risk or displace

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Research Plan

Cover Image - Process of eviction from edge of Billings Reservoir waterbank in Grajaú district, São Paulo

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Mitigating the displacement of vulnerable São Paulo residents from areas of ecological risk without proper infrastructure

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Figure 1 - Precarious housing without sewage infrastructure in Heliópolis, São Paulo

introduction

Human survival is dependent on four fundamentally basic needs – air, food, shelter, and water. The United Nations recognizes access to water and adequate housing as human rights. Correspondingly, the UN also establishes another human right - sanitation that is hygienic, secure, and ensures dignity. However, over two billion people, that being 1 in 4, lack access to safe drinking water, and over three billion people lack access to proper sanitation.[1]

The impact of water scarcity and proper housing is disproportionate – over 30% of the global population live in informal settlements[2], where access to public infrastructure for water, sanitation, and electricity is inconsistent. As the Global South continues to rapidly urbanize to accommodate exponential population growth, dense informal settlements are often built-up before proper infrastructure can be developed. Consequently, municipal intervention for installing new infrastructure in densely urbanized areas becomes a difficult task.

Brazil, a country with more than 12% of the world's freshwater[3], continually struggles with water scarcity - over 1.5 million residents in the state of São Paulo still did not have access to publicly supplied water in 2018.[4] Moreover, the population without access to sewage collection was almost 4.5 million, and the average income of people with sanitation was almost 2.5 higher than those without.[5]

São Paulo's tremendous urban growth, which began in the 1970s and is still continuing to this day, has pushed lower-income residents to the city's outskirts, where land is more open and inexpensive compared to the city center. Peripheral land was first seen as advantageous to residents of lower-income status who were in immediate need of housing, as they had a lower likelihood of eviction living in these areas.

Families who move into informal neighborhoods which are already extensively urbanized must use what little land is left to build their own housing, typically in less-desirable locations with various levels of environmental risk. About 900,000 homes in the city of São Paulo are located in zones requiring environmental protection or ecologically fragile areas, which may be prone to landslides and flooding.[6]

