More than corruption:

How integrity failures impact water and sanitation services in informal settlements in Lima, a case study

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STATEMENT OF AUTHENTICITY OF MATERIAL

This thesis contains no material which has been accepted for the award of any other degree or diploma in any institution and to the best of my knowledge and belief, the research contains no material previously published or written by another person, except where due reference has been made in the text of the thesis.

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Berlin, February 1st 2024

ABSTRACT

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Supplying water and sanitation to the capital city of Peru, Lima, located in a desert with more than 10 million inhabitants, is a continuous challenge for Lima's public water and sanitation company, SEDAPAL (*Servicio de Agua y Alcantarillado de Lima*). Despite the efforts to extend service coverage in the last 30 years, to date, there are still residents in Lima who are not connected to the water and sanitation network, especially those living in informal settlements. This situation is usually associated with technical, managerial, and financial challenges, along with the city's overflowed and disorderly growth. Nevertheless, urban political ecology argues that the urbanisation of water is never neutral and is a highly political and contested process. These characteristics expose water and sanitation to integrity failures, not only in the form of corruption but also inactions and more general acts, which are not necessarily criminal but contribute to the unjust provision of water and sanitation services.

By applying an urban political ecology lens and a multi-scalar and multi-stakeholder approach, this research seeks to uncover how integrity failures affect water and sanitation provision and access in informal settlements in Lima in the following way: First, it explores how integrity failures negatively affect the work of SEDAPAL and its efforts to extend services in informal settlements, including the provision of water through two main methods: tanker trucks and public water tabs. Second, by focusing on an informal settlement in the San Juan de Lurigancho district, the research examines how integrity failures affect how residents of informal settlements navigate and adapt the options provided (or not, as in the case of sanitation) by SEDAPAL to secure access to water and sanitation on an everyday basis.

By bringing into conversation literature on the human rights to water and sanitation, urban political ecology and the concept of integrity failures with an emphasis on informal settlements, this thesis examines how acting without integrity at both the water utility company and the informal settlement levels, allows a better understanding on how uneven power relations play in the water and sanitation sectors, and how inequalities are being reproduced by looking at who benefits and who loses from access to and control over water and sanitation services.

Keywords: Water, Sanitation, Integrity failures, Informal settlements, Infrastructures

ACKNOWLEDGEMENTS

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ANA   National Water Authority
(Autoridad Nacional del Agua)

DIGESA   General Directorate of Environmental Health
(Dirección General de Salud Ambiental)

INEI   National Institute of Statistics and Informatics
(Instituto Nacional de Estadística e Informática)

COFOPRI Informal Property Formalisation Agency
(Organismo de Formalización de la Propiedad Informal)

NGO   Non-Governmental Organisation

MOOC   Massive Open Online Course

MVCS   Ministry of Housing, Construction and Sanitation
(Ministerio de Vivienda, Construcción y Saneamiento)

SEDAPAL Water and Sanitation Utility Company of Lima
(Servicio de Agua Potable y Alcantarillado de Lima)

SDG   Sustainable Development Goal

SFA   San Francisco de Asis

SJL   San Juan de Lurigancho

SUNASS   National Superintendency of Sanitation Services
(Superintendencia Nacional de Servicios de Saneamiento)

UPE   Urban Political Ecology

WIN   Water Integrity Network

"Water is Life. Sanitation is Dignity"

Stockholm International Water Institute

CHAPTER 1

Introduction

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In the last thirty decades, SEDAPAL, Lima´s water utility company, increased the number of households in the city connected to the water and sanitation network by more than 15% (SEDAPAL 2021, p. 12). To do so, SEDAPAL had to keep pace with a city that doubled its population between 1990 and 2020, with a current population over 10 million inhabitants (INEI 2023, p. 1), and under a scenario of prevalent water stress, where only 2% of Peru´s renewable water sources are available in Lima, the capital city (ANA 2013, n.p.). Despite SEDAPAL's efforts to improve access to water and sanitation services, to date, almost 10% of Lima's population are not connected to the networks, especially those living in informal settlements[1](SEDAPAL 2023a, n.p.). This means that there is a vulnerable population that is still struggling every day to secure safe, affordable, and reliable water and sanitation services, on an everyday basis, and not being able to exercise their human rights to water and sanitation.

Beyond technical, financial and managerial intended justifications, one of the main causes affecting the proper provision of water and sanitation services in many cities around the world is the phenomenon of corruption. Corruption is typically defined as "the abuse of entrusted power for private gain" (Transparency International 2008, p.6), and it takes a variety of forms from small bribes for obtaining a water connection (petty corruption) to high-level diversion of millions of dollars through fraudulent procurement processes (grand corruption). In Lima, corruption in the water and sanitation involves different actors including the state, SEDAPAL, suppliers, and residents. A very well-known case of corruption in the water sector was registered in local news during the COVID-19 pandemic. Water tankers contacted by SEDAPAL to deliver free water to residents of informal settlements without connection to the network, turned back their route and

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[1] For the research and considering the reviewed literature in English, the definition "informal settlements" will be used. However, it is important to point out that in the Peruvian context the word "informal settlement" is not commonly used, but "human settlement". Another commonly used definition in Peru is "barriada", translated in English as "slum" but without negative connotations.

sold the water to private users to fill their swimming pools, for example (Redacción RPP 2022, n.p.).

Corruption is an entrenched evil in Peruvian society. In the last thirty years, all of Peru's former presidents have been investigated, convicted and/or imprisoned for corruption (Fowks 2023, n.p.). This would explain why in the year 2021, according to the latest measurement of the Americas Barometer, Peru ranked first with the highest perception of corruption of its politicians (88%) and according to the latest measurement made by Transparency International through the Corruption Perception Index 2022 the country also obtained a very low score (36 out of 100) and ranking 101st out of 180 countries, reflecting a high level of corruption (Transparency International 2022, n.p.). For this reason, talking about corruption in Peru is a very relevant topic.

However, there are some more general acts at the institutional and individual level that, while not being corrupt or criminal, they are immoral or unjust (despite being within the law) and contribute to the provision of unequal water and sanitation services. Therefore, acting with integrity in the water and sanitation sector is important since it comprehends actions and behaviours that are consistent with ethical or moral principles, and also entails protecting and granting everyone´s right to water and sanitation. Acting with integrity also creates a barrier to corruption. However, there are "instances in which integrity is violated or broken", which is defined as integrity failures (WIN, 2021, pp. 22-23). In informal settlements, for example integrity failures can occur, when the human rights to water and sanitation is not guaranteed due to insecure land status or when informal settlements are not taken into consideration in city expansion plans or in the implementation of water and sanitation projects. Also, integrity failures can emerge when staff of utility companies ask for bribes or are offered bribes for service provision. These acts affect the provision of water and sanitation services and force residents of informal settlements to look for alternatives to secure access through self-organisation or illegal practices.

But why is the water and sanitation sector particularly vulnerable to integrity failures? Mainly, because its provision tends to be a natural monopoly. In contrast to the electricity sector, where multiple companies provide the service, water and sanitation services in cities are typically supplied by a single provider. Furthermore, the water and

sanitation sector necessitate large-scale, long-term investment projects, including treatment plants, networks, dams, and other types of infrastructure, which increases the likelihood of corruption. In a smaller scale, the imperative necessity and high demand of the service can lead to the emergence of powerful groups such as cartels that control water services and set up their own prices (Transparency International and WIN 2010 cited in Jenkins 2017, p.3).

Integrity failures and corruption lead to the loss of billions of dollars annually in the urban water and sanitation sector. They hinder water and sanitation provision, impacting on people´s health and well-being, especially in vulnerable groups. Integrity failures and corruption are also a threat to both environmental preservation and economic growth (WIN, 2021, p. 14). In this context it becomes significant to address this issue, especially in Peru, where corruption is an entrenched evil in the society. Moreover, considering that integrity failures mainly affect access to water and sanitation of the marginalised groups (WIN 2021, p. 6), to focus on informal settlements in Lima that are not connected to the water and sanitation networks contributes to portray this situation. In addition, in a context of climate change and greater water stress, acting with integrity becomes even more important because it helps "ensuring that basic, sustainable water and sanitation services are accessible to everyone, particularly the poor and the marginalised" (WIN 2021, p. 6). Therefore, mobilizing the concept of integrity in this research may help to shed light on how acting with integrity or not, impact life in cities.

Through the urban political ecology lens and using a multi-scale and multi-stakeholder approach this research addresses how integrity failures impact water and sanitation provision and access in informal settlements in Lima with the aim to counteract purely technical, financial, and managerial approaches to the issue of water and sanitation within cities. For this purpose, first, this research focuses on SEDAPAL´s actions, including its attempts to expand its networks and, in cases where this is not feasible, to provide water access to informal settlements via public water tabs and tanker trucks. Moreover, it is also explored why SEDAPAL is sometimes unable to provide these services, especially sanitation. Second, the research investigates how integrity failures impact how informal settlement residents navigate and adjust to the options provided (or not, as in the case of sanitation) by SEDAPAL to secure daily access to water and sanitation, with a case

study on an informal settlement in the San Juan de Lurigancho district. Finally, this research sheds light on how acting without integrity at any scale perpetuates uneven power relations and inequalities, by identifying who gains and who loses from having access to and control over water and sanitation services in cities.

1.1 Research questions and hypothesis

Given the aforementioned context, the research aims to answer the following questions:

1. *How do integrity failures impact SEDAPAL's water and sanitation provision in informal settlements in Lima?*
2. *How do residents of informal settlements experience and navigate the integrity failures that emerge in accessing water and sanitation on an everyday basis?*

To answer the research question number one, the hypothesis being tested in this research is that the capacity of SEDAPAL to deliver universal and efficient water and sanitation services in informal settlements in Lima is hindered not only by technical and managerial issues, but also by integrity failures. These failures, encompassing corruption, mismanagement, and inadequate governance, contribute to a range of challenges that compromise the quality, accessibility, and sustainability of water and sanitation infrastructure in these marginalized areas. Moreover, it is presumed that integrity failures cannot be only attributed to SEDAPAL, but also to a range of actors directly or indirectly involved in providing water and sanitation in informal settlements, which shows a fragmentation of roles and responsibilities, and lack of clear regulations.

To answer the research question number two, the hypothesis being tested in this study is that integrity failures that emerge in accessing water and sanitation shape the everyday practices of residents in informal settlement of accessing water and sanitation services. It does so by generating a series of neighbourhood dynamics, modes of organizations and incremental infrastructures to improve their services. In addition, considering that in informal settlements a certain level of organization and power relations within the community exist, integrity failures could also occur, if community leaders are not held accountable for its actions or if there is no transparency in the water and sanitation management in the informal settlement.

1.2 Research gap, scope, and limitations

Recent studies on water and sanitation in informal settlements in Lima have been largely focus on community organization (Mendoza Flores, 2016), the utility company and management (Criqui 2020), and digital technologies and governance (Miranda Sara 2021, Hoefsloot 2022), and water scarcity and the exclusionary city (Ioris 2012,2016). However, studies that explore issues of integrity and corruption in the water and sanitation sector are scarce, particularly when it has to deal with informal settlements.

Regarding the scope and limitations of the research, first, it is important to note that this not an assessment of SEDAPAL as an institution and its integrity failures or corruption cases. SEDAPAL is researched as the main actor in charge of water and sanitation provision in Lima, in particular, its relation to informal settlements. Moreover, the research has not an intersectional approach[2]. While institutions like the Water Integrity Network (WIN) (2021, p.14) acknowledged that women are particularly affected by the lack of access to water and sanitation, this research focuses on integrity failures in informal settlements in general. However, this research may be a window for further research on how integrity failures affect access to water and sanitation by women specifically in informal settlements in Lima.

Finally, it is worth noting that, little literature on sanitation was found. Moreover, that the existing one is related to African and Asian case studies (Monstadt and Schramm 2017, Truelove 2011) paying limited attention to Latin American contexts. However, this also turn to be a motivation to address the issue of sanitation. Nonetheless, it will be identified that at some points in this research there is greater reference to the issue of water since there is more literature on the subject.

1.3 Aim of the research

First, the thesis aims putting into conversation, through the lens of urban political ecology, which seeks to understand the ways in which urban environments are produced and reproduced (Swyngedouw 2009, p. 56), the literature and concepts of the human

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[2] Intersectionality acknowledges that a person's identity, relationships, and social environment all influence their life. Depending on a person's context and the power structures that are in place, such as racism and patriarchy, these combine to create intersecting forms of privilege and oppression (Crenshaw 1991, n.p.)

rights to water and sanitation, integrity failures and informality to create a conceptual framework to analyse water provision and access in informal settlements in Lima.

Second, this research aims to portray how integrity failures impact supply and access to water and sanitation in informal settlements in Lima. For this purpose, this thesis considers different scales and actors, like the utility company and residents of informal settlements to have a more comprehensive and holistic understanding of the issue, contrasting different perspectives and opinions.

Third, through a case study in an informal settlement, this thesis seeks to uncover what happens after SEDAPAL installs water infrastructures (e.g. public water tabs) and leaves it in the hand of the local community. In addition, this research also seeks to understand what happens when SEDAPAL does not provide a service, as in the case of *Porcicultores* informal settlement. This research, therefore, explores how residents of informal settlement residents organize and adapt to the service provided (or not) by SEDAPAL on an everyday basis.

Finally, it is important to point out that this thesis does not intend to seek or judge actors involved in corruption acts or integrity failures, especially residents of informal settlements that are forced to resort to informal practices in to secure access to these basic services.

1.4 Personal motivation

I was always aware that Lima is a city on a desert, backing onto a polluted river with little flow and a city with no rain. I always knew I had to take care of water, knowing from my parents that I was privileged to have it. Later, while studying Architecture, I witnessed how mayors and presidents made inconsistent decisions to "improve" the city through major projects that turned out to be part of a framework of corruption. Later, as an Architect working in the public sector, I learned that processes are time consuming, that the state is fragmented, and that politics is often more important than compliance with the rules and prioritisation processes of public entities.

Motivated by these experiences and interests, I wanted to address a topic that combined issues that I consider relevant and pressing in Lima: water and corruption. However,

along the way I learned a new concept: integrity and its failures, something that goes beyond corruption and also encompasses carelessness, contradictions, inaction and the neglect from the state, which helps to understand the unequal access to services and lack of opportunities in the city. In addition, I learned that the issue of sanitation is received sufficient academic and practical attention as much as water, which made me also want to include it in the research despite the challenge it has posed.

As a future Urban Manager and living in a context of rapid urbanization, climate change and political turbulences from time to time, as well as private self-interests, I believe that integrity will have to play an important role in urban theory and planning. Not only in the water and sanitation sector, which are vital for life but in many others, with the aim of leaving no one behind.

1.5 Thesis structure

The thesis is organized around seven chapters. Chapter two introduces the literature review and theoretical framework developed for this study. Chapter three describes the methodology used to collect the data, and the conceptual framework to analyse the gathered information. Chapter four presents Lima and its utility company, SEDAPAL, giving an overall case study background. Chapter five describes how SEDAPAL provides water to informal settlements through water trucks and water tab, and subsequently, analyses how do integrity failures impact SEDAPAL´s water and sanitation provision in informal settlements, answering the first research question. Chapter six presents the case study in an informal settlement in the district of San Juan de Lurigancho, portraying daily practices to secure access to water and sanitation, beyond the water service provided by SEDAPAL (e.g. public water tap). Then chapter six analyses how residents of informal settlements experience the integrity failures that emerge in accessing water and sanitation, answering question number two. Finally, chapter seven concludes by considering in a transversal way how the emergence of integrity failures impacts the water and sanitation supply and access at both SEDAPAL and informal settlement level and reflects on the wider implications of the selected case study.

CHAPTER 2

Literature review

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This chapter is structured around three main literatures: the human rights to water and sanitation, informal settlements, and corruption and integrity which are approached through the Urban Political Ecology lenses. By developing this chapter, it was identified that there does not exist much work linking these three literatures together. Since Urban Political Ecology is the approach through which the thesis is developed, the authors selected for the literature review and theoretical framework are mainly aligned with this insight.

2.1 The Urban political ecology (UPE) lens in water (and sanitation[3])

Traditionally, urban water issues have been approached mainly from a managerial, economic, or engineering approach, not paying too much attention to social and political aspects (Swyngedouw 2004, p. 8). Moreover, the water literature has historically been limited to technoscientific approaches and top-down decision-making processes led by engineers, which academic research has identified as a critical problem (Bakker 2010, p. 8). Nevertheless, academic literature has shown that water embodies and expresses social relations too, shaping and being shaped by relations of power (Loftus 2009, p. 954).

UPE focuses on the uneven ways in which nature is urbanized, the socio-ecological disparities that distinguish cities, and the socio-ecological landscapes that are produced and reproduced from capitalist urbanization within, between, and outside of cities. Ernstson and Swyngedouw (2019, p. 4) state that the main goals of UPE is to identify the winners and losers of these changes and tracing how cities are shaped by sociophysical and socio-spatial processes that also co-produce discourses on nature, society, justice, and forms of rationality". Likewise, Walter and Schmidt (2023, p. 153) argue that analysing urban water through a political ecology perspective enables to gain insights

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[3] Most of the UPE literature on water is linked to water only. However, since sanitation also includes wastewater, which, just like water, is embedded in an arena of social relations of power, it is considered that the UPE lens can also be applied to the issue of sanitation (Karpouzoglou and Zimmer 2016, n.p.)

into the power structures that constitute and influence the distribution of water within cities and its effects on diverse social groups in society.

UPE´s critique of the traditional hydrological cycle gave rise to the concept of hydro-sociality, understood as the co-production of water and society and vice-versa (Swyngedouw 2009, p. 56). The study of cities using hydro-social analysis, seeks to overcome the nature-society duality, imagining water as a social and physical process that produces different hydro-social configurations. Moreover, the hydro-social analysis critically assesses contested water systems and processes, their networks, and the social power relationships between actors, helping to structure their individual and collective action (Mollinga 2014, Octavianti and Charles 2019, cited in Walter and Schmidt 2023, p. 150).

Finally, as Swyngedouw, Kaika and Castro state (2002, p. 4) states: "Political-ecology attempts to tease out who gains from and who pays for, who benefits from and who suffers (and in what ways) from particular processes of socio-environmental change. It also seeks answers to questions about what or who needs to be sustained and how this can be maintained or achieved", a useful perspective for analysing water supply and sanitation in informal settlements.

2.2 Access to water and sanitation as a common aspiration

To address the scholarship on the human rights to water and sanitation, documents from international organizations such as the United Nations and the World Bank were mainly reviewed. This institutional approach was combined with work from Geographers such as Farhana Sultana and Alex Loftus (2011), who have provided a vast literature combining the right to water, justice, and politics. While doing the literature review, it was noticed that there is a disproportion between the amount of literature and information related to the human rights to water compared to the right to sanitation. To fill this gap, this research has drawn primary from the work of Geographer Colin McFarlane, who recently published the book "Waste and the City" (2023), focusing on sanitation.

It was identified in policy documents that when reference is made to the concepts of "water security" or "water governance", sanitation is also included, which is usually indicated in the footer of the documents. Not placing sanitation in the main title of policy

documents or within the concepts makes sanitation invisible. Therefore, to highlight sanitation in the titles of this sub-chapters, it is written between brackets or quotation marks.

Finally, it is important to note that much of the existing literature on sanitation is related to African and Asian case studies (for example, Monstadt and Schramm 2017; Truelove 2011) while research conducted in Latin American contexts has received limited attention. Nonetheless, similar conditions and challenges are noticeable in rapidly urbanized Global South cities, making these theories applicable to Latin American cities. This research aims at filling the gap in the sanitation literature by focussing on Lima, the capital of Peru.

2.2.1 The human rights to water and "sanitation"

"Water is life-giving and non-substitutable." (Sultana and Loftus 2011, p. 1). It is vital for people, food, and energy production as well as the environment (Plummer 2008, p. 3). Water also embodies deep cultural values and social meaning, internalizing socio-economic and physical relations. For its characteristics, water is not an ordinary or typical economic good (Swyngedouw 2004, p.28).

Heller (2022, p. 19) notes that the human rights to water can be internationally tracked to the United Nations Conference on Water in 1977 where the approved action plan at the conference stated that "all peoples, whatever their stage of development and social and economic conditions, have the right to access drinking water in quantities and of a quality equal to their basic needs" (United Nations, 1977a n.p. cited in Heller 2022, p. 19). Further on, in 1992 the Dublin Statement on Water and Sustainable Development established four guiding principles stating that: fresh water is a finite and vulnerable resource, water management should be done in a participatory way, women play a central role in water provision and water has an economic value and should be recognized as an economic good (Nicol et al 2012 cited in Sultana and Loftus 2020, p.73). The latter point raised concerns since the poorest groups could be excluded from access to water (Sultana and Loftus 2015, p. 98), furthermore it has been considered that the use of such language may have played a determinant role in intensifying the water

privatization process that took place in the 1990s around the world (Heller 2022, pp. 19-20).

After almost two decades, in 2010, the United Nations General Assembly recognised the right to water and sanitation as human rights, considering it essential for "the full enjoyment of life and all human rights", calling upon international organizations and states to provide the capacity, technology and financial resources to execute it. According to the United Nations (2010, pp. 7-10) to secure the human rights to water and sanitation the following standards need to be guaranteed:

- Each person must have access to a **sufficient and continuous** supply of water for personal and domestic needs, which include drinking, washing clothes, preparing food, and maintaining personal and household hygiene. The right to water does not apply to other domestic water uses, such as water used for swimming pools or gardening.

- According to the World Health Organization (WHO) each person needs **between 50 and 100 liters of water per day** to ensure that their most basic needs are met and that they experience few health issues.

- Water required for personal or domestic use must be **safe**, meaning free from microorganisms, chemicals and radiological hazards that presents a risk to a person´s health. Measures to enhance the drinking-water safety are established by the local and/or national standards for drinking-water quality.

- Water, and water facilities and services, must be **affordable** for all. According to the United Nations Development Programme (UNDP), water expenses should not account for more than 3% of household income. Additionally, it is stated that no group or individual should be denied access to drinking-water for not being able to pay.

- Access to water and sanitation services should be **physically accessible**. The water source must be within 1,000 meters of the home, and the time spent collecting the water should not go over 30 minutes, according to the WHO.

There are different positions regarding the human rights to water and sanitation, being the most common that there is a significant gap between promoting the human right to

water and sanitation and implementing it (Finewood and Holifield, 2015, p. 87). According to Sultana and Loftus (2011, p. 6) there is an urge to materialise the human rights to water and sanitation, otherwise, UN's recognition is seen as a pure moral declaration and loses its conceptual weight, becoming a floating idea without political content and no ability to disrupt current water governance, still reproducing inequities. In that regard, both authors argue that discussions surrounding the human rights to water should emphasise power dynamics when making decisions about who gets water and who does not, how water becomes accessible or available, with what means and purposes, and how water governance is implemented across sites and scales (Sultana and Loftus 2011, pp. 4-10).

Additionally, Staddon et al (2011, pp. 62-63) support that the human rights to water do not consist of securing the material access to water, but rather to the advantages of having access to it such as hydration, access to food, hygiene, exercise, health and many others. Therefore, it is arguable that the right to water would not just have value on its own. Hence, it is important to address the deeper issues raised by the concept of a "right to water," such as who is said to be entitled to what types of water-related benefits or services.

Finally, Sultana and Loftus (2011, p. 5) state that acknowledging the right to water shows that authorities can be held accountable on a political and legal level, giving those who are denied access to it the means to fight and struggle for it. It is possible to create opportunities for marginalized communities and peoples to participate in the (often elitist) decision-making processes of institutions that manage and control water resources. Most academics and activists point out that the discussions surrounding the right to water emphasize the importance of ensuring equitable and pro-poor access to water.

2.2.2 And the human right to sanitation?

Although the human rights to water and sanitation have been internationally recognized, much of academic research and international efforts have been primarily focused on securing access to water services, while sanitation has remained in the margins. This is because water is essential for life and there is not any resource that can substitute it.

However, Geographers such as Colin McFarlane (2023, n.p.) strongly argues that access to sanitation is equally important than securing access to water as not having adequate sanitation services has devastating health impacts.

McFarlane (2023, n.p.), states that sanitation should not be understood as increasing the number of toilettes, but as an issue that "spills" over all others since it is a "networked" problem, which is closely related to land and housing issues. Moreover, he considers that urban sanitation has been worsening over the years, being the most pressing and urgent crisis in the world. Additionally, the author argues that sanitation is essential to overcoming poverty, inequality, and city living and that cities should adequately prioritise sanitation for low-income groups. Urban sanitation involves much more than just removing and containing human waste. It also entails controlling technology supply and demand. It concerns governance and provisioning, as well as bodies and their wastes, faulty and inadequate plumbing, municipal officials and activists, locations and political economies, cultural politics and individuals, microbes, and legal rights. Moreover, the lack of sanitation undermines health, restricts people's movement within cities, prevents adults from going to work and prevents children from attending school, causes local tensions, spreads disease, serves as a focal point for urban protest, and more (McFarlane 2023, p. 16).

Studies on everyday sanitation practices in urban contexts have typically concentrated on one toilet, one piece of technology, or one set of toilet postures. However, most urban residents combine a variety of non-networked technologies (such as buckets and plastic bags, portable toilets, and various types of latrines) with service provisioning arrangements (such as self-help, community based, and entrepreneur provided). It is still unclear how residents move between these various artifacts and how they interact with one another. (Vidal et al 2024, p.4).

