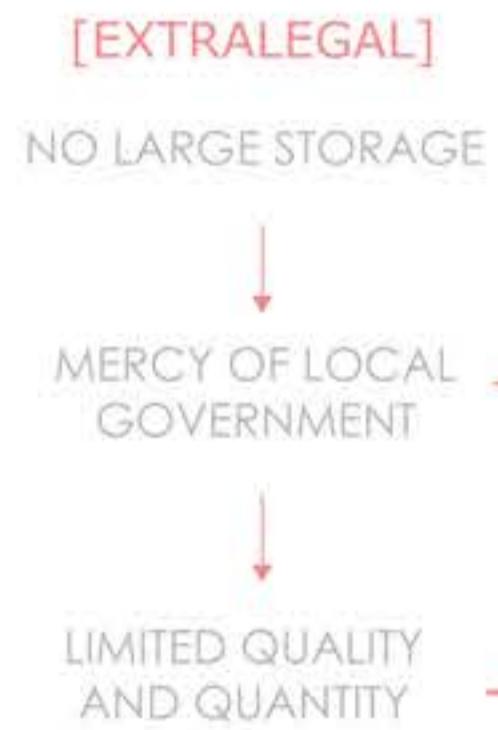


[HOW LEGAL GET WATER VS EXTRALEGAL]



[SOURCE]



Ability to store vast quantities of water in overhead tanks to which the water is pumped up by electrical pumps. Thus, they receive a 24-hour supply of water regardless of the time the municipal corporation releases water. Poor communities are completely at the mercy of the local government in terms of both the quantity of water supplied, the quality, and the time it is released.

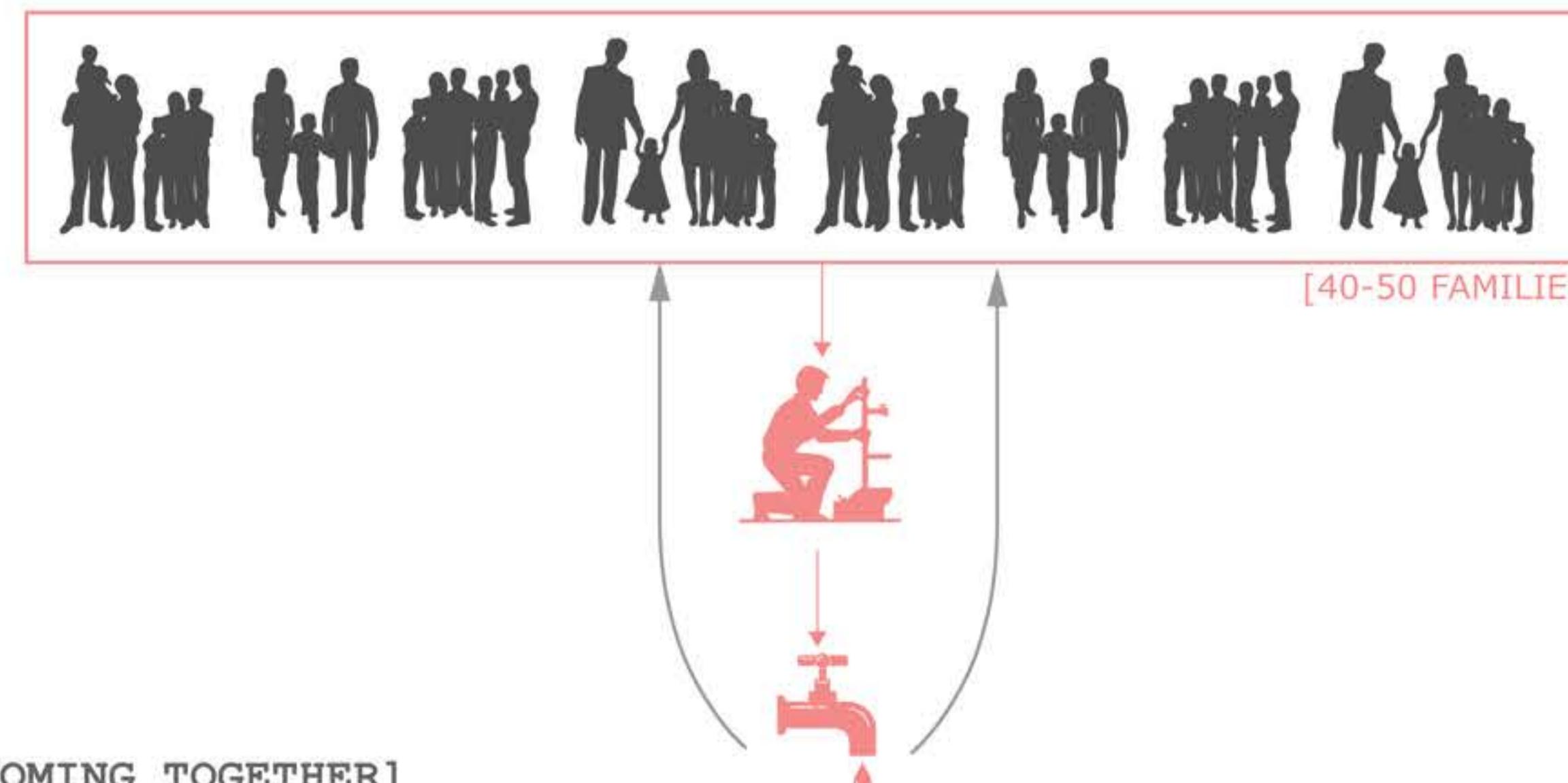


[TRUCK TANKS]

[THE FIRE HYDRANT SHANTY]

Some of them collect water from fire hydrants. If a hut is built near a fire hydrant, the resident of that hut manages to control the water from the hydrant. We pay Rs 30 per month for two handis per day per person. We stand in line from 3 a.m. in the morning often up to 7 a.m."

[INSTANCE 1] COST: RS 30 PER MONTH TIME: 3AM-7AM AMOUNT: 2 Liters PER DAY PER PERSON



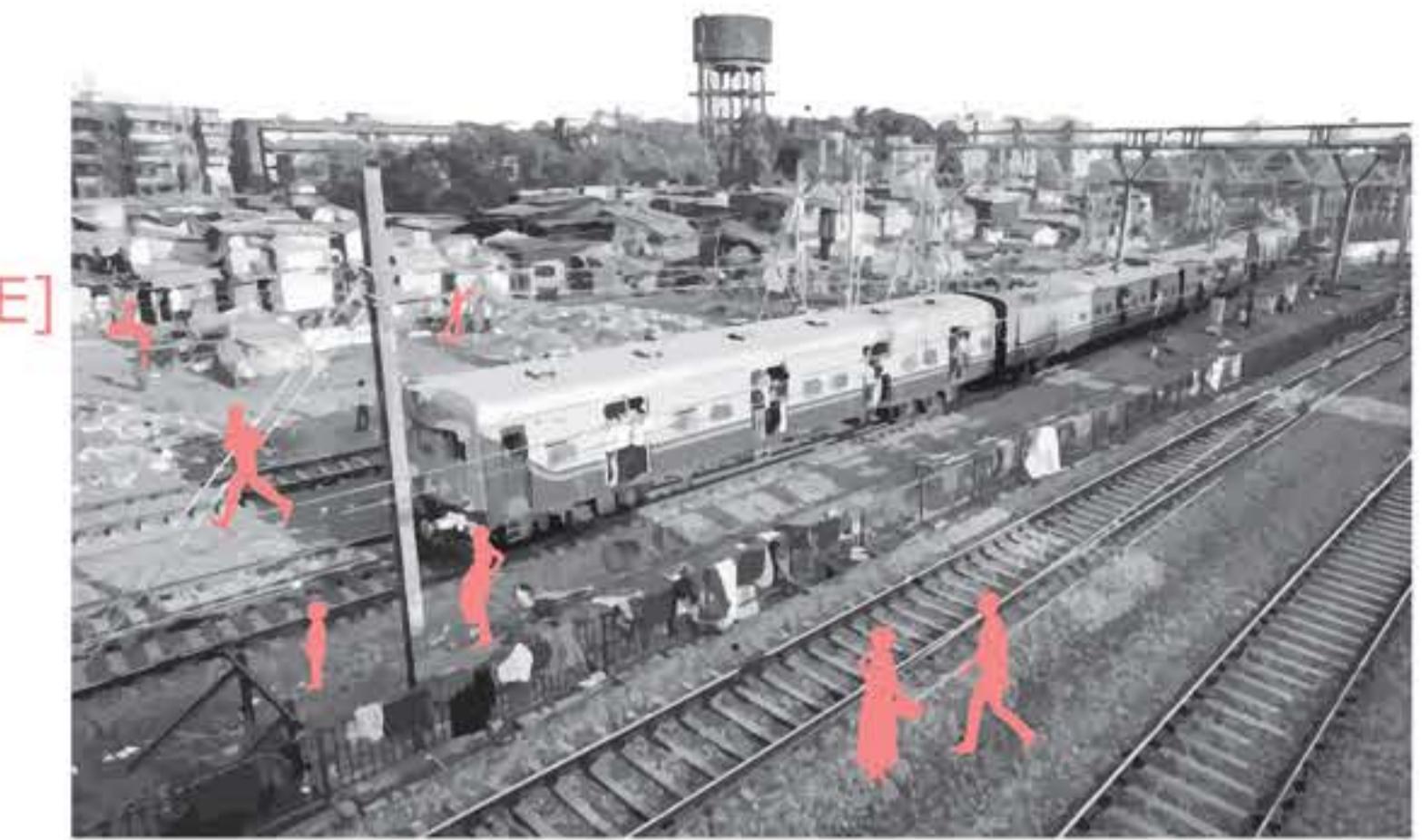
[COMING TOGETHER]

Around 40 or 50 families have struck a private deal with a local plumber. They have paid between Rs 700 to 1000 to access a water connection in the slum. Here water comes, at different locations, for a few hours every day. Some of the women say that they are able to fill six to eight handis a day from this source. The women say that they must get 10 to 15 handis a day. They do not mind if 15 families get together and are provided one water connection. At present, MP Nagar families spend up to Rs 60 a month on buying water.