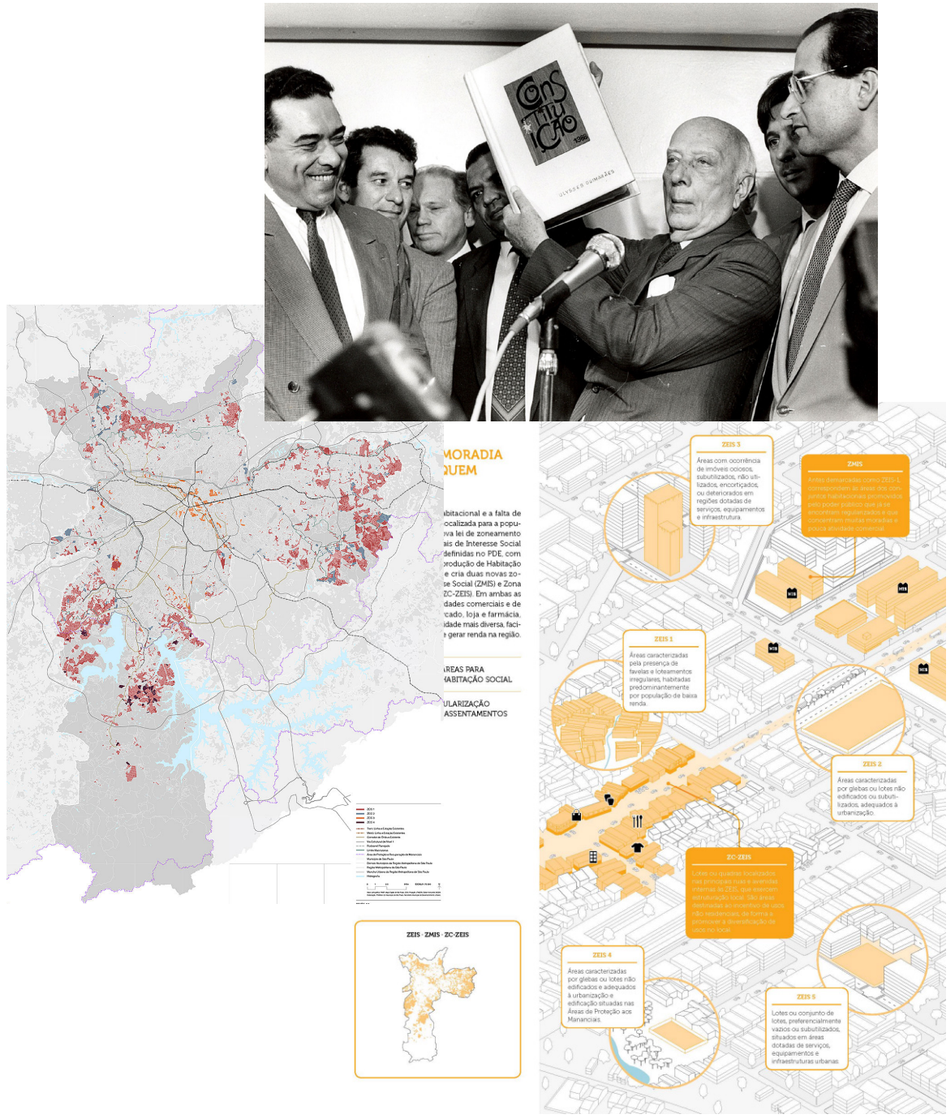


Figure 2 - Photocollage of relevant law & policy.
Ulysses Guimarães holding the Brazilian Constitution, ZEIS 4 zones map, and ZEIS policy infographic

Residents living in informal settlements are the most vulnerable to climate change since they are more dependent on local resources and cannot cope with climate extremes as easily as those with economic means.[7] Informal settlements, which tend to be built outside of legal construction and development frameworks, may not be able to withstand the effects of climate change due to poorer quality building practices in ecologically fragile areas.[8] Keeping these factors in mind, resiliency to ecological risk and climate change is a necessary consideration towards adequate housing design.

The 1988 Brazil constitution established adequate housing as a basic right alongside the right to ecologically balanced environment, in other words, the right to a healthy environment.[9] According to the São Paulo municipal government, the solution for helping those living in highly densified informal settlements in ecologically fragile areas without access to proper infrastructure requires displacing and rehousing the impacted population to safer environments. In 2002, São Paulo released a city statute with zoning plans for Zonas Especiais de Interesse Social (Special Zones of Social Interest), otherwise ZEIS, with the primary intent of increasing land used as social housing stock for low-income residents in São Paulo's periphery.

The ZEIS policy was developed with several goals - providing affordable housing, implementing urban improvements through infrastructure while preventing forced eviction, regularizing informal settlement plots, and aiding the process of environmental recovery in ecologically fragile areas.[10] ZEIS zones can be separated into two categories, the first of which aims to protect existing informal settlements, and the second of which reserves vacant or underutilised land for new affordable housing.

ZEIS 4, one of the five ZEIS types, is characterized as vacant land in environmentally protected areas. Since it is designated as land for future urbanization to rehouse those displaced from ecologically fragile areas without proper infrastructure[11], it is under the ZEIS 4 framework that resident displacement to safer environments would occur.

Figure 3 - Rooftop water cisterns in Copacabana, Rio de Janeiro

the problem

São Paulo's informal settlements were quickly built to satisfy the need for immediate housing, overlooking the necessary investments in public space and infrastructure for water and sanitation that contribute towards a healthy, adequate neighborhood. This has had a significant impact on the low-income residents living in São Paulo.

In the city's periphery, the effects of water scarcity are visible. During the droughts of 2015, peripheral São Paulo residents faced 12-hour water cut-offs.[12] While wealthier residents can purchase water from private sources, the lower-income population of São Paulo often have to turn to more self-reliant methods, such as rainwater cisterns located on roofs, to provide additional emergency water supply. Furthermore, informal settlement dwellers often rely on illegally constructed connections to city water lines to gain access to potable water and use natural water sources as a means of evacuating sewage and wastewater.[13]

These practices have consequences not only on São Paulo's natural environment, but on both upper and lower-class residents. For example, the Billings Reservoir, São Paulo's largest reservoir, supplies water to over 2.3 million people.[14] However, over one million people live along the Billings reservoir bank, and without sewage systems to service their homes, their waste often ends up in the reservoir and pollutes the city's drinking water.[15] Informal settlements along the reservoir banks are also more vulnerable to flooding.

