovery across all cities was low, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) encouraged states and cities to engage with the private sector to improve services in accordance with the National Water Policy recommendations (Water and Sanitation Program 2011). At the international level, The World Bank's private investment arm, the International Finance Corporation, is promoting the

involvement of the private sector in water infrastructure and supply through PPPs. The rationale for involving the private sector is to address the issues related to the current situation of « complex fragmented institutions with little accountability, inability to meet standards, weak commercial orientation and the absence of a regulatory framework focused on customer service and financial sustainability » (World Bank 2013). The goal is also to attract private investment, but this seems to be a secondary objective as most initial capital investment rely on external grants or public agencies, at least for PPPs in India. (Annex 2)

In India, the private operators are mostly Indian companies, as it is assumed that domestic operators may be able to mitigate the risk better than international firms, « because their local knowledge enables them to navigate through the local project environment, which tends to be politically challenging in the water supply sector » (Water and Sanitation Program 2011). A 2013 report from the Water and Sanitation Program specifically reviews PPPs in Indian cities, and underlines that PPPs have been adopted as a sector strategy in other infrastructure sectors such as energy or roads & highways, but PPPs in the water sector have been more project-level initiatives. The regulatory framework to accommodate PPPs, in India as in most countries, has been perceived as inadequate or inconsistent, and private investment in water infrastructure is low. Another reason for water sector PPPs not moving forward as much as in other sectors is the lack of support from stakeholders. The term PPP can include a wide range of arrangements which sometimes involve the private sector on only a small portion of operations and for a limited time, as illustrated below.
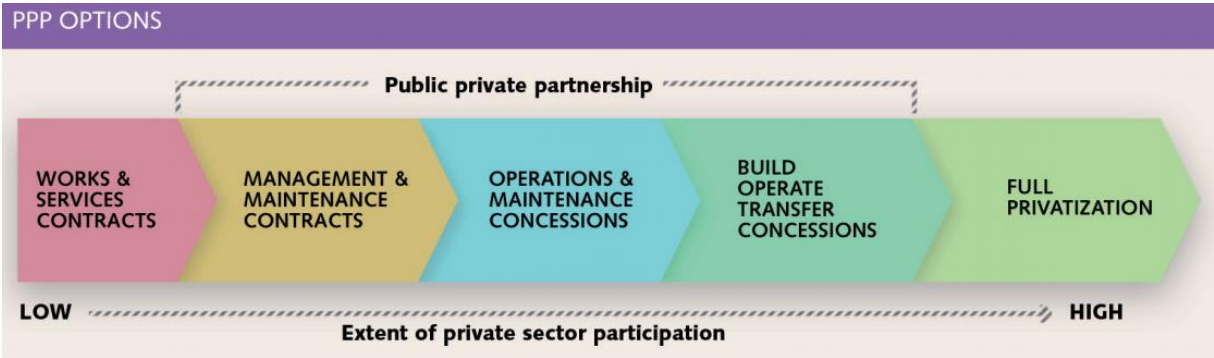
Source: Main Types of PPP, Public-Private Infrastructure Advisory Facility

Despite the variety of arrangements and rationales behind each contract, PPPs in the water sector have been consistently subject to « quite emotive debates, (…) made out to be « privatization », which dramatizes the notion of a public good being used at the behest of private profiteers » (Water and Sanitation Program 2011).

Since the government of Maharashtra decentralized responsibilities for water supply services in early 2000s, the decision to engage in a PPP sits with the municipality (World Bank 2013). A few cities in India have decided to involve the private sector in its water supply operations, including Latur, Aurangabad and Nagpur in the state of Maharashtra. As in all water projects, with the exception of Latur, the target was clearly 24x7 water supply and other service delivery operations, which is a shift from the focus on asset creation in the 1990s (Annex 3). Far from a one-size-fits all approach, cities are trying to design PPP structures that suit their context and specificities.

In Nagpur, after a pilot project was deemed successful and helped build support among a segment of customers and NGOs, the city decided to scale-up the initiative. This was made possible by securing a grant from JNNURM covering 70% of the costs, the 30% remaining being secured with a 25-year performance improvement contract awarded to a consortium of Vishvaraj Infrastructure Ltd. and Veolia Water India. The project includes the Operations & Management of the existing distribution system (treatments plants and distribution network) and rehabilitation of a significant part of the network, including replacement of connections and meters. According to the contract, the performance obligations of the operator begin 5 years after the assets takeover, which was in November 2011. The Nagpur PPP is held as an example by the World Bank and the Indian government, and Vishvaraj Infrastructure Ltd. has received awards and recognitions for bringing uninterrupted water to an Indian city for the first time through a PPP. Yet, there is resistance on the ground to the project both from civil society and within the bureaucracy (Petitjean 2013). Understanding that the Nagpur water privatization scheme is a pilot project for the rest of India, opponents of the project highlight that the PPP has not yet proven its efficacy, and points out to the flaws and irregularities of the scheme. Local opposition groups report that there has been deterioration in services in some areas, and that the water tariff is increasing every year. Allegations of corruption and conflicts of interest have led residents to protest and city officials are calling for investigations on contract violations. Vishvaraj Infrastructure Ltd., which has emerged as a big player in India's drinking water scene, is a privately owned Indian company with no previous expertise in water treatment, distribution or management, that has made huge profits from its motorway concessions (Petitjean 2013). Vishvaraj Infrastructure Ltd. alleged closeness to the Bharatiya Janat Party

contributes to concerns on corruption[32]. Residents have also reported a number of mistakes and delays, in particular those involving the tanker trucks contracted to supply off-grid areas, and high rise of costs (Petitjean 2013).

According to the 2013 review from the World Bank, the targets as defined in the PPP contracts for Indian projects are not linked to operator revenue in a realistic manner, with only 5% of the annual operator revenue linked to service delivery standards for the Nagpur PPP for example (Annex 4). The World Bank review also noted that although the PPP contract is designed to improve operating performance, « the city has retained significant risks, and the consequence to the operator for any shortfall in performance is minimal ». This can have serious implications, as these « risk-sharing clauses may benefit the interests that may not be unhappy to see the project fail ».

Yet, multinationals are pursuing the dream of setting up PPPs in India, as the country offers the advantage of being an emerging market and its government openly supports the privatization of water, somewhat against the global current (Petitjean 2013). This would also be an opportunity for multinationals and private companies to show that they are able to innovate and adapt to serve the poor and developing countries' special needs. Being considered as « a partner of choice » in achieving the Millennium Development Goals would help justify the subsidies and advantages granted to them by the International Financial Institutions and by development agencies like the French Development Agency.

While the benefits and issues of the PPP on the entire city is being debated, the pilot project in Dharampeth, a neighborhood of Nagpur, which was described as a success, is not described as such in an independent review by the Administrative State College of India, done in 2011. The review concluded that the 24x7 supply of all houses had not been reached, with only 50% coverage. According to this review, residents did not change their habits and kept storing water[33]. The old pipes were not replaced which cancelled out any potential health benefits of

[32] India Today, Aditya Menon. 2012. *The rise and rise of Nitin Gadkari*. [ONLINE] Available at: http://indiatoday.intoday.in/story/the-rise-of-bjp-president-nitin-gadkari/1/226559.html/. Accessed 10 August 2016.

[33] Times of India, Anjaya Anparthi. 2011. *24X7 pilot project in doldrums, can NMC deliver across the city?* [ONLINE] Available at: http://timesofindia.indiatimes.com/city/nagpur/24X7-pilot-project-in-doldrums-can-NMC-deliver-across-the-city/articleshow/10014081.cms. Accessed 10 August 2016.

24x7 supply. A local politician accused the private consortium of purposely overestimating the volume of water distributed to inflate fees and of charging services and materials at a high price to the municipality, and then using low-quality material and underpaying subcontractors (Petitjean 2013). Whether these accusations are founded or not, they contributed to the city plumbers going on hunger strike, and this kind of financial opacity is a main source of resistance, which politicians can use to increase their campaign visibility and get votes.

On paper, the benefits of 24x7 supply are undeniable, with continuous supply preventing negative pressure and contamination, and suppressing the need for riskier and expensive alternatives. The switch to 24x7 supply has been the slogan used to promote and justify the involvement of the private sector in water supply. Of course, some opponents to any form of privatization argue that switching to 24x7 doesn't necessarily need to involve a private entity and the public supplier could achieve this on their own, or through Public-Public Partnerships for example as was the case in Malkapour (population 180,000) and Amravati (population 645,000). These two cities have shown positive results. These projects were led with effective communication with political representatives, the media, welfare associations and consumer groups on the benefits of continuous supply. IT played a key role in monitoring networks, leakages and pressure on real-time basis and in the case of these projects, a geographic information system (GIS)-based hydraulic model was used for mapping and distribution network (Chhabra 2015).

But some people in India, including industry experts (Chhabra 2015) oppose even the notion of continuous water supply, highlighting the risk of encouraging wasteful practices on this resource that is scarce in many parts of the country. For the average man, rejection of 24x7 supply is more a reflection of anticipated water tariff increases. According to Sunita Narain, Director of the Centre for Science and Environment in Delhi, the « current generation of PPPs are fundamentally at odds with Indian cities in terms of financial viability », and contracts are designed and implemented with the illusion that all costs for constructing, operating and maintaining water revenues could be recovered through revenues collected from users, at least at some point in the future. She argues that in practice, « the reality of poverty and of inadequate management and governance system makes this approach totally unrealistic ».

On the corporate side, disruption from politicians and anti-privatization groups have been raised as elements making the PPP model's implementation more difficult. Private companies have blamed municipalities for not providing accurate data on the existing systems and

consumptions and not being able to provide maps of the infrastructure, which has been identified as a real risk for PPPs success by the World Bank's 2013 Review.

The BMC Water Department has contracted Suez Environment for a five-year period (2014-2019). The program Water for Slums is a component of this contract (Service #8). Alexia Michels, Head of the Water for Slums, provided some context on the ongoing work as well as information on the scope of the project which isn't available (yet) online. In this sensitive political context, the municipality wishes to be discrete on the involvement of the water sector multinational involvement in Mumbai, even though Suez Environnement's role is advisory. The full project's scope is to provide short, medium and long term recommendations to improve zoning, network mapping and leakage detection for Mumbai (minus Mumbai City), as a continuity or « re-launch » of the WDIP, with the target of shifting to 24x7 supply and decreasing NRW. The project includes the improvement of information management (GIS, customer information system, Water quality monitoring process).