[INSTANCE 3] COST: RS 700-1000 + RS 60 PER MONTH TIME: FEW HOURS A DAY AMOUNT: 6-8 Liters

[TRAVEL] → [SOURCE] → [COLLECT] → [TRAVEL] → [STORE]

[SOURCE]



[NEW RAILWAY] → [CUTS VEHICULAR] → [LONG DISTANCE]

[INFRASTRUCTURAL BLOCKAGE]

The new railway line has cut them off from the main road. There is no vehicular approach to the slum now. To go anywhere, they must cross two railway tracks and watch out for fast trains that suddenly appear on the horizon without a warning. Their closest water source is 150 metres away. To access it, they have to cross these tracks.

[INSTANCE 2] COST: N/A TRAVEL: 150 m TIME: 15-20 MIN AMOUNT: 2 Liters PER DAY



[GUTTER WATER]

Taps are attached to pipes which run adjacent to the gutter. To collect water from these floor level taps, the women must either carry a plastic pipe with them to attach to the tap or a mug in which they fill the water before pouring it into their handis. It is a long and tedious task. Given the weight of the handis and the distance they must walk, they can fill at most one or two handis a day. Each trip takes them at least 15 to 20 minutes.

[INSTANCE 4] COST: N/A TRAVEL: 150 m TIME: 15-20 MIN AMOUNT: 2 Liters PER DAY

[POINT OF SUPPLY]

GOVERNMENT LED

GOVERNMENT LED

COMMUNITY LED

[POINT OF USE]

NATURAL RESOURCE

75-100 kms

OUTSIDE SOURCE

75-100 kms

OUTSIDE SOURCE



SHOULD VS IS

MUMBAI RESERVOIRS



Over 50,000 people should be receiving 125-200 liters per day (lpd)

95% use less than the 50 liters per capita per day.

TRANSPORTATION



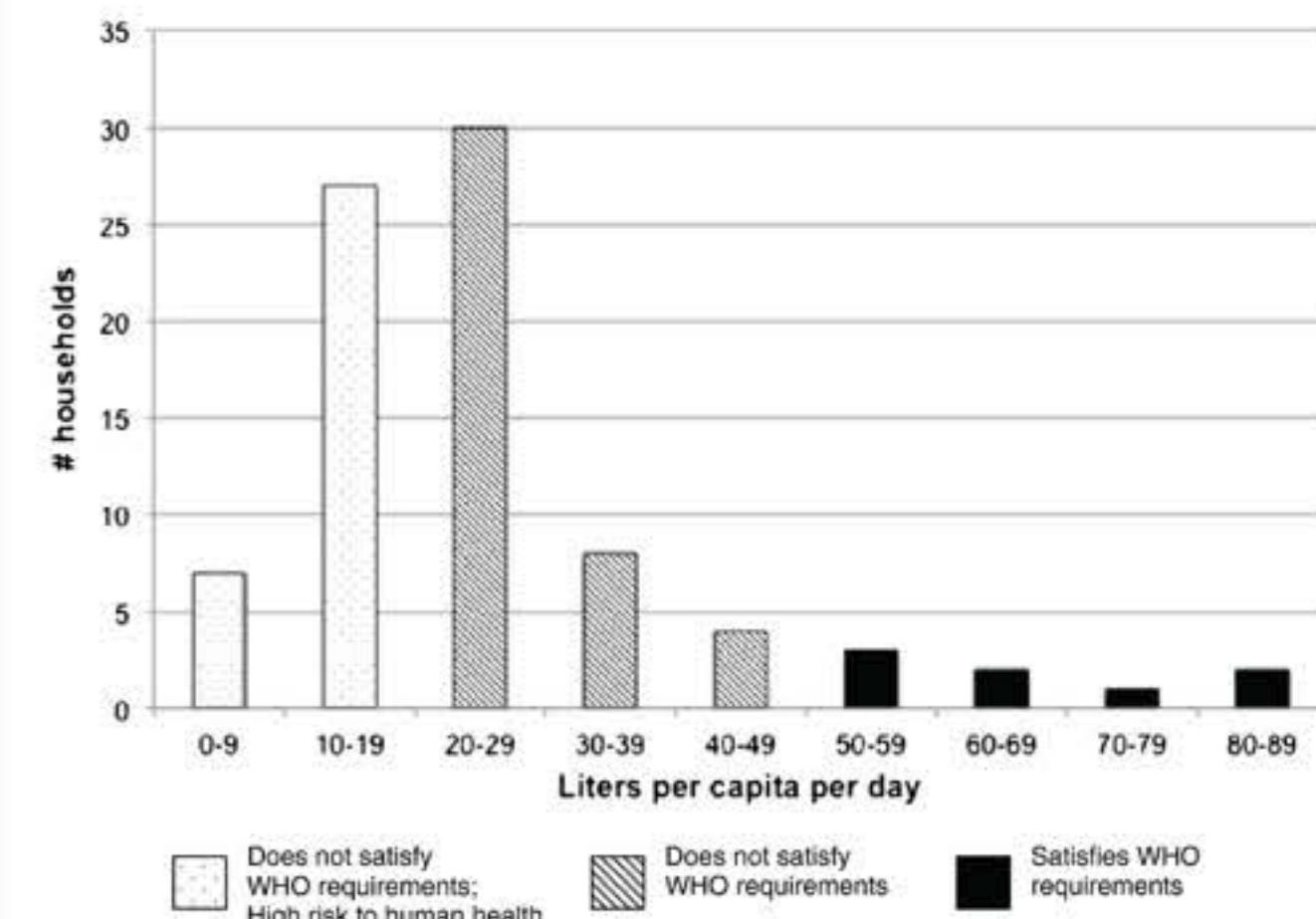
WATER TRUCK TANKS

RETRIEVAL

COLLECTION

FINAL DESTINATION

EXTRA-LEGAL



BIGGER PIPES

POINTS OF COLLECTION

SMALLER PIPES

REFER TO PAGE [7]

FIRE HYDRANT

INFRASTRUCTURAL BLOCKAGE

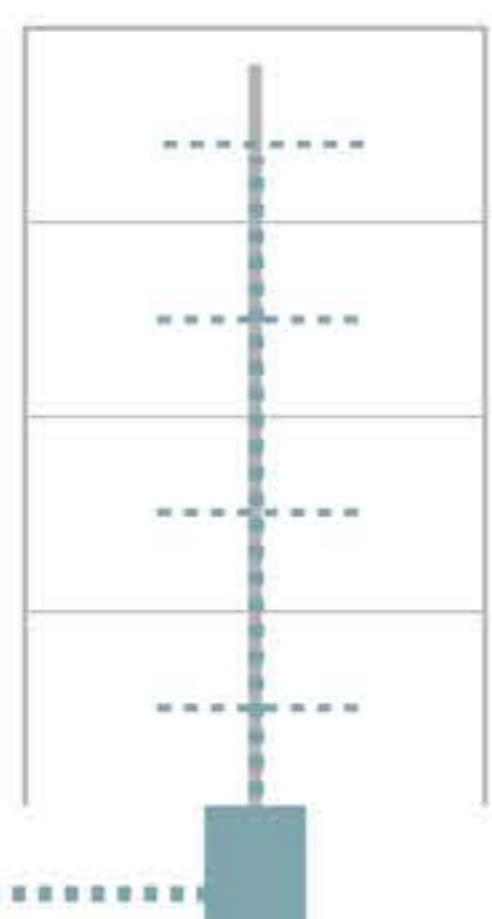
GUTTER WATER

"Extra-legal pay more for water for lesser amount and reliability."

5.9% to 15.9% of their monthly household income

150 to 400 rupees per month

[EXTRA STEPS FOR EXTRA-LEGAL]
REFER TO PAGE [] POINT OF ELIMINATION FOR DESIGN PROPOSAL



[I CLAIM] that there is a fundamental inequality in the right to water towards extra-legal communities.

An area where people get water through community distributed receivers less water than one where households have individual metered connections at the quantity of water released to publicly depends on the number of connections. Also, as mentioned earlier, these are different norms for metered connections in terms of the quantity of water supplied, and for transportation. What this means is that if you receive less water, even if the number of people living there are greater, because their housing conditions do not allow individual connections in their homes. On the other hand, the better off, living in high rise buildings, who by virtue of their better economic status can afford individual connections in their homes, get a better supply of water. The latter also have the

[I CLAIM] that extra-legal communities can create a completely new set of water infrastructure possibly lower than the total combined costs that they are currently paying towards government based sources,

Residents spend an excess amount of INR 13,097,458 (USD 237,754.00) yearly on water in the current informal system. We compared this excess amount to the cost of placing comprehensive water infrastructure in K8 (in the form of a new pipeline with community taps), which is INR 2,000,000, or approximately USD 45,455.00 (personal communication from Ward Corporation Mumbai (Bansod)). Based on this figure, the excess amount spent on water under the informal system could pay for entirely new water infrastructure in K8 more than five times.

The BMC provided additional data on water related households. In the BMC, 952 households (99.2%) report having a regular supply of water regardless of the time the municipal corporation releases water. This suggests that residents spend an excess amount of INR 13,097,458 (USD 237,754.00) yearly on water in the current informal system. We compared this excess amount to the cost of placing comprehensive water infrastructure in K8 (in the form of a new pipeline with community taps), which is INR 2,000,000, or approximately USD 45,455.00 (personal communication from Ward Corporation Mumbai (Bansod)). Based on this figure, the excess amount spent on water under the informal system could pay for entirely new water infrastructure in K8 more than five times every year.

[I CLAIM] that extra-legal residents are spending exponential amounts compared to legal counterparts with unreliable sources.