Looking towards the future, climate change will increase these risks as well as introduce new ones. Water scarcity will be further exacerbated by the increasing frequency of droughts. Flooding, caused by heavier rainfall during wet seasons, will progressively damage existing infrastructure in informal settlements.[16]

Rapid deforestation, a result of rapid urbanisation, can also lead to land degradation and unstable soil. Landslides will therefore become more common from the combination of unstable soil and flash flooding. In highly dense informal settlements, heat island effects will be significant as temperatures continue to rise[17], since fully built-up neighborhoods leave little room for public squares, let alone green space.

Figure 4 & 5 - Demolished home of an evicted family & fencing along plots slated for eviction in Cantinho do Céu, São Paulo

This last example sheds light on some of the social impacts resulting from rapid density, alongside the health and ecological risks. The rapid urbanisation of the settlements in São Paulo's peripheries has prioritized the regularization of land plots for families to build their homes, leaving public urban space as an afterthought. Consequently, there are very little community spaces for residents to meet, gather, and play.

These descriptions of water scarcity, environmental risk, and lack of public space and infrastructure are an everyday reality for São Paulo's peripheral residents. These living conditions arguably go against the Brazilian peoples' right to adequate housing and a healthy environment. However, these two rights are at odds when the implementation of public infrastructure that is required to achieve an ecologically balanced environment can destabilize access to adequate housing.

Robert Muggah, the author of Os Deslocados: Conceptualizing Internal Displacement in Brazil, defines internal displacement as involuntary population movement resulting in coerced resettlement between or within cities, or among neighborhoods. He categorizes three forms of displacement in Brazil: violence-induced, development-induced, and disaster-induced. Infrastructure and urban-upgrades are generally the leading factors of development-induced displacement, whereas disaster-induced displacement is typically in response to climate events, such as floods and drought, and long-term land degradation.[18]

While the challenges of insufficient public infrastructure and climate change may present a clear need for development and/or disaster-induced displacement, there is significant literature on how displaced residents become vulnerable to different risks. For instance, some research discusses how pre-emptive public policy could be used to conceal slum clearance as displacement action in the name of disaster risk.[19]

Forced displacement can have a substantial social and cultural impact, since residents must leave their communities behind to new areas, potentially far away, where they are disconnected from their previous social networks. It can expose residents to "risky situations dominated by militias"[20] or financial precarity. They may need leave their original means of income-generation. Many must accept monthly subsidies for rent instead of moving directly into new social housing, placing them at risk of exploitation by landlords who know the standard rent subsidy amount.

For example, 628 families residing in Grajaú, one of São Paulo's southern districts, were evicted due to living in at-risk areas along the Billings watershed under the Cantinho do Céu urbanisation project. As of 2022, 174 families that were given rent assistance while awaiting resettlement have still not been placed into new social housing.[21] Residents staying in precarious housing anticipating displacement may also live in constant fear of eviction. All of these factors can have serious impacts on the mental well-being of displaced residents.