Therefore, it is encouraged to consider heterogeneous infrastructure configurations and how their multiplicity allows access even in the event of infrastructure failure (Lawhon et al 2018, cited in Vidal et al 2024, p. 4)

Global South cities face the greatest technological, financial, and ecological obstacles when it comes to networked sanitation. However, many people are reluctant to move

beyond networked sewer systems due to past-dependence and the social connotations attached to flush and discharge systems and recognize the diversity of heterogeneous or hybrid sanitation systems (Vidal et al 2024, p.2). The COVID-19 pandemic exposed the stark disparities in access to toilets, soap, and water—all essential for limiting the spread of infection—that exist in cities all over the world. These factors made people much more susceptible to COVID-19, especially in impoverished and crowded urban areas, like informal settlements. However, the pandemic has not prompted a renewed focus on sanitation. (McFarlane 2023, p. 19-22).

Finally, climate change represents an enormous challenge for infrastructures, including sewers. Conventional water-based urban sanitation systems (flush toilets connected to a sewer network or to a septic tank) are considered to be the least climate-resilient sanitation technologies (Vidal et al 2024, p.4)

2.2.3 Water (and sanitation) governance and good governance

Academics and international organizations have recognised that current water crisis is a crisis of governance (Bakker 2010, Hukka et al 2010, Transparency International 2018). To this day, the government and the public sector continues playing the most important role in water governance since is the one in charge of establishing efficient regulatory frameworks and oversights (Transparency International 2008, n.p.).

Water governance is defined as the range of formal and informal processes, rules, and practices in politics, institutions, and administration that govern how decisions are made and carried out, how decision-makers are held accountable for the development and management of water resources, and how water services are provided. Moreover, it encompasses how stakeholders express their interests and have their concerns taken into consideration (OECD 2011 cited in Akhmouch et al 2018, p. 5). The future of water governance and the ability of governments to address it is challenged by economic, social, climatic, urban, and technological trends, which frequently necessitate multi-stakeholder solutions. Since the outlook for water is not promising, concerns about the distribution of water, funding for infrastructure, and disaster relief necessitate finding better ways to do things with less money, less water, and more support from people. In that scenario, decision-makers around the world will have to make difficult decisions

over the next ten years regarding how to manage water in a way that is equitable, efficient, and environmentally sound (Akhmouch et al 2018, p. 10).

According to Keping (2018, n.p.) good governance "refers to the public administration processes that maximize public interest." Additionally, he summarizes six perspectives on good governance, which are: legitimacy, transparency, accountability, the rule of law, responsiveness, and effectiveness (Keping 2018). Weiss (2000, n.p.) quotes former Kofi Annan United Nations Secretary-General who stated that good governance should strengthen democracy and promote capacity and transparency in public administration.

Within the water governance framework, the absence of "good governance" principles has been recognized as a primary cause of all major social constraints, encompassing issues related to the unsustainable management of water ecosystems and the worldwide crisis of access to clean water and sanitation services (Hukka et al 2010, p. 238). Good water governance comprehends integrity, transparency, and the engagement of the stakeholders. Additionally, it encompasses holding decision-makers accountable for their actions (World Resources Institute n.y. cited Camacho p. 13), aspects that will be developed further below.

2.3 Informal settlements and access to water and sanitation

While for some the term informality lies outside the bounds of planning and represents its failure to "regulate, manage, map, and control the "other" that eludes planning" (Roy 2009a, p.9), some authors conceive informality as a process of urban transformation in itself and not as the counterpart to the formal (Banks et al 2019, p. 3). This thesis draws on the work on informality of authors such as Ananya Roy, Oren Yifatchel and Faranak Miraftab.

Additionally, this research draws on the concept of political materiality of infrastructure developed by Andrew Barry (2020) who explores the paradoxical relationship between politics and materials, since objects do not exist in isolation but are embedded in certain contexts. Finally, this research utilises the concept of citizenship compiling denominations by different authors such as Charlotte Lemanski and James Holston. In particular, it draws on the work of Nikhil Anand on "hydraulic citizenship" where he highlights the connections between water infrastructures and citizenship recognition.

2.3.1 Informality and the city

Ananya Roy (2009b, p. 81) in her paper: *Why India cannot plan its cities: Informality, Insurgence and the Idiom of Urbanization,* proposes four overall statements about informality:

1. Informality is not synonymous with poverty.
2. Informality is a deregulated rather than unregulated system.
3. The state is an informalized entity, or informality from above.
4. Insurgence does not necessarily create a just city.

The author considers that informality is an "idiom" of urbanization (Roy 2009a, p.9). She describes informality as a production of space mode characterized by the territorial logic of deregulation. Moreover, she understands informality as a state of exception and ambiguity that is "inscribed in the ever-shifting relationship between what is legal and illegal, legitimate and illegitimate, authorized and unauthorized" (Roy 2009a, p. 8). Nevertheless, she argues that informality is not a list of unregulated activities that escape the purview of planning; rather is planning that designates which activities are authorized and which are unauthorized, defining the informal (Roy 2009a, p. 10).

In her elaboration on informality, Roy quotes Agambens who states that informality is not the "chaos that precedes order, but rather the situation that results from its suspension (Agmbens 1998 cited in Roy 2005, p.149). People responsible for enacting this suspension is the state´s planning and legal apparatus, also to establish what is informal and what is not, and which forms of informality will prosper and which not. (Roy 2005, p.149).

Just like Roy, Yiftachel also challenges dualistic conceptions about informality. The author terms urban informality as "gray space"- located between "the "whiteness" of legality/approval/safety and the "blackness" of eviction/destruction/death". Lying 'in the shadow' of the formal, planned city, polity, and economy, gray spaces are home to a multitude of groups, bodies, housing, lands, economies, and discourses, partially existing, outside the view of city plans and state authorities. Gray spaces are neither eliminated nor integrated, establishing a "pseudo-permanent" margin in the urban (Yiftachel 2009, p. 89).

Roy states that in a context of informatization, where "the relationship between legality and illegality, the recognized and the criminalized, the included and the marginalized" insurgence often unfolds, challenging the territorial logic of informality (Roy 2009a, p.10). In that regard, Miraftab (2009, n.p.) states that planning should not be seen as a prerogative of professionals acting in isolation, but rather as a contested field of interrelated activities by multiple actors. Then she elaborates on the concept of "insurgent planning", one that transgresses de dichotomies. Furthermore, Miraftab proposes that space-making involves a complicated terrain of cooperation and contestation, dissent and appropriation, and familiarization and defamiliarization) and then elaborates on the concept of "invited" and "invented" spaces related to insurgency (Miraftab 2009, n.p; Roy 2009a, p. 10). "Invited" spaces are legitimized by government interventions and donors trying to cope with systems of hardship, while "invented" spaces are created through the poor´s counterpolitics, creating or re-appropriating old ones where they can recall their citizenship rights (Miraftab 2009, n.p.).

2.3.2 Political materiality of infrastructure

Infrastructures facilitate connections, exchange, flows, and mobilities. They are built networks that enable the flow of goods, persons, and ideas across space, reconfiguring borders and territories (Larkin 2013 cited in Barry 2020, p.91). Infrastructure provision addresses human needs, frequently inequitably and imperfectly. They also create the sights, sounds, and smells that characterize and animate daily life, being part of the urban experience overall (Barry 2020, p.91).

According to Piló and Jafffe (2020, p. 10), political materiality refers to the role that objects have in mediating power relations between humans. They suggest that, by paying attention to material entities, one can better comprehend how governance actors work to justify a particular order and how people resist or follow it (Piló and Jaffe 2020, p. 10). Furthermore, material things serve as a medium for both individual and group struggles for recognition and rights (Piló and Jaffe 2020, p. 13).

For Andrew Barry, infrastructure is not only material but also comprehends "apparently immaterial phenomena" like imagination and emotions such as pain and suffering.

Therefore, analysing infrastructure should include both aspects, tangible and intangible. Related to the materiality, Barry also recognizes that infrastructures are subject to transformation over time, being subject to "to corrosion, fatigue, decay, and wear and tear, processes that may be exacerbated by neglect, theft, overuse, sabotage, hacking, obsolescence or changes in the environments in which they are embedded" (Barry 2020, pp. 92-93).

According to Maria Kaika (2005, p. 32), networks are essential to transport the final product of nature´s transformation to the city and the market. They are crucial for the transportation of utilities like gas, electricity, and water as well as for the conversion of these resources into commodities that can be used and exchanged. Therefore, networks constitute an important component in cities and the commodification processes. In the case of water, Kaika (2005, p. 32, p. 64), argues that water networks are the media by the natural element H2O is transformed into drinking water, a socially produced good, which acquires cultural and social significance. Moreover, thanks to the existence of a complex set of material and social networks, and the interaction between human beings and the physical environment, the flow of purified water to the modern home as the one that flows out in the form of sewage is possible.

To conclude, it is important to recall Lemanski (2019, p.1) who stated that the relationship between infrastructure and citizenship is essential because it highlights the links between the material and political aspects of state-society relations. She remarks that, even if citizenship is fundamentally a political relationship (state society), this relationship is mainly mediated by the materiality of public infrastructure, especially in urban contexts. As an example, the author recalls how Kyle Shelton uses infrastructural citizenship for a historical analysis of Houston resident´s strategies of mobilization against a highway construction in the 1970s, highlighting that "inert and technical materiality of infrastructure has political meaning" (Lemanski 2019, p. 14).

2.3.3 Barriers for water and sanitation provision in informal settlements

Sinharoy, Pittluck, and Clasen (2019, p.1), developed a framework based on Pierce´s work, examining the "drivers and barriers of water and sanitation policies for informal settlements in low- and middle-income countries". For the purposes of this research, I

will focus only on barriers, which are structured around the following six categories: economic, spatial, social, institutional, political and informational.

In the economic category, the authors address that a key barrier for the water and sanitation provision in informal settlements is the insufficient funding for infrastructures investments and the lack of cost recovery measurements to cover high upfront costs and maintenance, especially for sanitation. In the spatial category the geographical location of informal settlements as well as the high housing density and poor construction of settlements are pointed out as barriers. The lack of social capital and social cohesion and the marginalization and discrimination against residents of informal settlements are presented as barriers to provide the services. Furthermore, in the institutional category the following are identified as barriers: the lack of clear mandates, policy coordinantion and legal/planning frameworks, insufficient capacity, time and/or resources for urbanplanning and policymaking. Additionally, lack of tenure status of residents of informal settlements and obstacles to renure´s recognition are also considered barriers. The centralization and fragmentation of responsibility for water and sanitation service provisions and the lack of political will to meet the needs of residents of informal settlements are considered political barriers. At the informational category the barriers are the lack of appropriate global indicators and accurate, representative, and relevant data on informal settlements as well as insufficient evidence on "what works" in informal settlements (Sinharoy et al 2019, p.6).

Sinharoy et al (2019, p. 6) elaborate on this framework stating that "the nature and relative importance of these factors also may be context-specific", and that treating water and sanitation together may not be appropriate in every context as well, which justifies the adaptability of the types of barriers and the need for concrete case studies. While these categories are not mobilized to structure this research and its findings, they are used as inspiration to identify key information in order to go beyond mainstream explanations of why water and sanitation networks are not extended in informal settlements.

2.3.4 More than water and sanitation: Citizenship recognition

Being a citizen is not a destination but a continuous process that is full of challenges and tensions. Local customs have an impact on citizenship rights and can create new forms of inclusions and exclusions. Therefore, citizenship is more of a claim and a sense of belonging than a status (Ho 2009, Das 2011 cited in Sultana 2020, p. 3). No one can survive without water, so the daily struggle to find and obtain water comes to represent the precarious position of poor urban residents in the city. Thus, water is essential to understanding how the urban poor relate to the state and how this impacts their day-to-day experiences as citizens (Rodina 2016, Rodina and Harris 2016, von Schnitzler 2016 cited in Sultana 2020, p. 2).

The state is noticed by the urban poor both in its absence or in its manifestation (Sultana 2020, p. 3). Water access distinguishes subjects from citizens because the state provides water to those who are considered to be proper urban citizens but not to others. Clarifying the disparities in access to water is necessary to expose the power dynamics and citizenship practices that underlie the complex realities and complexities of the water-citizenship nexus. To understand the nexus, it is useful to consider how urban citizenship is shaped by materialities (of water and water infrastructure) is intersected with sociospatial differences (such as gender, class, etc.) (Sultana 2020, p. 2).

Charlotte Lemanski (2019, p.1.) develops the concept of "infrastructure citizenship", highlighting the inter-connection between infrastructure and citizenship, which shapes urban life at different scales In that regard "citizens' everyday access to, and use of, public infrastructure in the city affect, and are affected by, their citizenship identity and practice" (Lemanski n.y., p.8).

James Holston (2008, n.p.) articulates the idea of "insurgent citizenship", meaning by insurgent a form of counter-politics that disrupts the prevailing system of citizenship, making it susceptible and challenged. Holston states that insurgence can only be understood in the framework of "differentiated citizenship", emphasizing the uneven distribution of access and power where the periphery is simultaneously marginalized and yet capable of developing a counter-politics. Elaborating on Holston´s ideas, Miraftab then introduced the notion of "insurgent planning", mentioned in a previous

section, stating that these are characterized by being counter-hegemonic, transgressive, and imaginative (Roy 2009a, p. 8)

Finally, by exploring the politics of Mumbai´s water infrastructure, Nikhil Anand (2017, p. 545) developed the concept of "hydraulic citizenship", a form of city belonging made possible by social and material claims made on the city's water system. Hydraulic citizenship is a product of various articulations between the technologies of politics (enabled by laws, politicians, and patrons) and the politics of technology (enabled by plumbing, pipes, and pumps). It is produced in a field that is both social and physical. According to Anand, the "hydraulic citizenship" recognition is incremental, intermittent, and reversible.

2.4 Corruption and integrity in the water and sanitation sectors

This subchapter presents literature related to the concepts of corruption and integrity, firstly as broader concepts and then related to the water and sanitation sector. Since corruption is the most recognized integrity failure (WIN n.y., n.p.) this section begins developing it and then develops the concept of integrity. To conclude, this subchapter develops on instances where integrity has been broken: integrity failures.

From the literature review, it has been noticed that not many academic authors address access to water and sanitation services from an integrity perspective (WIN 2021, p. 25). In this regard, this research draws mainly from sources being published by Non-Governmental Organizations that advocate fighting corruption, such as Transparency International and the Water Integrity Network (WIN).

2.4.1 Corruption

Corruption is commonly recognized as a major contributor to poor access to water and sanitation services (WIN, 2021). Corruption in the water and sanitation sector may include diverting public funds for personal interests, the payment of bribes to access services through illegal connections, and political mismanagement of utilities for vote seeking, among others (Camacho 2021, p. 9). According to Transparency International, corruption is defined as "the abuse of entrusted power for private gain" (Transparency International 2008, p.6). Corruption changes among different cultures and its perception

is considered subjective since it "lies in the eye of the beholder" (Holmes 2015, p. 2). Corrupt practices are mostly hidden from the public eye, therefore accurately evaluating their effects is difficult, having both direct and indirect impacts (WIN 2021, p. 25) which are mostly measured in terms of financial and health-related impacts in the water and sanitation sector (Jenkins 2017, p. 2) Moreover, corruption degrees vary within cities and towns. On the one hand, there are certain places where corruption is primarily the result of singular acts of a small number of corrupt people. On the other hand, there are cities and towns where corruption is deeply and systemically incorporated at all levels of the governance structure (WIN 2021, p. 58).

In corruption acts, very often are involved two parties: the giver and the recipient of the bribe. Since both parties benefit from the exchange and are operating on equal footing, this exchange can be considered collusive. Corruption can involve all spheres of public, private, and civil society, generating exchanges between them. It is worth noting that most of the documents of NGOs fighting corruption emphasize on corruption cases involving the public sector, however, they recognize that corruption also occurs in agreements between private parties (Stålgren 2006, pp. 9-10). Empirical evidence has also shown that women, children and marginalized groups are the most affected by corrupt practices (WIN 2021, n.p.).

From the reviewed literature, it has been evidenced that there are different types of corruption and ways of grouping them. Arnold Heidenheimer (1970, cited in Holmes 2015, p. 8), for example, organizes corruption in three types: black, white and gray. Black corruption is defined as practices that most people, including both elites and the general populace, deplore and want to see punished, while white corruption is defined as practices that, while still formally being considered corrupt, are more-or-less tolerated by both groups, who do not want to see the perpetrators punished. Gray corruption refers to practices on which there are significant differences in opinion, including ambivalence, even between elites and the general public or between these two main groups of people. Heidenheimer also differentiates between petty (or low level) and grand corruption. The first one applies to the ordinary citizen kinds of corruption they can encounter on their everyday life. The latter refers to an elite level in which politicians take decisions that may benefit a group who has bribed them (Heidenheimer 1970, cited in Holmes 2015, p. 10).

Corruption is present at every stage of the water delivery process, from the creation of policies and budgetary allocations to the management of operations and invoicing. It damages all nations, wealthy or poor, and impacts both public and private water services (Transparency International 2008, n.p).

But why is the water and sanitation sectors particularly vulnerable to corruption? In general, the water and sanitation sector is highly exposed to different types of corruption because of different reasons: Its provision tends to be a natural monopoly. Contrary to the electricity sector, where the service is provided by more than one company, in cities water and sanitation services are commonly provided by a single provider. In addition, the water and sanitation sector require large and long-term investment projects, such as dams, networks, treatment plants, among other types of infrastructure, which creates greater opportunities for corruption. In addition, the technical and financial complexity of projects and works hinders access to information, open data transparency and accountability. The high demand for services can consolidate the emergence of groups that concentrate and exercise power for their own benefit, affecting the supply to the most vulnerable groups. Finally, the regulatory framework tends to be unclear and fragmented, leading to conflicts of interest between different public institutions (Transparency International and WIN 2010 cited in Jenkins 2017, p.3).

2.4.2 A new perspective: integrity

Conventional approaches to fighting corruption have frequently focused on implementing anti-corruption measures or more strict regulations. In many situations, it has been discovered that extremely strong compliance requirements and stricter enforcement are ineffective and expensive (WIN 2022, p.10). Instead, strengthening integrity has become a new approach mobilized by different international organizations, including the Water Integrity Network (WIN), to reduce corruption. However, the perspective of integrity has so far received relatively little academic attention, particularly when investigating informal settlements and access to services such as water and sanitation. Therefore, this research aims to contribute to this sidelined discussion.

According to Transparency International (n.y., n.p.) integrity comprehends "behaviours and actions consistent with a set of moral[4] or ethical[5] principles and standards that is embraced by individuals as well as institutions. Integrity creates a barrier to corruption". For WIN, integrity is defined as "the use of vested powers and resources ethically and honestly for the delivery of sustainable and equitable water and sanitation. Integrity is implicit in the human rights obligations, explicit in the administrative justice laws of many countries (…)" (WIN 2021, p.22).

Acting with integrity involves more than just preventing corruption; it also entails respecting, protecting, and granting everyone's rights to water and sanitation—especially the marginalized and poor. It is a positive aspiration that needs public sector workers to be committed to pursuing the aims of their institution and reporting any misconduct they know of. Integrity is implied worldwide in the human rights framework and explicated in the legislation of manyfold countries. The inability of cities to organize and facilitate informal settlements to obtain adequate water and sanitation services is considered a failure of integrity (WIN 2021, p.15).

WIN developed a framework for advancing integrity which is known as "TAPA" framework. This framework includes the governance principles of transparency, accountability, participation, and anticorruption to operationalize integrity.

Transparency	Implies easy public access to the information generated by each institution, related to budgets, financial statements, investment plans, and fulfillment of strategic objectives, among other data that allow measuring and controlling the results of each management.
Accountability	Mean that institutions make available to the public information on what they do, as well as the relationship they have with their strategic partners and economic agents.
Participation	Implies that all stakeholders, including vulnerable and resource-poor groups such as the population of informal settlements, are meaningfully involved in making decisions on how water is used, protected, managed, and allocated and how sanitation services are provided.
Anticorruption	It is exercised through strategic actions that reduce the incidence of acts of corruption, as well as their impact, through policies and procedures that seek to prevent, detect, and sanction any integrity failures.

Table 1:TAPA Framework

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[4]Moral: "relating to the standards of good or bad behaviour, fairness, honesty, etc. that each person believes in, rather than to laws" (Cambridge Dictionary, n.y., n.p.)
[5] Ethical: "relating to the beliefs about what is morally right" (Cambridge Dictionary, n.y., n.p.)

The TAPA framework is not only a guide for WIN and other organisations but also as methodological way to think about integrity at different levels, from the institutional to the individual (2022, pp. 14-24). Enhancing and adopting a culture of integrity contributes to the realization of the human rights to water and sanitation since the integrity framework is intrinsically associated with those human rights. For example, the application of the principles of transparency, accountability and meaningful and active participation are critical to the achievement of the Sustainable Development Goal 6 "Clean water and sanitation" (WIN 2021, p.93, WIN 2022, p.10).

2.4.3 Not only corruption: integrity failures

The water and sanitation sectors are not only subject to corruption and unlawful activities but also to a broad range of inactions, immoral or unjust acts that while legal, exacerbate uneven water and sanitation access. Unlike corruption, integrity failures are not always hidden from the public eye, for example, when the human rights to water and sanitation is visibly not fulfilled and people are affected by it. According to the WIN (2021, p. 23), integrity failures can be defined as "instances in which integrity has been broken or violated", this means acting without ethics, moral and honestly for the delivery of water and sanitation, not only at an institutional level but also at an individual one.

Integrity failures contribute to inadequate supply of water and sanitation services as well as the unsustainable use of freshwater resources across the world. They lead to violations of the human right to water and sanitation and worsen already-existing disparities in access to these services. This has major negative effects on people's daily lives and well-being in addition to having high financial, economic, and environmental costs (WIN 2022, p.9).

In the case of informal settlements, WIN (n.y, n.p.) suggests that integrity failures might occur at the policy, planning and delivery level of water and sanitation. Here are some examples of the most common integrity failures taking place at these three levels:

At the policy level, integrity failures occur when:
- The human rights to water and sanitation are not guaranteed.
- There are unclear regulatory frameworks for private water vendors.

- Informal settlements are excluded from water and sanitation due to insecure land tenure status.

At the urban planning level integrity failures occur when:
- Informal settlements are not included in service supply and city expansion plans.
- There is a lack of residents' participation in the design and implementation of water and sanitation services.
- Corruption is present in the allocation of land ownership.

At the service delivery level integrity failures occur when:
- Politicians use water and sanitation for vote-seeking.
- Utility company staff ask for bribes or are offered bribes for service provision.
- Tanker truck owners abuse prices, increasing the selling price of water for personal gain.

WIN's multi-scale and multi-stakeholder approach to integrity failures allows for a comprehensive understanding of the issue in the water and sanitation sector, which will be then applied to the research. Using the concept of integrity failures provides a broader view of actions and inactions that contribute to unequal water and sanitation provision and access, including all actors involved in the processes. Moreover, it also disrupts the dualistic conception of the legal and illegal, encompassing actions that while legal are violating the human rights t water and sanitation.

2.5 Theoretical framework

As can be see in Figure 1, first, the thesis draws on UPE theory which claims that the urbanization process is not the end of nature, but rather its transformation, and sees the city as a product of the socio-natural transformation. However, the process of urbanization of nature is never neutral, rather is highly contested and political (WaterPower Research Group Trier University 2018, p. 15). This is useful to identify unequal power relations between actors.

Then, the concept of integrity and integrity failures, highlights how vested powers and resources are used, either morally and ethically or violating these principles. Integrity

failures not only manifest in the form of corruption but also through more general acts and inactions, while not necessarily criminal contribute to injustices. This, not only at a government level but also individually. The concept of integrity encompasses the use of the TAPA framework (transparency, accountability, participation and anticorruption). Taking the TAPA framework into consideration in the development of the research allows for the identification of instances where these criteria are not met, so that integrity failures in the supply and access to water and sanitation in informal settlements in Lima can be recognised. Finally, addressing integrity failures through UPE allows for the identification of who gains and who loses from these actions.

Through the concepts of integrity and integrity failures, the human rights to water and sanitation is addressed. Integrity failures in the form of corruption within the water and sanitation sector constitutes a breach of the fundamental human rights to access water and sanitation services. It mainly impact individuals with limited influence, the impoverished and marginalized communities, usually living in informal settlements (WIN 2021, p.16). Moreover, informality worsens the problem of integrity failures and corruption. In areas characterized by informal settlements, residents are often neglected by the government, which might even prevent water and sanitation suppliers from extending their services to these regions (Transparency International 2008a cited in Jenkins 2017, p.4).
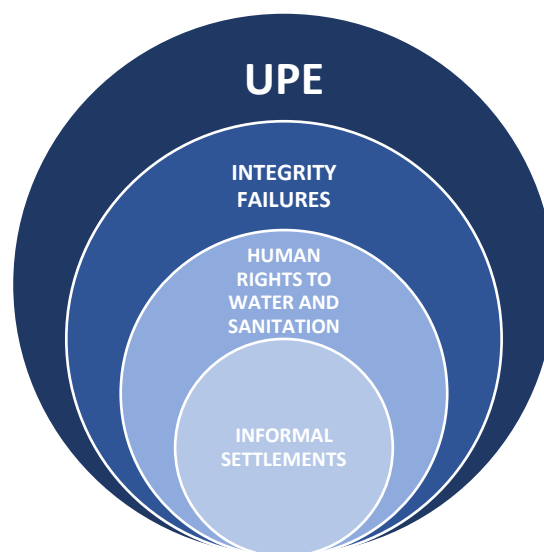
Figure 1: Theoretical Framework

CHAPTER 3

Methodology

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This chapter introduces the methodology and methods selected to collect data and answer the research questions. The chapter has been structured around the methods employed to help gathering the information needed to answer each question proposed in this thesis.