A 2010 PUNEKAR census of K8 found a population of approximately 10,000 people and an average household size of 4.8 people. Using these figures, we calculated the approximate yearly amount spent on water by the entire community to be INR 13,489,083 (USD 245,425.00). We compared this cost to an ideal scenario in which all 10,000 residents receive the WHO-recommended minimum of 50 liters per capita per day (lpcd) of water for every day of the year at the standard government charge of INR 2.25 (USD 0.04) per 1000 liters, in such an ideal scenario, the entire community would spend INR 410,623 (USD 7,486.00) on water yearly.

This suggests that residents spend an excess amount of INR 13,097,458 (USD 237,754.00) yearly on water in the current informal system. We compared this excess amount to the cost of placing comprehensive water infrastructure in K8 (in the form of a new pipeline with community taps), which is INR 2,000,000, or approximately USD 45,455.00 (personal communication from Ward Corporation Mumbai (Bansod)). Based on this figure, the excess amount spent on water under the informal system could pay for entirely new water infrastructure in K8 more than five times every year.

75-100 kms

OUTSIDE SOURCE

MUMBAI RESERVOIRS

"They receive a 24-hour supply of water regardless of the time the municipal corporation releases water. On the other hand, poor communities are completely at the mercy of the local government in terms of both the quantity of water supplied, the quality, and the time it is released."

POINT OF USE CONTAMINATION

52.4% COLIFORM BACTERIA

42.9% E.COLI

POINT OF SOURCE CONTAMINATION

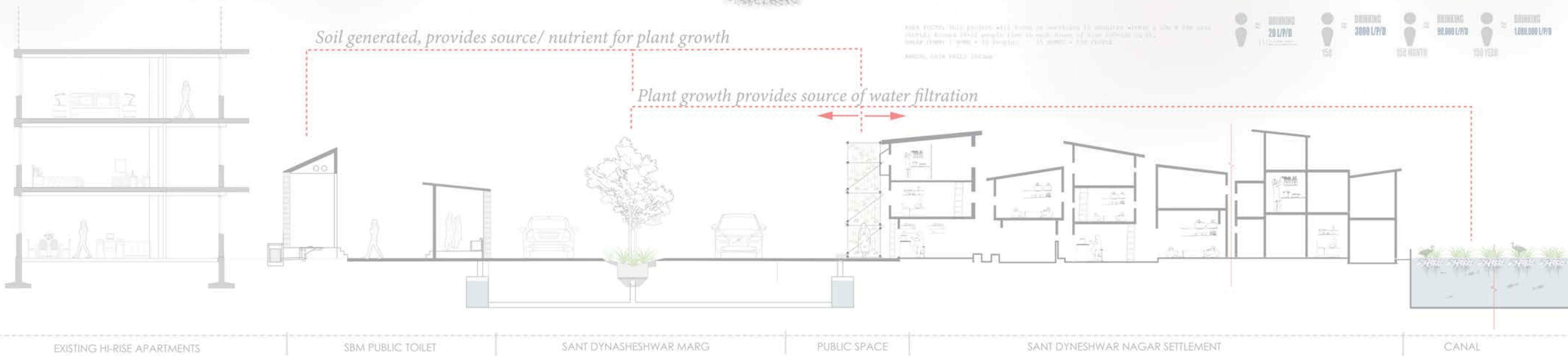
| Study period | Coliform | | E. coli | | p-value | |
|---------------|------------|-------------------------|---------|------------|-------------------------|-------|
| | Odds ratio | 95% Confidence interval | p-value | Odds ratio | 95% Confidence interval | |
| Winter | 1.0 | — | — | 1.0 | — | — |
| Summer | 4.3 | 2.1 - 16.1 | 0.002 | 11.0 | 3.7 - 111.4 | 0.001 |
| Monsoon | 10.2 | 2.5 - 42.4 | 0.001 | 6.1 | 0.7 - 56.0 | 0.016 |
| Spring/Julian | 1.8 | 0.2 - 4.1 | 0.000 | 6.3 | 0.7 - 56.0 | 0.016 |

[I CLAIM] that the core of the issue of contamination begins through storage practices. Creating a reliable and affordable storage system for water can elevate the health of extra-legal.

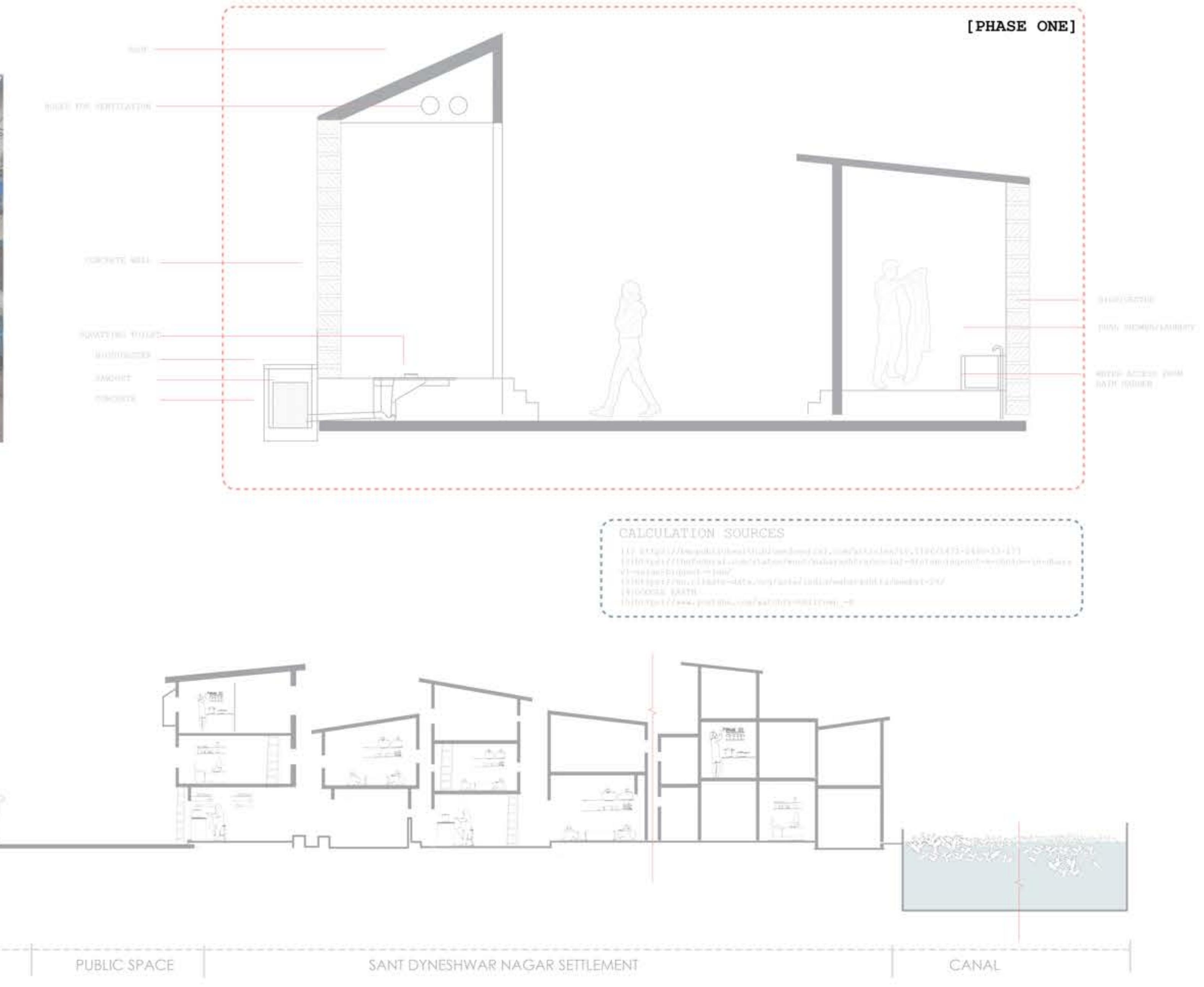
During winter and summer, there was no coliform or E. coli contamination of any at the point-of-source samples from the two comparison groups, Chawla Powai-Sarvodaya Housing and Dharami (a non-slum with regular water access). In winter and summer, none of the water samples collected from K8's household pumps (which represent the point-of-source) or from K8's houses (which represent the distribution network) showed any evidence of contamination with coliforms or E. coli. Despite the absence of bacterial contamination of water at the point-of-source in the distribution network of households in K8, there was significant contamination of drinking water and storage water at the household level (i.e., the point of use). For example, during the winter, 52.4% of drinking water samples were contaminated with coliform bacteria, and 42.9% were contaminated with E. coli. We suggest that off-bacterial contamination of water during the winter and summer was happening at the household-level (i.e., the point-of-use) and not at point-of-source or in the distribution nodes.

Subbaraman, Ramnath, Shruti Shitole, Tejal Shitole, Kiran Sawant, Jennifer O'Brien, David E Bloom, and Anita Patil-Deshmukh. "The Social Ecology of Water in a Mumbai Slum: Failures in Water Quality, Quantity, and Reliability." BMC Public Health 13, no. 1 (February 26, 2013). <https://doi.org/10.1186/1471-2458-13-173>.