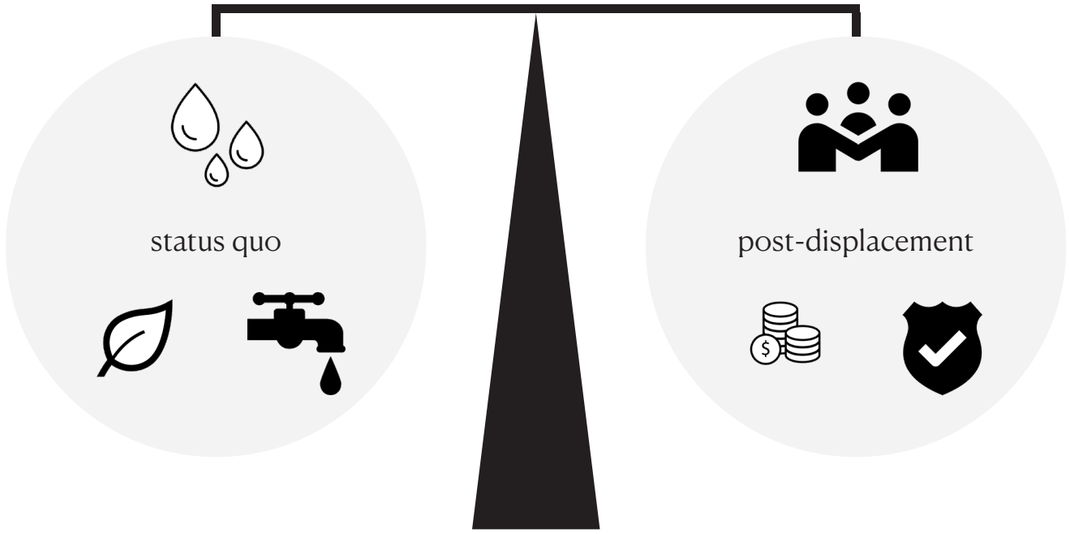


Figure 6 - Research question graphic - How to balance risk?

the question

Future housing design in these communities must therefore negotiate the need for environmental protection with the right to adequate housing. This complex problem thus requires a multi-faceted approach that prioritizes the well-being of residents who face the risk of displacement, while also embracing climate resilience. This begs the question, **how can design mitigate the impact of displacement on São Paulo residents that live without proper access to public infrastructure in ecologically fragile areas?**

This research question can be broken down to address the aforementioned problems and their effects on the residents of São Paulo. **What is the extent of the impact on São Paulo's informal neighborhood residents, regarding environmental and climate risks, water scarcity, and lack of public infrastructure?**

The practice of development-induced displacement, over time and after its implementation, should also be understood. **What are examples of safe and ethical processes to displace and rehouse at-risk residents of São Paulo?**

The process of displacement typically requires urban transformation to rehouse the displaced, disrupting the socio-spatial landscapes of informal settlements.[22] These transformations alter the urban practices of the residents, and may disintegrate the social cohesion of informal neighborhoods. Therefore, housing alone does not address the risks of displacement. **How can an integrated approach to housing and urban public space connect displaced residents to their new place of settlement, socially, culturally, and ecologically?**

While displacing São Paulo residents from ecologically fragile areas removes them from immediate environmental risk, the long-term effects of climate change will impact São Paulo residents from all social classes. Future urbanization must take climate change consequences into account. **How can urban spaces within informal neighborhoods promote climate resilience?**

framework

The existing literature for this research is segregated into four main topics: the impacts of water scarcity and public infrastructure across the globe, climate resilience in informal settlements, the effects of development- and disaster-induced displacement on vulnerable populations and case studies of rehousing and urbanisation projects in informal neighborhoods.

water and sanitation infrastructure

Literature surrounding water and sanitation infrastructure should address the impact of water scarcity, what is required to provide proper public infrastructure, and what factors may be limiting its installation in informal settlements. Sally, Wabby & Ferrara, for example, discuss how self-construction adapts to water scarcity using informal water infrastructure and illegal connections to formal water lines.

Figure 7 - Cantinho do Céu Urbanisation

climate resilience

The present and future climate risks in São Paulo and which methods are required to mitigate them should be analysed to understand how to build climate resilient neighborhoods. Through a global lens, the work of Satterthwaite et al. outline generalized climate risks on low-income populations and address different government- and community-led measures to build climate resilience. More pointedly, Andrea Young's research analyzes urban growth projections in São Paulo alongside flooding and landslide probabilities to identify environmental areas at risk.

Figure 8 - Chácara do Conde Social Housing

development- and disaster-induced displacement

The relevant literature should discuss the risks of displacement and its subsequent impact on residents and urban space, as well as how public policy influences displacement processes. The literature on displacement is most pertinent to the research questions as they can unpack the challenges that infrastructure and climate resilience strategies bring in relation to displacement processes in informal settlements. Walker and Alarcón examine legal structures, such as ZEIS 4 and Programa Mananciais, alongside the threat of displacement on the process of urban occupation.