The project is progressing but is experiencing some delays due to data from the municipality which is missing or obsolete, and a challenging working relationship with the BMC Water Department collaborators. As slums are highly politicized, the BMC Water Department tends to distance itself by both avoiding to go on-site and building perceptions on misconceptions. Work and discussions are therefore needed for Suez Environnement to inform and convince the BMC of the actual situation in some slums. The Water for Slums project includes legalizing connections, creating new connections and informing slum dwellers on the rights to access connections, their responsibility to pay on how to do so.

Source: Pilot Wards Presentation, WDIP, Suez Environment internal document, 2015

Non-Governmental and Community-Based Organizations

The early steps taken by the BMC Water Department to improve the network, potentially through privatization, was closely monitored by social activists, citizens and academicians who joined to formed the group Mumbai Paani. The first objective of the group was to create political awareness of the World Bank intervention in facilitating the WDIP pilot, and to ensure that decisions were made respecting democratic governance processes. The group then moved to a second objective: raising awareness and mobilizing citizens. Mumbai Pani grew into a group that defines itself today as a « collective of like-minded community-based organization[34], people's movements, NGOs and individuals », working for the right to water for all as «

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[34] Public or private nonprofit organization (including a church or religious entity) that is representative of a community or a significant segment of a community, and is engaged in meeting human, educational, environmental, or public safety community needs.

guaranteed by the Constitution of India in Article 21 »[35]. In 2012, the Mumbai-based NGO Pani Haq Samiti filed a public interest litigation, on behalf of slum-dwellers from various parts of the city, and challenged the BMC decision to not provide water to post-2000 slums. These are high profile advocacy groups involved in the struggle for access to water in Mumbai slums, and their work is possible with the support of the various, big and small NGOs that have been active in slums for decades. These NGOs include relief and welfare organizations, international NGOs involved in the slum participatory upgrading programs, and many community-based organizations.

Main types of NGO in slums

1	Relief and welfare agencies, including missionary societies.
2	Technical innovation organizations that pioneer innovative approaches in specialist fields.
3	Public service contractors, mostly funded by Northern governments and that work closely with Southern governments and official aid agencies to implement components of official programmes.
4	Popular development agencies, Northern NGOs and Southern intermediary counterparts that concentrate on self-help, social development and grassroots democracy.
5	Grassroots development organizations and locally based Southern NGOs whose members are the poor and oppressed themselves, and which attempt to shape a popular development process. They often receive support from popular development agencies.
6	Advocacy groups and networks: organizations that have no field projects but that exist primarily for education and lobbying.

Source: The Challenge of Slums, UN-Habitat, 2003

By their extensive work in the field, these NGOs have gathered a lot of data on urban poverty. They have also been the link between the communities and the government, as well as a link between communities and corporations, looking to implement CSR programs, for example. Indeed, slum rehabilitation can be treated as CSR activities by the Ministry of Corporate Affairs, considered as « measures taken for reducing inequalities faced by socially and economically backward groups ». Realizing the limited impact of traditional top down development programs[36] for slum upgrading, international NGOs and development agencies have increasingly relied on community-based organizations to find solutions that are suitable to people's needs and the environment. NGOs have been key actors in helping communities become active participants instead of program recipients, especially the grassroots support

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[35] The Right to Water: A Constitutional Perspective, Jayna Kothari. 2006. [ONLINE] Available at: http://www.ielrc.org/activities/workshop_0612/content/d0607.pdf. Accessed 08 August 2016.

organizations[37]. Top down development projects in access to water – the great majority deployed in rural areas - have had a very high rate of failure[38], because communities do not know how to maintain the infrastructure, or because pieces that need replacement are not available to them or simply too expensive to purchase, for example. Learning from past mistakes and new successes, NGOs' efforts are increasingly focused on finding solutions adapted to each community which, in some cases, is efficient and sustainable but also face the challenge of scalability.

Conclusion Chapter 1

There is a strong cultural notion in India that water should be affordable, or free, and is a human right. For this reason, users benefit from significant subsidies. Despite the very low cost of water in slums, inequity persists even in notified slums because access is inadequate in terms of reliability, pressure and quality. Indeed, the existing network doesn't reach all slum areas and the water received at the end of the network is often contaminated. Though water issues are exacerbated in slums, water supply poses issues in the whole city, with hundreds of BMC and private tankers having to deliver water every day to make up for the network's problems.

Across the country, the Indian government has been encouraging cities to set-up PPPs to leverage on the private sector business principles and technology, with the objective to increase municipal water supply efficiency. Despite Nagpur being the first Indian city to switch to continuous supply through a full city PPP, and the World Bank holding this project as an example, the involvement of a private company has spurred criticism and local resistance, showcasing the social risks of privatization.

In this context, the BMC water department is currently pursuing the WDIP through a short-term contract, involving the French multinational Suez Environnement on an advisory basis. Suez Environnement assessment and recommendations' objective is to help switch to a continuous supply, upgrade the water system where needed and legalize connections in slums.

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[37] Development NGOs providing services and resources that enhance the capacity of impoverished communities and their organizations to build sustainable alternatives to their challenging life conditions, as defined by Rafael A. Boglio Martínez, 2008.

[38] The UN Joint Monitoring Program estimates the failure rate for most water points in Africa at anywhere from 30-60%.

Considering the long and difficult history of the BMC water supply with privatization, the city remains discrete on the ongoing work with Suez Environnement, as it could result in unwanted scrutiny from anti-privatization groups and NGOs. Groups like Pani Haq Samiti have demonstrated through the recent public interest litigation that they are determined to make sure the BMC Water Department fulfills its responsibility, implements the right to water for all and respects democratic governance processes.

Despite efforts and some progress made towards better supply and a recognition of slum dwellers rights, neither the private nor the public formal sectors are addressing the slums access to water in an efficient and sustainable way, which forces slum dwellers to turn to alternative water supply solutions.

Chapter 2: Current Strategies and Practices

The centralized public system produces inequality in access to water for slums at two levels: the city rules make it difficult for households to be eligible for a connection, and the BMC Water Department allocates less water to these connections – as opposed to « toileted structures » - through their daily practices including timing and limiting supply (Anand 2011). People living in slums therefore need to supplement their water supply by purchasing extra water or need to purchase all their water from the informal sector.

Paragraph 1: Available Strategies for Access to Water

The battle for access to water in slums is being fought on several fronts. As illustrated by the recent public interest litigation, slum dwellers and NGOs are organizing to establish the right to water for all as part of Article 21 of the Indian Constitution, and confirming the BMC Water Department's responsibility in realizing that right. As shifting demography, unplanned developments and new leakages force the BMC engineers to constantly rearrange the water system, slum dwellers who are fortunate enough to have a connection may see it go dry. They then need to re-negotiate their supply with engineers, social workers, politicians and authorities. The constant struggle contributes to social unrest with occasional protests. Yet despite the many

barriers to accessing water in slums, people in these neighborhoods find a way to get their water every single day.

Residents in notified slums are charged 3.5 rupees per 1,000 liters of municipal water, but have inadequate access to water, including uncertain timing, low pressure and poor quality. Safe bottled water is usually too expensive or out of reach. Slum dwellers are marginalized through both the public and formal private water distribution systems. Yet Mumbai's 6 million slum dwellers are finding ways to access water for drinking, cooking and hygiene on a daily basis. Today, approximately 10,000 private tankers are a necessary addition to the central distribution system and public water tankers. This water distribution system is almost exclusively in the hands of informal distributors who provide slum households with water (BASF 2015). Small scale water providers ensure the distribution of water in slums, creating a huge informal water distribution system which many slum dwellers rely on. In some areas, the informal water sector has a monopoly on the sale of water. The water source can be water tankers, illegal connections to the municipal water supply, but also groundwater and wells, which means the water quality is unreliable and usually poor. These informal providers also charge high rates compared to the municipal (low) rate, requiring slum dwellers in some areas to dedicate up to 15% of their income to water. Water sold via the informal distribution networks in Mumbai represent a yearly turnover of billions of rupees (BASF 2015). In some places people have found ways to get superior water quality by building their own informal local distribution network, tapping into fire hydrants for example (BASF 2015).

Taps can suddenly lose pressure or run dry. In some cases, it is particularly difficult for engineers to pinpoint the origin of the leakage because of the impressive number of small pipes that look like a chaotic mess, also referred to as « spaghetti pipes ». The taps can run dry because of the unpredictable nature of the network, or because the pipe has been stolen (steel piping has a high resale value) or the connection has been stolen (the water is being diverted). In such cases, spaghetti pipes have the advantage of being connected to individual houses, and each household knows precisely which pipe is theirs, allowing them to find the origin of the interruption. To lessen the risk of theft, Lisa Bjorkman's field interviews reveal that it is common practice for the owner of a connection to pay a local person living near the connection point to the water main so they monitor the comings and goings in the area. Any failure to pay this person, a self-described « social worker », can lead him to sell the connection himself. This is one of many possible examples of how the everyday risk of water infrastructure breakdown is managed by local knowledge and authority in slum neighborhoods. Though the connection

itself is legal it involves paying a « social worker » to protect the connection from theft, paying a broker to get approval from the BMC Water Department and a plumber to install the spaghetti pipe in the first place.

BMC water collected from illegal connections is often in the hands of the « water mafia » who then sells it to small-scale providers and slum dwellers. The water mafia sells the water at a high price, and the illegal connections are pointed out for causing additional damage to the water supply network. But it would be wrong to think of water mafias as individuals making a profit on water access as an isolated group. Access to the BMC water through illegal connections is often set up with the complicity of the municipal bureaucracy, in order to serve the profit or the interests of BMC officials, politicians or slumlords (Galli 2013). Such activities break the boundaries between the formal and the informal.

The findings from two studies performed in 2008 and 2011 in Kaula Bandar, a non-notified slum in Mumbai, shed some light on how the informal sector may operate (Subbaraman et al. 2013). Since Kaula Bandar is a non-notified slum, its population doesn't have legal access to municipal water supply, resulting in the creation of an informal water distribution system. Most informal water vendors live in the neighborhood. They extract the water from two underground pipes installed decades ago by the fire department using motorized pumps and hundreds of meters of hose to reach the community. By lack of any other option, the hoses go through trash dumps and are perforated. The system, though quite rudimentary, represents a significant investment and maintenance costs for the vendor, costs which are passed on to the community. According to interviews with multiple water vendors, a new motorized pump cost on average 17,500 rupees (318 USD), a used one costs on average 11,000 rupees (200 USD), and frequent repairs are required, generally costing 500 rupees (9 USD). Local officials sometimes confiscate the pumps, on average every few months, requiring a 500 to 1000 rupees bribe to get it back, if they are lucky. The hoses cost 5000 rupees (91 USD) for every 100 meters. Each vendor generally hires one or two other persons to facilitate water distribution, and these individuals are remunerated by receiving free water (Subbaraman et al. 2013). Considering these costs and the fact that the BMC water is sold at a very low price helps understand why slum dwellers are forced to pay so much more for water than the municipal water rate.