Sharma, Kalpana. "Waiting for Water The Experience of Poor Communities in Bombay." SPARC. Accessed February 8, 2022. https://www.ucl.ac.uk/dpu-projects/drivers_urb_change/urb_infrastructure/pdf_public_private_services/W_SPARC_Kalpana_waiting_water.pdf



[RE-THINKING THE TOILET]



[YEAR 0]

FUNDED
GOVERNMENT

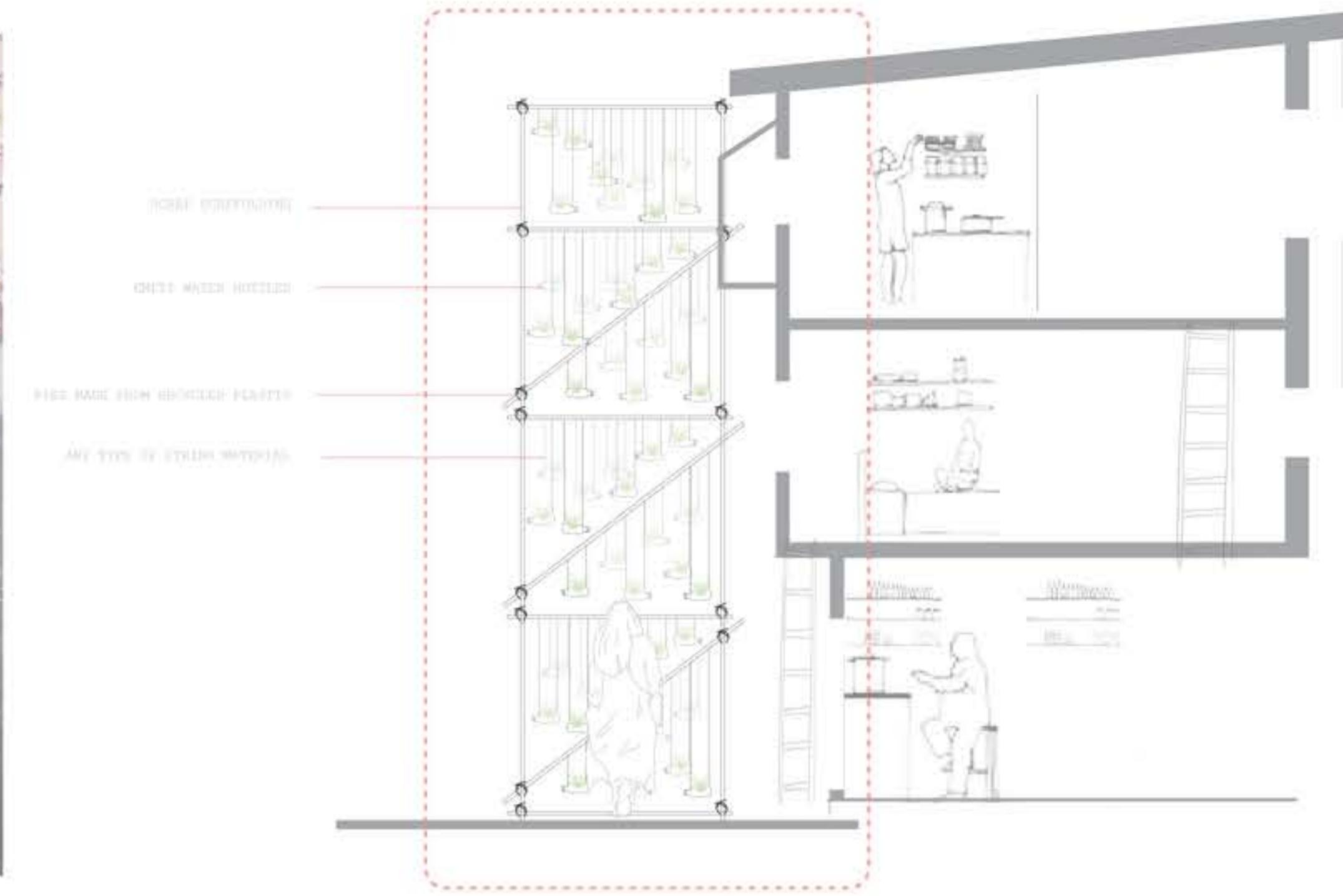
DESIGNED
PROFESIONAL

[YEAR 5]

MAINTAINED
COMMUNITY

[RE-THINKING THE STREET EDGE]

[PHASE TWO]



CALCULATION SOURCES

(1) <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2608440/>
 (2) <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2608440/>
 (3) <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2608440/>
 (4) <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2608440/>



A. Lemon Grass (Cymbopogon)



B. Song of India (Dracaena reflexa)

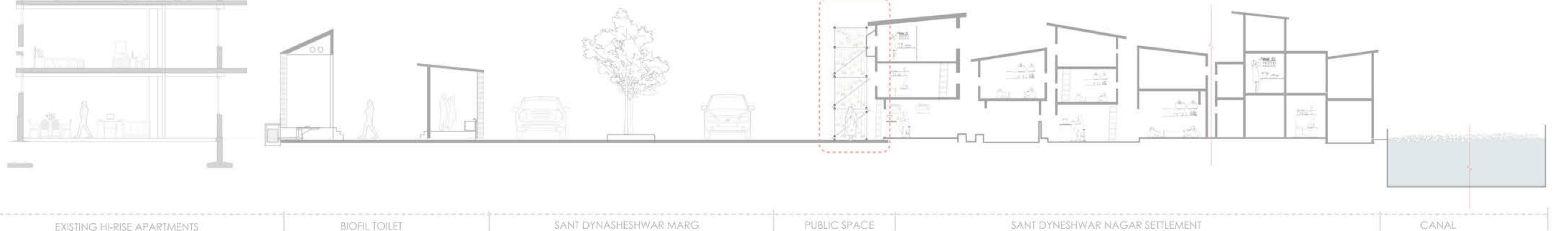


C. Elephant Ear (Alocasia sanderiana)



D. Philodendron scandens

SYSTEM PERFORMANCE & RELATED STRUCTURE
 FROM: ARCHITECT
 DESIGN BY: COMMUNITY
 MATERIALS: KALZITE, SCRAPWOOD, PLASTIC BOTTLES, TIES, ROPE, PLATE 1x1, LIME SLATE, PLASTER
 COST TO BUILD: 10000/-
 COST TO MAINTAIN: 1000/-
 POWER: 0.5kW/1A
 MAINTENANCE: Once. Increases monthly additional present by government.
 RATIO: USED: 1x1 = 1L of Fresh water.



EXISTING HI-RISE APARTMENTS

BIOFIL TOILET

SANT DYNASHWAR MARG

PUBLIC SPACE

SANT DYNESHWAR NAGAR SETTLEMENT

CANAL

[YEAR 5]

[YEAR 0]

FUNDED

COMMUNITY

DESIGNED

COMMUNITY

MAINTAINED

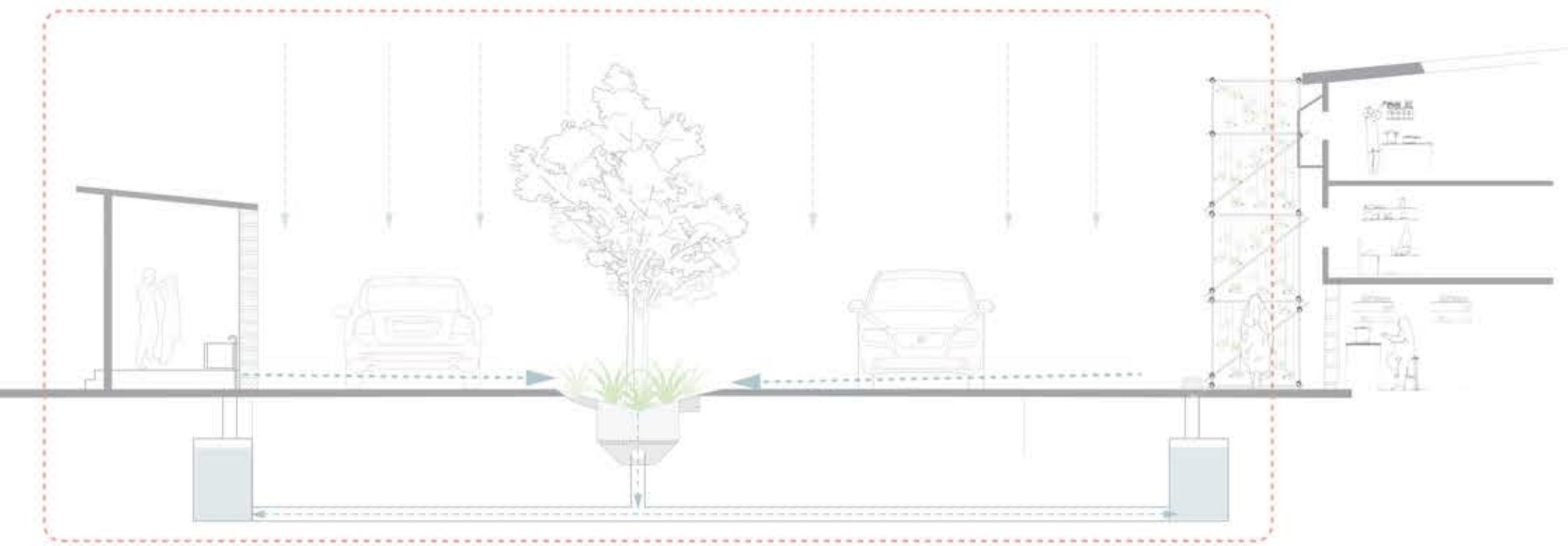
COMMUNITY

Through the process of the digester, within 2-3 years, rich soil will be available to the community. This soil will be utilized in the next phase of intervention. This soil will be used to plant specific species which will be used for future irrigation and water collection methods. This intervention takes place alongside the road consisting mostly of businesses on the ground floor and the beginning of the residential mammoth of the extra-legal settlements. This street edge is currently used for parking and the width of this space currently lies at approximately 5 meters. Using ample empty water bottles within the area that will be the container for plant species like A. Lemon Grass (Cymbopogon) main plant, Song of India (Dracaena reflexa) D. Elephant Ear (Alocasia sanderiana) all of which have biofiltrative properties. These will be hung through any form of ties onto scaffolding that is local and readily available in the area. These scaffolding will act as an open enclosure creating new urban space that gives back to the community and is integrated within a closed loop system. These garden structures will be managed by business owners and for additional support and encouragement of upkeep, the business will get monthly income from the government. This structure will not only beautify the street but invite more business to the area, on top of purifying the air, all in all, revitalizing intervently for a healthy interlinkage for extra-legal settlers. This intervention is to be led and initiated primarily by the community without government or design professional aid.