3.1 Methodological approach

Disparities in access to water and sanitation are the result of decisions made across various levels and actors. Hence, this research adapts a multi-scalar approach. According to López and Bruns (2018, p. 25) approaches that consider multiple scales help comprehend how actions at the local level are impacted by broader dynamics taking place at the local, city, national and global scale. Adopting a multi-scale perspective comprehends identifying diverse actors involved in water and sanitation services in informal settlements in Lima and understanding how their approaches are shaped and affected by specific local, national, and international contexts.

To identify key data sources for this research I was inspired in the six categories proposed by Sinharoy et al (2019, p. 1) to identify barriers for water and sanitation provision in informal settlements. The categories are economic, spatial, social, institutional, political, and informational, developed in Chapter 2. The use of these categories was especially helpful when reviewing the vast data related to SEDAPAL and public institutions, as they helped to filter out what would be important for this research.

Finally, to collect information this research has selected a mixed-methods approach, mainly focused on qualitative methods, utilising desk and field research, according to the nature of the research questions. Throughout the research triangulation was used on the one hand, combining data of two or more sources and, on the other hand, having multiple interviewees with different roles and perspective. This, in order to gain various

insights about integrity failures in the water and sanitation services in Lima with focus on informal settlements.

3.2 First research question

This section introduces the methods employed for answering the first question: How do integrity failures impact SEDAPAL's water and sanitation provision in informal settlements in Lima?

3.2.1 Researching a public utility company and related public institutions

This study relies on SEDAPAL institutional documents to understand its history, mission, vision and functions as well as origins and responsibilities. Simultaneously, the Peruvian legislation was reviewed to uncover the Government's position related to the human rights to water and sanitation. While reviewing these documents, it was recognised that SEDAPAL is not an isolated actor but that is linked to other institutions such as the: Ministerio de Vivienda, Construcción y Saneamiento (MVCS, Ministry of Housing, Construction and Sanitation), Organismo de Formalización de la Propiedad Informal (COFOPRI, Informal Property Formalisation Agency), Superintendencia Nacional de Servicios de Saneamiento (SUNASS,National Superintendency of Sanitation Services), Metropolitan Municipality of Lima, and others. Therefore, a stakeholder mapping was elaborated to identify the relationship between actors.

To address integrity failures and how they are handled by the utility company, guidelines on anti-corruption and integrity reinforcement adopted by SEDAPAL were reviewed. Additionally, this information was complemented with data collected in Peruvian newspapers, online news and documentaries that drew attention to scandals of corruption and lack of integrity in the water and sanitation sector.

To get different perspectives on SEDAPAL´s performance and its responsibility in the provision of water and sanitation services in informal settlements, interviews were conducted with different experts in the topics. Members of the academia, local NGOs and institutions working in the field of water and sanitation in Peru were selected for the interviews (see Annex 1 for a complete list of people interviewed).

3.2.2 Development of a Massive Open Online Course (MOOC)

While working on the thesis, I took part of an internship at the Water Integrity Network (WIN) in Berlin from August to November 2023. In this internship, I was primarily involved in the development of a Massive Open Online Course (MOOC) on "Informal Settlements in Lima: Corruption, Integrity and Access to Water and Sanitation". This project received funding from the Global Center of Spatial Methods for Urban at the Technische Universtät Berlin. Besides WIN, the MOOC was developed in cooperation with the Center for Research in Urban and Territorial Theory (UrbesLab) from Lima and the former director of the Integrity Unit at SEDAPAL.

The MOOC became a key method to gain important insights and different points of view around access to water and sanitation in informal settlements in Lima. Through continuous virtual meetings, the content of the MOOC was collectively developed, for which interesting debates about the challenges and opportunities to improve access to water and sanitation in Lima emerged. In addition, an event with *Agua y Saneamientos Argentinos* (AySA) from Buenos Aires and *Empresas Públicas de Medellin* (EPM) from Medellín was organized to gain knowledge on how other water utility companies in Latin America address the issue of water and sanitation access in informal settlements and evaluate lessons learned from other similar contexts.

3.3 Second research question

This section introduces a series of methods for answering the second research question: How do residents of informal settlements experience and navigate the integrity failures that emerge in accessing water and sanitation on a everyday basis?

3.3.1 Doing research in informal settlements in Lima

To select the field research site for this thesis, a series of criteria were considered. First, an informal settlement was selected where households were not directly connected to SEDAPAL's water and sewerage networks and had a certain level of community organisation to respond to this situation. After consulting a couple of entities, I got to know the local NGO "*Haz tu mundo verde*" (Make your world green, own translation from Spanish), founded by Jorman Cabello and Hernán Baca, who kindly agreed to help with the research. They were valuable contacts to provide information and introduce me

to residents of *Porcicultores* informal settlement in San Juan de Lurigancho district, where data collection for this research took place.

The local NGO *"Haz tu mundo verde"* has been working for more than 10 years to protect the "*Lomas de el Mirador*" (The Viewpoint hills, own translation from Spanish), an area located very close to *Porcicultores*. The hills are a fragile and stationary ecosystem with different vegetation, which is characteristic of the Peruvian coast (PNDU 2018, pp. 3-6). *"Haz tu mundo verde"* works with local communities to promote the care of the hills, generate tourism and cultural activities not only to enhance ecological values, but also prevent land traffickers from invading this areas and destroy the fragile ecosystem. The economic profits coming from these activities are used to improve *Porcicultores* informal settlement common spaces infrastructure.

Figure 2: Lomas El Mirador close to informal settlements

3.3.2 Data collection methods on-site

During October and November 2023, field visits were carried out in *Porcicultores* neighbourhood. Consciously, different days of the week were selected to conduct the visits as it was considered that the everyday dynamics of accessing water and sanitation and the number of residents would differ on weekdays and weekends. Most visits were

carried out with the guidance of Jorman or Hernán from the NGO *"Haz tu mundo verde"*, and in some cases they were conducted individually.

The first visit to *Porcicultores* primarily focused on observations of infrastructures, particularly on water and sanitation infrastructures. Inspired by the work of Andrew Barry (2013), who suggests "following the pipelines", resulting from his work related to exploring spatial networks around an oil pipeline, acknowledging its immediate environment and context, thinking of it as part of the existence of the infrastructure (Barry 2013, n.p.).

I paid attention not only to water infrastructures, but also to electrical and internet networks as well as their distribution in the space to have a comprehensive understanding of access to basic public services in the informal settlement. In addition, during this first visit, attention was paid to the built environment, like the house's materials, dimensions, conditions, the public spaces conditions, and urban equipment.

This study also drawn on semi-structured interviews using snowball sampling (see Annex 1). The first interview was conducted to Jennifer, a resident of *Porcicultores* informal settlement, in charge of filling the water tanks. She provided a great support to contact residents who potentially be willing to talk about the issue. In total 15 interviews were conducted (see Annex 1). Most of the interviews were to residents of *Porcicultores* informal settlement. However, a couple of residents of the surrounding settlements were also interviewed to gain insights on the relations across settlements since there is an interdependence between them to be able to access water and sanitation.

Interviews were voluntary and were conducted either at the door of the residents' homes or in the public space of the informal settlement. It is important to point out that all participants interviewed filled a consent form after the aims and objectives of the interview and the research were explained to them. It should also be noted that although the thesis does not have a gender approach, most of the interviews were conducted with women who are responsible for care work at home, and who are therefore more aware of water management in their households.

Finally, it is important to note that despite not being part of the case study, a one-day visit was carried out to another informal settlement in San Juan de Lurigancho where

water is provided by private tanker trucks. This visit was made in the company of the local researcher Diana Torres, and it was possible to observe a tanker truck and to talk to the tanker driver and a resident using the service provided by the tanker truck.

3.4 Overall data collection limitations

For the first research question, to gain more insights and opinions about how SEDAPAL provides water and sanitation in informal settlements, as well as discuss integrity failures in the sector, an effort was made to interview more employees of the utility company. Nonetheless, the contacted persons were reluctant to talk, even anonymously, which can be understandable considering that they belong to the public sector.

To answer the second research question, the following limitations were encountered:

- Residents of informal settlements were not always at home or at the neighbourhood, so despite of visiting the neighbourhood several days during the week, it was not possible to interview more residents or observe more dynamics between residents and the water and sanitation infrastructures. On weekdays most of the residents were at work while on weekends they were at the market, participating in football events o taking the opportunity to visit family living in other districts.
- Not all the contacted residents wanted to participate in the interviews. It was perceived that people have some fear of talking about how they access to services, especially if it's not in a formal way and if issues about integrity failures, accountability, and transparency within the water management in their neighbourhood.
- Interviewees responses were not always clear or straightforward in answering the questions but rather wandered or deviated from the point, especially with the questions related to sanitation and informal connections.
- Some confusions in the responses of interviewees were identified when naming documents, procedures, and processes for land tenure regulation or access to water and sanitation.

- It was identified that talking about sanitation was not as easy as talking about water. Additionally, it was not possible to enter a household toilet, but it was possible to enter a communal one.

- The resident in charge of paying the water bill in *Porcicultores*, did not want to be interviewed, so I lost the perspective of a major actor in this case study.

- Finally, while organising the fieldwork in September 2023, the Peruvian Government declared San Juan de Lurigancho district, where the *Porcicultores* informal settlement is located, in a state of emergency for two months due to a high crime and extortion rate (El Peruano 2023, n.p). While this did not cause any setbacks in the fieldwork, it meant that special care had to be taken when moving to and within the district and increased perceptions of fear. However, it is worth noting that while conducting fielwork in *Porcicultores* and in company with residents, a sense of security always prevailed.

3.5 Conceptual framework for analysis

The following figure shows the concepts that will be used for this research analysis and how they are linked together:
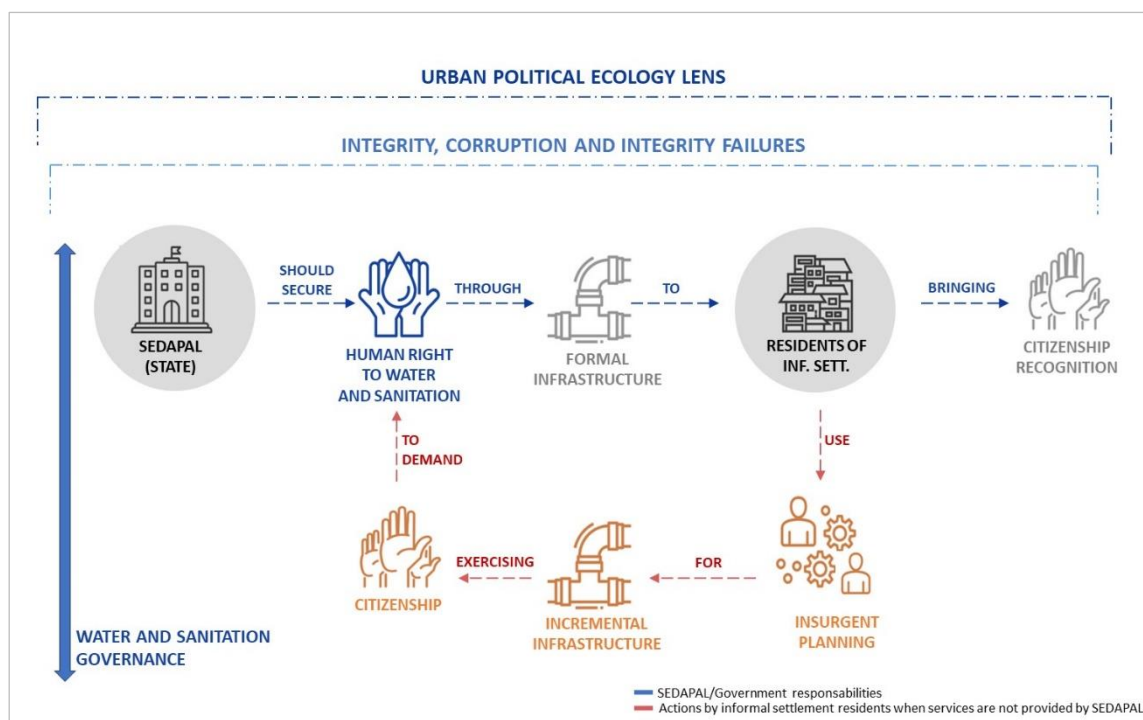
Figure 3: Conceptual Framework

SEDAPAL and residents of informal settlements constitute the main actors in this research (See Figure 3). SEDAPAL as a public entity that belongs to the government has certain responsibilities to ensure the human rights to water and sanitation for the residents of informal settlements. By doing so, they recognize residents of informal settlements as citizens, according to Sultana (2020, pp. 2-3), who underpins that access to water distinguishes subjects from citizens since the state provides water to those who are considered to be proper citizens (see blue arrows in Figure 3).

However, when SEDAPAL does not do so or the provided services do not meet the actual needs of the residents of informal settlements, they organise themselves through insurgent planning to build and/or increment infrastructures with the aim to exercise their human rights to water and sanitation (red arrows in the figure).

Overall aspects are that both SEDAPAL and residents of informal settlements exercise water and sanitation governance. Additionally, integrity, corruption, and integrity failures can occur in the whole process of supply and access to water and sanitation. And, finally, these concepts are approached from the UPE perspective as explained in the theoretical framework (see Chapter 2).

CHAPTER 4

Lima: Situating SEDAPAL and informal settlements

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This chapter introduces the city of Lima, the Water and Sanitation Utility Company: SEDAPAL and informal settlements as background for the case study. The chapter provides information on how water is supplied to the city, water tariffs and consumption, and presents some of the challenges faced by SEDAPAL to supply water and sanitation to a city located on a desert. In addition, this chapter addresses how the utility company mobilizes integrity. Next, the chapter gives an overview on the emergence of informal settlements in Lima almost 100 years ago, the state's response and the eternal promise of access to water and sanitation for all the residents of informal settlements.

4.1 Geographical and political characteristics of Lima

The city of Lima, Peru´s capital, lies on a coastal desert on the shores of the Pacific Ocean and is the second largest desert city in the world, followed by El Cairo (Grovers et al 2019, p. 1). Due to its geographical location close to the Equator line, Peru should be a tropical country, with a warm a rainy climate overall. However, in Lima, it only rains around 9 mm a year due to a very stable atmosphere generated by the coldness of the seawater generated by the Humboldt Current (Woodman and Takashi 2014, p. 4).

While paradoxically Peru is among the top 20 countries with the highest amount of renewable water resources per capita (Burgueño Salas 2023, n.p.), the availability of freshwater is unevenly distributed. Only 2% of this type of water is available in Lima (ANA 2013, n.p.), where more than 10 million citizens live, representing about one-third of the country's population (INEI 2023, n.p).

There are three rivers in Lima: Chillón, Lurín and Rímac, the latter constituting the main source of drinking water supply (80%) in the city (Groves et al 2019, p. 1). The rivers are born in lagoons located in the Andean foothills, situated less than 80 kilometres to the east of the city. Since the average annual per capita freshwater availability of the three

rivers is 125 m3/inhabitant, 8 times less than the "chronic water scarcity index[6]", Lima is in an alarming situation of "water scarcity" (Aquafondo 2020, p. 18). In this regard, supplying water to Lima is a continuous challenge.
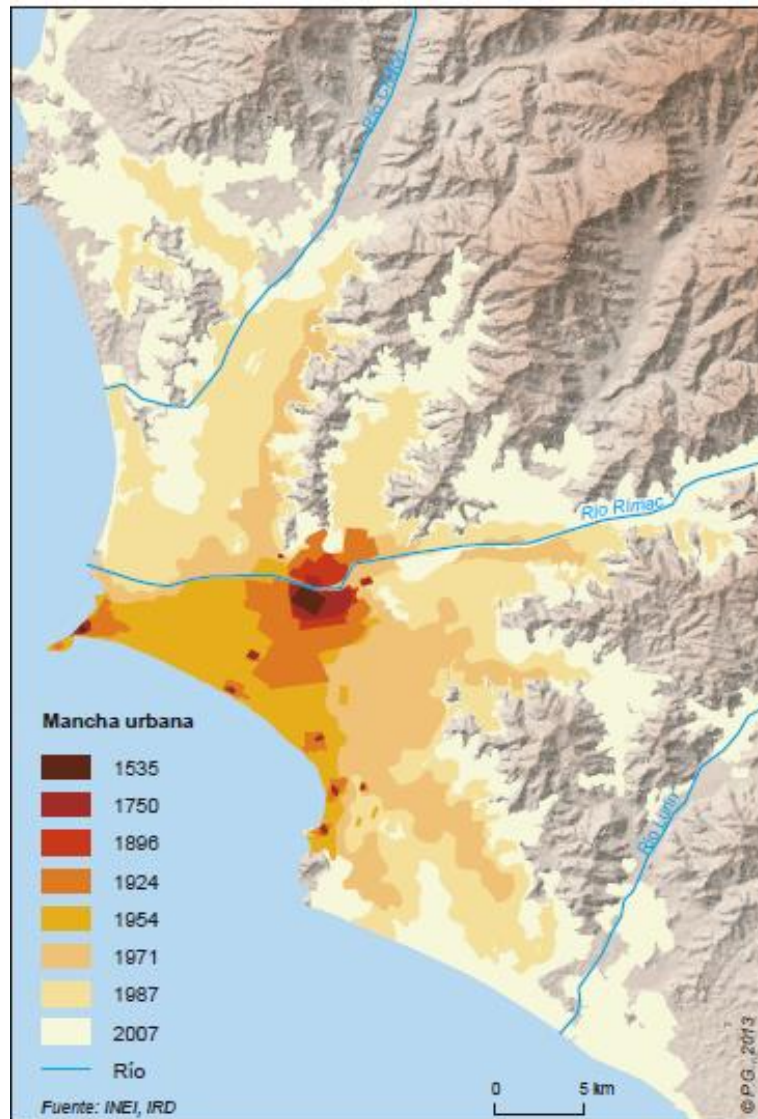
Figure 4: Lima

The Metropolitan Municipality of Lima is responsible for the governance of the whole city. The city is then divided into 43 districts, each with its own district municipality with territorial organisational responsibilities at local level. Districts are organised in sectors and neighbourhoods, depending on the size.

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[6] UN measures water scarcity through the water-to-population ratio per year. An area will experience water stress when its annual water supply falls below 1,700 m3 per person. When that same annual supply falls below 1,000 m3 per person, then it is talked about water scarcity (UN n.y, n.p.).

4.2 SEDAPAL and water and sanitation supply in Lima: an overview

SEDAPAL is a public company founded in 1962, which nowadays provides water and sanitation services to more than 9 million citizens in Lima. Its mission is "to provide drinking water, sewerage, wastewater treatment and reuse services with high-quality standards to meet the needs of the population served, enriching people's lives, generating economic, social and environmental value" (SEDAPAL n.y., n.p.). Although SEDAPAL has always been a public company, up to this day it has adopted Public Private Partnerships arrangements with foreign-owned companies to run some activities. For example, for wastewater management SEDAPAL has given concessions for up to 25 years to private companies (Enríquez Hurtado 2022, p.54). SEDAPAL is regulated by SUNASS, the National Superintendency of Sanitation Services, created in 1992, which is responsible for supervising and overseeing the 50 water and sanitation public utility companies at the nationally in Peru. Only SEDAPAL depend on the National Government while the other utility companies depend on the regional or municipal level (SUNASS 2021, n.p.).

As mentioned in the previous section, the water that supplies Lima comes from three rivers that are born in lagoons located in the Andean foothills, where rainwater is stored (Groves et al 2019, p. 1). From there, the water is then transferred to Lima not only by the rivers but also across dams, and through tunnels, until it reaches the SEDAPAL plant *"La Atarjea"*, located 246 metres above sea level, in the same place where already in the 16th century the Spanish colonisers collected water from springs to bring clean water to the city centre (Bell 2021, p. 4). Once there, SEDAPAL decants, filters, chlorinates, stores, and distributes the water in the city, which adds value to it and makes it fit for consumption (SEDAPAL 2024, n.p). Looking for other water resources, the first desalination plant was inaugurated in 2022, to supply water to the southern part of Lima, benefiting more than 100,000 residents (Espinoza 2023, n.p.). In addition to surface water, SEDAPAL also counts with groundwater sources, but they only constitute 17.7% of water production (SEDAPAL 2022, p.27). According to a World Bank Group analysis, both groundwater and surface water are barely sufficient to meet the growing demands and could be severely affected due to climate change (Groves et al 2019, n.p). In that regard, the geographical conditions of Lima and its exposure to climate change, coupled

with water storage and pumping capacity, would pose a major challenge for water management in a low rainfall season in the highlands where water is collected. Together, these factors pose a major challenge for SEDAPAL to meet the needs of a growing urban population (Groves et al 2019, p. 5). However, despite of challenges SEDAPAL has managed to increase water and sanitation provision over the years as Table 2 shows:

WATER AND SANITATION COVERAGE IN LIMA BY SEDAPAL NETWORK			
Indicators	1993	2003	2023
Lima´s population	6,434,323	7,880,000	10,151,000
% water connection	75%	91%	91.7%
% sanitation connection	60%	85%	90.7%

Table 2: Water and sanitation coverage in Lima

In term of sanitation, SEDAPAL is in charge of collecting, treating and disposing wastewater. Its sewerage system comprises a network of primary and secondary collectors, sewerage chambers, impulsion lines and 20 wastewater treatment plants. The volume of wastewater being threated has increased over the years from, 1.4 m3/s in 2003 to 23.2 m3 /s in 2022, showing a considerable improvement in infrastructure investments (SEDAPAL 2022, n.p.).

4.2.1 Low or insufficient tariffs?

Since 2017, SEDAPAL has applied a cross-subsidy system for tariffs approved by SUNASS, linking charges to the socio-economic level of Lima residents in favour of the vulnerable living in poverty and extreme poverty. To date, approximately 2.6 million users are benefiting from the subsidy (Enríquez Hurtado 2022, p. 61).

Table 3 shows the domestic tariff structure for SEDAPAL's water and sewerage services for the population connected to the network:

CATEGORY	CONSUMPTION RANGE (m3/month)	TARIF (EUROS/M3)	
		DRINKING WATER	SEWERAGE
SUBSIDISED	0 - 10	0,40	0,19
	10 – 20	0,44	0,22
	20 – 50	0,46	0,29
	50 - more	1,69	0,80
NON SUBSIDISED	0 – 20	0,46	0,29
	20 – 50	0,66	0,40
	50 - more	1,69	0,80

Table 3: SEDAPAL´s tariffs

According to reports and management documents, SEDAPAL points out that the average domestic tariff applied to users in Lima is € 0.72 per m³ (without V.A.T), constituting one of the lowest tariffs in comparison with other utility companies in Latin America (see Table 4). It is identified that proportionally the cost of water is lower in Montevideo and Santiago in relation to the minimum wage, while in Lima and Buenos Aires the cost of 1 m3 of water it is higher in proportion to the minimum wage (Melo 2024, n.p.).

AVERAGE WATER AND SANITATION TARIFFS PER M3 IN LIMA AND OTHER LATIN AMERICAN CITIES

	OSE Montevideo Uruguay	EPMAPS Quito Ecuador	SABESP Sao Paulo Brazil	Acueducto Bogotá Colombia	Aguas Andinas Santiago Chile	SEDAPAL Lima Perú	AYSA Buenos Aires Argentina
Tariff	1.93 €	1.72 €	1.46 €	1.2 €	1.1 €	**0.72 €**	0.17 €
MIN. WAGE:	520 €	419 €	265 €	305 €	475 €	252 €	139 €
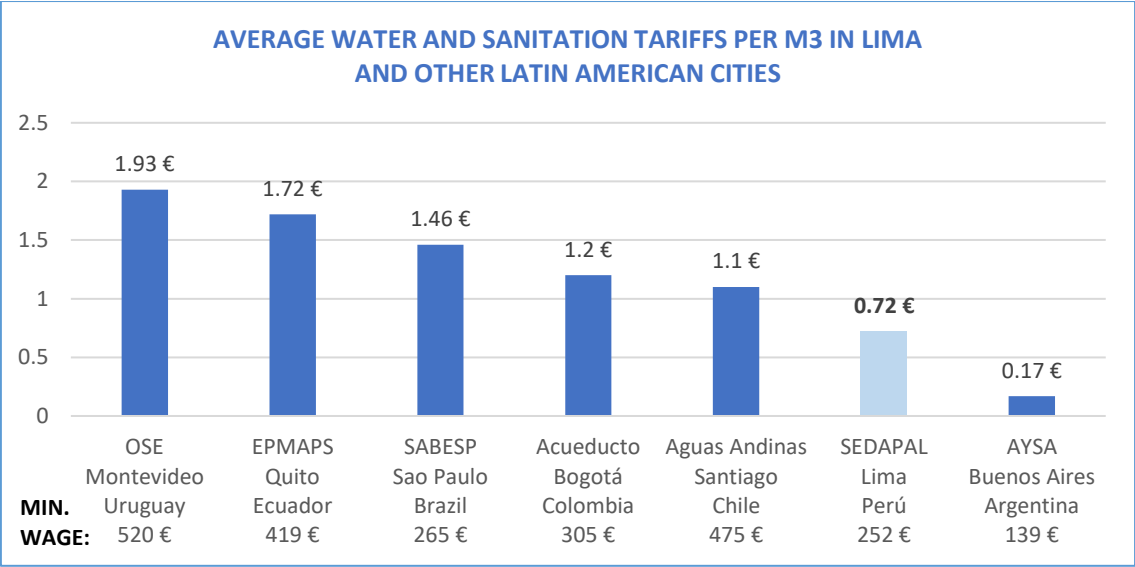
Table 4: Average Water and Sanitation tariffs per m3

In an interview conducted to Prof. Oscar Angulo from the local university *Pontificia Universidad Católica del Peru* on 27 October 2023, (Interview 5), he highlighted that comparing water tariffs among cities may be inadequate to identify which water service costs less than the other, as tariffs are usually calculated based on the cost of water production. In some cities, water can be located close to water treatment plants, which consequently lower the cost, whereas in the case of Lima, water requires high investments as it must be transported from the Andes not only by rivers but also by infrastructure. In this sense, Prof. Angulo (Interview 5) points out that the cost of water in Lima could easily be two or three times more expensive than it is today, but currently systems of cross-subsidies and state investments prevent tariffs from rising so much and to allow a large part of the population to secure safe and reliable access to water services.