Whether water connections in slums are legal or illegal, it is common practice for households that have a tap to then sell their water to neighbors. These arrangements allow « members » to access the tap for a certain amount of time every day or on a regular schedule. Other ways to

get access to water, depending on the neighborhoods and availability, are public pumps, local shops that sell pouched drinking water in small quantities, or NGO-run water kiosks that sell treated water, for example.

Slum dwellers in both notified and non-notified slums use the whole range of strategies they have available to them, and make « diverse kinds of claims, as clients, as citizens, as friends and neighbors, as customers of roving plumbers » (De Schutter and Pistor 2015). Though having to mobilize many strategies is inefficient for slum dwellers, navigating through the political environment and local authorities is the only way to gain access to water.

Paragraph 2: Practices and Impact on Slum Populations

The strategies used to access water differ widely from one settlement to another, with non-notified slums like Kaula Bandar lacking any legal access to the municipal water supply, and others like large settlements in Dharavi having access to public taps. But even in the slums that have legal access to municipal water, the supply of water is overall inadequate and inconsistent, requiring schedules to be organized around water supply and to spend a lot of time waiting for water to arrive. This translates into lost work opportunities and lost income, especially for women who are in charge of collecting water, and missed school for children if they are in charge of collecting water while the parents are working. Having to rely on informal water vendors' forces unserved residents to pay high prices for water. Based on the studies conducted in Kaula Bandar in 2008 and 2011, it was estimated that people spend 52 to 206 times more on water than residents of notified slums with legal supply, depending on the season, which represents 5.9% to 15.9% of their monthly household income, or approximately 8.4% of their yearly income (Annex 5). The high costs result in 95% of residents using less than the World Health Organization recommended minimum of 50 liters of water per day. A few times a year, local officials raid and confiscate the motorized pumps tapping into the fire brigade pipes causing periodic failures of the informal distribution system. Such « system failures » introduce an additional significant increase to the cost of water and is a source of stress.

Contamination of water is, of course, also a major issue especially for slum dwellers using alternative informal sources of supply that may be of lower quality. Water-borne diseases, such as gastroenteritis, typhoid and hepatitis (A and E) are recorded in Mumbai every year, especially during the monsoon season. According to a joint study by the World Health Organization and UNICEF published in 2009, « some 386,600 children die in India every year of diarrhea, with

contaminated water being the main source of contamination ». Diarrheal illness in children is associated with both increased mortality and poor nutritional status. According to a 2010 survey in Kaula Bandar[39], about 46% of children younger than 5 years are moderately or severely underweight as compared to 36% in notified slums and 26% in Mumbai's formally housed population.

Contamination of water varies with seasons, with up to 50% of point-of-source[40] water samples contaminated during monsoon. Even when point-of-source showed no contamination during other seasons, the contamination in point-of-use water samples (water storage at household level) were high in all seasons with rates as high as 43% for *E.Coli* and 76% for coliform bacteria. In Kaula Bandar like elsewhere, water is available sporadically and just a few hours a day, so residents need to store it. In the Kaula Bandar studies, each household stored water in two types of containers.

- 100 to 300-liter plastic drums placed outside the home, which store water used for bathing, toileting, and washing clothes
- 1 to 50 liter containers kept inside the home, which store drinking water

Nearly all containers used for drinking water storage are wide-mouthed which allows people to directly access water with their hands. Such storage practices have major implications on water contamination at the household level. Poor or no access to improved sanitation facilities, open air defecation and poor hand washing habits explain the high level of fecal contamination. The same study revealed that nearly 60% of people didn't use any purification method, and about 25% used unreliable cloth filters (Annex 7).

Informal practices of slums to access water are pointed out by city officials and Mumbai residents as threats to the entire water supply network integrity. By creating illegal connections, the informal water sector contributes to pressure issues and to the contamination of the piped water. Though the quantity of water in the 7 lakes feeding the Mumbai water network is sufficient for the city's needs, the water supply network does experience issues that create water scarcity inside the city. The illegal consumption and practices of slum dwellers not only

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[39] Data from a 2010 India's National Family Health Survey of 811 children in Kaula Bandar
[40] In this case the point-of-source is the connection point to fire brigade pipes

contribute to increasing Non Revenue Water but are responsible for wasting water by storing more than they need. The slum dwellers practice of storing more water than they consume, and emptying and refilling storage containers when water is available again is also a regular practice in households, and the only reasonable strategy available to guarantee access to something so vital on a daily basis despite erratic supply.

Residents of non-notified slums have no other choice but to turn to informal alternatives to get water. But many settlers in notified slums *make* that choice. For example, water can dry up on a connection whose meter has been stolen, or is broken. In such cases, bills continue to be received, according to estimates based on supply norms. When people require a new connection at the BMC Water Department, they are told that they need to pay the overdue water bills (for water that never came out of the tap) before their request can be processed. They can then choose to either obtain the connection legally or illegally. The legal way involves paying a broker who arranges for the connection to be officially documented and to receive official bills. This comes at a high cost with no guarantee that water will actually come out of the tap. The second way, which is illegal, is to pay the broker less so he arranges the connection but without the official documentation. This second option is cheaper but involves the risk of having the illegal connection cut in a municipal raid. Still, many poor families decide to minimize their financial risk by choosing the second illegal way. For some officials and the public opinion, these informal and illegal practices can be perceived as choices, putting the responsibility on the individuals rather than attributing these behaviors or strategies to the root cause, which is the lack of adequate infrastructure. Strategies and current practices used by slum dwellers and current practices therefore contribute to delegitimizing any claims the residents might address to the state (Zimmer and Sakdapolrak 2012).

Conclusion Chapter 2

Even when legal connections are available, people have to rely on their local knowledge of the water supply network and understand local authorities to ensure the sustainability of their connection and of the water flow. Since not all households have a tap and the supply is inconsistent, neighbors put in place arrangements amongst « members » who can access supply from the tap owner for a given time and for a monthly fee. Despite the low price of municipal water available through legal connections in notified slums, the inadequate and insufficient water supply pushes slum dwellers to get access to water through the informal sector, as a supplement or as their only source. The informal sector is a diverse group, with more or less

control on the provision of water for a given area. These informal water vendors, and perceptions of them, range from the monopolistic water mafias to the local entrepreneurs providing a valuable service to the community. There are different theories on the extent to which these vendors, who illegally access municipal water and sell it for a profit, are operating with the active complicity of city officials and politicians. Regardless of the specific arrangements for each informal vendor, their activities break the boundaries between the formal and the informal, creating the link between the state and the slum dwellers (Anand 2011). Other options for access to water, depending on the status of the slum and neighborhoods, are public pumps or kiosks run by NGOs or by the community, for example. The diversity of Mumbai settlements shape the opportunities for water access, producing complex hierarchies of deprivation (South Asia Institute 2017). Settlers mobilize all strategies at their disposal to gain access to water, as clients, as citizens or as neighbors, through both public and private means. The most underserved slums rely exclusively on informal and illegal practices, which contributes to further criminalizing these neighborhoods. These practices have a significant impact on settlers who have to pay a high price for water, sometimes up to 15% of their monthly income, and who miss work or education opportunities because unreliable access requires a lot of waiting time and trips to the point of source. Some of the informal vendors source their water from unknown areas and their handling of water can lead to contaminants being introduced, even if the source is clean. This leads to water-borne diseases which affect young children in particular, causing higher child mortality and malnutrition rates in slums unserved by legal connections. Beyond contamination at the source or on the distribution circuit, the storage practices and lack of improved sanitation contribute significantly to water contamination. All these aspects - higher water costs, illness and health care spending, lost work and missed education opportunities- contribute to decreased productivity especially for women, keeping the underserved slum dwellers in a poverty trap.

Chapter 3: Market Potential for Water in Slums

Paragraph 1: « The Fortune at the Bottom of the Pyramid »

The importance of the informal economy for the city as well as for poverty alleviation is now recognized, as places like Dharavi are described as « pulsating with intense economic activity

». By some estimates, 40 to 60% of all economic activity in developing countries is informal, and involves most poor people who live in rural areas or urban slums (Prahalad and Hart 2002). In water provision, the high prices charged by informal water vendors in slums proves that slum dwellers can pay and do pay, even for access to sub-standard quality water.

According to the concept described in the article « The Fortune at the Bottom of the Pyramid » in 2002, such low-income markets should be considered by big companies as a « prodigious opportunity » to both make profit and bring prosperity to the underserved poor. Economically speaking, the « Bottom of the Pyramid » (BoP) is the largest and also the poorest socio-economic class of people across economies. This consumer segment consists of 2.5 billion people who live on less than 2.50 dollars per day, often in rural areas or urban slums. This concept argues that big corporations should review their perception on the bottom of the pyramid not being a viable market. It also acknowledges that successful business with the very poor would « require radical innovations in technology and business models » and would be a huge managerial challenge.

For instance, corporations have to rethink their understanding of scale, moving towards « highly distributed small-scale operations married to world-scale capabilities », use alternative communication channels, demonstrate cultural sensitivity and perseverance, and design products and services that are extremely affordable, to name a few. This consumer segment has drawn the attention of the biggest marketing firms like Hindustan Unilever Limited (HUL), due to the earnings potential from volumes of sales with low margins. HUL was a pioneer in adapting one of their products for poor customers. To do so, they created a new business system that included new product formulation, low-cost manufacturing processes, wide distribution network and special packaging for daily use. The new formulation responded to the practice of poor rural people washing their clothes in rivers, the distribution system was decentralized to leverage the abundant labor pool and, taking into account poor people usually rely on a daily income, was packaged for daily purchase. The creation of this formal BoP market for detergent led the way for competition, validating the poor as a profitable market and allowing for more options to be available to them. Having successfully addressed local market conditions with the detergent Wheel, HUL adopted the BoP as a corporate strategic priority.