[RE-THINKING THE STREET CENTER]

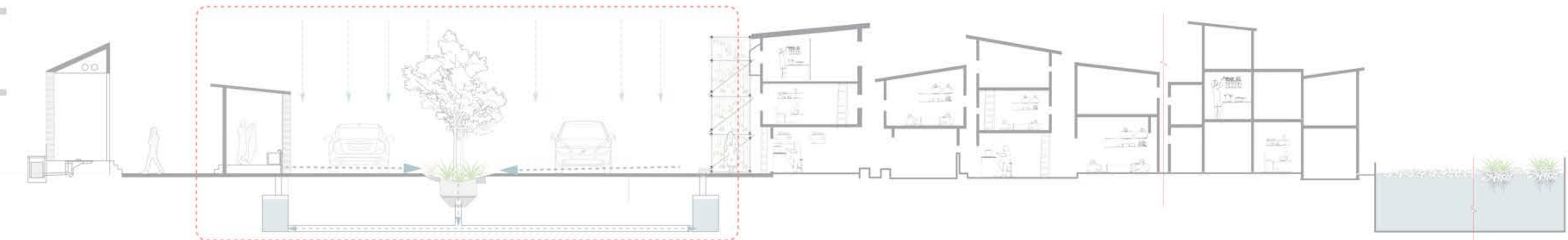
[PHASE THREE]



SYSTEM TYPE: RAIN GARDEN
LOCATION: MUMBAI
WATER USE: COMMERCIAL AND RESIDENTIAL
CAPACITY: 200 L/H
WATER TO DRINK: <200,000 L/H
WATER REQUIREMENT:
 COMMERCIAL: 100% REUSED
 RESIDENTIAL: 100% REUSED
 WATER SOURCE: ROOF
 WATER COLLECTED ANNUALLY: >100,000 L
 INTERNAL SURFACE AREA: 100% + CONCRETE SURFACE: 100% + DENSELY PLANTED (OTHER)
 GROUND WATER (FROM MURBALLY): >100,000 L
 THROUGHPUT: >10

CALCULATION SOURCES

- (1) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1000000/pdf/
- (2) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1000000/pdf/
- (3) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1000000/pdf/
- (4) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1000000/pdf/
- (5) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1000000/pdf/



EXISTING HI-RISE APARTMENTS

SBM PUBLIC TOILET

SANT DYNASHESHWAR MARG

PUBLIC SPACE

SANT DYNASHESHWAR NAGAR SETTLEMENT

CANAL

[YEAR 5]

[YEAR 10]

FUNDED
GOVERNMENT

DESIGNED
PROFESSIONALS

MAINTAINED
COMMUNITY

As the cycle of the plants outgrow the bottles, the community will work together in its transfer to two other points of intervention. In addition to the already available soil, these plants will be the bases of a rain garden located in between the existing roads as well as the center of the toilet; amplifying and purifying that space as well. Rainwater will be led into this engineered ecosystem where the water will be filtered naturally through plants, and below that is layers of mulch, sediment, and an installation of high performance underdrains. Based on the square footage of the area and the annual rainfall, this system shall create 250 liters of water annually for the 150 residents. Even though this does not equal the 1,080,000 already minimally drunk, this creates 23% off for accessible and more importantly clean water for the residents of this selected sector.



Fusing current architecture and infrastructure with ecology to provide clean water to extralegal settlers.

WHY EXTRA-LEGAL

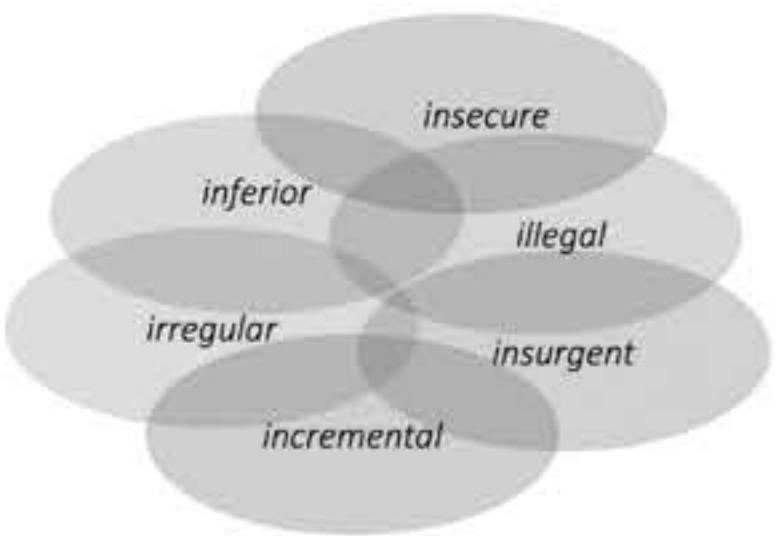


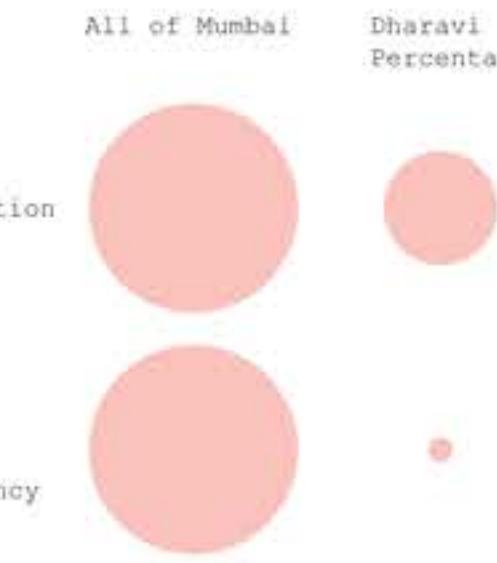
Figure 3 The six i's of urban informality
Source: Kim Dovey

WHY IT MATTERS

“3 Billion living in Extra-Legal Settlements by 2050 globally”



WHY IN DHARAVI



WHY WATER FOCUSED



Viewpoint Informal settlement is not a euphemism for 'slum': what's at stake beyond the language?

Source: Kim, et al. "Viewpoint: Informal settlement is not a Euphemism for 'Slum': What's at Stake beyond the Language?" *Environment Development Planning Review*, 2000, vol. 1-2, <https://doi.org/10.3828/edpr.2000.14>.

Photo: Aditi, flic.kr/p/2nQHgA; Rohit, flic.kr/p/2nQHgA.

Global Urban Growth and Decline

"Global Urban Growth and Decline" *Habitat International*, <https://doi.org/10.1016/j.habint.2013.09.001>; *Journal of Planning Literature*, 2013, vol. 28, pp. 1-24. Project MUSE, <https://muse.jhu.edu/article/502533>.

Photo: Miller, flic.kr/p/2nQHgA; Photographic Bernstein Long, 2019, <https://www.flickr.com/photos/longphotography/>.

[REDEFINING CONTEXT]

In the article "Viewpoint Informal settlement is not a euphemism for 'slum': what's at stake beyond the language?" The author inspected and rearticulated the definition of informal settlements more respectfully known as slums. They looked into not only defining the 'slum' but in defining 'informality', "when informal settlement is used as a synonym for slum it invokes the negative meanings of illegal/inferior/insecure yet it simultaneously evokes ideas of everyday self-organisation: incremental/irregular/insurgent. The larger concept that integrates this definition of urban informality is the idea of informality as a mode of production, this idea is not new (Moser, 1977) but has been most clearly put by Roy (2005, 148) who has defined urban informality as: 'an organising logic, a system of norms that governs the process of urban transformation itself'. For Roy, informal urbanism is primarily produced by the state as an integral aspect of neocolonial governance: 'informality must be understood not as the object of state regulation but rather as produced by the state itself [...] (the) state has the power [...] to determine which forms of informality will thrive and which will disappear' (Roy, 2005, 149).

With the access and innovation of current technologies we as a society cannot allow for this progression and create holistic methods to adapt to this growth and give opportunity to healthy infrastructures to those who cannot afford or have access to prioritized design.

[GLOBAL CONTEXT]

According to the Nordic Council of Ministers "A century ago only two out of ten people lived in urban areas; in the least developed countries figures were as low as 5%. The total population of the world was then around two billion people." They go on to say that in coming years due to the world's demographic growth, close to 90-95% of the world's population will be concentrated in urban areas primarily in the cities of the 'south'. In addition they state that "By 2050, according to the latest UN-Habitat scenario, the world will have a total of almost nine billion inhabitants, almost 70% of whom will be urban dwellers. Perhaps as much as a third of these people will live in slums or so-called 'informal settlements'."

These numbers are not only alarming, but impacts of mass growth within informal settlements can be visually seen across the world especially in emerging countries such as Africa, India and China. Globally, governments have allowed and arguably encouraged lack of access to essential infrastructures such. This has, and will continue to, create an environment more prone to malnutrition, disease, and segregation for billions of people globally.

With the access and innovation of current technologies we as a society cannot allow for this progression and create holistic methods to adapt to this growth and give opportunity to healthy infrastructures to those who cannot afford or have access to prioritized design.

This Is Not a Slum: What the world can learn from Dharavi

Editorial: Matias Echanove and Rahul Srivastava, "This Is Not a Slum: What the world can learn from Dharavi," *World Policy Journal*, vol. 33, no. 3, 2016, p. 19-24. Project MUSE, <https://muse.jhu.edu/article/602533>.

Photo: Miller, flic.kr/p/2nQHgA; Photographic Bernstein Long, 2019, <https://www.flickr.com/photos/longphotography/>.

[LOCAL CONTEXT]

Further creating the basis of this thesis and thinking about creating a design solution for a specific informal settlement, I was immediately intrigued by Dharavi which is located at the heart of Mumbai, India, and is considered one of Asia's largest extra-legal settlements. My curiosity of Dharavi stems from the locality of my origins. Both my parents grew up in Mumbai and I have personally witnessed the architecture and experiences of Mumbai's extra-legal settler's.

In this article Matias Echanove and Rahul Srivastava express that, "In these areas, a home is not just a residence. Houses double as tiny factories, shops, and hostels. This quality makes the whole area enormously productive."