It should be noted that the water tariff is updated every five years. The increase is proposed by SEDAPAL and approved by SUNASS after a technical evaluation. According

to both institutions, updating the tariff helps to the sustainability of the water and sanitation service, otherwise, there would not be sufficient funds to repair the infrastructure and increase the coverage of the service (Mamani 2023, n.p).

According to an interview conducted by the local newspaper *Gestión* to a previous director of SEDAPAL in 2023, the company would require around 2,470 million euros in the next five years for large water investment projects to secure water and sanitation services for the coming years. However, the current tariffs would only allow for the collection of 469 thousand euros, meaning that SEDAPAL could run the risk of becoming underfinanced to extend water and sanitation network but also to carry out large-scale engineering works to collect and store water. In addition to this, at the same time as there is more water production, it is also necessary to set up collectors to face a higher level of wastewater (García Olano 2023, n.p.).

4.2.2 Unequal water consumption

Another important aspect to consider regarding water access in Lima is the unequal water consumption in the different districts (SUNASS 2023, n.p.). Table 5 shows that, overall, water consumption in the whole city has decreased between 2016 and 2023 in all districts of Lima. This trend may be explained due to different campaigns and initiatives of SEDAPAL and SUNASS to raise awareness among the population for responsible water consumption. In 2023, for example, a campaign called "with 100 is enough" was launched to encourage the use 100 litres of water per person per day, in line with the World Health Organization recommendations to ensure that basic needs are met (SUNASS 2023, n.p.).

According to Table 5 the main decrease in drinking water consumption is registered in high-income districts such as San Isidro and Miraflores. In middle-income districts, consumption has remained very similar over time. In lower-income districts such as San Martín de Porres (SMP), San Juan de Lurigancho (SJL) and Villa el Salvador (VES), water consumption has increased. This increment is presumably due to the expansion of water networks in these districts over the last years.
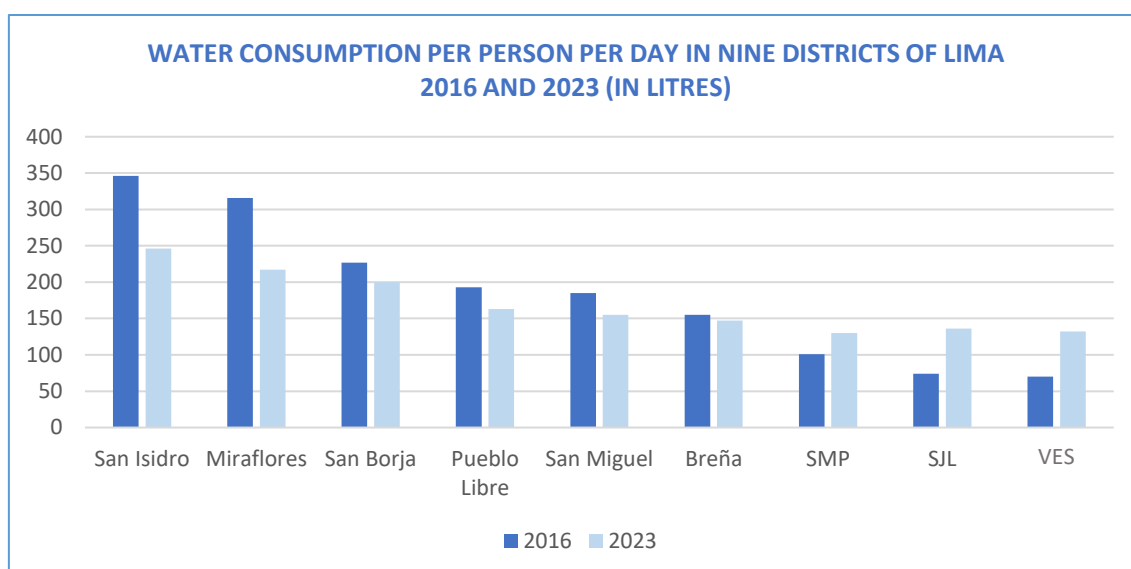
Table 5: Water consumption in nine districts of Lima, years 2016 and 2023

According to Prof. Angulo (Interview 5) the daily water consumption per person indicator cannot be totally reliable neither representative of water consumption in the different districts of Lima. The indicator divides the total daily consumption of the district by the number of registered residents without taking into consideration that some districts have a high number of floating population[7]. For example, being San Isidro Lima´s financial district, it has many offices and workers that realize about one-third of their daily water consumption in that district, impacting on the indicator.

4.2.3 Mobilizing integrity in SEDAPAL as an institution

Putting in place integrity systems in utility companies has been an important mechanism to reduce corruption, improve performance, reinforce accountability and transparency as well as show credibility. Since 2017, SEDAPAL counts with an Office of Compliance and Integrity in charge to lead and direct actions and strategies for investigation, prevention, detection, and fight against corruption in SEDAPAL, ensuring regulatory compliance and institutional integrity. When interviewed on 08 November 2023, SEDAPAL´s Official, from the Compliance and Integrity Team (Interview 8) explained that the company has implemented a model called the Anti-Corruption and Anti-Fraud System, which is structured based on the following axes:

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[7] It is the population that mobilizes and uses a territory for a certain period of time but has a different place of residence (Woongg et al 2020, n.p.).

1. The existence of an Integrity Office.

2. The existence of an external reporting channel, including the investigation of cases.

3. Risk management.

4. Dissemination, training, and awareness-raising activities.

5. Continuous follow-up and monitoring.

All these measures to implement an integrity agenda within SEDAPAL have resulted in the following: In 2021, SEDAPAL obtained a score of 76% for the implementation of the Integrity Model proposed by the Public Integrity Secretariat of the Presidency of the Council of Ministers. The same year, SEDAPAL obtained the 2nd place in the Evaluation of the Index of Preventive Capacity against Corruption, among the institutions belonging to the Ministry of Housing, Construction and Sanitation. Moreover, SEDAPAL is aligned with the National Integrity and Anti-Corruption Policy, and with the ISO (International Organization for Standardization) Standard 37001:2017 - Anti-bribery Management System (SEDAPAL 2021, n.p.).

To increase citizen participation, SEDAPAL has a complaints digital channel where you are not obliged to provide personal details. This channel can be used to report missing mailbox covers, clandestine connections, and meter theft, among other dishonest acts. Likewise, to promote transparency and accountability, SEDAPAL produces a series of annual reports, management reports, and publications of multi-annual plans, among other publicly accessible documents so that the population can be informed of its actions. In addition, at the government level, the Peruvian State has a standard Transparency Portal, through which publicly updated information on SEDAPAL's budget, the portfolio of investment projects, and contracting processes, among others, can be accessed (Portal de Transparencia estándar n.y., n.p.). Yet, why is it important for an entity like SEDAPAL to act with integrity? When interviewed, SEDAPAL´s Official (Interview 8) mentioned the following:

> *"At the institutional level, integrity seeks to ensure that the State generates public value in decision-making, with a positive impact on society and the well-being of citizens. Furthermore, acting with integrity increases the credibility of public*

entities and bodies, as well as the people who operate them, legitimise their actions, and reaffirms the institutional framework and the democratic system as a whole, generating, in this specific case, trust among the actors involved in the provision of water and sanitation services. This is why promoting and adopting it as an organisational culture and good practice is essential to ensure the achievement of strategic objectives and public policies with a rights-based approach, such as access to water and sanitation." (own translation from Spanish)

As part of the monitoring and control actions following its Anti-Corruption and Anti-Fraud System, SEDAPAL seeks to identify illegal connections. An outstanding case in the year 2023 was the discovery of an illegal connection supplying water to a private recreational club. It was identified that the club was consuming four times the amount billed since 2015, causing an economic loss of around 25,000 euros to SEDAPAL (Redacción Canal N 2023, n.p.). Such cases result in SEDAPAL not being able to account for the water that is consumed. For example, in 2021 SEDAPAL produced a total of 754.1 million m3 of water, of which almost 30% was not billed (SEDAPAL 2022, pp. 26-27). The unaccounted water indicator has a direct impact on service costs and tariffs, affecting the most vulnerable groups and the quality of services (Enríquez Hurtado 2022, p. 71).

However, integrity failures cannot be only found outside the utility company but also within it. During 2023, residents from various districts from Lima reported improper charges by SEDAPAL, what was later discovered to be the manipulation of receipts by administrative officials. Complaint channels and the regulation of SUNASS were instrumental to bring this case to light and take corrective action, while SEDAPAL was committed to return the money to the affected residents (Cabeza 2023, n.p).

4.3 Informal Settlements in Lima: an overview

Between 1913 and 1939, the continuous migration from Peru´s rural provinces to Lima and the lack of social housing supply encouraged the formation of the first informal settlements in the capital city (Figure 5). People arrived in search of better living conditions, access to employment, health, and public services, settling down mainly in unsuitable areas such as peripheries and hillsides, without access to basic services

(Calderón 2016, p.142). The occupation of land for housing purposes was carried out mainly through three mechanisms: violent invasion, the purchase of agricultural land by associations or cooperatives, and gradual invasion of private or state property being the latter the most frequent case (Varela and Archimbaud 2006, p. 574).

Figure 5: Occupation in 1950

During the 1950s, these settlements grew progressively from 56 to 213 in 1960, occupying almost 10% of the area of the city and housing around 300,000 residents. As the years progressed, successive governments took a clientelist position towards informal settlements, which encouraged the occupation of public land over private one. For example, in 1961, the government enacted the "Law of Slums" (*Ley de Barrios Marginales Nr. 13517*), which allowed the formalisation of all the land informally occupied until 1960. This exceptional measure was maintained over the years until it became the norm. In addition, Lima began to concentrate the industrial production, strengthening its centralising role in the country. As a result, Lima move from having 1.8 million residents in 1961 to 6.3 million in 1993, of which 2.5 million lived in informal settlements, occupying 34% of the city's area (Calderón 2016, n.p. and Matos Mar 1986, pp. 71-74).

In the 1980s, political and economic instability limited public investment in infrastructure. Meanwhile, some informal settlements already secured access to services such as water and sanitation and consolidated their environment by forming new urban centres. Over the years, accessible and affordable land became scarce and new informal settlements appeared in more remote and higher hillside areas, and in sandy and unstable areas which constantly exposed them to risks (Calderón 2016, n.p.). Since 1990s, in many Latin American cities new approach to the state's role in urban development and the provision of housing responded to a neoliberal, mercantilist and individualistic approach (Torres 2019, n.p.) In that regard, in 1996, the National Formalisation Policy was created, promoted by the National Commission for the Formalisation of Informal Property (*Organismo de la Formalización de la Propiedad Informal*, COFOPRI). From its creation until 2021, COFOPRI provided more than 841,515 property titles in Lima (COFOPRI 2023, n.p) focusing more on individual land ownership than on the integral development of cities, as the high demand for social housing could not be met.

Torres (2019, pp. 33-34) underpins that the consolidation of informal settlements in Lima, as in many other Latin American cities, has an informal logic, is inhabited illegally, and is built irregularly, as it is outside the stipulations of the regulations. However, the responsibility cannot be placed solely on the residents of informal settlements. The Peruvian State that has allowed this model of city growth to last for almost hundred years, due to inactions, unclear or irrational administrative frameworks, malpractice, and integrity failures. Moreover, the consolidation of informal settlements over the years favoured Lima to grow horizontally instead of vertically, demanding the extension of SEDAPAL´s networks to the periphery of the city in hillside areas. This still requires SEDAPAL to find technical solutions and adequate strategies to ensure that investments reach the less favoured sectors of the city (SEDAPAL and Water and Sanitation Program 2006, p.16).

Finally, although the informal occupation of the scarce free land available in Lima continues at present, this is generally framed in land trafficking and responds to private interests and speculation that take advantage of the most vulnerable groups (Alomía

2023, n.p.). Meanwhile, the accumulated lack of an accessible and massive supply of social housing that goes hand in hand with population growth has led to the identification of a housing deficit of 85,000 homes in Lima by the year 2021. Although there are currently national support programmes and vouchers such as "*Techo propio*" and "*Mi vivienda*" to cover the deficit of social housing these programs do not reach low-income families and only manage to serve 11% of Peru's urban population (Lozano 2021, n.p.).

4.3.1 Land tenure and demanding access to water and sanitation services

After land invasion, residents of informal settlements put their efforts into having state recognition of the land they lived in as their own. This would not only regularize the land tenure status but also allow them to demand access to basic services such as water and sanitation. In Peru, a process has been established in which first, land occupation of residents of informal settlements is recognised and then land tenure is legally formalised. Both processes must be done by an association representing the residents of the informal settlement since the process is done as a community and not individually.

The *"constancia de posesión"* (proof of possession) is a document provided by the corresponding district municipality where the informal settlement is located. Although the document does not accredit the occupier of the land as the owner, it does recognise that the resident is "positioned" (living) there. This document will then allow residents to request access basic services such as water and sanitation. Once the proof of possession is obtained, the *"título de propiedad"* (property title) can be requested from COFOPRI (Torres 2019, pp. 89-90). These processes, in addition to taking time, require organization from residents off informal settlements and resources.

It is regulated by law up to which year of informal land occupation proof of possession and then land title can be granted. In this regard, in 2020 the Peruvian Congress of the Republic approved the extension of deadlines for the titling of land occupied informally, empowering COFOPRI to formalise land occupied until December of 2015. Before the law, COFOPRI could only grant land titles to families who could prove possession until December 2004. Although the regulation of the law considered certain mechanisms

against land trafficking and the non-formalization of informal settlements located in unmitigable risk areas (MVCS 2021, n.p.), laws like this encourage and perpetuate the growth of the city through the creation of informal settlements.

To apply for new water and sanitation connection, first either the proof of possession or the land title must be submitted to SEDAPAL together with the land plot or a sketch of the property plus the payment of 35 euros. Then, SEDAPAL carries out a feasibility study to identify if the connection is possible, which should be answered within five days. If the connection is feasible, a payment of approximately 250 euros must be made and the connection should be completed within 15 days. It is important to highlight that SEDAPAL´s web platform points out that the network extensions only apply to urban areas where SEDAPAL has coverage and that there is no indication of what to do in case the application is refused (SEDAPAL 2023b., n.p.).

4.3.2 The challenges and the promise of water

"Sociotechnical systems of basic services are embedded in, and dependent on, urban contexts. In the Global South, utilities are confronted with the spatial, social and institutional irregularities of the settlements to be serviced" (Criqui 2020, p. 161).

Ioris (2012, p. 612) highlights the severe gap between water supply and demand in Lima, which has been worsened by the rapid rates of urbanization and environmental change. Additionally, the author states that even if water scarcity is undoubtedly a physical reality, it is also the result of the interaction between inequality and poverty. Moreover, the author underlines that "the scarcity of natural resources, such as water, is not external to social relations, but is a collective violence perpetrated by some social groups against other members of society" (Ioris 2012, p. 613). Ioris also identifies three main reasons for the persistence of water scarcity in Lima: First, the relation between water problems and poor housing access for low-income residents. Second, the little improvement in water services provision by public investment programs, which have mainly answered to political and electoral demands of the party in power. And third, the systematic exclusion of grassroots communities from decision-making processes, priming technocratic and managerial decisions (Ioris 2012, pp. 615-620).

According to an interview conducted by a local news *Radio Programas del Perú* to Flavio Ausejo, a former member of the Board of Directors of SUNASS, he discusses the issue of election campaigns and the eternal political promise of water for all Peruvians. Ausejo argues that the underlying problem is that water in Peru is mobilized as a very powerful political instrument for votes, taking advantage of vulnerable populations, such as residents of informal settlements. In addition, Ausejo pointed out that to the political interests assumed in the campaign, there is a lack of transparency with the population. Water and sanitation services are promised, but there is no explanation of the timeframes, processes and money needed to carry out projects (Chinchay 2023, n.p.).

In 2016, Pedro Pablo Kuczynski assumed the presidency of Peru with the promise of water and sanitation for all, in line with the SDGs and the 2030 Agenda (Clima de Cambios 2016, n.p.). Because of this, in the year 2017 the Safe Water Programme for Lima was created to manage the construction of water and sanitation public investment projects to close the gap of residents without access to these services, especially in informal settlements. It should be noted that this programme is not responsible for providing water and sanitation services but only for the construction of the infrastructure, therefore once the infrastructure is completed is then transferred to SEDAPAL (PASLC 2022, pp. 7-9). In this case it can be seen how political will generated attention to the water and sanitation sector. However, responsibilities that were previously the sole responsibility of SEDAPAL were also fragmented.

Finally, in 2023, the Minister of Housing, Construction and Sanitation presented a Law on Universal Access to Water to Congress, stating that it will contribute to closing the gap at the national level in the short-term using so-called "non-conventional" technological options such as public water tabs or mobile reservoirs fed by tanker trucks. The Minister also pointed out that conventional investment projects such as the expansion of networks and equipment will be carried out gradually over a period of ten years and that this law will contribute to "improving the health of the vulnerable population and will bring social peace to Peru" (MVSC 2023, n.p.).

However, the promise and the politicisation of water is not something that is done only at the national level but also at the Metropolitan Municipality of Lima level. In April 2023,

for example, mayor Rafael López Aliaga inaugurated the first public water tab of the project *"Agua en Emergencia"* (Water in Emergency) in the *Santa Rosita* informal settlement in the district of San Juan de Lurigancho just four months after being elected (Redacción RPP 2023, n.p.). To achieve this, the Municipality of Lima received a donation of 60 thousand dollars from the company *Aceros Arequipa* for the pumping system and accessories (Aceros Arequipa 2023, n.p.).

The project takes water from one of SEDAPAL's reservoirs and through a pumping system takes it to the higher areas where *Santa Rosita* is located. Looking for online information in news, reports and on the website of the Metropolitan Municipality of Lima, no data was found indicating that more water points have been inaugurated nor the state of progress of the works related to this funding. Also no information was found, on how or why *Santa Rosita* informal settlement was prioritised over others.

Figure 6: Mayor López Aliaga inaugurating a public water tab

4.3.3 And sanitation?

During this research, it has been identified that the human right to water is prioritized over the human right to sanitation, both at the municipal and national level, in terms of promises, projects and information. It was not surprising to found out that SEDAPAL does not have a policy oriented towards alternative forms of sanitation provision in informal

settlements. However, for the case of water the company has a policy of so-called "non-conventional" water provision through tanker trucks and public water tabs.

To find information on types of access to sanitation in Lima, the results of the last national census in 2017 were used. In this census, it was reported that the population of Lima secured access to sanitation by public sewerage networks inside the house (80.58%), public sewerage networks outside the house but inside the building (9.83%), cesspits (5.39%), septic tanks (2,19%), latrines (0.95%) and others (river, ditches or similar, open air) (1.06%). In 2017, the total population of Lima without a toilet connected to the sewerage totaled 9.59 % (KNOW, PUCP, and CIAC 2019, p. 26).

Searching for information online, it was possible to find independent projects that have contributed to improved access to sanitation in informal settlements which are not connected to SEDAPAL´s network. For example, local NGOs FICUS and SANIMA carry out projects for the installation of dry toilets in informal settlements (Figure 7) together with the work and commitment of the neighbours and the financial support of donors. Depending on the case, the dry toilets are either installed inside each house or a structure is built to contain it and serve as a communal toilet (SANIMA n.y., n.p., FICUS n.y, n.p). Dry toilettes, considered to be an environmentally friendly system that does not require water for waste disposal and is based on the separation of waste (Herrera, 2013, n.p).

Figure 7: Carrying a SANIMA dry bath

CHAPTER 5

SEDAPAL: Water provision in informal settlements
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The following chapter first describes two non-conventional measures adopted by SEDAPAL to supply water in informal settlements in Lima: tanker trucks and public water tabs. In addition to describing them, it is pointed which integrity failures could occur in these systems. Further on, it is discussed how integrity failures impact SEDAPAL's water and sanitation provision in informal settlements in Lima. First, in the expansion of water and sanitation networks and then in the provision of water through tanker trucks and public water tabs.

5.1 Tanker trucks

Water supply by tanker trucks has been a common practice used to provide water to informal settlements, as Figure 8 shows. Before SEDAPAL regulated this service, it was in the hands of the private sector, either individuals or companies.

Figure 8: "Patience brother". Tanker truck in 1955 in the Pucusana district in Lima.

In the last decades tanker trucks obtained water from one of SEDAPAL's 22 water points located throughout the city. In an interview with a SEDAPAL´s Official (Interview 8) he

outlined that the water tariff established by SEDAPAL to sell water to the truckers was considered a "social tariff" and once the tanker was filled each truck oversaw the commercialisation of the water, each one establishing the route, the frequency and the price to resell the water.

According, to a survey conducted in the city of Lima in 2015, it was found that households not connected to the water network paid up to six times more per cubic metre of water than a connected household (SUNASS, 2015). In this context, it was identified that water delivery was subject to a free market in which each trucker set the price according to his own criteria, considering for example fuel consumption, risks, and time. During this period SEDAPAL did not monitored prices or controlled if the targeted population was being supplied, but only ensured that drinking water was sold to the truckers.

On 11 March 2020, the COVID-19 pandemic generated the beginning of a nationwide quarantine, which led to the closure of almost all productive and social activities due to the immobilisation and curfews. This meant that the Peruvian population living from day-to-day was unable to work, affecting their income. It is in this context that the Peruvian government provided a series of bonuses and subsidies to ensure compliance with the restrictions and sanitary measures (Banco Interamericano de Desarrollo 2022, n.p.). Another of the measures adopted by the government was to distribute water by tanker trucks free of charge in informal settlements not connected to the water network in Lima and at the national level to ensure that handwashing recommendations to fight the pandemic. To achieve this, the Ministry of Economy and Finance had to transfer a special budget[8] to SEDAPAL since this expenditure could not be covered by SEDAPAL's revenues only.

This policy changed the rules for water distribution by tanker trucks, giving greater responsibilities to SEDAPAL, now in charge of water distribution in informal settlements. However, since SEDAPAL does not have its own fleet of tanker trucks, the utility company had to hire around 350 of them for the distribution of drinking water free of charge in

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[8] The budget amount for 2020 was not found. However, 8 million euros were transferred in 2023 and 9.6 million euros in 2024 to continue with this policy (Gestión 2023, n.p. MVCS 2024, n.p.). Presumably, the 2020 amount should be around 8 to 9 million euros.

around 2,500 informal settlements in 28 districts of Lima (El Peruano 2021, n.p.). Moreover, SEDAPAL´s Official (Interview 8), explained that to achieve the free distribution of water in informal settlements, it was necessary to coordinate and sign agreements with each district municipality in which there was a benefited informal settlement by the service. However, coordinating with the district municipalities was not always supportive, since it was identified that in some cases, mayors or municipal staff wanted to prioritise certain informal settlements over others. To verify that the water was being correctly delivered, the beneficiaries had to sign a proof of document to the tanker truck drivers which then had to be signed by the district municipality to guarantee their veracity.

In 2021, almost a year after the start of the free water distribution, it was identified through residents' complaints and random checks by SEDAPAL that water was not reaching the beneficiaries. Instead, water was distributed to restaurants, private universities, construction companies, and private swimming pools, among others. In some cases, these acts were directly organised by the drivers of the tanker trucks and their assistants, while in others, there was even the participation of the district municipalities' staff who intentionally neglected the signatures of residents. According to SEDAPAL´s Offical (Interview 8). This fraud meant a double profit for the truck drivers, since they received water for free in addition to the payment for the service by SEDAPAL and, on top of that, they received payments from the beneficiary. To overcome this integrity failure, SEDAPAL compelled the tanker truck owners to install Global Positioning System (GPS) devices plus a series of measures to monitor the correct distribution of water.

Another integrity failure that was identified during the pandemic was that trucks declared to have a certain volume capacity to transport water, which was directly related to the payment made for the service. However, it was then identified that they were declaring a lower capacity than the real one, to the economic detriment of SEDAPAL. Once this integrity failure, the trucks were weighed and controlled at the water-supplying points. To date, the water distributed continues to be free, however, it is not identified that the service can be sustainable over time as it implies a cost for the Peruvian state.