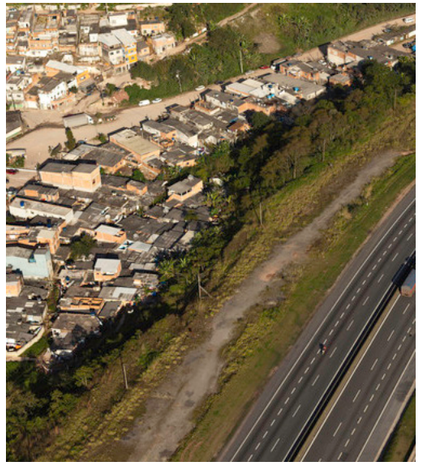


Figure 9 - Areião Complex Urbanisation

rehousing and displacement urbanisation case studies

The case studies should present pre- and post-displacement design strategies at various stages. For example, looking at the urban rehabilitation of ecologically fragile areas (Cantinho do Céu Urbanisation), social housing projects for resettlement (Chácara do Conde Social Housing) and urban transformations that couple public space with housing (Areião Complex Urbanisation). Boldarini's work in Cantinho do Céu, in particular, consolidates the irregular occupation process with the qualification of urban space, while promoting environmental recovery. Boldarini achieves this by transforming the Billings waterbank into a linear park and installing micro-interventions to upgrade Cantinho do Céu's public infrastructure.

framework diagram

The intent of this research is to address these four issues through an integrated approach, in order to respond to the complex problem. While some preliminary references are categorized by strongest relevancy, the references are interrelated across the four topics.

1 Cawood, Sally, Noura Wahby, and Luciana Nicolau Ferrara. "Hybridity in Practice: Responding to Water Insecurity in São Paulo, Dhaka, and Cairo," 2022.

2 Secretaria Municipal de Habitação. "Programa Mananciais." Prefeitura da Cidade de São Paulo, 2022.

3 Singha, Sumita. Architecture for Rapid Change and Scarce Resources, 2012.

4 "Addressing Displacement and Migration Related to Disasters, Climate Change and Environmental Degradation." European Commission, 2022.

5 Burgess, Rod, Marisa Carmona, and Th (Theo) Kolstee. The Challenge of Sustainable Cities: Neoliberalism and Urban Strategies in Developing Countries, 1997.

6 Campello Torres, Pedro Henrique, Demerval Aparecido Gonçalves, Flávia Mendes de Almeida Collaço, Kauê Lopes dos Santos, Katia Canil, Wilson Cabral de Sousa Júnior, and Pedro Roberto Jacobi. "Vulnerability of the São Paulo Macro Metropolis to Droughts and Natural Disasters: Local to Regional Climate Risk Assessments and Policy Responses," 2021.

7 Satterthwaite, David, Diane Archer, Sarah Colenbrander, David Dodman, Jorgelina Hardoy, Diana Mitlin, and Sheela Patel. "Building Resilience to Climate Change in Informal Settlements," 2020.

8 Soares, Mariana Corrêa. "Parques lineares em São Paulo: uma rede de rios e áreas verdes que conecta lugares e pessoas." Universidade de São Paulo, 2014.

9 Young, Andrea. "Urban Expansion and Environmental Risk in the São Paulo Metropolitan Area," 2013.

10 Barbosa, Luciana Mendes, and Robert Coates. "Resisting Disaster Chronopolitics: Favelas and Forced Displacement in Rio de Janeiro, Brazil," 2021.

11 Millington, Nate. "Linear Parks and the Political Ecologies of Permeability: Environmental Displacement in São Paulo, Brazil," 2018.

12 Muggah, Robert. "Os Deslocados: Conceptualizing Internal Displacement in Brazil," 2014.

13 Pimentel Walker, Ana Paula, and María Arquero de Alarcón. "The Competing Social and Environmental Functions of Private Urban Land: The Case of an Informal Land Occupation in São Paulo's South Periphery," 2018.

14 Robinson, W Courtland. "Risks and Rights: The Causes, Consequences, and Challenges of Development-Induced Displacement"

15 "ZEIS Maps: Comparing Areas to Be Earmarked Exclusively for Social Housing in São Paulo City." Land Use Policy, 2016.

It is important to note that while the interest of this research is strongly aligned with Boldarini's work, the theoretical framework of the project aims to go beyond a singular lens approach – in other words, only looking at one stage of post-displacement design. The research framework and methodology aim to bring together all literature and case study strategies to produce a comprehensive design that addresses all stages of the displacement process.