I want to understand the delicate and specific dynamics of Dharavi's economy that may not represent typical perceptions of slums. I want to understand why people continue to live in this area of Mumbai and how this area grew to be an area of economic benefactors producing over \$500 Million in exports per year according to Rahul Srivastava. In addition, I want to discover the history and cause for population and building density in order to cultivate a beneficial and flexible design that can evolve with the residents over generations.

COLORED PHOTO CITATION

Photo: flic.kr/p/2nQHgA; Creative Commons

[EXPERIENTIAL CONTEXT]

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[PAST]

1850

Koli Fisherman inhabited Dharavi

1877 Saurashtra, Gujarat ravaged by drought [1]

The Indian Famine [Chappaniyo 1899-1900] [1]

Rediscovering Dharavi
by Kaplana Sharama

Sharma, Kaplana. Rediscovering Dharavi: Stories from Asia's largest slum. Penguin Books, 2006.

[MIGRATION CONTEXT]



How Caste System plays a Role?



"the system which divides Hindus into rigid hierarchical groups based on their karma [work] and dharma [the Hindi word for religion, but here it means duty] is generally accepted to be more than 3,000 years old." The system bestowed many privileges on the upper castes while sanctifying repression of the lower castes by privileged groups. This ties back to Dharavi as most of the residents are considered Dalits who are considered untouchable, or non-hindu. The historical hierarchy paints a picture of the Dharavi people as not worthy or deserving of health and wealth.



Rediscovering Dharavi by Kaplana Sharma highlights how the lives of Dharavi's residents form the perspective of its residents. This source gives readers a glimpse into a perspective that has been ignored due to misconception. This book creates a guide for us to look together at diversity in which people migrate from their regions for migration, and compare effects before and after moving to Dharavi.

Dharavi's original inhabitants were the Koli community. However, during the late 19th century, tribal food manufacturers (Dhangri) arrived and took over. This triggered a shift in power dynamics, leading to the exclusion of certain tribes from their industry. This pattern of exclusion was seen in Korean textile industry (West), Tamil Nadu (South) textile industry, and Jharkhand (tribal industry).

[CLAIM] that comprehending the origins of the current residents of Dharavi will help us understand the symbiotic relationship of their practices to context in order to better understand past farming practices and whether past farming practices could be growing within the compact areas of Dharavi.

1900

1932 Potter village of Kumbarwada migrated from Gujarat [1]

The Indian Famine [Chappaniyo 1899-1900] [1]

Lush Fields and Parched Throats
Political Economy of Groundwater in Gujarat

Wright, Ann. "Lush Fields and Parched Throats: Politics of Groundwater in Gujarat." Economic and Political Weekly, Vol. 38, No. 10, June 2003, pp. 102-103. Downloaded from JSTOR by 122.102.10.120 on 02/03/2020 10:45:20.

[THEORETICAL ARGUMENT]

This study focuses on two alarming aspects of the present water utilization patterns in Gujarat: overexploitation and inequity.

INEQUITY → DROUGHT → FAMINE

| Table 1: Rural Irrigation Relative to Demand, Kutch-Surat-Dhule (1993-94 Survey) | | | | | |
|--|-----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Category | Number of Villages/Survey Circuit | Expenditure incurred (Rs. In Lakhs) |
| Plots | 4670 | 5226 | 1495 | 2882 | 1926 |
| New wells | 672 | 472 | 431 | 228 | 451 |
| Old wells | 724 | 174 | 174 | 174 | 174 |
| Cultivation | 154 | 154 | 222 | 192 | 192 |
| New Plot | 154 | 154 | 143 | 143 | 143 |
| Depotization of wells | 154 | 264 | 264 | 428 | 316 |
| Depotization of tanks | — | — | — | — | 368 (NA) |
| Depotization of canals | — | — | — | — | 367 (NA) |
| Total Plot | 4672 | 8000 | 10479 | 1827 | 1492 |
| Total New wells | 672 | 672 | 672 | 672 | 672 |
| Total Old wells | 724 | 724 | 724 | 724 | 724 |
| Total Cultivation | 154 | 154 | 154 | 154 | 154 |
| Total New Plot | 154 | 154 | 154 | 154 | 154 |
| Total Depotization of wells | 154 | 264 | 264 | 428 | 316 |
| Total Depotization of tanks | — | — | — | — | 368 (NA) |
| Total Depotization of canals | — | — | — | — | 367 (NA) |
| Total | 4822 | 8152 | 10634 | 1839 | 1500 |
| Grand total | 4822 | 8152 | 10634 | 1839 | 1500 |

Annual average income per household in Dharavi is Rs. 31,780.

Source: Conditions of India 1999. The Survey of Rural and Household Income and Expenditure, New Delhi.

But the dream turned sour when one observed not only that the neighbouring Heli was barren but also that its owner and her family hardly had enough water to drink. Their own well was rapidly drying up, even as their richer neighbors were reaching deeper and deeper to extract groundwater. And as the water table went down, their dependence on their neighbors for water kept increasing.

TABLE 2: TRENDS IN RAINFALL: RESULTS OF A LINEAR REGRESSION OF RAINFALL ON TIME

| Area and Period | Time Coefficient | t-ratio |
|-----------------------|------------------|---------|
| Gujarat, 1951-85 | 0.73 | 0.16 |
| Gujarat, 1951-90 | -1.87 | -0.49 |
| Sabar Kantha, 1951-85 | -0.30 | -0.05 |
| Sabar Kantha, 1951-90 | -3.11 | -0.66 |
| Sabar Kantha, 1980-85 | -0.60 | -0.42 |
| Sabar Kantha, 1980-90 | -1.26 | -0.96 |

[DATA PROOF OF CONSISTENT RAINFALL]

"How can we make sure that these resources are utilized to meet real needs rather than to enrich a privileged minority?"

With the diagram, it is clear that the focus of the research is to understand how the caste system has impacted the availability of resources.

The article "India's Famine and Political Economy of Chappaniyo in Gujarat" by Nitin Wright and Miriam Gathigah argues that the research was not able to relate the reduction of rainfall directly to the caste system. They believe that the reduction of rainfall was not due to the caste system, but rather due to the lack of investment in irrigation systems. This is a common argument in the field of environmental science, where it is often claimed that climate change is the primary cause of reduced rainfall, rather than the caste system.

Through the analysis, it is clear that the research is focused on understanding the relationship between the caste system and the availability of resources, rather than the impact of the caste system on rainfall.

[CLAIM] that addressing the right of access to land for marginalized communities is a key factor in ensuring food security.

1950

GOVERNMENTAL RECOGNITION

1947 India's Independence from Britain

In 1948, an eighteen-year-old boy from Tirukoyoor, traveled to Bombay. It was difficult to survive in his drought-hit village. [2]

1971 Declaration of Slum in Dharavi

1980 Relocation of large tanneries [Freed up land for private builders to build high rise allowing for successful business owners of Dharavi to stay]

1982 Prime Ministers Grant Project (PMGP) prime ministers special grant of Rs 100 crore (100 million) for the development of Dharavi.

1982 Mill Strike [many workers lost their job and became self-employed in Dharavi]

1992 Bombay Riots

1997 The Slum Rehabilitation Scheme which followed the PMGP

2004 DRP (Dharavi Re-development Plan) Initiated through Government: Residents were never involved

2013 Dharavi Bandh group formed to protest the DRP

2020 COVID PANDEMIC

2050 Children between 0-5 nutrient levels increased by over 30%

"Dharavi - Ground Up": A Dwellers-Focused Design Tool for Upgrading Living Space in Dharavi, Mumbai

Spira, Anne, and Michaela Zell. "Dharavi - Ground Up: A Dwellers-Focused Design Tool for Upgrading Living Space in Dharavi, Mumbai." Environment and Planning D: Society and Space, Vol. 30, No. 1, 2012, pp. 103-122. Downloaded from JSTOR by 122.102.10.120 on 02/03/2020 10:45:20.

[CURRENT INFRASTRUCTURE]

[DEVELOPMENTAL REGULATIONS]

[CONVERGENT DISTRIBUTION]

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

[PRESENT]

2000

2000

GOVERNMENTAL RECOGNITION

1997 The Slum Rehabilitation Scheme which followed the PMGP

2004 DRP (Dharavi Re-development Plan) Initiated through Government: Residents were never involved

2013 Dharavi Bandh group formed to protest the DRP

2020 COVID PANDEMIC

2050 Children between 0-5 nutrient levels increased by over 30%

Distribution of Fresh Fruits and Vegetables in Dharavi India by Proshant Chakraborty

Carrasco, Silvana. "Slums Farmers Rise Above the Sewers." Inter Press Service, 27 Mar. 2010. www.ipsnews.net/2010/03/slums-farmers-rise-above-the-sewers/

Slum Farmers Rise Above the Sewers By Miriam Gathigah

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

Slum Farmers Rise Above the Sewers

By Miriam Gathigah

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

[AGRICULTURAL PRECEDENT]

[FUTURE DEVELOPMENT]

[ECOLOGICAL APPROACH]

[TYPES OF LEAFY GREENS GROWN]

[GROUND UP UPROACH]

[DEVELOPMENTAL QUESTION]

[W03]

[TRANSIENCE]

[PERMEANCE]

[LONGEVITY OF IMPACT]

[PERMEANCE]

[LONGEVITY OF INTERVENTION]

WEEK

[PERMEANCE]

[RESIDENCE AMOUNT INVOLVED]