Figure 9: Tancker truck in Lima

Figure 10: Water tanks in informal settlement

5.2 Public water tabs

Public water tabs are community infrastructures located in public spaces in informal settlements (Figure 11), which are usually placed at the end of SEDAPAL's water networks, and where the sewerage network is not yet connected in each house. A public water tab is composed by a single water meter and users pay a single bill jointly (SEDAPAL and WSP 2006, p. 27).

Figure 11: Public water tab in San Juan de Lurigancho district

The procedure for accessing a public water tab is the same as for an individual housing network. However, in this case, a representative must be indicated in whose name the public water tab will be placed and to whom the ballot will be send. Additionally, a list of residents who will be using the public water tab must be provided. For SEDAPAL, the installation of public water tabs is considered to be the transition to the definitive household connection system (SEDAPAL and WSP 2006, p. 27). In an interview with SEDAPAL´s Official (Interview 8), he mentioned that one advantage of the public water tab, as opposed to the water supply by tanker truck, is that water reaches the population directly from the network, ensuring its quality. In total, SEDAPAL has installed 2,423 public water tabs in informal settlements in Lima.

According to SEDAPAL´s Official (Interview 8), the main integrity failure a public water tab can be susceptible to is informal network ramifications. However, he specified that if ramifications are made before the public water tab and its respective water meter, it would constitute an integrity failure. However, if ramifications are made after the water meter and the public water tab, it would not be a integrity failure since the consumed water is being billed.

Since most of the informal settlements that access to public water tabs are located in hillside areas, it is usual that they increase the public water tab infrastructure by

installing electric pumps and hoses to boost water to tanks closes to their homes, which will be explained in more detail in the case study (see Chapter 6).

By exploring roles and functions of district municipalities, it was identified that the Urban Development Management Offices of each district municipality has the faculty to design, finance and execute the installation of public water tabs in informal settlements within its jurisdiction. However, SEDAPAL is always in charge of approving and installing the water supply point. Therefore, it is assumed that there must be coordination between both entities. In the year 2022, the district municipality of San Juan de Lurigancho constructed one public water tab in an informal settlement (Project Investment Code: 2531814). Examining the project costs, it could be concluded that the materials and construction costs for the installation of a public water tab could be around 15,000 euros (Municipalidad distrital de SJL 2023, p. 81, p. 88).

Finally, after reviewing documents of SEDAPAL, the Metropolitan Municipality of Lima and district municipalities, it was not identified that they are responsible for what happens after the installation of the public water tab. This is also one of the reasons why it was decided to undertake a case study about access to water through public water tabs, to explore what happens after the provision of the infrastructure.

5.3 How integrity failures impact water and sanitation supply by SEDAPAL

As discussed in Chapter 2, integrity can be defined as "the use of vested powers and resources ethically and honestly for the delivery of sustainable and equitable water and sanitation" (WIN 2021, p.22). Moreover, acting with integrity involves more than just preventing corruption; it also entails respecting, protecting, and granting everyone's right to water and sanitation—especially the marginalized and poor (WIN 2021, p.15). Moreover, integrity failures are instances in which integrity has been broken or violated, including not only corruption and criminal acts but also more general acts that affect the realisation of the human rights to water and sanitation for all (2021, p. 23).

A starting point for the analysis is that SEDAPAL is a public company. According to the Secretariat of Public Integrity (2021, p.18), in charge of the Presidency of the Council of Ministers of Peru, this implies that in the case of activities carried out at the state level by those who exercise public functions, the aim is to contribute to social welfare from

actions that respond to the common good and with resources that are of a public nature (Secretaría de Integridad Pública 2021, p.18). It also claims that *"those who serve in public administration are confronted daily with situations that test their ability to make the "right choice"* (Secretaría de Integridad Pública 2021, p.12). Therefore, SEDAPAL's functions should be aligned to contribute to social welfare by using state resources responsibly.

According to WIN integrity failures can occur at the policy level, the urban planning level and at the service delivery level (for a more detailed explanation see Chapter 2). Based on this characterization, the analysis adopted in this section is divided into two sections: firstly, integrity failures in the extension of water and wastewater networks in informal settlements mostly related to the policy and urban planning level, and secondly, in service delivery level through the so-called "non-conventional" measures such as public water tabs and tanker trucks.

5.3.1 On extending the water and sanitation network

At the policy level, it was identified that SEDAPAL and the Peruvian Government are aware of the importance of the human rights to water and sanitation, as established by the United Nations in 2010, however, the right is not guaranteed for all Lima´s citizens up to this day. Following the United Nations' publication on the human right to water, in 2017, Article 7-A was added to the Peruvian Constitution staying that: "The State recognises the right of everyone to progressive and universal access to safe drinking water. The State guarantees this right by prioritising human consumption over other uses (...)" (Congreso del Perú 1993, p. 20, own translation from Spanish). After the enactment, the Peruvian State approved different policy instruments, such as the National Sanitation Plan 2017-2021, which includes as one of its most important objectives universal coverages of access to drinking water and sanitation, also oriented to the governmental actions guided by the SDGs (Matayoshi et al 2021, p. 285).

It is interesting that when the right was included in the constitution the term "progressive" was used, surely in the knowledge that if the right could not be secured in the short term. It is also evident that when the right to water was incorporated in the Constitution, sanitation was not included, which could be correlated with the fact that

water coverage has higher priority than sanitation coverage. In the case of Lima specifically, Prof. Angulo (Interview 5) points out that in the city the issue of sanitation does not attract as much attention since the wastewater discharges go into the sea after being treated but in other cities where the discharges end up in the river and that river is the source of water for other cities, then the situation is much more complex.

Fragmented water governance

At both the policy and urban planning level it is important to note that SEDAPAL does not exist as an isolated entity in Lima to ensure access to water and sanitation. Figure 12 identifies the actors involved in both the provision of water and sanitation services and the formalisation of informal settlements, processes that are linked:

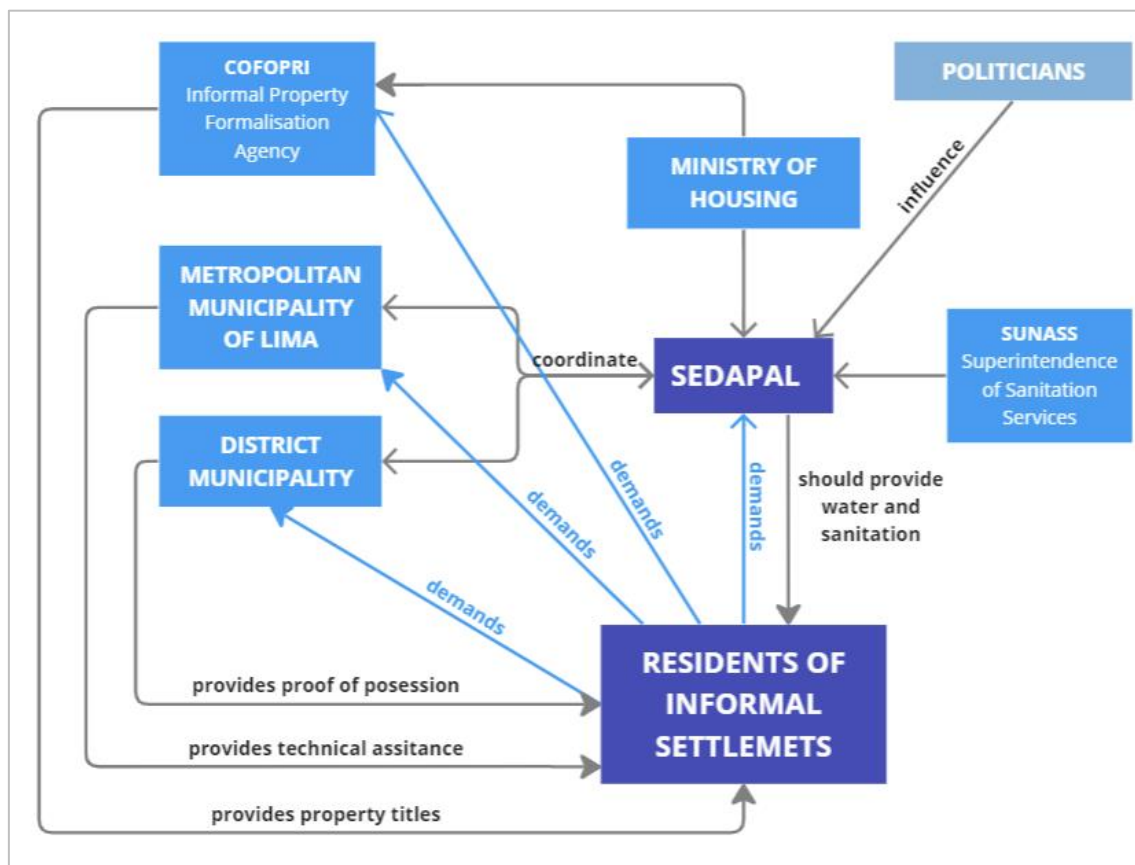*Figure 12: Stakeholders involved in water and sanitation provision in Lima*

As explained early in Chapter 4, without proof of possession or title to the land, SEDAPAL cannot provide water and sanitation connections to any household. Therefore, residents of informal settlements demand this from their district municipality, the Metropolitan Municipality of Lima and from COFOPRI according to the process stage. Moreover,

SEDAPAL is an autonomous entity but under the Ministry of Housing, Construction and Sanitation, and is regulated by the National Superintendence of Sanitation Services (SUNASS), the entity that approves the tariff increase, e.g. In addition, there is the Safe Water Programme for Lima (PASLC in Spanish), responsible of formulate, execute and supervise water and sanitation investment projects in the area of intervention of SEDAPAL, in coordination with this company. In addition, as seen before there are politicians and government officials who have their interests and often use the promise of water and sanitation for political purposes.

From the above it was identified a fragmentation of roles, responsibilities, and actions, which places the extension of the water and sanitation network in a vulnerable position where multiple actors can seek personal gain instead of thinking about the well-being of informal settlement residents. In an interview with Prof. Angulo (Interview 5), he agreed that there is indeed a rupture and fragmentation of the state, which means that entities do not talk to each other. Along the same lines, when interviewed on 26 October 2023, Architect Lourdes Giusti, Dean of the Peruvian School of Architects (Interview 4) said that in her opinion, in Peru´s public management, everything is too fragmented and, in the end, nobody is responsible for anything. Moreover, while in Peru there is, for example, the Ministry of Housing, in other Latin American countries they have the Ministry of "Housing, City and Territory" so the issues are seen more holistically and integrally. Moreover, the fact that there are so many actors on the part of the state and with mixed functions makes it difficult to hold each entity accountable, an aspect that is promoted in water management with integrity.

In addition, beyond public actors, there is the private sector, which actively participates in the construction projects or finances projects as seen above in the case of the installation of a water pylon in Lima through donations from the Aceros Arequipa company. However, actions such as these can lead to increase cases of lack of integrity or to what, when interviewed on October 30, Architect Juan Carrlos Calizaya (Interview 7) referred as "the revolving door", in which a businessman then runs for public office and having financed a water project can bring him political rewards later. Furthermore, it should be noted that in the last elections, it has been seen that those who hold the post of Mayor of Lima then seek to become president, so it has been identified that in

many cases projects are carried out, for example, linked to water and sanitation, which can later secure their votes for the presidency. For example, Architect Calizaya (Interview 7) insists that in cases like this SEDAPAL should "get tough" and not allow itself to be used as an entity for possible political ends.

To conclude with the analysis of the actors, it is important to note that in Peru there is often no continuity of ministers and public officials, which has an impact on the entities. For example, between 2020 and 2023 there have been six ministers in the Housing, Construction and Sanitation sector. In general, it is evident that in Peru there is a high turnover of ministers, who on average last 200 days in office. The change of ministers usually corresponds to political interests and influences.

The arrival of a new minister means that he or she must quickly absorb the knowledge of an entire public organization. In a recent interview with a local newspaper, the Minister of Housing, Construction and Sanitation indicated that "SEDAPAL has not had a master plan since 1981, which hinders its management and projection" (Libón 2023, n.p.). However, it has been identified that one of the main institutional documents of SEDAPAL is the "Master Plan" which has a long-term vision for 30 years and is updated every five years. The last "Master Plan" corresponds to the period of 2015-2044. This kind of unawareness on the part of the minister of the sector to which SEDAPAL is assigned is surprising.

Finally, when changes of ministers or heads of state institutions are made, programmes and projects are held up for re-evaluation and change in their order of priority can be made, ultimately affecting residents. In addition, there are changes of personnel, especially in the so-called "positions of trust", positions appointed by ministers without a public competition. Moreover, SEDAPAL has not been immune to political interference. The former company president was forced to resign in September 2023 due to political pressure and allegations of irregular contracting under his mandate (León 2023, n.p.).

Lack of planning and land tenure in an informal environment

The research has identified that, in the case of Lima, the lack of access to water and sanitation is closely linked to the lack of urban planning and social housing offers, aspects that were overwhelmed by population and informal settlement growth (Varela and

Archimbaud 2006, p. 575). To this must be added, the permissiveness of the state through invaded land formalisation policies, as pointed out by Roy (2009b, p.81), who argues that there is "informality from above" through the deregulation of norms.

Since the "Law of Slums" in 1961 until the last extension of deadlines by the Peruvian Congress enabling COFOPRI to legalize informally occupied lands until 2015, is seen how the state designates which activities are authorised and which are not, defining the informal, as Roy (2009a, p.10) states. Moreover, it is in the expectation the extension of deregulations that land invasion has continued over time. Despite being placed in a vulnerable situation and without access to basic services, informal settlements know that if they wait a few years their land tenure will be formalised, as it has happened so many times before.

As Torres points out (2019, p. 15) although it may seem paradoxical, the main cause of the growth of urban informality in Lima and in Peru is the permissiveness of the National Formalisation Policy, managed and implemented by COFOPRI. However, this creates a perverse incentive and lends itself to land traffickers taking advantage of this condition. In this sense, the Dean of the Peruvian School of Architects, Architect Lourdes Giusti (Interview 4) pointed out that it is the land traffickers who drive the urban development in Lima. She also added that even if regulations are established, they ultimately only apply to the formal sector and not to the informal sector, which continues to remain outside the rules. Therefore, any regulatory initiative is worthless if it does not also reach the informal sector. In this sense, the state decides to whom the rules apply and to whom they do not.

Furthermore, in settlements that have been formalised, it is evident that, despite having legal tenure of the land, what is built has no technical or administrative regulation, and there is no control by the municipalities of how the housing is built, the materials, the heights and free areas stipulated, among others (Torres 2019, p. 122). It is in this context that SEDAPAL is asked to extend the water and sanitation network, when there is not even a clear idea of the size of the city, which increases over the years and has been extended to higher areas, which generates the need to pump water, increasing the cost of the service.

Another integrity failure that impacts on SEDAPAL's ability to extend the water and sanitation network in informal settlements is the requirement to have at least a proof of possession of the land being occupied, which generates pressure on the municipalities who are the ones who grant this document. Architect Calizaya (Interview 7) indicated that he is aware that in many cases the municipalities have provided proof of possession in the context of corruption or, as in the case of Lima for private gain or vote-seeking in the district. An aspect to have into account is that for informal settlements to be regularised by the municipality, they cannot do it independently by household, but must do it as a community, which generates a certain pressure on the group's organisational capacity. In addition, they have to submit plans, sketches and documents, etc., all of which have costs and can lead to integrity failures because of corrupt community leaders or fake professionals taking advantage of the community making them pay higher fares or providing bad quality products, as told by Architect Calizaya (Interview 7).

Today it is difficult to quantify how many people live in informal settlements, whether they have title to their land, access to basic services, etc. since the last census was taken in 2017 and is conducted every ten years and municipalities do not update their cadastre regularly, and informal occupation of the territory is constantly changing. This lack of information and therefore transparency means that there is no up-to-date database, making it difficult to hold the state and the company accountable and that SEDAPAL can take better measures for the extension of water and sanitation networks, as indicated by SEDAPAL´s Official (Interview 6).

5.3.2 Water provision through tanker trucks and public water tabs

One aspect that is also considered an integrity failure is inaction. In this sense, in the case of tanker trucks, it has been identified that for many years the supply of the service was left to the free market without the existence of any control, so that the inhabitants of informal settlements paid more for water than the people of consolidated Lima. For many years, SEDAPAL was only responsible for ensuring that the water reached the tankers and the General Directorate of Environmental Health of the Peruvian Ministry of Health requested documentation that the tanker had the conditions to deliver drinking water. There was no institutional control of the routes covered by the tankers, the

frequency or whether mafias or conditions of extortion were generated in the population to access the service.

As noted above, since the COVID-19 pandemic, water distribution by tanker truck has been free of charge and the functions have been taken over by SEDAPAL. In this context, cases of water theft and diversion of trucks occurred affecting not only the population but also the entity economically and institutionally. For this reason, control measures were taken by installing GPS and monitoring the trucks. In this context, it has been identified that the lack of control and monitoring can lead to integrity failures in pursuit of self-interest. However, the existence of an integrity office to deal with these issues makes it possible to respond to them. In addition, during a field visit to an informal settlement provided with water by tanker truck, it was identified that a fee is still paid for the water, but not to the truck driver but to the community leader who will then pay the driver to "secure" that the truck travels through the informal settlement and gives it priority. Therefore, while this is just one case of many, it suggests that it is not enough to place GPS tankers but also to reach out to the community level to ensure that water arrives to the population.

In the case of the public water tabs, the main integrity failure for SEDAPAL is the ramifications that are made before the water comes out of the pylon, as this constitutes theft by consuming water that is neither measured nor billed. However, if the network is extended and/or branches are made after the public water tab this does not constitute a failure of integrity or theft of water as it is being metered and charged for. In both cases, SEDAPAL´s Official (Interview 6), mentioned that under no circumstances is it advisable to make branches to the public water tab as this affects the water pressure and continuity, and that when work is carried out informally, defective connections can be made and lead to loss and waste of water. As will be seen in the case study further on, the integrity failures in this case are more related to the community's management of the public water tab, beyond the scope of SEDAPAL's current functions.

5.3.3 An overall aspect: water governance

As mentioned in the literature review, to this day, the government and the public sector continue to play the most important role in water governance and is therefore in charge of establishing efficient regulatory oversight of water and sanitation provision (Transparency International 2008, n.p.). In that sense, Transparency International also postulates that a water crisis is a water governance crisis. Akmouch et al (2018, pp. 5-12) postulate that the future of water governance and the ability of governments to address it are challenged by economic, social, climate, urban and technological trends, often requiring multi-stakeholder solutions. Along these lines, in the case of Lima, it is evident that there are multiple stakeholders among which more coordination is required. In an interview with a SEDAPAL official (Interview 6), he pointed out that, for example, municipalities do not consult with SEDAPAL before issuing proof of possession if they will be able to extend the network to that area in the future. And what happens is that once the resident has the proof of possession, they can ask for access to water and sanitation, to which SEDAPAL may respond that they do not have the technical capacity. Therefore, there must be clarity and logic between the processes that are connected. In this sense, it is important to remember that there is also "good governance", which refers to the public administration processes that maximize public interest as supported by Keping (2018, n.p.), also acting with integrity, transparency, and accountability. Good governance and acting with integrity imply not leaving loopholes in terms of management, monitoring etc. that could lead to third parties such as land traffickers or independent water providers taking over the provision of services, as has happened in the case of Lima.

As stated in the literature review, there are different positions regarding the human rights to water and sanitation, being the most common that there is a significant gap between promoting and implementing it (Finewood and Holidield, 2015, p. 87). In this sense, the Peruvian state has created laws and mechanisms at the national, municipal, and institutional levels to try to guarantee the human rights to water and sanitation in Lima and throughout the country. It is evident then that the creation of programmes and laws has often remains on paper and has not fully materialised the human rights to water and sanitation, turning it into a purely moral declaration, losing content and becoming

an idea without the ability to impact on the governance of water and sanitation, maintaining existing inequalities, as Sultana and Loftus argue.

Finally, since urban planning is a political action (Fainstein, 2013) framed in distributive justice, its evaluation criteria should be defined by democracy, diversity, and equity of the urban condition of the city. These concepts are not clear in the actions of Peruvian government. As Torres (2019, pp. 144-145) highlights, it is important to ask who are those who make urban policies and under what concept is assumed what is "good for all" over "fair for all"? In that regard, governors, or decision-makers, elected representatively, must - under the principle of ethical responsibility - guarantee the morality of their actions with integrity.

CHAPTER 6

Informal settlements: access to water and sanitation, a case study

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This chapter explores the condition of access to water and sanitation in the informal settlement of "*Porcicultores*" (pig farmers). The informal settlement is in the district of San Juan de Lurigancho, one of the 43 districts that belong to Lima. The first section of the chapter provides information at the district level as an overview, which allows to identify the context in which *Porcicultores* is located. The second section explores *Porcicultores* in relation with adjacent settlements. This relation is important to explain the dynamics and conflicts that exist between them in relation to securing access to water and sanitation. The following sections turn to the issue of access to water and sanitation in *Porcicultores* and the chapter concludes with the analysis on how residents of informal settlements experience the integrity failures that emerge in accessing water and sanitation on a everyday basis.

6.1 Lima´s most populated district: San Juan de Lurigancho (SJL)

The district of San Juan de Lurigancho (SJL) is located in the northeastern part of Lima and has an area of 131.25 square kilometers (Figure 13). It is placed in a gully on the right bank of the Rimac River. The lowest point of the district is located at 190 masl and the highest at 2200 masl (Municipalidad Distrital SJL 2023, n.p.).
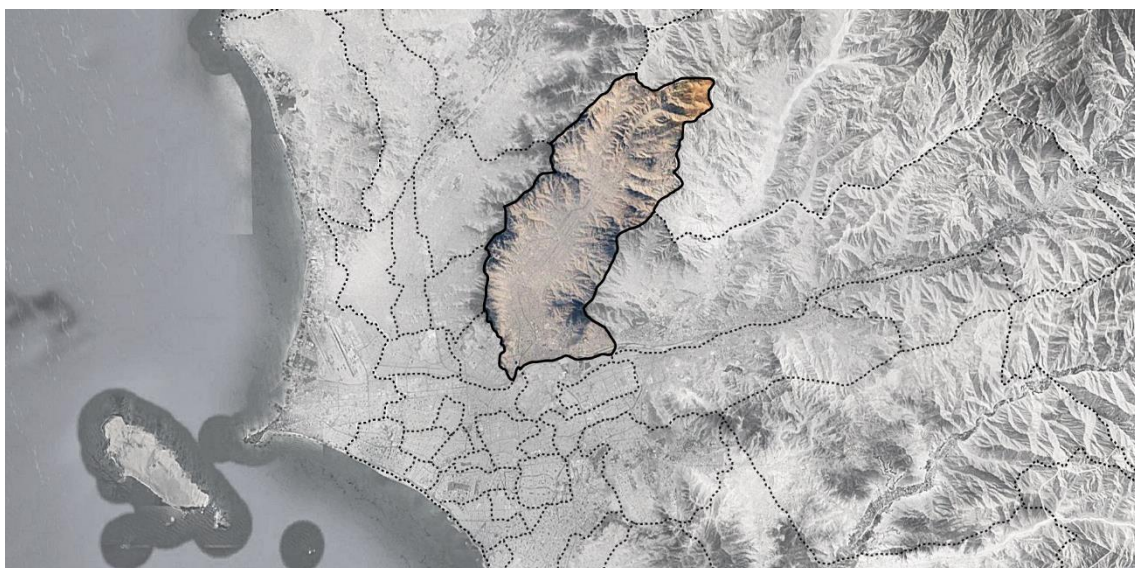

Figure 13: San Juan de Lurigancho district in Lima

Due to its size, the district is divided into 18 *"comunas"* (commune, own translation from Spanish) for territorial organization (Municipalidad Distrital SJL 2023, n.p.). Each of these *"comunas"* are then divided into settlements that may be informal, in the formalisation process or formal. San Juan de Lurigancho is the most populated district of Lima and Peru. Founded in 1950 by a neighbourhood association (Municipalidad Distrital SJL 2023, p. 7), the district has nowadays more than one million residents, concentrating 12.3% of Lima's population (INEI 2023a, p.1). In the last census conducted by the state in 2017, the majority of SJL residents reported to be between 15 and 64 years of age (70%), and the population over 65 years of age represented a low number in the district (6%). Therefore, in general terms, the district has a majority of young and working-age population (KNOW, PUCP, and CIAC 2019, pp. 6 -21).

In the same census, the majority (83%) of residents in the district of SJL reported to have an independent house, of which 41% have land title and 32% do not. Regarding housing construction, the census identified that there was a high number of houses in the district with sheet metal roofs (30%), with wood walls (18%) and earthen floors (10.3%) (KNOW, PUCP, and CIAC 2019, pp. 6 -21). These percentages show that several houses are not of noble material, which leads to the conclusion that they are houses in the process of construction, possibly in informal settlements (Figure 14).