Corporations can also capitalize on « drivers of innovation » (Prahalad and Hart 2002). For example, they can use increased television access among the poor to promote their products, and the decrease in governmental intervention can be used as an opportunity to build strong

cooperation with NGOs. The article popularizing the concept of « The Fortune at the Bottom of the Pyramid » argues that large multinational corporations are well positioned to trigger this revolution. Among their strengths, they have the resources to do the significant research work required to create a market, from product R&D to building and sustaining complex commercial infrastructures, and are best established to unite the range of actors required to successfully deploy these products and services, including NGOs, local governments, entrepreneurs and international development agencies. The authors argue that the BoP is a profitable market for corporations, but also makes a strong point on the humanitarian dimension and positive social impact of including the poor in the market economy. Commercial development is presented as a way to make products and services available to the poor that can help them improve their living conditions and contribute to poverty reduction.

HUL shows an interesting example of the market potential within the poorest customer segments, and how BoP products can have a significant positive impact on people's health, with its signature BoP product Pureit, a water purifier sold mostly in emerging countries. Procter&Gamble, the world's biggest consumer product company in the world, also introduced a water purifying product on the market, called PUR. Though the product was highly innovative, consisting of a powder that decontaminates water by stirring it and straining through a cloth, the sales were insufficient and it was considered a commercial failure in 2004. To be successful, a BoP product needs to reach a very high penetration rate – about 30% - to ensure high volumes and be commercially viable despite low margins. The main reason identified for the products' commercial failure was that the time needed to persuade customers they needed PUR and the time for them to learn how to use it was too long[41].

This echoes Erik Simanis'[42] critic of Prahald's model, who argues that a good product and low price are not sufficient to reach a high penetration rate, and that successful BoP business also depends on two other variables, the absence of which make the BoP product lines too costly to maintain: decent infrastructure for product distribution - also known as the « last-mile »

[41] Financial Times, Carol Seagle & al. 2014. *Case Study: Procter & Gamble's Pur*. [ONLINE] Available at: http://www.ft.com/cms/s/0/1415f250-44fe-11e0-80e7-00144feab49a.html#axzz4Ibpbw3WY. Accessed 13 August 2016.
[42] Managing director of market creation strategies at Cornell University's Sustainable Global Enterprise

problem - and consumers who are already familiar with the product[43]. This second condition, familiarity with the product, is explained by the fact that BoP consumers aren't used to experimenting new products and lack what anthropologists call a « cultural competence » for product consumption[44]. Getting across the learning curve therefore requires substantial sales and marketing efforts, and many touch points. The fact that the BoP already used detergent sold by local shops previous to HUL's product launch were pre-conditions that allowed its success.

Recognizing PUR's commercial failure, the company decided to distribute it through a non-profit model. The model of donations along with sales at cost-recovery prices to aid organizations – acting as a free distribution network - allowed PUR to stay viable in the market[45]. This decision proved to be very beneficial for the company, turning a commercial failure into a humanitarian success. This increased the brand's presence in emerging markets, allowed to learn about new markets and earned Procter & Gamble a lot of valuable marketing attention. The climb of Mount Kilimanjaro to raise awareness on access to drinking water challenges, involving 12 celebrities and a Procter & Gamble senior executive, allowed the company to gain 50,000 Facebook fans in one day, for example. PUR also allowed the company to increase its sales in traditional markets by launching an initiative where consumers can support the Clean Water Program by redeeming coupons on Procter & Gamble products. As summarized by a senior executive, the distribution of PUR and awareness campaigns « is good business, as well as good philanthropy ». The company's dedication to its Clean Water Program and philanthropic operations also had a very positive impact on energizing employees within the company, retaining competent staff and recruiting new talents.

But considering the examples of HUL and Procter & Gamble, we can make the following observations concerning the benefits of focusing some R&D efforts and market research into the BoP for multinational companies. First, Puerit is considered a successful BoP product and has a great positive impact on its customers' health. If sales are insufficient on the BoP products, big companies can still afford to create and sustain their market with profits generated from their other products sold to upper and middle class, and continue learning how to penetrate the

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[43] Harvard Business Review, Erik Simanis. 2012. *Reality Check at the Bottom of the Pyramid.* [ONLINE] Available at: https://hbr.org/2012/06/reality-check-at-the-bottom-of-the-pyramid. Accessed 21 August 2016.
[44] Ibid.
[45] Ibid.

BoP market. The example of the PUR product shows that for big companies, innovative technology can be valorized and bring business-related benefits even if the product fails on the market, which is made possible through their international outreach and connections with diverse actors. Multinationals have long-term strategies to ensure their sustainability, and they understand that successfully engaging with the BoP today could lead to even greater potential profits in the next decades, when the income of some segments of the BoP rises.

The size or existence of a fortune to be made at the BoP is debatable. As is the potential of inclusive capitalism on poverty alleviation. Prahalad's proposition also received some criticism from Aneel Karnani who argued that the market at the BoP is very small in terms of earning and there is no «Fortune» to be made. Karnani's theory is that poverty alleviation is possible by considering the poor as producers rather than as a market of consumers.

While Prahald's concepts provides some theories to make the « market work for the poor » through consumerism, new models and concepts have emerged, aiming to create positive social impact using private capital and markets.

Paragraph 2: Private Investment for Social Impact
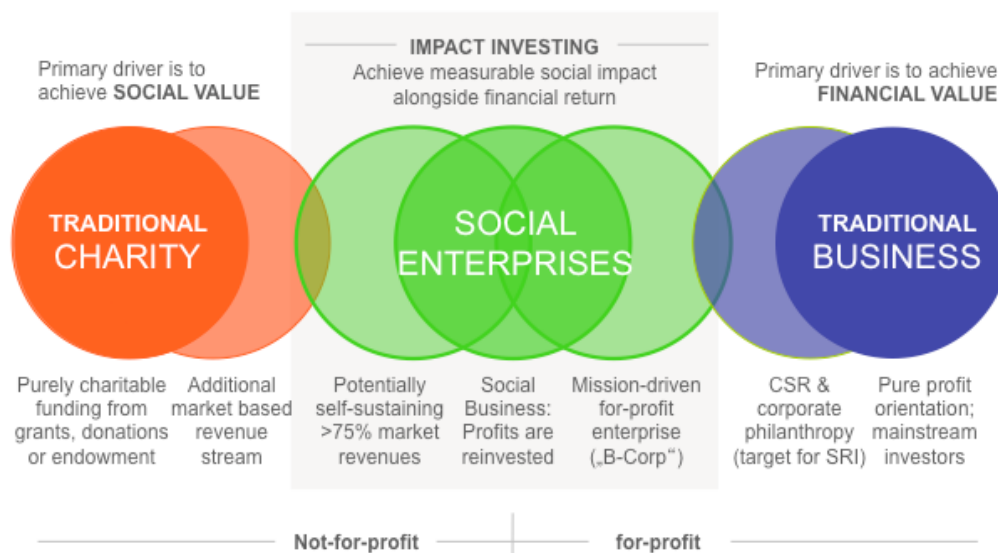
Source: Adapted from J. Kinsgton Venturesome, CAF Venturesome, and EVPA.

The private sector has shown an increased interest in non-financial impact, considering social and environmental effects of their business as well. This has led to the emergence of new concepts including impact investing, which has emerged over the last decade as one of the most talked about strategies for tackling social and environmental problems. As defined by the Global Impact Investment Network, « impact investments are investments made into companies, organizations, and funds with the intention to generate social and environmental impact alongside a financial return »[46]. The emergence of impact investing reflects an evolution of society's expectations from both traditional charity, focused on social value, and from traditional business, focused on financial value. The emergence and growth of impact investing are therefore attributed to two observations. First, by the criticism of traditional forms of philanthropy and international development, which are characterized by some as unsustainable and driven by the whims of the donors. Second, by the fact that society and shareholders attribute a value to corporations' impact on the society and the environment, distinctly from the financial performance, and measured through Corporate Social Responsibility (CSR) programs effectiveness or the « triple bottom line[47] ».

The number of funds engaged in impact investing grew quickly and a 2009 report from the research firm Monitor Deloitte estimated that the impact investing industry could grow from around US$50 billion in assets to US$500 billion in assets within this decade. But as a new term used to describe investments made across many asset classes, sectors, and regions, the market size has not yet been fully quantified[48]. Impact investments are typically debt or equity investments with longer payment times than for traditional venture capital, and an exit strategy[49] may not exist. These investments are made by a variety of investors, both institutional and individual. The institution can be diversified financial institutions, pension funds, private foundations, insurance companies etc. The individuals are usually successful business people and/or high net worth individuals. There has been some debates amongst the world's wealthiest venture capitalists on whether or not private investors should back businesses with explicit

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[46] Global Impact Investing Network. https://thegiin.org/

[47] The triple bottom line consists of three Ps: profit, people and planet. It aims to measure the financial, social and environmental performance of the corporation over a period of time

[48] Global Impact Investing Network. *What You Need to Know About Impact Investing*. [ONLINE] Available at: https://thegiin.org/impact-investing/need-to-know/. Accessed 22 August 2016.

[49] The exit strategy allows the venture capital to cash out its investment, ideally in 3 to 7 years and through an initial public offering, or through a merger or acquisition.

social and environmental missions[50]. While Warren Buffet favors traditional separation of business and charity, admitting he thought « it's difficult to serve two masters », Bill Gates recently invested in Unitus Seed Fund, which has invested in more than a dozen for-profit startups providing health, education and livelihoods for Indian families living on less than $10 a day[51]. As the leader of philanthropy efforts amongst the world wealthiest, Bill Gates' personal investment in an impact investing fund will certainly bring more attention to this already fast growing sector.
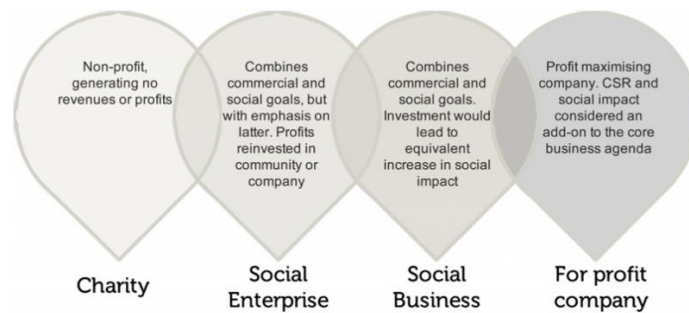
« Impact investing is a powerful model with the potential to build markets and drive change for the people who need it most » Bill Gates.