INDIVISUAL

MONTH

YEAR

DECADE

CENTURY

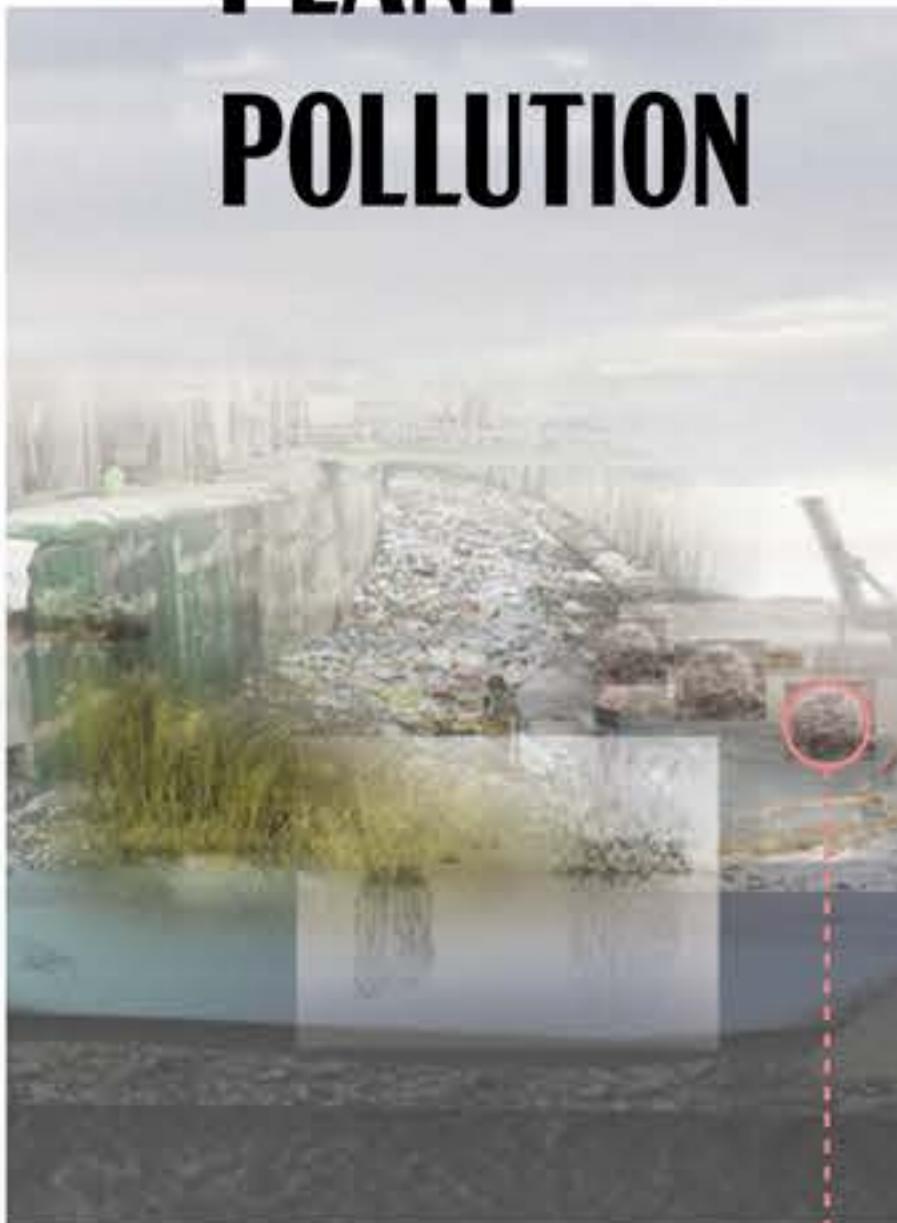
NEIGHBORHOOD

COMMUNITY

VILLAGE

Speculations

PLANT POLLUTION



HIDDEN SEAWEED



PLANT FLOATY

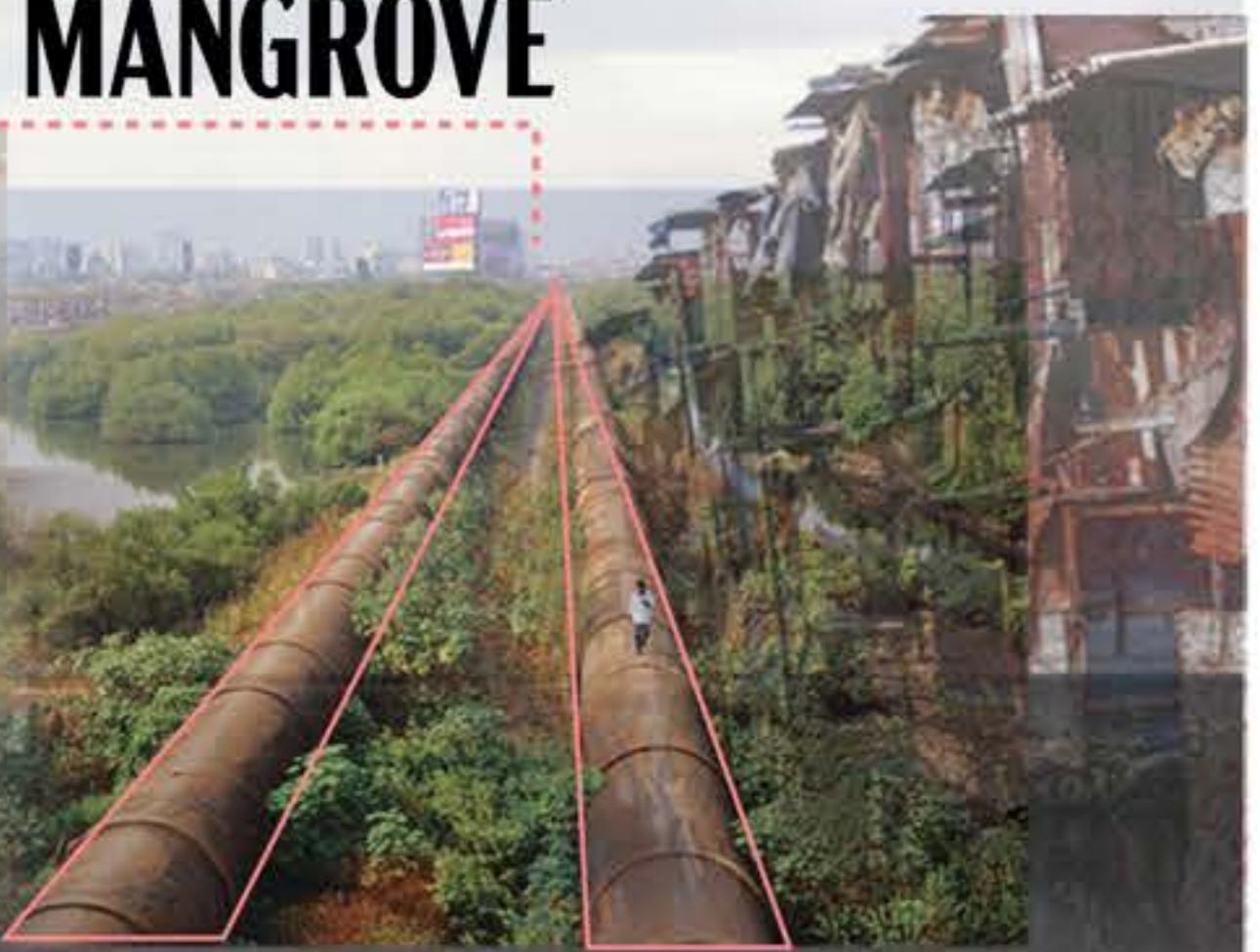
TO THE FUTURE



FUSION PARK



CONSTRUCTED MANGROVE



Precedents



Students Create 10,000 Seed 'Bombs' For A Greener Chennai

Barker, Jeremy. "A New 'Fishing Park' Made out of Recycled Plastic Waste Has Popped up in the Netherlands." Business Insider. Business Insider, 28 July 2018. <https://www.businessinsider.com/maritime-fishing-park-made-out-of-recycled-plastic-waste-2018-7>.

This is a student-driven initiative as they wanted to do something for the environment after cyclone Vardah wreaked havoc on the city's green cover last year in December. They have created 10,000 seed balls made of clay, soil, seed and manure to perform 'seed bombing', an aerial reforestation method in which the seed balls are dropped like bombs for growing vegetation cover.



Eco India, Episode 115: Seaweed farms in Tamil Nadu act as carbon sinks, say scientists

Barker, Jeremy. "A New 'Fishing Park' Made out of Recycled Plastic Waste Has Popped up in the Netherlands." Business Insider. Business Insider, 28 July 2018. <https://www.businessinsider.com/maritime-fishing-park-made-out-of-recycled-plastic-waste-2018-7>.

Located in Sambal Village, southeast coast of India is the emerging industry of seaweed farming. Seaweeds play an essential role in food and habitat in the marine world.

The method of installation is done by creating a square frame using four bamboo logs and tying existing seaweed onto them creating a planar surface. In about 45 days the grown seaweed is harvested. This technique has economically benefitted and provided livelihoods for 1500 families and has created a women led industry within the area. Scientifically, seaweed's properties remove inorganic nutrients from water. In addition, attract filtration specimens like clams, mussels, and their relatives filter organically bound particles rich in nutrients.

On an individual scale, plant pollution consists of the idea of throwing seeds of plants with filtration characteristics like that that are abundant in the area into the river. The blankets of plastics that currently exist will act as a barrier and through time these seeds will float in full grown plants where the roots act as a filter for the water and the roots will release oxygen to the community.

This technique can be utilized within this Dharavi waterways. What if Dharavi residents use seaweed from the Mahim Bay and attach it to current barriers like water bottles that act as filtration devices. The rapid growth characteristic of the plant can create underwater ecosystems that can possibly not only purify the water but create food sources within this seaweed as well as fish, oysters, and clams within a couple of years and have lasting effects for decades.



Man-made, Floating Islands That Clean Up And Revive Urban Lakes

Egerton, Jeremy. "A New 'Fishing Park' Made out of Recycled Plastic Waste Has Popped up in the Netherlands." Business Insider. Business Insider, 28 July 2018. <https://www.businessinsider.com/maritime-fishing-park-made-out-of-recycled-plastic-waste-2018-7>.

A decade ago the lakes of Bengaluru started to foam, due to the sewage and industrial pollution. Usha Rajagopal, a lake activist and community member, led a community based initiative to clean the lake. The islands are designed to be lightweight and easily installed by one person, he explains. The only materials you will need are PVC pipes, 4 elbows, used plastic bottles, a nylon mesh, and tags. In a decades time, the lake is continuously tested as clean, and community members are able to experience the beauty of the lake.