Regarding access to water, 77.2% of residents in SJL reported to be supplied with water at home by the public network. Other residents reported to be supplied by public water tabs (7.9%) and tanker trucks (7.6%). About continuity of water service, 70% of the residents reported to have water every day, while 30% did not. In the case of access to sanitation, the main figures showed that 79% of the residents reported to be connected to the public sewage network inside the house, while and 8% reported the use of a cesspit. In total, 13.14% of the residents reported not having a drain connected to SEDAPAL´s network (KNOW, PUCP, and CIAC 2019, pp. 22-27). Finally, in 2017 SEDAPAL reported that 37% of the sewerage network in the district of San Juan de Lurigancho was between 20 and 30 years old (SEDAPAL 2017, p.86).

Figure 14: San Juan de Lurigancho district

6.2 Up the hillside: *Porcicultores* and the neighbouring informal settlements

Porcicultores[9] gets its name from the fact that until 2017, what are now the housing plots of the informal settlement were pig farms belonging mainly to the residents of the *Nuevo Peru* settlement, located in the lower part of the hillside. In an interview conducted with resident of *Porcicultores*, Eulogia, on 17 October 2023 (Interview 11) she indicated that pig farming started around 1990s. When interviewed on 15 September 2023, Jorman (Interview 1) recounted that due to complaints from residents about the smell and noise from the pigs, in 2017 the district municipality of San Juan de Lurigancho forced their removal. Once this happened, what used to be pig farms were converted into housing plots, creating the informal settlement of *Porcicultores*. Since these plots belonged to people who already had a house (mainly in *Nuevo Peru* settlement), some of the plots were sold and others were given to family members. *Porcicultores* currently has a total of 36 houses, however only 23 are occupied. Resident of *Porcicultores* Jennifer mentioned that to date there are 13 plots on which, although there is a built house, no one lives there. This is because the owners have another place to live and are keeping the plot while waiting for the land to increase in value and then sell it (pers. comm., on

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[9] Porcicultores informal settlement is composed of two sectors: A and B. The research will focus only on sector A, which will be referred to as Porcicultores only.

December 12, 2023). As figure 15 shows, before arriving to *Porcicultores* informal settlement, it is necessarily to pass through other settlements: *San Francisco de Asis* (SFA), and *San Francisco de Asis* Extension (SFA Extension):
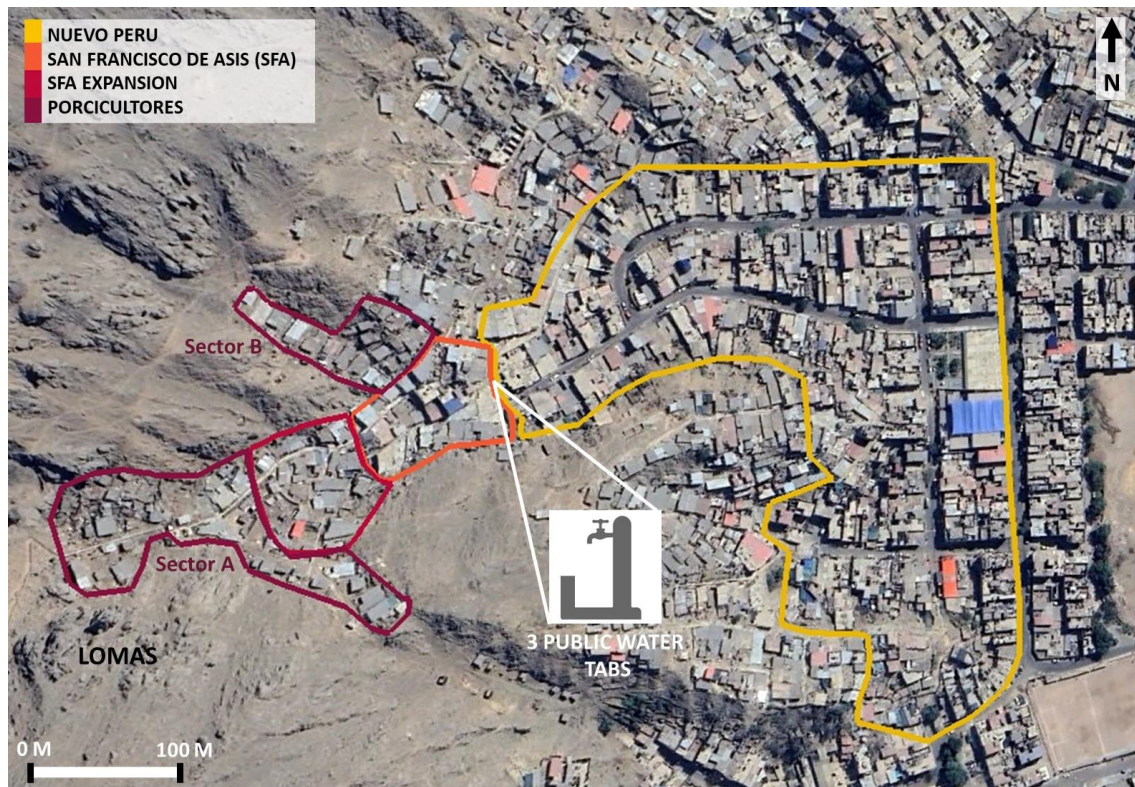

Figure 15: Porcicultores and surrounding settlements

In addition, in the lower part of the hillside sits the settlement of *Nuevo Peru* (in yellow in Figure 15). Jorman (Interview 1) narrated that *Nuevo Peru* started as an informal settlement invaded in 1969, being then formalised. Just by observing the characteristics of the houses and the built environment, it can be identified that today *Nuevo Peru* is a consolidated settlement. The houses are made of noble material, almost all of them have two floors and all the streets are asphalted.

Next to *Nuevo Peru* formal settlement and up the hillside is the settlement of *"San Francisco de Asís"* (SFA) which has a total of 25 lots, all of which have a land title. Further up the hill is the informal settlement called both *"Hijos de San Francisco de Asís or Ampliación San Francisco de Asís"* (Saint Francisc of Assisi sons or Saint Francis of Assisi Extension, own translation from Spanish) which has about 23 plots, which do not have land title or proof of possession and was mainly occupied by family members of the residents of the settlement of SFA. Finally, next to SFA Extension and in the highest part

of the hillside is *Porcicultores* informal settlement. As one goes up the hillside and passes from one settlement to another, one can see how the materials used in the houses become more precarious, the houses smaller and their distribution more disordered. In addition, as mentioned in Chapter 3, a little further up from where *Porcicultores* ends, *Lomas El Mirador* begins.

Since *Nuevo Peru* is the oldest and most consolidated settlement, all houses are connected to SEDAPAL water network and each has its own water meter, however water arrives only intermittently. SFA, SFA Extension and *Porcicultores* access to water through public water tabs provided by SEDAPAL. Each settlement has a public water tab to its name, and the three are located on a football pitch in SFA settlement, as Figure 16 shows.

Figure 16: Public water tabs in SFA public space

The interviewed residents gave different dates for the installation of the public water tabs, but all pointed out that first the SFA public water tab (the one that stands alone in Figure 16) was installed about eight years ago and then the SFA Extension with the *Porcicultores* public water tabs were installed about five years ago. What Jorman (Interview 1) explained is that in this second case it was *Porcicultores* who applied to SEDAPAL for the public water tab, since they have proof of possession, and SFA Extension joined the application by obtaining its own public water tab, despite not having any document proving land tenure. Unfortunately, the interviewees were unable to provide more details about the process.

In terms of continuity of the service, residents from SFA, SFA Extension and *Porcicultores* responded water comes through the public water tabs interdiary, in the afternoons and that the water pressure is variable. As can be seen in Figure 16, water taps are padlocked. The keys are held by the leaders of each settlement. It should be noted that due to the layout of the houses and the fact that there is no track from the SFA settlement onwards, it would be impossible to provide water by tanker in this area.

Concerning sanitation, it was identified through the interviews to residents (see Annex 1 for the list), that SFA is informally connected to *Nuevo Peru´*s sewerage network. In the case of the SFA Extension they do not register sewerage connection, neither formal nor informal. When interviewed on 28 October 2023 Laura (Interview 19), a resident of SFA Extension informal settlement, commented that she and her kids use the bathroom of a family member living in SFA settlement. However, to shower and wash her clothes she uses buckets at her house and then throws the water on the hillside. In the case of *Porcicultores*, there is an informal sewerage system, which will be discussed in more detail below.

Unlike water, it was observed and confirmed in the interviews that all the residents of *Nuevo Peru,* SFA, SFA Extension and *Porcicultores* have access to electricity, either formally or informally. While in the case of internet, only some residents have access to this service, either formally or informally. In the interviews with residents, the use of the term *"jalar"* (to pull) was identified when referring to informal access to services. When a resident connects informally to another resident´s formal connection, he or she is said to be "pulling" the service. It would seem that by using the term "pull" residents are talking about an extension of the network and not about an informal act. This possible common practice in informal settlements is made when residents cannot access services in a formal way because they live in areas where companies do not have proper coverage or the residents do not have the resources or time to wait for the formal connection procedure, relying on its neighbours' connections. However, the problem of "pulling" connections to access services is that the tariff is subject to the resident that provides the service, which may even be higher than the market rate.

Finally, Table 6 summarises the main characteristics of the settlements described above:

Item	Nuevo Perú	San Francisco de Asís (SFA)	San Francisco de Asís (SFA) Extension	Porcicultores
Plots	200	25	23	36
Land status	Property title (Formal settlement)	Property title (Formal settlement)	Without documents (Informal settl.)	Proof of possession (Informal settl.)
Water	SEDAPAL network (Interdiary)	One public water tab for each settlement (Interdiary - For hours in the afternoons)		
Sanitation	SEDAPAL network	Informal	No	Informal
Electricity	Yes, but the situation on each household varies, can be formal or informal			
Internet	Depends, but the situation on each household varies, can be formal or informal			

Table 6: Neighbourhoods characteristics

6.3 Incremental infrastructure: Everyday practices to secure access to water and sanitation

6.3.1 Beyond the public water tab: hoses, pumps and tanks

As mentioned above, *Porcicultores* informal settlement secures water through a public water tab installed by SEDAPAL. However, the public water tab is not located inside the informal settlement´s area but a distance about 120 metres, next to a football pitch that also serves as a plaza that belongs to SFA settlement. Thus, to reach the public water tab, residents of *Porcicultores* must descend a series of stairs that function as streets since their informal settlement is located higher up the hillside than the SFA settlement as Figure 17 shows.
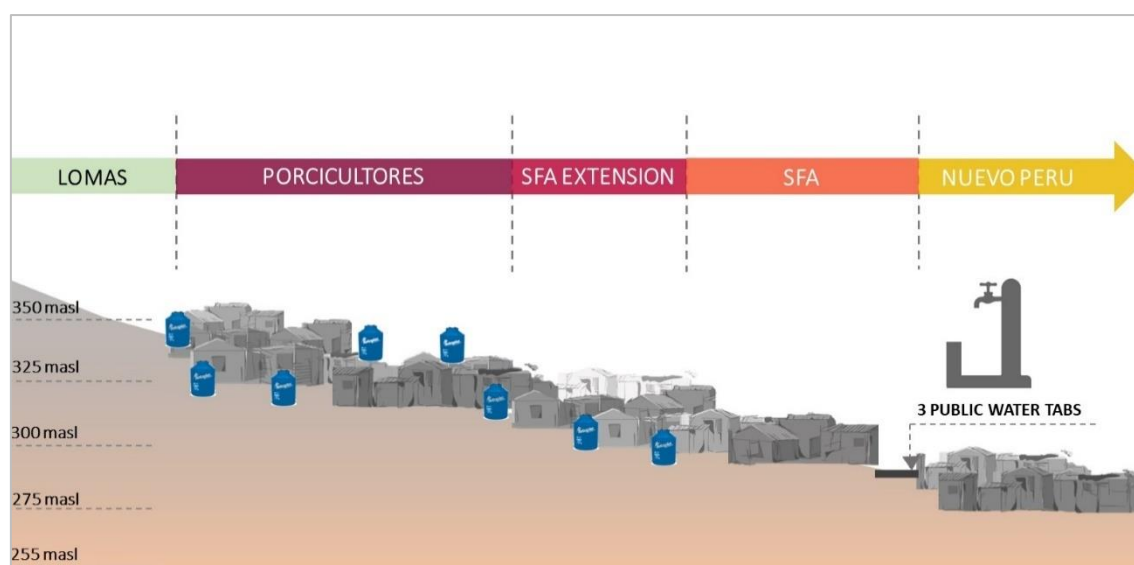

Figure 17: Slope section showing Porcicultores and the adjacent settlements

As mentioned in Chapter 5, the general idea of SEDAPAL when installing the public water tabs in informal settlements is that residents fill buckets, which are then taken to their homes for direct use or to fill their own water tank from which they can be supplied as required. In the case of the *Porcicultores*, as they are at a considerable distance from the water supply and located at a higher level, residents have devised a system that allows them to access the water more comfortably and quickly, thus avoiding carrying heavy water buckets up the stairs. A few years ago, residents jointly bought hoses and two electric pumps (each pump for 40 euros) to pump water from their public water tap to the tanks that each house possesses and are located outside the constructed area (Figure 18). In most cases, it is sought that these storage tanks are placed in a higher adjacent area of the house so that the water is then used inside the house by gravity. These plastic tanks have a capacity of 1100 litres and cost approximately 180 euros.

Figure 18: Hose and water tank

Three times a week, when water is available in the public water tab, *Porcicultores* resident Jennifer pumps water to each of the houses of the informal settlement. To do this, she first requests Isidro, *Porcicultores* leader, the key to access the tab, hoses, and pumps as he is in charge of storing the items. For the water pumps to work, Jennifer connects them to the electricity of two residents of SFA Extension who live close to where the water pumps need to be placed to impulse water to *Porcicultores.* Each house owner of SFA Extension is paid 25 euros per month for providing electricity services.

Figure 19: Detachable electric water pump

Once pumps are installed (Figure 19), Jennifer goes from house-to-house of *Porcicultores* filling 1100-litre storage tanks, which takes about one hour each. For her water pumping work, residents pay her directly 2.5 euros, in addition to the 2.5 euros they pay for the 1100 litres of water, totalling 5 euros. When interviewed about her work, Jennifer (Interview 9) indicated that in an afternoon she can fill tree to five water storage tanks while caring for her 1-year-old son. In a week, she can fill 18 tanks depending on the availability of water and the needs of her neighbours.

Furthermore, in the interview, Jennifer on October 14 2023 (Interview 9), she pointed out that the *Porcicultores* has a Whatsapp group in which she writes to which resident she has filled up a tank and when. In this way, she keeps track of consumption per household and the community is informed about it too. Payment for water consumption is made to another resident in charge of paying SEDAPAL´s bill since the public water tab was registered under his name (representing *Porcicultores*) at the time of his leadership. Unfortunately, this resident did not want to be interviewed or to show the SEDAPAL bill, so his name is not given.

In interviews conducted to different residents of *Porcicultores* (see Annex 1), they expressed strong satisfaction with the work done by Jennifer. Although her service is optional, many residents rely on it because, as they work, they are not at home when

water is available to fill the tanks. On residents taking charge of pumping their own water, Jennifer commented (Interview 9) that she understands that residents do this to save the 2.5 euros for her service and pay for the water only. She also helps them as much as possible by leaving the hoses near their houses when she finishes her work. However, she does not like it very much when this happens as the connections to the hoses and to the pump may not be done correctly and water may leak, as has happened before, disturbing the neighbours of SFA where the pumps are placed.

On one of the last days of the field work, on a Sunday, it was observed that a *"faena"* *(communal work)* was being carried. The goal was to install a plastic water pipe under SFA football pitch/plaza to connect *Porcicultores* water tab to a new water point closer to the informal settlement. Residents who do not participate in the *"faena"* must pay a fine.

Figure 20: Chores Sunday to improve the networks

Finally, residents of *Porcicultores* continue to demand improvements to their infrastructure. When interviewed on 29 October 2023, community leaders (Interview 21, 22 and 23), indicated strong interest to have a large-capacity water tank made of concrete and located in the upper part of the hillside, so that the water can easily flow "by gravity". The tank would be connected to the SEDAPAL network via the connections of the settlement located behind the hill which already has a large-capacity water tank.

In this regard, they have hold meetings with district leaders. However, they are aware that these processes take time and see it as a distant solution, not showing much faith in mayors or politicians. In general, when talking about how access to water and sanitation in *Porcicultores* can be improved, the interviewed neighbours said that they wanted a better quality of life, especially for their children and that they knew they were not living in the best conditions but "they do what they can".

6.3.2 Uneven water consumption

Interviews with residents showed that water consumption is not the same throughout *Porcicultores* informal settlement residents. When interviewed on 17 October 2023, resident Maria (Interview 14) shared that in her 3-person household one tank of water is consumed per month, while resident Amparo (Interview 10) who belongs to a 4-person household, reported a consumption of one tank of water per week. In this sense, while one family may pay a total of 5 euros for water per month, another may pay 20 euros, according to the consumption.

Furthermore, through the interviews, it was identified that water consumption varies according to the season of the year, with more water being consumed in the summer. Therefore, by paying per tank, families can regulate their water consumption. In addition, in the interviews, the residents said that they are looking for ways to save water. For example, using water from washing clothes or dishes to flush the toilet.

Each public tab is billed by SEDAPAL individually. Thanks to the controls carried out in the WhatsApp group it is possible to identify how much each household needs to pay according to how many tanks were filled per month. Since it was not possible to see the water bill of the neighbourhood and to find out how much more residents of *Porcicultores* were paying than the tariff stablished by SEDAPAL the following exercise was done:

- Imagining that each of the 23 families living in *Porcicultores* fill a water tank of 1100 litres per week, this adds up to a total of 92 tanks, which is equivalent to 101,200 litres per month or 101.2 m3.

- Considering that they pay 2.5 euros for 1100 litres of water that adds up to a total of 230 euros per month in total. However, if Jennifer's work is included (2.5 euros for the filling of each tank), the total would be 460 euros per month.

- If the consumption of 101,200 litres (101.2 m3) is multiplied by the SEDAPAL tariff of 1.69 euros per m3 of water (from 50 m3 per month upwards), this adds up to a total of 171 euros.

- Therefore, it is identified that the *Porcicultores* pays around three times more for water under the current system than residents having a direct network connection to their homes. This is in line with other media reports and research that indicated that on average residents of informal settlements not connected to the water network could pay up to 6 times more than those who are connected (Mamani 2023, n.p.).

Price payed by residents connected to the network for 101.2 m3 of water	Price payed by Porcicultores residents for 101.2 m3 of water	Price payed by Porcicultores residents for 101.2 m3 of water plus Jennifer´s work
171 Euros	**230 euros**	**460 euros**

Table 7: Water price comparison

So, what is the real costs of water in *Porcicultores*? Community leaders indicated that the price includes the consumption for water and electricity (to connect the pumps) as well as savings to pay fines, maintenance of electric water pumps or upgrades or extension of the network. Through interviews, residents of *Porcicultores* were asked if they have seen the water bill, to which they indicated that they have not. When asked whether the process for setting prices was participatory and clear, residents indicated that the price was set by the previous administration's leadership and has not changed since then.

6.3.3 Informal access to sanitation

Through interviews, residents of *Porcicultores* indicated that access to sanitation is "artisanal, rustic, temporary and provisional" denying any form of informal or clandestine connection. In an interview, Jorman (Interview 1) said that about 5 years ago an engineer came to the community and told them that he had the skills to make the design of a sewerage system. He charged each family a total of 200 euros, totaling 7.200 euros for the sewerage design and materials, while the construction was done through

"faenas" (communal work). The main sewerage that collects the discharges from each house was located under the main concrete staircase of the neighbourhood, the only access to the higher areas. If the sewerage main pipe must be repaired, the staircase would have to be broken, which would affect the neighbours temporarily. This sewerage is connected to the SFA settlement one, for which they had to negotiate with the neighbourhood and pay them an undisclosed amount. For example, SFA Extension currently wants to do the same, but SFA and Nuevo Peru do not want it because it would be "saturating" the sewer. Possibly the population is aware that this is not convenient because several recalled that a few years ago a sewerage pipe broke in a lower area in the district due to overloading and lack of maintenance, which left them without water for a month due to lack of repair. Through the interviews, residents of *Porcicultores* also expressed that a few years ago they were fined by SEDAPAL for 1.000 euros for the illegal connection. As a result, they live in constant fear that at some point they will be cut off from access to the sewerage system.

Finally, although it was not possible to enter the bathrooms of any of the houses, it was possible to visit the public bathrooms that were installed for visitors to the hills (Picture 20). It was evident that although the toilet is connected to the drain, water stored in a bucket must be used to be able to flush the toilet.

Figure 21: Access to sanitation

6.4 How integrity failures impact water and sanitation access in informal settlements

6.4.1 Partially fulfilled human rights

This section will analyse whether the human rights to water and sanitation is being exercised or not in the case of the informal settlement of *Porcicultores*, according to the key aspects detailed by the United Nations (2010, pp. 7-10). In case of sufficiency and continuity, it has been identified that water provided by SEDAPAL through public water tabs arrives in an intermittent way. However, because each family stores 1.100 litres of water in a tank located next to their home, they do manage to have continuous water for domestic use., It was identified that the maximum that a family consumes is 4 tanks of 1.100 litres per month, adding up to a total of 4.400 litres. This is due to the pumping and storage capacity. Assuming that a family is composed of 4 people (taking as a reference the average number of people per household in Lima), it can be calculated that each person uses an average of 36.6 litres per day. This is below the WHO recommendation, which estimates that each person needs between 50 and 100 litres of water per day.

On water safety, SEDAPAL points out that the benefits of the public water tab is that water comes out of the network, which ensures that its quality meets the company's standards. However, as the water flows through the hoses and tanks installed by the residents, it is very likely to become contaminated in the process. As a result, the responsibility to clean the tank to keep the water clean lies on the residents. In addition, according to interviews conducted to residents, they pointed out that during the summer period tanks and water get warm, causing them to experience a different taste of water but that in general, the water from the public water tab comes out clean.

On the affordability aspect, it is evident that residents are paying much more than the established rate. According to United Nations (2010, pp. 7-10) water expenses should not account for more than 3% of a household income. According to the National Institute of Statistics and Informatics (INEI) (2020, p.48), the average per capita income in this area of the SJL district is medium low and is between 209 euros and 268 euros, just in the range of the Peruvian minimum wage of 256 euros. Let's take this value as a reference and imagine a family of *Porcicultores* consumes four water tanks monthly, for

which they pay 20 euros in total (including the work of Ms. Jennifer to pump the water). In the case of a family where both parents work and each one earns a minimum wage, the expenses related to water consumption would represent 3.9% of the income of the household. However, interviews revealed there are some single mothers in the informal settlement who are the sole support in their families. In this case water expenses represent 7.8% of the monthly income. Therefore, it is evident that, in general, more is being paid than is stipulated in the human right to water. Moreover, as seen above, up to three times more than the average SEDAPAL tariff is paid. Therefore, it would make no sense to have a system of cross-subsidies if each settlement not connected to the water network sets their own prices for water.

In terms of physically accessibility, in the case of water although the public water tab is located less than 1000 metres from the houses and less than 30 minutes away, as proposed by WHO, experience in the field shows that it is not accessible. Before the installation of the pumping system, residents of *Porcicultores* had to carry water in buckets, which require significant physical effort. They even said that they had to pay a neighbour to carry the water. Therefore, it can be concluded that even if the distance and time are shorter than proposed by WHO, this does not mean that water is physically accessible in the in *Porcicultores*, which prompted the neighbours to propose the pumping system. And finally, in the case of sanitation, accessibility could not be ensured if were not if community members do not organised itself, albeit informally.

From the above, it can be concluded that the fact that SEDAPAL installs a public water tab does not mean that it is necessarily complying with the key aspects of the human right to water, which would constitute an integrity failure in itself. It is required extra economic and physical efforts from the side of the residents to improved access to these rights.

6.4.2 Exposed to integrity failures

This research has identified that residents of *Porcicultores* are exposed to integrity failures when accessing water and sanitation. Firstly, because access to water is centralized in the public water tab which is padlock. In case of misconduct on the part of the community leader who holds the key, residents could be affected from accessing the

service. In addition, since some infrastructures are located in open spaces and exposed, they could be violated or stolen (hoses and pumps, for example), affecting the residents. In an interview with Hernán Baca, founder of the NGO *"Haz tu mundo verde"* (Interview 2) he narrated that a couple of years ago and a fog-catching infrastructure was installed to recover water. Unfortunately, in less than a month the installed infrastructure was stolen and has not been replaced since.

Unscrupulous people, external to the informal settlement, could take advantage of the need and rip residents of *Porcicultores.* For example*,* by promising water connections for each house, charging them a very high fee and putting them at risk of being fined by SEDAPAL. If this has happened before with the informal sewerage, why could not it happen now with water?

Finally, since tariffs are not regulated or controlled by any external entity, they are set according to personal criteria. For example, the cost of Jennnifer's work or the cost of electricity for pumps. Likewise, according to the interviewed residents of *Porcicultores,* it was not evidenced that the establishment of the 2.5 euros tariff for water in the past leader's administration was participatory.

Through interviews, residents said that they don't like living like this *"but what can be done".* Many came to live in *Porcicultores* once they got married to become independent and looking for a "saving for the future, something for their children" (resident Amparo, Interview 10).