16 Areião Complex Urbanisation, Boldarini Arquitetos Associados, 2011-2014.

17 Cantinho do Céu Complex Urbanisation, Boldarini Arquitetos Associados, 2009-2012.

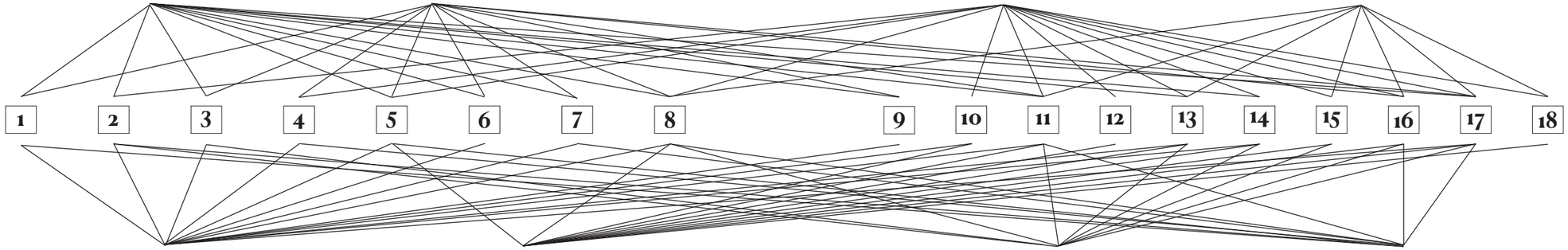
18 Chácara Do Conde Social Housing, JAA Arquitetura, 2009-2018.

water and sanitation infrastructure

climate resilience

development- and disaster-induced displacement

rehousing and displacement urbanisation case studies



What is the extent of the impact on São Paulo's informal neighborhood residents, regarding environmental and climate risks, water scarcity, and lack of public infrastructure?

What are examples of safe and ethical processes to displace and rehouse at-risk residents of São Paulo?

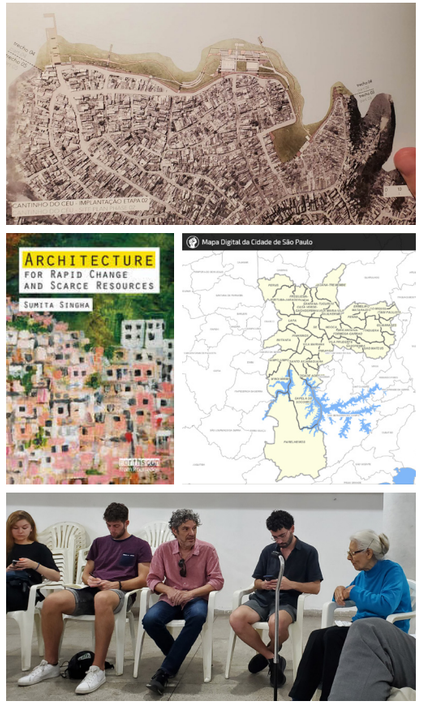
How can an integrated approach to housing and urban public space connect displaced residents to their new place of settlement, socially, culturally, and ecologically?

How can urban spaces within informal neighborhoods promote climate resilience?

Figure 10 - Theoretical Framework Diagram - Relationships between literature and research topics/sub-questions

methodology

The overarching research method for the project will be research-by-design. Building on the concepts outlined in the theoretical framework, the main methodologies will be pursued in combination with visualization methods such as modelling, photography, mapping, and drawing. The research is thus separated into four methods: literature review, case study analysis, mapping, and field research.



literature review

Closely aligned with the theoretical framework, an existing literature review will provide insight on the current academic discussions on the four topics, both on a global scale and in the local context of São Paulo. Furthermore, it will be pertinent to research the "hidden designers" that have an impact on the topic categories, such as laws and regulations that outline public policy.

The lens through which the literature review will be conducted is particularly important, given the influence of Western values on evaluating the success of existing research, case studies, or policies. For example, the sub-question, what are examples of safe and ethical processes to displace and rehouse at-risk residents of São Paulo, requires a reflection of what is considered safe and ethical, in the context of São Paulo. The safety of an environment based on present infrastructure, the determination of ecological risk, or the ethics of different development-induced displacement methods are all subjects which have variable perspectives depending on the context or agents involved.

case study analysis

The case study analysis will be used to examine precedents that have dealt with the lack of public space and infrastructure or various stages of the displacement process. The analysis will use a correlational approach by juxtaposing different displacement projects, such as urban revitalization or rehousing. Relating or contrasting these case studies may reveal how these projects have tackled the challenges of displacement and resettlement, and their resulting impact on residents.