Impact investing typically involves for-profit, and social or environmental mission-driven businesses. These social enterprises apply commercial strategies to maximize social and environmental impact and can take the form of co-operative, a mutual organization, or a social business, depending on the country. The point in common to all these structures is that their success depends equally on both their social mission and any potential profit.

Unlike social enterprise, social businesses follow the 7 principles set by Muhammad Yunus, and any profit generated does not go back to the investors but is instead invested in expansion and improvement.

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[50] Quartz, David Bank 2014. Bill Gates is putting his own money into a small impact-investing fund focused on India. [ONLINE] Available at: http://qz.com/297097/bill-gates-unitus-seee-fund-impact-investing-fund-focused-on-india/. Accessed 23 August 2016.
[51] Ibid.

Charity — Non-profit, generating no revenues or profits

Social Enterprise — Combines commercial and social goals, but with emphasis on latter. Profits reinvested in community or company

Social Business — Combines commercial and social goals. Investment would lead to equivalent increase in social impact

For profit company — Profit maximising company. CSR and social impact considered an add-on to the core business agenda

The 7 principles of Social Business

- Business objective will be to **overcome poverty, or one or more problems** (such as education, health, technology access, and environment) which threaten people and society; not profit maximization.
- Financial and economic sustainability.
- Investors get back their investment amount only. No dividend is given beyond investment money.
- When investment amount is paid back, company profit stays with the company for expansion and improvement.
- Gender sensitive and environmentally conscious.
- Workforce gets market wage with better working conditions.
- ...do it with joy.

Developed by Muhammad Yunus at the World Economic Forum in Davos, January 2009

Social businesses therefore have end goals that are similar to an NGO or other international development agencies by focusing exclusively on the impact on the target population, except they operate like a company. Therefore, the « recipients » are customers who pay for a product or service, and the model requires financial and economical sustainability.

Corporate philanthropy through CSR programs can also be a source of investment for poverty alleviation and environmental projects. Since 2014, large companies have to spend 2% of their net profit into CSR initiatives[52]. India is the first country to mandate CSR, and some people on both the business side and philanthropy side fear a « tick box » behavior or even corruption arising from this forced philanthropy[53]. The law being recent, and considering many Indian companies had been engaged in philanthropic projects for decades in order to build a

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[52] The Guardian, Oliver Balch 2016. *Indian law requires companies to give 2% of profits to charity. Is it working?* [ONLINE] Available at: https://www.theguardian.com/sustainable-business/2016/apr/05/india-csr-law-requires-companies-profits-to-charity-is-it-working. August 11 August 2016.
[53]Ibid.

reputation, it is difficult to assess the law's impact or positive effects. The Ministry of Corporate Affairs confirmed in a circular that slum redevelopment is treated as a CSR activity under the category « measures taken for reducing inequalities faced by socially and economically backward groups »[54]. It is also specified that CSR activities should preferably be done in the areas around where the company operates[55]. Considering Mumbai is home to many companies, support to slum redevelopment or upgrading programs could find some funding through this mechanism.

These different models are emerging at the intersection of the social and business sectors, and the distinction is becoming increasingly fluid. Businesses are trying to incorporate social and environmental impact into their company strategy, and NGOs are looking at private companies for expertise and best practices to improve operational efficiency. This wide range of models and actors has the potential to unlock significant sums of private capital and create impact by reconciling contradictions between economic and social objectives, and complement public resources and philanthropy[56].

Paragraph 3: Market Opportunities for Water Provision in Slums

Options currently available to slum dwellers for access to clean water fail to meet the needs of most of them. On one hand, the water supplied by the BMC Water Department through in-house taps or public pumps is insufficient in terms of quantity, quality, reliability and easy access. On the other hand, the informal sector provides water that is often exposed to additional contamination along the supply chain and at a high price. As a result, many slum dwellers drink contaminated water and/or use daily quantities of water that are below the World Health Organization's recommendations. The imbalance between supply and demand could be a huge market opportunity and incentive for companies and social entrepreneurs to invest in clean

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[54] Government of India, Ministry of Corporate Affairs. 2015. *Communication*. [ONLINE] Available at: http://www.mca.gov.in/Ministry/pdf/lok_starred_ques_286_18122015.pdf. Accessed August 22 2016.

[55] The Times of India, Lubna Kably. 2014. Slum redevelopment a CSR activity: Ministry of corporate affairs. [ONLINE] Available at: http://timesofindia.indiatimes.com/business/india-business/Slum-redevelopment-a-CSR-activity-Ministry-of-corporate-affairs/articleshow/37207352.cms. Accessed August 19 2016.

[56] Global Impact Investing Network. [ONLINE] Available at: https://thegiin.org/

water pro-poor solutions. Two main unmet needs can be considered from a market perspective: improved access and improved quality.

Improved Access

Considering the challenges for access to water, especially in certain slums that are underserved, illegal, or hilly and difficult to reach, a market approach could be an effective course of action for designing, building and managing decentralized water supply systems. A number of social business initiatives have been implemented and are scaling up, in both rural areas and urban neighborhoods. These are few examples of such models.

1001 Fontaines Water Kiosks

The social business 1001 Fontaines has created a franchise of water treatment sites run by « micro-entrepreneurs » who are also in charge of distribution within the community in rural areas of Cambodia. The model requires initial funding for building the site and paying salaries in the early stage of the project, as costs are slowly being recovered through sales. Most entrepreneurs reach profitability after 1 or 2 years of activity, at which point they provide a percentage of their profit to the 1001 Fontaines organization. The profit made is re-invested to expand the franchise. The model has proven successful in Cambodia with 60 sites built and 240,000 beneficiaries served. 1001 Fontaines is now looking to reproduce their model in rural India in partnership with Sulabh International.

Eau&Vie Bangladesh network extensions

Eau &Vie Bangladesh creates local social businesses that build up water networks and distributes water throughout the slums. These businesses also provide related services including billing services and network maintenance. The goal is to connect every household to an individual meter. It has provided safe drinking water through house taps to 15,000 beneficiaries.

Pirmal Sarjaval Water ATMs

Piramal Sarvajal is a mission driven social enterprise which designs and deploys innovative technologies and purely market-based models to provide sustainable water supply to both urban and rural areas. Solar powered water ATMs and remote monitoring of distribution points through cloud connections are used to serve isolated communities. The organization serves 300,000 people in 12 Indian states.

In Mumbai, water kiosks that treat and distribute water also exist and provide water in the Govandi slums for example (ACF Field Assessment 2016). These solutions are usually local initiatives and non-profits. A for-profit water kiosk franchise could be effective in bridging the gap between infrastructure and service, and maximizing efficiency and scalability. Through a

franchise model organization, economy of scale would be achieved by centralizing resource intensive activities like administrative tasks and building stakeholder relationships, therefore reducing transaction costs. Lower prices for the kiosk infrastructure and treatment material could be negotiated by purchasing high volumes, for example, and trained skilled maintenance staff could work on several sites. A franchise has the advantage of giving greater incentive than direct employment. As in the 1001 Fontaines model, the entrepreneur in charge of the kiosk increases his/her salary by running the kiosk as an efficient business and by increasing the number of customers. While maximizing economy of scale, each kiosk can make the adaptations necessary to meet the customers' needs and preferences. A well performing franchise will build a reputation and earn trust for reliable and quality service.

Information on communities' current practices, preferences and willingness to pay would be gathered through market research to clearly identify needs and business opportunities, in order to define the kiosk set-up and services provided. CBOs can help make the link with the target population, and help formalize the community's demand for such a water provision option, as well as their willingness to pay. Local NGOs knowledge can also be leveraged to gain support, navigate local authorities and fine tune the service to maximize adoption. Engaging with communities through CBOs, NGOs and other local influencers would be necessary to determine if a kiosk would be a viable business in each neighborhood. Securing support from local politicians is also important before implementing such a project, and relationships should be carefully maintained.

The authorization to operate, and support of the BMC is of course required for such operations, as the great majority of water distributed would be municipal water. The current situation of water supply to slums indicates the BMC would be supportive of such a system, as long as an agreement can be reached on the price of water sold to the kiosks. Extending service through decentralized distribution points like kiosks would avoid the need to add a high number of extensions, which place extreme stresses on an already overstretched infrastructure. Kiosks could also be an opportunity to reduce NRW. Leakages can be reduced by upgrading the pipes feeding the kiosk and, if the kiosk becomes the main source of water, theft through illegal connections in the area would decrease. Beyond the technical and financial advantages, decentralization of water supply would be a chance for the BMC Water Department to distance themselves from slums in terms of interaction and responsibility, which would be a relief for them as slums tend to be politically sensitive. The Bombay High Court recent ruling imposes water accessibility in all slums, including non-notified and hilly areas, which will be difficult

to do by network extensions alone. Since the BMC is responsible for ensuring access to water by any means and possibly at a higher price, water kiosks which require only one water connection could be a viable solution to fulfill the BMC Water Department obligations and a managerial relief.

Water kiosks, where possible, could also diversify sources of water by using borewells and rain harvesting. Although groundwater and rainwater cannot be used for drinking, it can be used for bathing and cleaning purposes. Depending on local needs and topography, the kiosk could be a treatment plant or simply a storage and distribution system for off-grid slums, including non-notified slums, and areas difficult to reach in the hills.

In communities where unmet needs are identified and expressed demand is given, the water market competition would need to be understood but would likely not be a threat since the BMC Water Department would be a partner in such a setting and not a competitor, and since water sold by the informal sector or bottled water are significantly more expensive than the price per liter that can be offered by kiosks, as demonstrated in existing models.

Kiosk franchises can tailor their products and services to best meet clients' needs and budgets, to ensure a large customer base and maximize profit on « premium » services. For example, a kiosk could provide both treated potable water, and non-potable water for a lower price. The sealed containers would need to be clearly labeled so there is no confusion. A higher price could be applied to water distributed in smaller, more convenient containers and bottles. Customers could also have the choice between picking up their water or having it delivered for a small fee. Kiosks could implement payment methods that are adapted to customers, and helps manage the structure's financial stability. Customers could be members by paying a monthly fee for the allocation of a fixed daily amount of water. For those preferring daily payments or not having sufficient money for a monthly upfront payment, a pay-per-use system would also be accessible. Finally, hours of service could be tailored around customer's preferences and schedule, and quality would be guaranteed by a formal complaint procedure managed centrally and allowing to detect any issues with specific kiosks.