6.4.3 Everyday water governance

In *Porcicultores*, it has been identified that there is also water management and governance at the local level in which SEDAPAL does not participate through controls or monitoring. It is evident that there is a multiplicity of actors in the process of access to water in the informal settlement: the leader who has the key to the water tap, the resident who has the tap under his name and makes the payment to SEDAPAL, Jennifer who does the water pumping, but also every resident who decides to fill his or her water without Jennifer's help and must handle the elements for the filling. Actors go beyond *Porcicultores*, including residents of SFA Extension who are paid for electricity for the pumps, as well as the community leaders who were asked for permission to place the

pumps and hoses on their stairs. Similarly, in the case of sanitation, it was necessary to coordinate with SFA leaders so that *Porcicultores* could connect informally to its sewerage system. This multiplicity of actors involved in water and sanitation access could lead to integrity failures in the absence of transparency, accountability, participation and anti-corruption, as stipulated in WIN's TAPA Framework.

At the leadership level, the informal settlements have mechanisms for electing and renewing leaderships, who in the case of *Porcicultores* are in office for a period of three years. Leaders are in charge of managerial activities and reach consensus related at the informal settlement level and also to represent it in front of the district municipality of SJL, other authorities and other settlements. From conversations with *Porcicultores* residents, they are satisfied with the performance of their current leaders. However, as pointed out by Architect Calizaya (Interview 7), community leaders should be not romanticized. He mentioned that, in his experience working in informal settlements, he has been let down by some leaders who sought to enrich themselves at the expense of their community.

As Finewood and Holifield (2015, p.86) point out, governance encompasses community activism, participation, and a recognition of the influence of culture in decision-making. When it comes to urban water governance, it primarily involves the way communities decide on and execute actions related to the allocation, utilization, treatment, and recycling of urban water. In that regard, when thinking about water governance and infrastructure the government should not just think about large-scale dams or other big investment projects but give it a bigger meaning including buckets, tanks and others.

Moreover, as seen in the case of *Porcicultores*, water and sanitation governance go beyond their own informal settlement. To access the services, former leaders of *Porcicultores* had to negotiate with close settlements, because the public water tab is in SFA's public space, and its sewerage pipe is irregularly connected to theirs. When interviewed on 29 October 2023, Leader Isidro (Interview 23) said that at the beginning of his term he had a good relationship with the neighbouring leaders. However, over the years they have had conflicts and feel that they are obstructing *Porcicultores* progress. For example, they used to have a plastic water tank near the SFA square which helped the pumping of water from there to *Porcicultores* to be more fluid. But sometime later

it was asked to be taken away. Leader Isidro said that the envy between neighbourhoods generates that they cannot make better efforts not only for the benefit of *Porcicultores* but for everyone.

6.4.4 Incremental citizenship

Sultana (2020, pp. 2-3) highlights that the state distinguishes subjects from citizens because the state provides water (and sanitation) to those who are considered proper urban citizens only. This section is called "incremental citizenship" as it portrays the experience and the process for citizenship recognition of informal settlement residents. Being considered citizens by the state is an ongoing task, through the performance of regularisation and formalisation procedures and the demand for infrastructure. As the residents of informal settlements gain access to documents such as proof of possession, property titles and access to services, it could be said that their recognition as citizens is incremented.

The situation of *Porcicultores* aligns with the concept articulated by Anand (2017, p. 545) as "hydraulic citizenship", a sense of city belonging facilitated by asserting social and material demands on the urban water system. For example, resident Maria mentioned: "we live in Peru´s capital, not so far from the city centre, however, we do not have access to water at home" (Interview 14), expressing, in some way, not feeling included as an "hydraulic citizen" in Lima.

Furthermore, Lemanski (2019, p.1) emphasized the significance of the connection between infrastructure and citizenship, highlighting the links between the material and political dimensions of state-society interactions. When interviewed leader Isidro (Interview 21), indicated that they suffer from political absence and that *Porcicultores* residents do not feel supported by the district municipality and perceive it as an institution placing obstacles in their way. He also reported that SEDAPAL personnel visit the area only to verify that the public water tab is in good condition and to check the meter but not to get involved with the residents or propose improvements that would help increase quality of life.

However, residents of informal settlements take action on their own demonstrating that citizenship is more than a status of individuals but rather the actions and processes by

which citizenship is exercised (Lemanski 2019, p. 9, Holston and Appadurai 1998 cited in Morales et al 2014, p.4). In the case of *Porcicultores* residents, it could be argued that they are exercising their insurgent citizenship through community organization when increasing their water infrastructures to have easier access to it, or by taking care of the sewerage installation (even if informally). Interviews with residents revealed that they do not perceive SEDAPAL as a utility company that really cares for residents of informal settlements. *Porcicultores* residents feel "left to their fate" by SEDAPAL. Along these lines, leader Isidro (Interview 23) said that in the *Porcicultores* everything is done with *"esfuerzo y dinero del pueblo"* ("effort and money of the people", own translation from Spanish).

As seen in the case of informal settlements in Lima, for infrastructure to arrive there are, technical, financial, and political decisions, and just like planning deficiencies and integrity failures under which it is decided who accesses services and who does not. It is not by accident, who benefits from water and sanitation services, so infrastructure is more than objects in space but the materialization of inequality, in the case of Lima. Just as underlined by Larkin (2013, p.330) "infrastructures are not, in any positivist sense, simply "out there"", or not.

CHAPTER 7

Conclusions

7.1 Mobilizing the concept of integrity failures in research

Through the lens of urban political ecology, this research has addressed how integrity failures impact water and sanitation supply and access in the capital city of Peru, Lima, particularly looking at informal settlements. To do so, this research has undertaken a multi-scalar and multi-stakeholder approach and has implemented a mix of methods to understand supply and access to water and sanitation both from the side of SEDAPAL and the state as well as from the side of residents of informal settlements.

By applying the concept of integrity failures to analyse water and sanitation services in informal settlements, it was necessary to review critical literature on informality. This led to the identification of commonalities and linkages between integrity failures and informality. Roy (2009a), for example, understands informality as an ambiguous state that faces dualistic conceptions between legal and illegal, somewhat like integrity failures, which are not necessarily illegal or legal, but rather immoral or acting unethically. Furthermore, Roy points out that informality is a "language" of urbanisation that influences the production of space in cities. Taking this approach as an inspiration, could it then be argued that integrity failures also have an impact on how cities are produced?

Just as Yifatchel (2009) refers to informality as a "grey space" between legality and illegality, Heidenheimer (1970) uses the term "grey corruption" to refer to practices that generate different opinions, including ambivalence and dilemmas in society, since they are not considered totally corrupt practices, within which integrity failures could be framed. Furthermore, considering that corruption and informality mainly affect vulnerable groups, for example, those living in informal settlements, it could be concluded that integrity failures can increase informality, and informality can increase integrity failures, not only in water and sanitation services. Moreover, another common ground of informality and integrity failures is that both increase inequality and reinforce unequal power structures.

Doing research on access to water and sanitation services in informal settlements in Lima through the lenses of urban political ecology and using the concept of integrity failures has enabled this research to go beyond the utility company, SEDAPAL, and technoscientific and top-down decision-making processes. By including the residents of informal settlements' perspective, insights have been gained into the dynamics and integrity failures that occur after SEDAPAL provides (or does not) water and sanitation services in informal settlements.

The concepts of material politics of infrastructure and insurgent citizenship have been important for this research to unveil that infrastructure in informal settlements is more than pipes and cables alone but material elements with immaterial significance like citizenship, either insurgent or recognized by the state through the material politics of infrastructure. Finally, this research uses the concept of "incremental citizenship" to refer not only to the incremental infrastructure that residents of informal settlements build continuously over time to improve their access to water and sanitation on a daily basis but also to refer to how citizenship is being "won" gradually over time, incrementing it, through human rights recognition, such as the rights to water and sanitation.

Just as water and sanitation services in informal settlements in Lima have been researched using integrity failures, this concept could be replicated in other areas and on a city scale, addressing issues such as electricity services, public transport, public space, housing, and others. The advantage of thinking about using the integrity and integrity failures concepts is that it allows questions such as: is there transparency in public resources management? Are institutions being held accountable for their actions and inactions? Are, for example, residents of informal settlement participating in the decisions that are being taken in the city? Are anti-corruption measures taking place? How are decisions being taken in the city? Are the poorest and most vulnerable being considered? In this sense, it is recommended to incorporate the concepts of integrity and integrity failures into the discussion of urban issues in the aim for a just city.

7.2 Integrity failures at the utility company (SEDAPAL) scale

From SEDAPAL and the state, integrity failures are mainly linked to water and sanitation governance. The fragmentation of roles and responsibilities between SEDAPAL,

Metropolitan Municipality of Lima, district municipalities, and the Ministry of Housing and other actors seems to hinder processes and establish clear responsibility frameworks. In this regard, the lack of clarity of institutional mandates not only means that service delivery to informal settlements can fall through the gaps but also that it is difficult for the residents of informal settlements to know who to hold accountable (WIN 2022). Moreover, it has been identified that political interference can also undermine effective governance of water and sanitation at the city and informal settlement scales in Lima.

Another integrity failure identified from the state´s water and sanitation management is the fact that land tenure functions as a mediator for the exercise of the human rights to water and sanitation, making the proof of possession a document that differentiates who has access to water and who does not, beyond SEDAPAL's technical capacity. This means that municipalities have a high probability to collude with residents of informal settlements by accepting bribes to provide them with proof of possession, as Architect Calizaya suggested (Interview 7).

One more aspect of the governance of water and sanitation in informal settlements in Lima, where the government has yet to improve, is participation. As Ioris (2012, p. 621) mentions, the only technocratic and top-down approaches to resources management are not enough, since including community participation in decision-making processes could be of enormous value. As argued by WIN (2021, p. 209), all urban residents should have the chance to actively engage in decision-making regarding the design of services and investments in water and sanitation. This is particularly important for residents of informal settlements and other marginalized communities, as their perspectives are frequently overlooked.

Drawing on the above, it is recommended better coordination between state entities involved in urban planning and SEDAPAL, applying the principles of good water governance and integrity, encompassing the principles of transparency, accountability, participation and anti-corruption. All this is in the context of water stress and climate change, which will lead to greater pressures on SEDAPAL and the government in office.

7.3 Integrity failures at the informal settlement scale

Through the case study in *Porcicultores*, it was possible to explore how residents of informal settlements improve, generate, and manage their water and sanitation infrastructure access and infrastructure on a daily basis. In the absence of the state, insurgent planning and organization appear, "governing from below", which emphasizes governance at the local level through community organization (Vaz et al 2022, n.p.). Therefore, it is suggested that critical scholars concentrate on emerging governance strategies, viewing them as mechanisms through which urban citizens shape and govern themselves, particularly in their interactions with water (Finewood and Holifield 2015, p. 91).

However, despite the high organisational level, this does not mean that integrity failures are absent at the informal settlement level. Approaching the case study in informal settlements through the concept of integrity made it possible to see the actions of the residents and its community leaders in a more practical and "non-romanticised" way. For example, in the case of *Porcicultores*, it was identified that there might be a case of lack of accountability related to the water and sanitation costs, to the point that residents do not even think of questioning the prices, as identified in the interviews.

In addition, the role of community leaders is very important in informal settlements as they have the power to secure access to water and sanitation services. On the one hand, they are in charge of carrying out the formalities in this regard, and on the other hand they are usually the ones who keep the key of the public water tab, as in the case of *Porcicultores*. In addition, by representing the community, they are responsible for meeting with authorities and other leaders. There were no complaints about the current management of *Porcicultores*. However, some interviewees made allusions to former leaders who took advantage of their position, scamming residents on project fees or colluding with municipal officials for supposed improvements in the informal settlement for their financial gain.

Lastly, the case study showed how insurgent citizenship plays an important role in the improvement of infrastructure in informal settlements. However, inspired by the illegal sewerage connection in *Porcicultores*, if the infrastructure that is built is clandestine, could insurgent planning still be seen as something positive in the absence of the state?

This brings us back to these grey spaces (Yifatchel 2009) discussed above. For example, in the case of public water tabs, the interview with SEDAPAL Official showed that SEDAPAL justified certain practices in informal settlements such as illegal network extensions if they are built after the public water tab and its water meter. However, if the network extension is constructed before the public tab´s water meter and, consequently, water is not billed, SEDAPAL reports these actions as theft. It would be interesting for future research to contrast and compare different authorities and their reactions to these types of integrity dilemmas in which the exercise of human rights, such as water and sanitation, conflict with formal legal practices.

Finally, the main limitation in researching integrity failures and potential corruption cases in informal settlements is that residents could be reluctant to be interviewed about this issue or cannot openly talk about it. Moreover, considering that it would not be appropriate to directly ask "do you know of any integrity failures or cases of corruption in your informal settlement?", it may be difficult to gather the information in a consistent and measurable way, being able to quantitative identify the impacts of these acts. However, by using one-on-one semi-structured interviews and concepts such as transparency, accountability and participation, insights into integrity and corruption failures in informal settlements can be gained in more qualitative driven research.

7.4 Final reflections and recommendations

The ability to supply water and sanitation services to the entire city of Lima is a complex issue due to the physical and demographic conditions of the city and the unplanned growth, which overwhelmed SEDAPAL's capacity to provide water and sanitation to residents of informal settlements. Along these lines, this research resonates with Zinnbauer (2019, p. 2), who points out that the dynamics of urbanization, particularly in rapidly growing urban agglomerations, have a high risk of corruption and integrity failures due to competition for scarce resources such as land, housing, water, among other access to services, as in the case of Lima.

This research concludes that integrity failures are transversal to the supply and access to water and sanitation in informal settlements in Lima in the following ways:

- Integrity failures can occur throughout the whole chain of supply and access to water and sanitation, at the policy, urban planning, and service delivery level, within SEDAPAL, municipalities, in outsourced services or linked to those who access the service.

- Integrity failures include a variety of actors, like politicians, civil servants, the public sector and the residents, who may act individually or in collusion with other actors from the same or different sectors.

- Integrity failures manifest not only in the informal sectors, as in the case of informal settlements and tanker trucks, but also in formal settings, as in the case of the *El Bosque* club, a private social club in Lima.

- Integrity failures can take the form of petty or grand corruption, depending on the case and the actors involved.

- Integrity failures are closely linked to a lack of clear institutional and regulatory frameworks and manifest through political interests.

In view of the above, as the water and sanitation supply and access in informal settlements is highly exposed to integrity failures, including corruption, SEDAPAL should continue to promote its Corruption and Anti-Fraud System through the Office of Compliance and Integrity. However, this alone does not ensure that there will be no more corruption or integrity failures. Acting with integrity must be internalized and socialised, including all the actors involved in the process of supplying and accessing water and sanitation, like owners of tanker truckers, community leaders and residents of informal settlements.

This research has shown how the price of water is not fix as it is internally decided in the informal settlement of *Porcicultores*, even though water prices are established by SEDAPAL. Although it is unlikely that SEDAPAL could interfere in water management or water pricing in informal settlements, since extra water charges are also used by residents as savings for infrastructure improvements, SEDAPAL could provide integrity training to those informal settlements being supplied by tanker trucks or public water tabs. In this way, SEDAPAL could socialise transparency, accountability, participation, and anti-corruption at the level of informal settlements so that residents can held accountable to their leaders.

SEDAPAL should not wait for integrity failures or corruption cases to happen, as in the case of water theft by tankers during the COVID-19 pandemic, to undertake greater monitoring and control and become more involved in the water and sanitation provision in informal settlements. As part of the MOOC discussions, when talking about the public water tabs in Lima, colleagues from Colombia asked if there was any case of a public water tab controlled by mafia cartels. The comment came as a surprise since, from what has been reviewed to date, no such case has been reported in Lima, however, in Colombia the control of communal taps and communal meters has been a practice highly controlled by mafias. However, thinking ahead, what could prevent this from happening, considering that to date, there are more than two thousand public water tabs in Lima, a city in a desert? Could public water tabs eventually become small water monopolies instead of community infrastructures?

This research has focused on a single case study in an informal settlement in Lima. However, considering that access to water and sanitation is heterogeneous within a city, it is advisable to learn more about experiences of access to water and sanitation in other informal settlements so that SEDAPAL and the state can incorporate this knowledge and dynamics into its policies. In addition, it would be interesting if these initiatives did not only come from the academia and international organizations, but also from public institutions themselves.

Additionally, this research has highlighted that there is not much information or literature on access to sanitation in informal settlements in Lima. It is recommended to continue exploring this field, not only from an academic perspective, but also from state institutions. As McFarlane (2023, n.p.) suggests, advocating for universal access to sanitation, starts with the premise that sanitation is a basic right crucial to the overall urban living experience. However, fulfilling this commitment requires going beyond the scope outlined in the prevailing global discussions.

Finally, Vidal (2024, p.3) states that "the provision of urban services requires compromises, and this is likely to be increasingly true given the uncertainties of the future". Consequently, given the current challenges posed by climate change and population growth, compromises to good governance through integrity within the water

and sanitation sector becomes increasingly important, with the aim of leaving no one behind to exercise their human rights to water and sanitation.

REFERENCES

Aceros Arequipa (2023): Inauguran proyecto "Agua en emergencia" que abastecerá de agua potable a más de 12,000 pobladores de las zonas altas de San Juan de Lurigancho. *Noticias Aceros Arequipa* 12.05.2023. https://investors.acerosarequipa.com/noticias-detalle/59/inauguran-proyecto-agua-de-emergencia-que-abastecera-de-agua-potable-a-mas-de-12000-pobladores-de-las-zonas-altas-de-san-juan-de-lurigancho, accessed 07.01.2024

Akhmouch, Aziza, and Clavreul, Delphine, and Glas, Peter (2018): Introducing the OECD Principles on Water Governance. *Water International*, 43(1), pp. 5-12

Alomía, Camila (2023): Denuncian que traficantes de terrenos invaden las Lomas de Ancón. *La República* 18.05.2023. https://larepublica.pe/sociedad/2023/05/13/denuncian-que-traficantes-de-terrenos-invaden-lomas-de-ancon-883285, accessed 10.01.2024

Autoridad Nacional del Agua (ANA) (2013): *Plan Nacional de Recursos Hídricos del Perú. Memoria 2013*

Anand, Nikhil (2017): *Hydraulic City. Water & the Infrastructures of Citizenship in Mumbai*. Duke University Press, Durham

Bakker, Karen. (2010): Privatizing Water: Governance Failure and the World's Urban Water Crisis. *Cornell University Press*

Banks, Nicola, Lombard Melanie and Mitlin, Diana (2019): Urban Informality as Site of Critical Analysis. *The Journal of Development Studies*

Barry, Andrew (2020): *Material Politics. Disputes along the pipeline*. Wiley Blackwell, Malden

Banco Interamericano de Desarrollo(BID) (2022): *Acceso al agua y COVID-19: un estudio de regresión discontinua para áreas periurbanas de Lima Metropolitan a, Perú*

Bell, Martha G. (2021): Overlooked legacies: Climate vulnerability and risk as incrementally constructed in the municipal drinking water system of Lima, Peru (1578-2017). *Geoforum,* pp. 1-14

Burgueño Salas, Erick (2023): Global per capita renewable water resources 2020, by country. *Statista* 17.05.2023. https://www.statista.com/statistics/269361/worldwide-renewable-water-resources/**,** accessed el 15.12.2023

Cabeza, Yuriko (2023): Funcionarios de SEDAPAL ordenaban manipular recibos para cobrar "bonos de productividad" de hasta 13 mil soles. *Infobae* 12.06.2023 https://www.infobae.com/peru/2023/06/12/sedapal-cobros-indebidos-recibos-adulterados-comas-y-brena-bonos-de-productividad/, accessed 10.09.2024

Calderón Cockburn, Julio (2006): *La ciudad ilegal. Lima en el siglo XX.* Punto Cardinal, Lima

Camacho, Gabriela (2021): *Transparency International Anti-Corruption Helpdesk. Water and*

Corruption in Latin America. Transparency International, Berlin

Chinchay, Maricarmen (2023): Las campañas electorales en el Perú y la eterna promesa política del agua para todos los peruanos. *Radio Programas del Perú* 09.10.2023. https://rpp.pe/politica/elecciones/las-campanas-electorales-en-el-peru-y-la-eterna-promesa-politica-del-agua-para-todos-los-peruanos-noticia-1509341?ref=rpp, accessed 10.01.2024

Ciriaco Ruiz, Mayté, and Bazo Reisman, Ana (2022): Perú es el país de Sudamérica en el que menos dura un ministro. Informe. *El Comercio* 28.06.2022. https://elcomercio.pe/politica/gobierno/peru-es-el-pais-de-sudamerica-en-el-que-menos-dura-un-ministro-informe-pedro-castillo-pcm-ministerio-educacion-salud-economia-interior-ecdata-noticia/?ref=ecr, accessed 13.01.2024

Clima de Cambios (2016): PPK: "Aseguraremos el acceso al agua y alcantarillado para todas las familias peruanas". *Pontificia Universidad Católica del Perú* 20.09.2016. https://www.pucp.edu.pe/climadecambios/noticias/ppk-aseguraremos-el-acceso-al-agua-y-alcantarillado-para-todas-las-familias-peruanas/, accessed 08.01.2024

Congreso del Perú (1993): *Constitución Política del Perú*

Collyns, Dan (2016): ¿Acabará con la crisis de agua del Perú la gran visión del nuevo presidente? *The Guardian* 25.10.206. https://www.theguardian.com/global-development-professionals-network/2016/oct/25/acabara-gran-vision-nuevo-presidente-crisis-agua-peru-kuczynski-ppk, accessed 08.01.2023

Criqui, Lure (2020): Sociotechnical Alternatives and Controversies in Extending Water and Sanitation Networks in Lima, Peru. *Water Alternatives*, 13 (1), pp. 160-181

Crenshaw, Kimberly (1991): Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. Standford Law Review, 43(6), pp. 1241-1299

El Peruano (2021): Pandemia: Cisternas realizaron 500,000 viajes para reparto de agua gratuita en Lima y Callao. *El Peruano* 20.03.2021. https://elperuano.pe/noticia/117322-pandemia-cisternas-realizaron-500000-viajes-para-reparto-de-agua-gratuita-en-lima-y-callao, accessed 04.01.2023

El Peruano (2023): ¡Es oficial! Ejecutivo extiende estado de emergencia en San Martín de Porres y SJL. *El Peruano* 16.11.2023. https://www.elperuano.pe/noticia/227949-es-oficial-ejecutivo-extiende-estado-de-emergencia-en-san-martin-de-porres-y-sjl, accessed 15.01.2024

Enríquez Hurtado, Raúl (2022): *Agua Potable y Saneamiento en el Perú. Diagnóstico y Propuestas* Fundación Friedrich Ebert Stiftung, Lima

Espinoza, Analí (2023): Convierten el agua de mar en potable para abastecer a cuatro distitos de Lima Sur. *Infobae* 28.08.2023. https://www.infobae.com/peru/2023/08/25/convierten-el-agua-de-mar-en-potable-para-abastecer-a-cuatro-distritos-de-lima-sur/, accessed 09.01.2024

Ernstson, Henrik, and Swyngedouw, Erik (2019): *Urban Political Ecology in the Anthropo-Obscene.: Interruptions and Possibilities.* Routledge: New York

FICUS (n.y.): *Gestión Sostenible de Agua y Saneamiento en Asentamientos Humanos.* https://ficus.org.pe/gestion-sostenible-de-agua-y-saneamiento-en-asentamientos-humanos/, accessed 11.01.2024

Finewood, Michael, and Holifield, Ryan (2015): Critical approaches to urban water governance: from critique to justice, democracy and transdisciplinary collaboration. *WIREs Water*, 2, pp. 85-96

Fondo de Agua para Lima y Callao (Aquafondo) (2020): *Crisis de Agua: Una amenaza silenciosa para el desarrollo económico*. Aquafondo, Lima

Fondo de Agua para Lima y Callao (Aquafondo) (2023): Estrés hídrico en Lima: ¿Qué es y por qué es importante implementar soluciones? *Aquafondo* 09.06.2023. https://aquafondo.org.pe/estres-hidrico-en-lima-que-es-y-por-que-es-importante-implementar-soluciones/, accesed 14.01.2024

Fowks, Jacqueline (2023): Perú, el país de los presidentes encarcelados y procesados. *Público* 24.04.2023. https://www.publico.es/internacional/peru-pais-presidentes-encarcelados-procesados.html, accessed 16.01.2024

García Olano, Elías (2023): SEDAPAL se queda sin recursos para grandes obras que asegurarían más agua para Lima. *Diario Gestión* 03.03.2023. https://gestion.pe/economia/sedapal-se-queda-sin-tarifas-para-grandes-obras-que-iban-a-traer-mas-agua-para-lima-noticia/?ref=gesr, accessed 13.01.2024

Gobierno del Perú (n.y.): *Portal de Transparencia estándar*. https://www.transparencia.gob.pe/enlaces/pte_transparencia_enlaces.aspx?id_entidad=10046, accessed 15.12.2023

Groves, David, and Bonzanigo, Laura, and Syme, James, and Engle, Nathan, and Rodriguez, Ivan (2019): *Preparing for Future Droughts in Lima, Peru. Enhancing Lima´s Drought Management Plan to Meet Future Challenges.* World Bank Group, Washington

Heller, Léo (2022): *The human rights to water and sanitation.* Cambridge University Press
Herrera, Lisette (2013): Baños secos constituyen sistema ecológico para zonas sin alcantarillado. *Andina* 21.02.2013. https://andina.pe/agencia/noticia-banos-secos-constituyen-sistema-ecologico-para-zonas-sin-alcantarillado-448218.aspx, accessed 11.01.2024