However, the analysis of different case studies calls into question their perceived success. This is further emphasized through the comparative analysis between case studies. Due to the complexity of the problem and the scope of the research, this method uses a top-down approach. This presents an inherent bias since these research methods are carried out externally to the context of São Paulo, without directly involving the residents that would be impacted by this research.

mapping

The mapping research method will support the research-by-design through a contextual analysis of the project site. Using Google Earth historical imagery and GeoSampa (an official map application by the municipality of São Paulo) will help identify its ecological advantages and risks by visualizing site transformations. Mapping will also show the urban activities and relationships present on the site and its surroundings.

field research

The final method, field research, is arguably the most important to the project. This ethnographical approach provides an entirely new experience of São Paulo that cannot be found through literature review or case study documentation alone. The field research provides the basis for a first-hand analysis of the socio-spatial factors that influence the urbanisation of informal settlements.

The field research includes

- interviews with residents and city employees
- morphological analysis through photography, film and audio
- note-taking on urban atmosphere and sensory experiences
- case study site visits

Figure 11 - Methodologies collage

Figure 12 - City Panorama from Paraíso, São Paulo

relevance

Everyone deserves access to clean water, accessible sanitation, and affordable housing in a safe, healthy living environment. Nevertheless, the endeavor to provide these services to people across the globe will continue to be a challenge. Urbanisation in the Global South is not slowing down. It is estimated that in 2030, 2 billion people will be living in informal settlements and will ramp up to 3 billion by the year 2050.[23] These projections don't account for the significant repercussions of climate change which will disproportionately affect populations living in tropical and sub-tropical climates.

In order to cope with this intense growth, global action that tackles the issues of infrastructure, climate change, affordable housing, and public space will be critical. The purpose of this research is to propose a sustainable strategy that addresses this problem from various lenses and could be applicable to both the context of São Paulo and globally.

There are extensive literary references that discuss these subjects, and many case studies that focus their design solutions on particular issues, but few references from Brazil engage in the discussion using integrated design approaches or propose how to target all topics. For instance, Chácara do Conde addresses the process of resettlement without a cohesive urban strategy, and Cantinho do Céu is an urban revitalisation without an integrated rehousing proposal.

Therefore, it is valuable for this research to contribute to the discussion by presenting an interdisciplinary approach, across ecology, urban planning, and architectural design. Going beyond the present literature, this research will consider the social practices of residents building their homes without proper infrastructure or in ecologically fragile areas, before and after displacement.

Ultimately, this thesis will use architecture and urban design research to address the difficult challenges associated with climate and social resilience, through the lens of the socio-spatial relationship between people and environment.

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notes images

Cover Image - Process of eviction from edge of Billings Resevoir waterbank in Grajaú district, São Paulo.
Photograph by Geneviève Shymanski

Figure 1 - Precarious housing without sewage infrastructure in Heliópolis, São Paulo
Photograph by Geneviève Shymanski

Figure 2 - Photocollage of relevant law & policy.
Ulysses Guimarães holding the Brazilian Constitution
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Figure 3 - Rooftop water cisterns in Copacabana, Rio de Janeiro.
Photograph by Huub Fenten

Figure 4 - Demolished home of evicted family in Cantinho do Céu, São Paulo
Photograph by Geneviève Shymanski

Figure 5 - Fencing along plots slated for eviction in Cantinho do Céu, São Paulo
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Figure 6 - Research question graphic - How to balance risk?
Diagram by Geneviève Shymanski

Figure 7 - Cantinho do Céu Urbanisation
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Figure 8 - Chácara do Conde Social Housing
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Figure 9 - Areião Complex Urbanisation
Lara, Fernando Luiz. Boldarini Arquitetos Associados. Sao Paulo: Nhamerica, 2019.

Figure 10 - Theoretical Framework Diagram - Relationships between literature and research topics/sub-questions
Diagram by Geneviève Shymanski

Figure 11 - Methodologies collage
Cantinho do Céu Site Plan
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Group interview with Conjunto Casarão Celso Garcia community leader
Photograph by Geneviève Shymanski

Figure 12 - City Panorama from Paraíso, São Paulo
Photograph by Geneviève Shymanski