As shown by the many different decentralized water distribution systems existing in both rural and urban areas, in India and elsewhere, various models and solutions exist and can be profitable if well adapted to demand. The franchised kiosks is one possible model that seems capable of addressing many issues and provide quality service to populations that are already

paying a high price for sub-standard services. Such a model would also benefit from slums' high density, allowing to serve many customers within a small area and from abundant cheap labor to support operations and deliveries.

Improved Quality

Market opportunities exist also at house-hold level to improve the quality of water, by providing adequate water storage and water filters, for example.

In circumstances where household storage of water is unavoidable, alternative storage containers could help avoid contamination at the household level. Slum dwellers often use open-mouth containers which allows contamination during use and do not necessarily wash the container properly and frequently enough. Space is, of course, precious in cramped slum houses. Compressible storage could be preferred to save space when the container is emptied out, and more practical when travelling to refill. Considering collecting water is a daily or frequent task, small improvements on water-related materials can contribute to modifying practices and improve water quality.

Most middle-class homes have a water purifier, and a whole range of products and technologies to clean water exist from luxury versions to the most affordable, some of which work without electricity (Tata Swacth, Pureit). According to a survey conducted in Dharavi by the NGO WaterWalla, approximately half of the 160 surveyed households identified their water as unsafe and still do not use a water filter (Annex 6). Surveys on water-borne diseases in slums also indicate that people are drinking non-treated water. The most effective and immediate way to address health issues due to contaminated water would be the adoption at household level of filters systems. Still, the absence or misuse of a purification system in many slum households leads to higher water-borne diseases, poor health and ultimately in low sales of such products. By not having a treatment solution that fits their needs and preferences, some people will not treat water despite knowing there is a risk. The taste of treated water for example can lead people to drink contaminated water. Some people will not use purifying powder because it gives a bad taste to water (ACF Field Assessment 2016) and others will prefer to simply filter through a cloth instead of boiling, because boiled water has an unpleasant taste (BASF 2015).

This reflects Erik Simanis critic of Prahalad's model, arguing that a good product at a low price is not sufficient to enter BoP markets. Distribution needs to reach out to marginalized or

isolated communities - « the last mile problem » - and consumers need to know how to use the product[57]. Preferences need to be considered as well to increase product adoption.

A business model based on an organized sales force and leveraging on the existing informal sector could increase adoption of water filters and adequate storage containers. WaterWalla, a Mumbai-based NGO, is enabling the creation of micro-enterprises around a clean water portfolio. The portfolio includes purifying solutions and storage containers. Such a model allows to sell products adapted to customers' needs. Entrepreneurs could also add water and hygiene related services, like potties for young children, or simple rain harvesting tarpaulin for non-potable use for example. These micro-entrepreneurs could inform customers on how the different systems need to be maintained, and help them understand the benefits of buying these products, both for their health and their budget, as savings are made on medicines but also on the kerosene used to boil water.

Feedback loops could be created with such a model, where information on customers' preferences and barriers to purchase are collected by the entrepreneurs and centralized through the organization. Such information can be used to direct and encourage companies in designing cheaper, electricity-free filters that are easy to use and maintain and meet customers' preferences and needs. Including local people already active in the informal sector into this formal model could be very beneficial as they have an « entrepreneur spirit » that can help them succeed, and they can leverage on their experience to gauge risk, measure demand, perceive preferences and be responsive to the market.

Another significant barrier to consumption of clean water in slums is the lack of understanding between water contamination and health issues. To help change behaviors and practices, companies and social businesses can leverage on organizations working at grassroots levels, especially in relevant areas such as health and sanitation or women's empowerment. Practices and misconceptions need to be understood and integrated into the organization's social marketing strategy. Habits and practices are difficult to change, and a lot of work needs to be done within communities. Today, even remote communities have access to television, which

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[57] Harvard Business Review, Erik Simanis. 2012. *Reality Check at the Bottom of the Pyramid.* [ONLINE] Available at: https://hbr.org/2012/06/reality-check-at-the-bottom-of-the-pyramid. Accessed 21 August 2016.

provides a huge opportunity for bigger companies and multinationals to reach out to millions of customers.

In 2015, HUL gave a great example of the positive impact companies can have on communities, demonstrating how a big company's foundation can coordinate a powerful awareness campaign on health and hygiene. This was made possible by mobilizing their internal resources and coordinating with the government, international development and aid agencies, and community organizations. The campaign is « a first-of-its-kind multi-brand behavior change program synergizing the efforts of HUL's leading brands Lifebuoy (a brand of soap), Domex (a house cleansing product) and Pureit », deploying both an « onground behavior change model, including in Mumbai slums, and a mass media campaign »[58]. The program encourages people to adopt three 'Clean Habits': washing hands 5 times a day, using a toilet for defecation and adopting safe drinking water practices. As Sanjiv Mehta, Managing Director and CEO of HUL explained: « More than 90% of households in India use HUL products. This gives us both an opportunity and responsibility to make a meaningful difference. Our expertise in behavior change programs in the area of hand washing and sanitation and our experience in developing and delivering innovative partnership models positions us uniquely in doing this ».

Conclusion Chapter 3

In 2002, the article from Prahalad introduced the concept of « the Fortune at the Bottom of the Pyramid », arguing that the BoP held huge untapped market opportunities that have been ignored by traditional business. The article argues that multinationals are the best equipped to address unmet needs that could both help poverty reduction and make significant profits by selling high volumes with low margins. HUL was a pioneer in creating a BoP business strategy by managing to transform its business model and one of its products. HUL now also sells a water purifier considered a BoP product success, Pureit. Procter & Gamble on the other hand failed to make its water purifying powder PUR a commercial success, which can be explained by « the last mile problem » of distribution and unfamiliarity with the product, as point out by Eric Simani's critic of Prahalad's concept. Another critic of the « Fortune at the Bottom of the

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[58] Hindustan Unilever Limited. 2015. [ONLINE] Available at: https://www.hul.co.in/news/press-releases/2015/15-12-04-hul-launches-swachh-aadat-swachh-bharat-programme-in-india.html. Accessed 11 August 2016

pyramid », Karnani argues that poverty alleviation is possible only by considering the poor as producers rather than consumers. New concepts have been emerging from both traditional philanthropy and traditional business to serve the BoP. These investment strategies and business principles aim at using a market approach to create business models that reconcile economic and social objectives. Business models for improved water access designed by both non-profit and for-profit organizations have shown to be accepted by the community, profitable and have a positive impact on health and livelihoods. A kiosk franchise could, for example, be adapted to slum communities, respond to customers' preferences and budget by offering different services and pricing strategies, while guaranteeing quality and reliability. Entrepreneurs trained on marketing skills could offer a portfolio of affordable clean water solutions at the household level, and help overcome the « last mile problem ». As argued by the Mumbai-based NGO WaterWalla, such a model could create and validate the existence of a market and identify barriers to purchase, encouraging companies to keep designing affordable and adapted products for slum dwellers. By formalizing local water supply services, these models help stimulate employment and create micro economies that benefit the community. Finally, social marketing could contribute to a behavioral change around water and hygiene that is much needed, and remains one of the primary reasons for health issues related to contaminated drinking water.

Conclusion Part II

The BMC Water Department's ongoing efforts to improve the water supply network will certainly benefit from the expertise, technology and recommendations provided by Suez Environnement and the WDIP. Systematically using methods like helium leak detection technology for example could make routine operations a lot easier, cheaper and allow to focus the BMC Water Department's resources on engineering work and planning instead of firefighting network breakdowns. While improvement to the network is a reasonable expectation, a shift to continuous supply considering the current state of the infrastructure and its management raises skepticism in terms of potential success, positive outcomes for all and realistic timelines. The rationale of the WDIP is basically to improve service by replacing as little water supply infrastructure as possible, and fix leaks using new technologies, which can also raise concerns on the network's sustainability and capacity to support more extensions. The Water for Slums project can bring adapted solutions to slums, but the challenges should

not be underestimated. Any improvement to the network or to water supply to slums will be a long and debated process, and slum dwellers will most likely have to continue to rely on additional strategies for their daily water supply. As slums are very diverse, so is their level of access to municipal and consequently their dependence on informal vendors. The most deprived neighborhoods suffer the poverty penalty and have to dedicate a significant proportion of their income to buy water which is often contaminated. Consumption of water through the informal sector causes higher water-borne diseases, child mortality and malnutrition. Despite a willingness to pay for water and improved services, the poor don't have access to solutions that meet their needs or their budget, which affects their health and productivity, keeping them in a poverty trap.

As popularized in the article « the Fortune at the Bottom of the Pyramid », the poorest underserved segments of the population would represent an untapped market opportunity, who could benefit from extremely affordable products and services adapted to their needs, empowering them out of poverty. Though this concept has received founded criticism, it is a starting point to approach the problems of extreme poverty by considering the barriers which prevent the poor from overcoming poverty, and how goods and services can help overcome those barriers. A similar faith in the forces of the market to alleviate poverty is at the origins of business models and investment principles that seek both profit and positive social impact, in the form of impact investment funds, social enterprises or social businesses for example.

In the water sector, affordable water purifying products already exist but the rate of adoption in slums is relatively low. By leveraging on local entrepreneurs and formalizing the informal sector, business models could work on promoting and selling these products in slums, and informing customers on how to properly use them. This would enable BoP products to reach more customers, growing the market and encourage more investment and innovation from companies to create cheap useful products. Solutions can be found to serve Mumbai slums by benchmarking existing solutions, such as kiosks franchisees, and tailoring a model that could be scalable, sustainable and offer quality service to poor customers. Impact investment funds can be solicited and multinationals in sectors like hygiene and purifiers (HUL, Procter&Gamble) but also water chemical treatments (BASF, Dow Chemicals) could be suitable partners for these initiatives for initial funding, material or expertise.

Making water accessible and providing the solutions to treat it centrally or at the household level is necessary but not sufficient. Behaviors and practices are still a primary cause of

contaminated water and need to be changed. This will require mass awareness campaigns as well as information provided at local level. Small business and multinationals can contribute tremendously to these efforts, while generating sales.

Providing clean water to slum population would have a huge impact on health and mortality, and would also be income enhancing. The time saved from fetching and waiting for water could be spent on activities to increase income, which would have a ripple effect on women empowerment, children's education and living conditions' improvement.