Hoefsloot, Fenna (2022): *Knowledge Infrastructures for Just Urban Futures. A case of water governance in Lima, Perú.* University of Twente

Holmes, Leslie (2015): *Corruption: A very short introduction.* Oxford University Press, Oxford

Holston, James (2008): *Insurgent Citizenship: Disfunctions of Democracy and Modernity in Brazil.* Princeton University Press

Hussein, Ashatu (2009): The use of Triangulation in Social Sciences Research: Can qualitative and quantitative methods be combined? *Journal of Comparative Social Work* (1) pp 1-12

Instituto Nacional de Estadística e Informática (INEI) (2020): *Planos Estratificados de Lima Metropolitana a Nivel de Manzanas 2020. Según ingreso por cápita del hogar.*

Instituto Nacional de Estadística e Informática (INEI) (2023b): Población peruana alcanzó los 33 millones 726 mil personas en el año 2023. *Nota de Prensa* 10.07.2023

Ioris, Antonio (2012): The geography of multiple scarcities: Urban development and water problems in Lima, Peru. *Geoforum*, 43, pp. 612-622

Ioris, Antonio (2016): Water scarcity and the exclusionary city: the struggle for water justice in Lima, Peru. *Water International* 41(1), pp. 125-139

Jenkins, Matthew (2017): *The impact of corruption on access to safe water and sanitation for people living in poverty*. U4 Anti-Corruption Resource Centre, CHR. Michelsen Institute, Bergen

Kaika, Maria (2005): *City of flows. Modernity, Nature and the City.* Routledge, New York

Karpouzoglou, Timothy, and Zimmer, Anna (2016): Ways of knowing the wastewater: Urban political ecology and the politics of wastewater in Delhu, India. *Habitat International*, 54(2), pp. 150-160

Keping, Yu (2018): Governance and Good Governance: A New Framework for Political Analysis. *Fudan Journal of the Humanities and Social Sciences* 11, pp. 1-8

KNOW - Conocimiento en acción, and Pontificia Universidad Católica del Perú, and Centro de Investigación para la Arquitectura y la Ciudad (CIAC), and Pontificia Universidad Católica del Perú (PUCP)(2018): *Estadísticas y mapas de Lima Metropolitana por distritos según el censo 2017.*

Larkin, Brian (2015): The Politics and Poetics o Infrastructure. Annual Review in Anthropology 42(3), pp.327-343

Lemanski, Charlotte (ed) (2019): *Citizenship and Infrastructure. Practices and Identities of Citizens and the State. Routledge,* London and New York

Lemanski, Charlotte (n.y.): Infrastructural citizenship. Spaces of living in Cape Town, South Africa. In Lemanski, Charlotte (ed) (2019): *Citizenship and Infrastructure. Practices and Identities of Citizens and the State. Routledge,* London and New York, pp. 8 – 21

Leon, Valeri (2023): SEDAPAL: Designan como nuevo president a Jorge Gómez Reátegui. *Infobae* 28.09.2023 https://www.infobae.com/peru/2023/09/29/sedapal-designan-como-nuevo-presidente-a-jorge-gomez-reategui/, accessed 15.01.2024

Loftus, Alex (2009): Rethinking Political Ecologies. *Third Worl Quarterly,* 30(5), pp. 953-968

Lozano, Israel (2021): Viviendas en el Perú: ¿Cuánto más hace falta construir para cubrir el déficit nacional. *El Comercio* 25.06.2021. https://elcomercio.pe/economia/dia-1/viviendas-en-el-peru-cuanto-mas-hace-falta-construir-para-cubrir-el-deficit-nacional-mercado-inmobiliario-deficit-habitacional-ministerio-de-vivienda-fondo-mivivienda-noticia/?ref=ecr7, accessed 16.01.2024

Mamani, Maria Elena (2023): ¿Cuánto cuesta el metro cúbico de agua en Lima? *Infobae* 22.03.2023. https://www.infobae.com/peru/2023/03/22/dia-mundial-del-agua-cuanto-cuesta-el-metro-cubico-de-agua-en-lima/, accessed 16.01.2024

Matayoshi, Andres, and Mejia, Janneth, and Chuquitapa, Jsé (2021): Deconstruyendo el derecho al agua potable en el Perú: Nuevos retos a nuestros doscientos años como república. *Thêmis – Revista de Derecho*, 80, pp.279-293

Matos Mar, José (1986): *Desborde popular y crisis del Estado. El nuevo rostro del Perú en la década de 1980.* Instituto de Estudios Peruanos, Lima

McFarlane, Colin (2023): *Waste and the city. The crisis of sanitation and the right to citylife.* Verso, London, New York

Melo, María Florencia (2024): Los salarios mínimos en América Latina para 2024. *Statista* 03.01.2024. https://es.statista.com/grafico/16576/ajuste-de-los-salarios-minimos-en-latinoamerica/, accessed 10.04.2024

Mendoza Flores, Mariel (2016): *En la periferia de la ciudad y la gobernanza. Un estudio de caso sobre la gestión local del agua y saneamiento en el Asentamiento Humano del Cerro Las Ánimas.* Pontificia Universidad Católica del Perú

Ministerio del Ambiente (2021): MINAM, SEDAPAL, ANA y BID coordinan acciones en favor de la gestión hídrica para Lima y Callao. *Plataforma digital única del Estado Peruano* 11.10.2021. https://www.gob.pe/institucion/minam/noticias/543656-minam-sedapal-ana-y-bid-coordinan-acciones-en-favor-de-la-gestion-hidrica-para-lima-y-callao, 13.01.2024

Ministerio de Vivienda, Construcción y Saneamiento (MVCS) (n.y.a): Reglamento de ley que amplía plazos de titulación de predios incluye candado para evitar tráfico de tierras. *Plataforma digital única del Estado Peruano* 16.01.2021. https://www.gob.pe/institucion/vivienda/noticias/324983-reglamento-de-ley-que-amplia-plazos-de-titulacion-de-predios-incluye-candado-para-evitar-trafico-de-tierras, accessed 08.01.2024

Ministerio de Vivienda, Construcción y Saneamiento (n.y.b): Solicitar conexión del servicio de agua potable y alcantarillado. *Plataforma única del Estado Peruano*. https://www.gob.pe/659-solicitar-conexion-del-servicio-de-agua-potable-y-alcantarillado-solicitar-conexion-en-lima-metropolitana-y-callao, accessed 09.01.2024

Ministerio de Vivienda, Construcción y Saneamiento (2023): Ministra Pérez de Cuéllar: Ley de acceso universal al agua contribuirá a cerrar brecha a corto plazo. *Plataforma digital única del Estado Peruano* 19.09.2023. https://www.gob.pe/institucion/vivienda/noticias/836705-ministra-perez-de-cuellar-ley-de-acceso-universal-al-agua-contribuira-a-cerrar-brecha-a-corto-plazo, accessed 11.01.2024

Ministerio de Vivienda, Construcción y Saneamiento (2024): Ministerio de Vivienda transfiere más de S/ 38 millones a SEDAPAL para distribuir agua potable gratuita. *Plataforma digital única del Estado Peruano* 06.01.2024. https://www.gob.pe/institucion/vivienda/noticias/890721-ministerio-de-vivienda-transfiere-mas-de-s-38-millones-a-sedapal-para-distribuir-agua-potable-gratuita, accessed 31.01.2024

Miraftab, Faranak (2009): Insurgent Planning: Situating Radical Planning in the Global South. *Planning Theory,* 8(1), pp.32-50

Miranda Sara Liliana (2021): *Knowledge building in configuring metropolitan water governance: Water-related climate risk scenarios, governance networks, concertation processes and territorialities in Lima, Peru.* Thesis Universiteit van Amsterdam

Monstadt, Jochen, and Schramm, Sophue (2017): Toward The Networked City? Translating Technological ideals and Planning Models in Water and Sanitation Systems in Dar es Salaam. *International Journal of Urban and Regional Research*, 41(1), pp. 104-125

Moreno, Gabriela (2023): Ministra de Vivienda bajo presión por situación actual de SEDAPAL. *Federación de Periodistas del Perú* 02.10.2023. https://fpp.org.pe/ministra-de-vivienda-bajo-presion-por-situacion-en-sedapal/?amp=1, accessed 11.01.2024

Municipalidad distrital de San Juan de Lurigancho (2023): *Memoria Anual Institucional 2022*

Organismo de Formalización de la Propiedad Informal (COFOPRI) (2023): Cofopri formalizó más de 2 millones 830 mil propiedades urbanas en todo el país. *Plataforma única digital del Estado Peruano* 22.03.2023. https://www.gob.pe/institucion/cofopri/noticias/729738-cofopri-formalizo-mas-de-2-millones-830-mil-propiedades-urbanas-en-todo-el-pais, accessed 09.01.2024

Piló, Francesca and Jaffe, Rivke (2020): Introduction: *The Political Materiality of Cities. City & Society,* 32(1), pp. 8-22

Plumber, Janelle (2008): Water and corruption: a destructive partnership. In Transparency International (2008): *Global Corruption Report 2008. Corruption in the Water Sector.* Cambridge University Press, New York, pp. 3-15

Redacción Canal N (2023): Surco: encuentran conexión clandestina de agua en el Country Club el Bosque. *Canal N* 05.06.2023. https://canaln.pe/actualidad/surco-encuentran-conexion-clandestina-agua-country-club-bosque-n462689, accessed 10.01.2024

Redacción Gestión (2023): Ministerio de Economía transfiere S/ 32.5 millones para el abastecimiento gratuito de agua segura. Gestión 25.03.2023. https://gestion.pe/economia/ministerio-de-economia-transfiere-s-325-millones-para-el-abastecimiento-gratuito-de-agua-segura-mef-sedapal-noticia/?ref=gesr, accessed 31.01.2023

Redacción Radio Programas del Perú (RPP) (2022): SJM: Asentamientos humanos denuncian que camiones cisterna de SEDAPAL no llegan a sus zonas. *Radio Programas del Perú* 01.05.2022. https://rpp.pe/lima/actualidad/sjm-asentamientos-humanos-denuncian-que-camiones-cisterna-de-sedapal-no-llegan-a-sus-zonas-noticia-1402523, accessed 15.10.2023

Redacción Radio Programas del Perú (RPP) (2023): Municipalidad de Lima inauguró primer punto del proyecto Agua en Emergencia en San Juan de Lurigancho. *Radio Programas del Perú* 27.04.2023. https://rpp.pe/lima/actualidad/municipalidad-de-lima-inauguro-primer-punto-del-proyecto-agua-de-emergencia-en-san-juan-de-lurigancho-noticia-1481446?ref=rpp, accessed 09.01.2023

Roy, Ananya (2005): Urban Informality. Toward an Epistemology of Planning. *Journal of the American Planning Association* 71(2), pp. 147 – 158

Roy, Ananya (2009a): Strangerly Familiar: Planning and the Worlds of Insurgence and Informality. *Planning Theory,* 8(1), pp. 7-11

Roy, Ananya (2009b): Why India cannot plan its cities: Informality, Insurgence, and the Idiom of Urbanization. *Planning Theory,* 8(1), pp- 76-87 *

SANIMA (n.y.): *Saneamiento para una ciudad inclusiva*. https://sanima.pe/, accessed 11.02.2024

Secretaría de Integridad Pública. Presidencia del Consejo de Ministros (2021): *Integridad Pública. Guía de conceptos y Aplicaciones*. Biblioteca Nacional del Perú, Lima

Servicio de Agua Potable y Alcantarillado de Lima (n.y.): Información Institucional. *Plataforma digital única del Estado Peruano*. https://www.gob.pe/institucion/sedapal/institucional, accessed 27.12.2023

Servicio de Agua Potable y Alcantarillado de Lima, and Water and Sanitation Program (2006): *Agua para las zonas periurbanas de Lima Metropolitana. Lecciones aprendidas y recomendaciones*. World Bank, Lima

Servicio de Agua Potable y Alcantarillado de Lima (2017): *Anuario Estadístico* 2017. SEDAPAL, Lima

Servicio de Agua Potable y Alcantarillado de Lima (2021): Modelo de Integridad de SEDAPAL alcanza calificación meritoria otorgada por PCM y WIN del BID. *Plataforma única del Estado Peruano* 13.07.2021. https://www.gob.pe/institucion/sedapal/noticias/505863-modelo-de-integridad-de-sedapal-alcanza-calificacion-meritoria-otorgada-por-pcm-y-win-del-bid, accessed 28.12.2023

Servicio de Agua Potable y Alcantarillado de Lima (2022): *Memoria anual 2021*. SEDAPAL, Lima

Servicio de Agua Potable y Alcantarillado de Lima (2023a): *Memoria anual 2022*. SEDAPAL, Lima

Servicio de Agua Potable y Alcantarillado de Lima (2023b): Solicitar nueva conexión de agua potable y alcantarillado. *Plataforma digital única del Estado Peruano* 26.10.2023. https://www.gob.pe/37227-solicitar-nueva-conexion-de-agua-potable-y-alcantarillado, accessed 10.01.2024

Servicio de Agua Potable y Alcantarillado de Lima (2024): Producción y distribución de agua potable. *Plataforma única del Estado Peruano* 07.01.2024. https://www.gob.pe/12753-servicio-de-agua-potable-y-alcantarillado-de-lima-produccion-y-distribucion-de-agua-potable, accessed 09.01.2024

Staddon, Chad, and Appleby, Thomas, and Grant, Evadne (2011): A right to water? Geographico-legal perspectives. In Sultana, Farhana and Loftus, Alex (eds): *The right to water: Politics, governance and social struggles*. Routledge New York pp. 61 - 77

Stålgren, Patrik (2006): Corruption in the Water Sector: Causes, Consequences and Potential Reform. *Swedish Water House Policy Brief, 4*

Sultana, Farhana, and Loftus, Alex (eds) (2011): *The right to water: Politics, governance and social struggles.* Routledge, New York

Sultana, Farhana, and Loftus, Alex (2015): The Human Right to Water: Critiques and Condition of Possibility. *WIREs Water*, 2, pp. 97-105

Sultana, Farhana, and Loftus, Alex (2020): *Water Politics: Governance, Justice and the Right to Water.* Earthscan from Routledge, London and New York

Sultana, Farhana (2020): Embodied Intersectionalities of Urban Citizenship: Water, Infrastructure, and Gender in the Global South. *Annals of the American Association of Geographers,* 0(0), pp. 1-18

Superintendencia Nacional de Servicios de Saneamiento (SUNASS) (2015): Comprar agua por camión cisterna les cuesta a las familias limeñas 72 soles mensuales. *Nota de Prensa* 161 ‐ 2015 Superintendencia Nacional de Servicios de Saneamiento (SUNASS) (2020): *Memoria 2020. Superintendencia Nacional de Servicios de Saneamiento*

Superintendencia Nacional de Servicios de Saneamiento (SUNASS): Sunass: sin agua, Lima perdería 1113 millones de soles en una semana. *Plataforma digital única del Estado Peruano* 8.03.2023.https://www.gob.pe/institucion/sunass/noticias/721653-sunass-sin-agua-lima-perderia-1113-millones-de-soles-en-una-semana, accessed 18.01.2024

Swyngedouw, Erik, and Kaika, Maria and Castro, José Esteban (2002): Urban Water: A Political – Ecology Perspective. *Built Environment*, 28(02), pp. 124-137

Swyngedouw, Erik (2004): Social Power and the Urbanization of water. Flows of Power. *Oxford Geographical and Environmental Studies*, New York

Swyngedouw, Erik (2009): The Political Economy and Political Ecology of Hydro-Social Cycle. *Journal of Contemporary Water Research & Education*, 142, pp. 56-60

Transparency International (n.y): *Corruptionary*. https://www.transparency.org/en/corruption ary/integrity, accessed 03.12.2023

Transparency International (2008): *Global Corruption Report 2008. Corruption in the Water Sector.* Cambridge University Press, New York

Transparency International (2022): *Corruption Perception Index.* https://www.transparency.org/en/cpi/2022?gclid=CjwKCAiAzc2tBhA6EiwArvi6YQ3vtoUwgtUUS iLKo0tFXNAqm1lE83IMJSwUobCExXIVYJedwWSPBoCa-sQAvD_BwE&gad_source=1, accessed 15.12.2023

Truelove, Yaffa (2011): (Re)-Conceptualizing water inequality in Delhy, India through a feminist political ecology framework. *Geoforum*, 42(2), pp. 143-152

Torres Obregón, Diana Dalila (2019): *Lima: Titulación de tierras sin ciudad, del bien colectivo al privado. La organización social como promotor urbano frente al fracaso de la Política Nacional de Formalización (1996-2015).* Universidad Nacional Autónoma de México, Ciudad de México

United Nations (n.y.): Water scarcity. *United Nations* https://www.un.org/spanish/waterforlifedecade/scarcity.shtml, accessed 15.01.2024

United Nations (2010): The Right to Water. *Fact Sheet No. 35 Office of the United Nations*. High Commissioner for Human Rights, Geneva

Varela, David F., and Archimbaud, Jorge L. (2006): Derechos de propiedad y tenencia de la tierra. In: Banco Mundial (eds): *Perú: La oportunidad de un país diferente Banco Mundial, Lima,* pp.569-605

Walter, Christina and Schmidt, Matthias (2023): Political ecological perspectives on an indicator-based urban water framework. *Water International,* 48 (1), pp. 149-164

Water Integrity Network (n.y.): Online Course: Integrity in Informal Settlements: Securing the Human Right to Water and Sanitation. *Cap-Net*. https://cap-net.org/informal_settlements/?lang=es, accessed 29.11.23

Water Integrity Network (2021): *Water Integrity Global Outlook 2021: Urban Water and Sanitation*. WIN, Berlin

Water Integrity Network (2022): *Catalysing a culture of integrity: WIN Strategy 2023-2033.* WIN, Berlin

Weiss, Thomas (2000): Governance, good governance and global governance: conceptual and actual challenges. *Third World Quarterly*, 21(5), pp. 795-814

Woodman, Ronald and Takashi, Ken (2014): ¿Por qué no llueve en la costa del Perú (salvo durante el Niño? *Boletín Técnico: Generación de modelos climáticos para el pronóstico de la ocurrencia del Fenómeno del Niño. Instituto Geofísico del Perú*, 1 (6), pp. 4 – 7

Woong, Carlos, and Padilla, Fernando, and Gutiérrez Pablo (2020): Población flotante y ciudad desde una perspectiva socioespacial: revisión de estudios recientes. *Si somos americanos*, 20(1)

Yiftachel, Oren (2009): Theoretical Notes on "Gray Cities": The coming of Urban Apartheid? *Planning Theory,* 8(1), pp. 88-100

Zinnbauer, Dieter (2019): Leveraging the Role of the Urban Planning Profession for One of the Central Policy Challenges of our Times. Cities Of Integrity Working Paper, 1

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https://proyectos.inei.gob.pe/web/biblioineipub/bancopub/est/lib0002/cap01 01.htm, accessed 15.01.2024; INEI (2003): *Estado de la Población Peruana 2003. Adolescencia y Juventud*; Criqui, Lure (2020): Sociotechnical Alternatives and Controversies in Extending Water and Sanitation Networks in Lima, Peru. *Water Alternatives*, 13 (1), pp. 160-181

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own chart based on: Melo, María Florencia (2024): Los salarios mínimos en América Latina para 2024. *Statista* 03.01.2024.
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Annex 1

Interviews

Expert Interviews:

Nr.	Name	Position and Organization	Date
1	Jorman Cabello	Founder Haz tu Mundo Verde – Lomas el Mirador	15.09.2023
2	Hernán Baca	Founder Haz tu Mundo Verde – Lomas el Mirador	17.10.2023
3	Rodrigo García-Sayán	Director General Director for Spatial Planning and Integrated Management – Ministry of Environment	26.10.2023
4	Lourdes Giusti	Dean Peru´s National School of Architects	26.10.2023
5	Oscar Angulo	Professor MSc in Integrated Water Management Water Resources Management Master Pontificia Universidad Católica del Perú	27.10.2023
6	Jan Hendriks	Engineer Water Resources Consultant at HELVETAS Swiss Intercooperation	30.10.2023
7	Juan Carlos Calizaya	Architect Institute for Urban Development - CENCA	30.10.2023
8	Anonymous	SEDAPAL´s Official Compliance and Institutional Integrity Team	08.11.2023

Informal settlement residents' interview:

Nr.	Name	Position	Neighbourhood	Date
9	Jennifer	Responsible for water pumping	*Porcicultores*	14.10.2023
10	Amparo	Resident	*Porcicultores*	17.10.2023
11	Eulogia	Resident	*Porcicultores*	17.10.2023
12	María de los Ángeles	Resident	*Porcicultores*	17.10.2023
13	Edelmira	Resident	*Porcicultores*	17.10.2023
14	María	Resident	*Porcicultores*	17.10.2023
15	Manuel	Resident	*Porcicultores*	22.10.2023
16	Herlinda	Resident	San Francisco de Asis	22.10.2023
17	Justina	Resident	San Francisco de Asis	22.10.2023
18	Yeseca	Resident	SFA Extension	22.10.2023
19	Laura	Resident	SFA Extension	28.10.2023
20	Antonia	Resident	Nuevo Perú	28.10.2023
21	Dani	Community leader	*Porcicultores*	29.10.2023
22	Raúl	Community leader	*Porcicultores*	29.10.2023
23	Isidro	Community leader	*Porcicultores*	29.10.2023

Annex 2

Guide for semi-structured interviews conducted with NGO founders of *"Haz tu mundo verde"*

- How *"Haz tu mundo verde"* was founded and what activities it carries out in *Porcicultores* and the nearby settlements?
- When and how was *Porcicultores* created?
- What is the land tenure status?
- How do *Porcicultores* residents access water and sanitation?
- Whan and how was the public water tab installed? What did it generate in the community?
- When and how was sewerage installed?
- Do you know of conflicts of access to water or sanitation in *Porcicultores* ?
- Have you known of cases of water theft?
- How do you consider the relationship between residents of *Porcicultores* with each other and with the residents of nearby settlements?
- What do you think of the work of the leaders of *Porcicultores* and nearby settlements?
- What would you say is the biggest challenge of living in *Porcicultores*?

Guide for semi-structured interviews conducted with experts

- How do you perceive the performance of SEDAPAL in the city of Lima?
- What is your opinion about guaranteeing the human right to water and sanitation to residents of informal settlements who live in areas of difficult access and risk and do not have land title?
- How do you perceive the coordination between SEDAPAL and other public entities linked to the management of water and sanitation (MVCS, ANA, Municipal Ministry of Lima, etc)?
- Do you think corruption and other integrity failures can affect water and sanitation supply in Lima, particularly in informal settlements?
- What do you think of the illegal/informal connections made by the residents of informal settlements to improve/secure their access to services, particularly water and sanitation?
- In the face of challenges such as the *El Niño* phenomenon and climate change, what actions should SEDAPAL take to ensure better and fairer access to water and sanitation and services provision?
- How important do you think it is to act with integrity in the public sector, especially in SEDAPAL or entities related to water and sanitation access?

Guide for semi-structured interviews conducted with Jennifer (resident in charge of water pumping in *Porcicultores*)

- Since when have you been in charge of filling the water tanks?
- How many times a week do you do it?
- How many tanks do you fill per day/per week?

- How long does it take you?
- How much do you get paid?
- How much do residents pay for water only?
- Who is paid for the water?
- What happens if a resident does not pay on time?
- How do you keep track of who has filled your tank?
- What happens if a resident does not want you to fill their tank?
- Where is the public water tab, key, pumps, hoses?
- What is the most difficult part of doing this job?
- Have you seen the *Porcicultores* water bill?
- Have you had conflicts with residents from other settlements due to hoses and pumps being placed in their area?
- What are the main difficulties in accessing water in this way?
- How did *Porcicultores* accessed to sanitation?

Guide for semi-structured interviews conducted with residents of informal settlements

- What is your name and in which settlement do you live?
- With how much people do you leave, how many people under 18 years old?
- Since when do you live in the settlement?
- Where did you leave before moving here and why did you move here?
- Do you have access to electricity? How much do you pay per month and to whom?
- Do you have access to internet? How much do you pay per month and to whom?
- Where do you get water from and since when do you get water like this?
- How did you access water before? Would you say your access to water has improved?
- How much litres of water do you use a month?
- How much do you pay and to whom?
- Have you ever seen the communal water bill?
- Would you say that you have difficulty paying for water or that you can't afford it? Have you ever been unable to pay?
- How do you wash your clothes?
- Do you recycle water in some way?
- Do you have toilets in your home? How do you flush the toilet?
- Do you have a sewer connection and how did you get it?
- ¿ What are your main concerns about access to water and sewage?
- What would you ask SEDAPAL to do for you to have better access to water and sewage?
- Are you in the process of obtaining proof of possession or do you already have it?
- Once you have them, would you ask for a direct water and sewer connection to your house?

Guide for semi-structured interviews with *Porcicultores* leaders

- What is your name and since when are you a leader in *Porcicultores*?
- What is the biggest problem regarding access to water and sanitation in *Porcicultores?*

- How was the process of applying for the public water tab?
- How did you access sanitation?
- How much is paid for water?
- Has SEDAPAL come to the informal settlement after the installation of the public water tab? What for?
- How do you consider the relationship between residents of *Porcicultores* with each other and with the residents of nearby settlements?
- Have there been cases of water theft in *Porcicultores*?
- If you could ask SEDAPAL for anything, what would it be?