GENERAL CONCLUSION

India's economic liberalization in 1991 launched a series of market-driven reforms aiming to transform Mumbai into a World Class City, attracting businesses and investments. While marketization of land rights attracted domestic and foreign luxury property seekers, the private sector's intervention in slum redevelopment schemes failed to solve the city's low-income crisis and contributed to the growth of slums. The use of market mechanisms led to improvised constructions that disrupted urban plans and led to a mismatch between the overground and underground water infrastructure. Insufficient investment and slow deterioration of the network has resulted in Mumbai's water supply network reaching its limits, providing unreliable flows of occasionally contaminated water to the city's residents. In 1995, an electoral promise to provide housing to every family living in slums generated laws and policies that differentiate slums according to the date of settlement. This cutoff date determines which settlements can benefit from legal connections to the municipal water network and which remain deprived of access to municipal water supply. The diversity of Mumbai settlements shape the opportunities for water access, from in-house legal taps to access through informal vendors.

In the context of the public sector's failures in providing reliable safe water to large proportions of the Mumbai population, reflecting on the potential role of the private sector in improving the water supply and services for slum population allows to apprehend the complexity of water supply as a system. The failure of the Mumbai water infrastructure unveils the multidimensional forces that shape water networks and distribution, « the inner workings usually invisible in a functioning system » (Latour, 1999). Beyond the question of adequate investment in infrastructure, the Mumbai water system faces multiple barriers preventing universal and reliable access to water. Reported anecdotes around slum dwellers' current daily strategies to access water and efforts to claim their rights allow to grasp the social and cultural dimensions of access to water, which is both a source of conflict and cooperation.

A closer analysis of the challenges to access water in slums reveals a complex nexus of political powers and social practices that affect everyday life in slums. The public system, while unequal, is also inclusive through personal relations with city councilors, engineers, and the plumbers (Anand 2011). This allows a system of control on slum populations, where access to water is granted through personal connections, constant negotiations and votes for politicians to act, ultimately perpetrating a patron-client relationship. Inadequate access or lack of access to municipal water legal connections forces slum dwellers to rely on the informal sector to purchase water at a high price, and informal distribution methods often cause higher contamination rates in water. In unserved areas and unauthorized slums, residents therefore

have to dedicate a significant part of their income to water and suffer the consequences of water-borne diseases.

Recent events indicate that the access to municipal water might improve for slum dwellers. In December 2014, the Bombay High Court ordered the BMC to provide access to water to residents living in non-notified slums using a human-rights-based framework. Though the ruling has limitations, it is a step forward in disentangling security of tenure from the right to water. This ruling also underscores the importance of legal, institutional and political barriers in preventing universal access to water. That same year, senior water engineers urged for the Government of Maharashtra's Urban Development Secretary to review the policy and delink the water supply with the legality of structure.

Until the WDIP delivers its promises on 24x7 water supply, and slums are granted adequate access to municipal water, the gap between demand and supply needs to be urgently filled to provide slums with reliable and affordable access to clean water. Considering the BoP theories arguing a market-approach targeting the poor can both generate profit and contribute to poverty alleviation, private companies and social businesses could contribute in solving « the last mile problem » of access and the water quality issues by focusing on end user purifying solutions that are adapted and affordable. Creating community focused formal markets for water supply would create employment, leverage on social capital and participate to capacity building. By designing customer focused business models, products and services, the private sector could contribute in providing both mid-term incremental solutions with the benefit of immediate relief, and long-term sustainable decentralized supply models. A purely market-driven approach to tackle water issues may hugely improve options available to slum dwellers. Nevertheless, current practices show that the traditional dichotomy between public and private « doesn't adequately deal with the wide diversity of institutional arrangements that humans craft to govern, provide, and manage public goods and common-pool resources » (Ostrom 2010). Indeed, slum dwellers use a wide range of strategies to access water, through the activities of diverse private and public actors.

In an effort to understand whether provision of public services through a wide array of actors was chaotic, as charged by scholars, or potentially a productive arrangement, the concept of « polycentricity » was introduced (Ostrom 2010). Further empirical studies of polycentric governance of common-pool resource and infrastructure have shown substantial evidence that multiple public and private agencies can co-create productive ways of organizing water

resources at multiple scales (Ostrom 2010). The Institutional Analysis and Development (IAD) framework (Annex 8) was created by Elenor Ostrom and colleagues in order to provide a roadmap for social scientists attempting to analyze such complex institutional « puzzles ». As a framework, it « provides a general set of variables that can be used to analyze all types of institutional arrangements » (Ostrom 2011). This tool is widely used to study human interactions and outcomes across diverse complex settings – as opposed, for example, to pure market arrangements or hierarchies. Popular in the study of common-pool resources (Ostrom 1994), the IAD has also been solicited for analyzing problems of water governance. In fact, the popular concept of « polycentricity » in the IAD literature originated from Vincent Ostrom's work on governing metropolitan areas and water supply (Ostrom 2010), and even though the contexts were different from the case of Mumbai, these concepts remain highly relevant in the case study of Mumbai slums. Therefore, building on the IAD framework could have structured our analysis and allowed us to take advantage of conclusions, information, and lessons from the broad existing IAD literature.

ABBREVIATIONS

BMC: Brihanmumbai Municipal Corporation

BoP: Bottom of the Pyramid

CSR: Corporate Social Responsibility

HUL: Hindustan Unilever Limited

IAD: Institutional Analysis and Development

JNNURM: Jawaharlal Nehru National Urban Renewal Mission

NRW: Non Revenue Water

PPP: Public-Private Partnership

TDR: Transferable Development Right

WDIP: Water Department Improvement Project

ANNEXES

Annex 1: BMC Water Department Organigram (Bjorkman 2015)

Annex 2: Financial Summary of Five PPP in India (World Bank 2013)

Annex 3: Summary of Public-Private Partnerships Projects in the Indian Urban Water Supply Sector, (World Bank 2013)

Annex 4: Nagpur Public-Private Partnership Project Sheet, (World Bank 2013)

Annex 5 : Water indicators from the 2011 seasonal water assessement in Kaula Bandar, (Subbaraman et al. 2013)

Annex 6: Market Research Data from Dharavi, Collected by WaterWalla.

Annex 7 : Water-related data the baseline needs assessment, (Subbaraman et al. 2013)

Annex 8: Background on the Institutional Analysis and Development Framework (Ostrom 2011)

Annex 1: BMC Water Department Organigram (Bjorkman 2015)
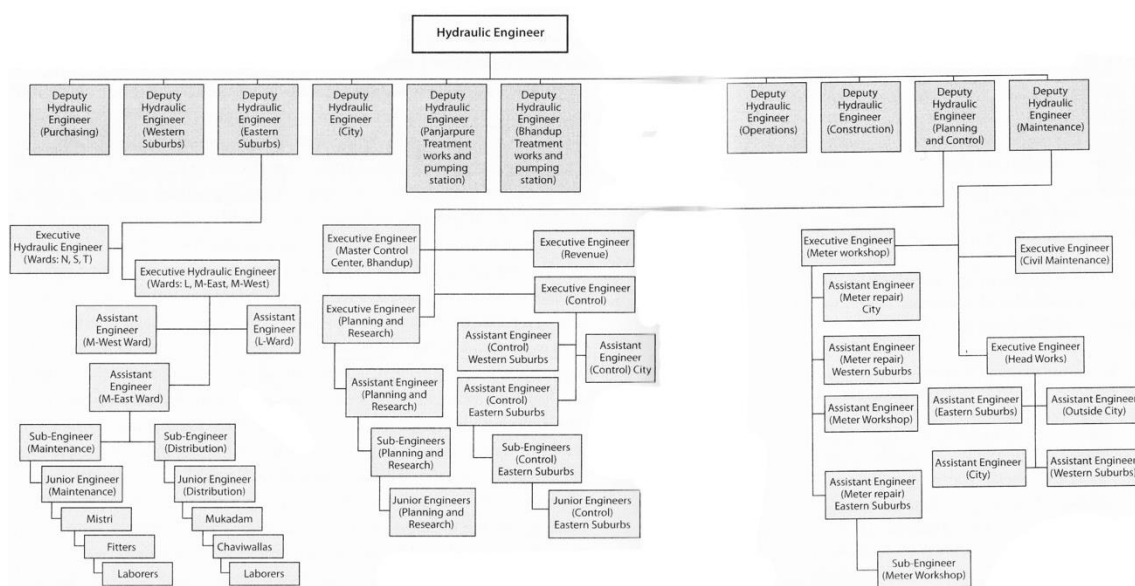
Annex 2: Financial Summary of Five PPP in India (World Bank 2013)

	Khandwa	Aurangabad	Nagpur	Latur	Mysore
Project is concurrent with tariff revision to improve cost recovery	Yes	Yes	Yes	Yes	No
User charges are an integral part of the revenue model of the operator	Yes	Part user charges, part subsidy	Distinct from user charges	Yes	Distinct from user charges
Project eliminates need for operating cost subsidy from the city	Yes	No, but subsidy is capped	No; will require operating subsidy	Yes	No
Project finances part of initial capital costs	10%	50%	30% of distribution network	No	No
Project design includes a solution for financing of change in scope in initial capex	No	No	No	NA	No
Project design includes a solution for financing of future expansions	No	No	No	No	No

Annex 3: Summary of Public-Private Partnerships Projects in the Indian Urban Water Supply Sector, (World Bank 2013)

Parameters	1990s	2000-04	2005 Onward
Number of PPP projects attempted	5	8	13
Contracts awarded	1	3	13
Current status of contracts awarded	1 operational	2 operational	12 projects are under various stages of implementation/operation; 1 project is currently stalled.
Project scope	• 100% bulk water supply	• 75% distribution O&M • 13% bulk water supply • 12% water treatment	• 38% distribution O&M • 31% distribution investment + O&M • 8% treatment + system rehabilitation/ upgradation + distribution O&M • 15% bulk system investment + O&M • 8% desalination
PPP model	• 100% BOT/BOOT	• 75% management contracts • 25% BOT/BOOT	• 38% management contracts • 62% BOT/DBFOT and similar
Private operator mix	• 100% international	• 65% international • 35% domestic	• 65% domestic • 21% international • 14% local/regional

BOOT: Build Own Operate Transfer; DBFOT: Design Build Finance Operate Transfer; O&M: operation and maintenance

Annex 4: Nagpur Public-Private Partnership Project Sheet, (World Bank 2013)

KEY PROJECT DATA

Name of the City	Nagpur	**Service Coverage**	80%
Size	2. 5 Million	**Continuity of Supply**	12 Hours per day
Location	Maharashtra, Central India	**Water availability**	135 litres per capita per day
Institutional Structure - O & M	Water department of Municipal Corporation	**NRW**	Estimated at 54%
Institutional Structure - Planning and investments	Water department of Municipal Corporation	**Operating Cost Recovery**	59.70%
Scope of PPP	Conversion of intermittent supply to continuous supply		
	Rehabilitation of distribution network, replacement of house service connections and metering, rehabilitation of select treatment plants		
	Operation of treatment plants and distribution network, supply to consumers		
	Billing and collection		
	Financing of 30% of initial capital expenditure		
Term of Contract	25 Years		
Status of Project	Awarded in 2011, Operator has taken over assets and has commenced rehabilitation		
Investments in Phase I	70.52 USD Mn	**Public funds provided as grants** 70%	**Private Finance** 30%
Project Preparation	The project was based on an overall water sector roadmap. A pilot project preceded the decision to implement continuous water supply for the entire city. Political consensus was secured.		
Bid Process	International two stage competitive bidding		
Number of prequalified bidders	3	**Number of financial bids received**	2
Selection Criteria	Least operator fee per unit of water billed and collected from consumers		

CONTRACT STRUCTURE AND KEY RISKS

Revenue model for the operator	Fee per unit of water billed and collected from consumers.		
Consumer tariff	Delinked from PPP. The city will fix tariff independently		
Source of operating subsidy if any	Required since tariff realisation will not cover city's cost and operator fee. Subsidy from the general budget of the city.		
Key performance requirement	Achievement of continuous water supply	**Linkage of key performance requirement to operator revenue**	No direct linkage. A maximum of 5% of operator fees deductible as liquidated damages for all performance shortfalls in aggregate. Repayment of investments financed by Operator is through an annuity like structure.
Key investment phase responsibilities of the city	Providing 70% of investment requirement	**Key operating phase responsibilities of the city**	Supply of raw water, electricity
Risk	**Allocation**	**Remarks**	
Change in project scope	City	City is responsible for financing any change in scope.	
Capital Cost over run	City	Escalation risks are addressed through adjustment. The city bears the risk of any increase in the initial capital investments required to meet performance standards	
Delays in receipt of grants	City		
Operating cost escalations	City	Operator fee is reset to adjust for actual expenditure	
Investment risk	City	There is no material impact on operator compensation.	
Time overruns in rehabilitation/ investment phase	Substantially by the city	There is no material impact on operator compensation due to delays.	
Demand Risk	City	Operator is compensated based on a normative billing in the first five years. The fee is reset after five years if the business planning assumptions change	
Revenue Collection risk	Operator	The operator bears the risk after the first five years.	
Condition of pre-existing assets	City	Any change in investments is borne by the city	
Baseline information risk	City	Increase in investments is borne by the city. Any change in business planning assumptions leads to fee reset.	
Expansion	City		

Annex 5 : Water indicators from the 2011 seasonal water assessement in Kaula Bandar, (Subbaraman et al. 2013)

Water indicator	Study period			
	Winter	Summer	Monsoon	System failure[4]
Water costs				
Monthly spending on water in INR[1,2]	379.8 (139.8)	1022.0 (676.6)	378.6 (114.1)	–
Mean (SD)				
Monthly spending on water in USD[2,3]	6.91 (2.54)	18.58 (12.30)	6.88 (2.07)	–
Mean (SD)				
Monthly spending on water as a percentage of the mean household income in KB[2]	5.9%	15.9%	5.9%	–
Estimated cost in INR per 1000 liters of water[2]	145.4 (87.0)	327.9 (258.9)	117.9 (56.6)	463.1 (297.2)
Mean (SD)				
Estimated cost in USD per 1000 liters of water[2]	2.64 (1.58)	5.96 (4.71)	2.14 (1.03)	8.42 (5.40)
Mean (SD)				
Comparison to government rate of INR 2.25 per 1000 liters of water[2]	65	146	52	206
Number of times more expensive				
Quantity of household water use				
Liters per capita per day of water use	22.6 (12.6)	31.2 (23.6)	25.6 (13.2)	23.8 (14.2)
Mean (SD)				
Households using <50 liters per capita per day	20 (95.2)	17 (80.95)	19 (90.4)	20 (95.2)
n (%)				
Households using <20 liters per capita per day	9 (42.9)	8 (38.1)	8 (38.1)	10 (47.6)
n (%)				

[1]INR = Indian rupees.
[2]These figures are based on both the standard monthly payment to water vendors *and* additional weekly payments given during summer season and during periods of system failure.
[3]USD = US dollars.
[4]Data for monthly spending on water during the episode of system failure are not presented here, because the monthly costs are the same as those for the summer season, since the system breakdown happened in the same month. However, using the monthly summer costs plus the extra weekly cost spent during the period of system failure, we are able to present the estimated cost per 1000 liters of water for the system failure episode.

**Annex 6: Market Research Data from Dharavi, Collected by WaterWalla.**
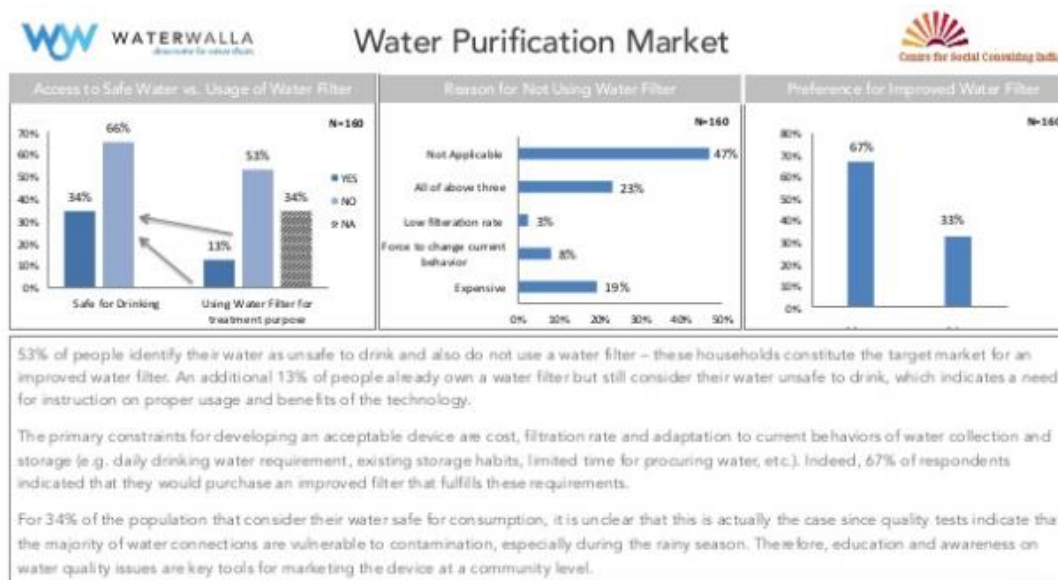
Annex 7 : Water-related data the baseline needs assessment, (Subbaraman et al. 2013)

	n (%)
Frequency of water access	
Does not purchase water	7 (0.7)
Daily	144 (15)
Every two days	279 (29.1)
Every three days	231 (24.1)
Every four days	236 (24.6)
Weekly	62 (6.5)
Time spent obtaining water	
<½ hour	584 (60.9)
½ hour to 1 hour	291 (30.3)
1 hour to 1 ½ hours	65 (6.8)
More than 1 ½ hours	14 (1.4)
Mode of obtaining water	
Delivery via water vendors' hoses	817 (85.2)
Fetch water from outside their lanes	125 (13.1)
Other	17 (1.7)

Does lack of water affect you or your family members':	
Health?	860 (89.7)
Ability to go to work?	371 (38.7)
Ability to go to school?	87 (9.1)
Ability to study?	38 (4.0)
Ability to start a new business?	13 (1.4)
Ability to increase productivity in your current business?	14 (1.5)
Water purification methods used[1]	
Filter-based water purifier set	5 (0.5)
Cloth filter used during collection	274 (25.8)
Boiling	165 (17.2)
Alum	8 (0.8)
Other purifying agents (i.e., chlorine)	18 (1.9)
No purification method used	568 (59.2)
Why do you think that the community lacks running water?[1]	
Land belongs to an external agency, so that municipal government cannot provide water	426 (44.4)
The community is unauthorized	111 (11.6)
No one cares about the community	182 (19.0)
Don't know	289 (30.1)
Other	18 (1.9)
Who has the primary responsibility for providing water to the community?[1]	
The local politician	390 (40.7)
The municipal system	320 (33.4)
Residents themselves	44 (4.6)
Other (i.e., local water vendors)	263 (27.4)

[1]These questions allowed respondents to give multiple answers to the questions, so the percentages add up to

Annex 8: Background on the Institutional Analysis and Development Framework (Ostrom 2011)

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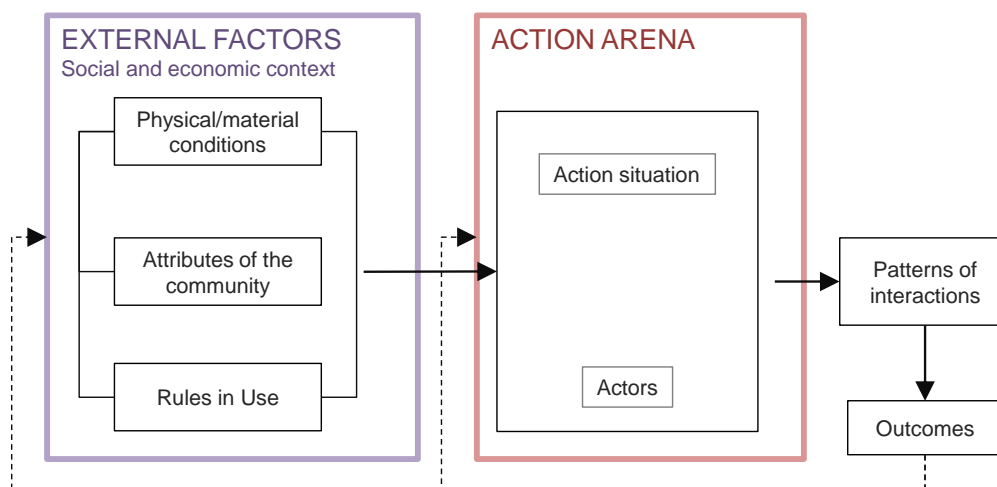
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