Dharavi can implement this technique by using existing plastics from the polluted water ways to form a round shape floating device that acts as a mold for vegetative growth. Over time small plant ecologists could scan the polluted waterways and clean out the much polluted water.



A new 'floating park' made out of recycled plastic waste has popped up in the Netherlands

Barker, Jeremy. "A New 'Fishing Park' Made out of Recycled Plastic Waste Has Popped up in the Netherlands." Business Insider. Business Insider, 28 July 2018. <https://www.businessinsider.com/maritime-fishing-park-made-out-of-recycled-plastic-waste-2018-7>.

Rotterdam's Floating Park — which is now open to visitors, though the park is just a prototype of what may become a much larger installation — is made out of plastic recycled from Rotterdam's waterways.

The recycled plastic is constructed into hexagonal pods, which mimic the landscape of Rotterdam's Maas River before humans altered the landscape, according to the Recycled Island Foundation, the group behind the park.

The pods can be used to create gardens, as habitat for wildlife, or for chilling out, and they can be molded into different seating arrangements.

The idea of a plant floaty can be implemented on a much larger scale. With a larger group involvement, the community of Dharavi can create larger floaty floats that can develop into much stronger ecologies. This can lead to possible strength to carry multiple humans on. What if plant parks start emerging in parts that were so polluted to even see the water. What does that mean for future community engagement and health?

Using [ecological filtration] methods will help [pave] the [eradication] of the clean water [dependency on governmental led infrastructures] and will create a future for [sustainable urban health and agriculture].

These orchestrated interventions can lead to a landscape that ties back to the history of the Koli fisherman's relationship with mangrove ecology.

The current pollutants will be the base of an ecosystem that will form into estuaries through the guidance of Dharavi Residents. These actions will create a permanence of an eco environment where the residents will not only be able to receive clean water but have an area that creates eco-systems for food, shelter from floods, and possibly an area to grow edible vegetation for centuries to come.

[IMMEDIATE REMOVAL]

DEVELOPER LED

GOVERNMENT LED

COMMUNITY PARTNERSHIP

[PROGRESSIVE INTERVENTION]

LUXURY

RELOCATION

VERTICALITY

INCREMENTAL UPGRADING

HUMAN HABITAT NOT ARCHITECTURE

URBAN FOOTPRINT IMPLICATIONS

Mumbai's Slums Make Way for Luxury Residential Towers

Awami Sherkhan and Gopinath Mehta, "Mumbai's Slums Make Way for Luxury Residential Towers," The Hindu, 2019.

https://www.hindu.com/todays-paper/2019/06/20/mauritius-slums-make-way-for-luxury-residential-towers.html#page:1

[RHETORICAL CONTEXT]



Built Plan for Mumbai-Private Sector

[47,000 LUXURY APARTMENTS] [19 MILLION SQFT OFFICE SPACE]

"The entire strength of this business is whether you can convince the people to move out."

GREY AREA OF LAW
Private developers get clear land and permit to build upscale towers in exchange for providing housing to slum dwellers at no cost to them.

Only 162,000 housing units have been built and allotted to former slum dwellers in Mumbai over the last two decades, according to the city's Slum Rehabilitation Authority.

EVICTION STRATEGIES
MONEY
POLITICAL PRESSURE
PHYSICAL FORCE

"Clearing the slum is the dirty job. It's a mix of legal and illegal things that involves putting pressure on the slum dwellers who are unwilling to leave."



PROCESS OF RELOCATION



[I CLAIM] that due to exponential privatized economic and financial uprise in Mumbai, India, the government led initiatives to rehouse the people living in informal settlements are only designed for rapid removal in order to use the lots to develop for financial gains. They ignore the health and social dynamics of the general rooted ways of life of informal dwellers.

This strategy fails to relocate residents in an ethical manner. Developers are finding ways against the law that is put in place to protect informal dwellers. Tactics of removal are within the lies and manipulation. Not only are developers tearing down the structures that residents invested to build but stripping large communities and leaving them shelter less and in unhealthy living conditions, even worse than before. Is there a way luxury apartments can include affordable housing for the families whose homes are getting shipped away?

[II CLAIM] that due to exponential privatized economic and financial uprise in Mumbai, India, the government led rehousing development builds structures to simply compact as many people vertically as possible. They ignore the business, family, and lifestyle relations along with the existing spatial formations around those elements.

The failure of this relocation work is that it ignored the living sustainable strategies within the communities lifestyle. The respect of having communal outdoor spaces is ignored and thus, issues like high mortality rate, separation, and lack of ventilation arises. Not only is the government creating vertical hot spots but increasing overall lifestyle costs that residents did not spend before. With Mumbai's rising high levels of pollution, the type of design cannot go on. Due to the lack of sources, Dharavi residents are forced to implement sustainable practices, especially in the sector of ventilation. Mimicking spatial context within a highrise can create a more efficient and comfortable environment for the occupants while reducing global emissions and saving costs.

HEALTH & SOCIAL IMPLICATIONS

Mahul, Mumbai's Rehabilitation Hellhole

WolffGott, "Mahul Mumbai Rehabilitation Hellhole," YouTube, YouTube, 13 Mar. 2018.

https://www.youtube.com/watch?v=KwvRw-1st_cJM

[RHETORICAL CONTEXT]



NEGATIVE IMPLICATIONS

| [CAUSE] | [REASON] |
|------------------------------|--|
| Spending more on ELECTRICITY | "They switch on the light at 6 in the morning and leave it on until they go to sleep at night, which may never happen if they were in the slums where they spent most of their time outside." |
| Greater fuel CONSUMPTION | Slum-dwellers have always relied on their social networks for work and support. And when they moved from the slums to rehabilitation housing, these networks took down. Bandhan has found, for instance, that people who used to come together in open spaces in the slums were now forced to cook individually in their homes, meaning that their fuel consumption has significantly increased. |
| Lock of CHILD CARE | Slum-dwellers have always relied on their social networks for work and support. And when they moved from the slums to rehabilitation housing, these networks took down. Bandhan has found, for instance, that people who used to come together in open spaces in the slums were now forced to cook individually in their homes, meaning that their fuel consumption has significantly increased. |
| Lack of SUNLIGHT | Existing building laws mean that some houses never receive sunlight and therefore expose their occupants to a higher risk of infections. |

[II CLAIM] that government led rehousing development builds structures to simply compact as many people vertically as possible. They ignore the business, family, and lifestyle relations along with the existing spatial formations around those elements.

The failure of this relocation work is that it ignored the living sustainable strategies within the communities lifestyle. The respect of having communal outdoor spaces is ignored and thus, issues like high mortality rate, separation, and lack of ventilation arises. Not only is the government creating vertical hot spots but increasing overall lifestyle costs that residents did not spend before. With Mumbai's rising high levels of pollution, the type of design cannot go on. Due to the lack of sources, Dharavi residents are forced to implement sustainable practices, especially in the sector of ventilation. Mimicking spatial context within a highrise can create a more efficient and comfortable environment for the occupants while reducing global emissions and saving costs.

VERTICALITY

Fixing India's Slum Rehabilitation Housing

Athanas Williams, Tom, "Fixing India's Slum Rehabilitation Housing," University of Cambridge, 10 Feb. 2020.

https://www.cam.ac.uk/research/docs/library/2020/02/fixing-indias-slum-rehabilitation-housing

[RHETORICAL CONTEXT]



SEGREGATION

| [CAUSE] | [REASON] |
|---|---|
| Relocation of Residents to Resettlement | Sites that were already outside of the city. Governments not only had to start removing clearing lands and resettling immediately, but also later had to finance public transportation to facilitate access to employment in the center city. |
| Clearance and Redevelopment | Resettled density of slum sites development is not much greater than that of a Central City Community. In addition to that, high rise development doesn't provide enough ground-level space for low-income families to operate small businesses, which these families need to supplement their incomes. |
| Upgrading | Upgrading consists of improving basic infrastructure such as water, electricity, sanitation, etc. However, upgrading does not involve home construction, since the residents can do this themselves, but instead offer optional loans for home improvements. |
| Advantages of Upgrading | Upgrading tenure rights to the occupants of pieces they can afford. They are provided by transferring their tenure rights to individual occupants to level two to four times the amount of land that the government invests in infrastructure improvements in a slum area. |

[II CLAIM] that government led rehousing development builds structures to simply compact as many people vertically as possible. They ignore the business, family, and lifestyle relations along with the existing spatial formations around those elements.

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"Neighbors remain neighbors, local remains local"

Incremental Housing Strategy by Filipe Balestra and Sara Göransson

Foto: Marcus, "Incremental Housing Strategy by Filipe Balestra and Sara Göransson," Deseret, 19 Oct. 2016.

https://www.deseret.com/2016/10/20/incremental-housing-strategy-by-filipe-balestra-and-sara-goransson/

[ARCHITECTURAL CONTEXT]



URBAN UPGRADING STRATEGIES

| | |
|---------|--|
| House A | Two-story house. House A is a story taller than its neighbor which is fully enclosed. |
| House B | Incremental ground floor, which is left open for either parking or for the family to turn their spare space into a shop. |
| House C | Incremental middle floor, to hang clothes or to be used like a living room. |

[II CLAIM] that government led rehousing development builds structures to simply compact as many people vertically as possible. They ignore the business, family, and lifestyle relations along with the existing spatial formations around those elements.

The failure of this relocation work is that it ignored the living sustainable strategies within the communities lifestyle. The respect of having communal outdoor spaces is ignored and thus, issues like high mortality rate, separation, and lack of ventilation arises. Not only is the government creating vertical hot spots but increasing overall lifestyle costs that residents did not spend before. With Mumbai's rising high levels of pollution, the type of design cannot go on. Due to the lack of sources, Dharavi residents are forced to implement sustainable practices, especially in the sector of ventilation. Mimicking spatial context within a highrise can create a more efficient and comfortable environment for the occupants while reducing global emissions and saving costs.

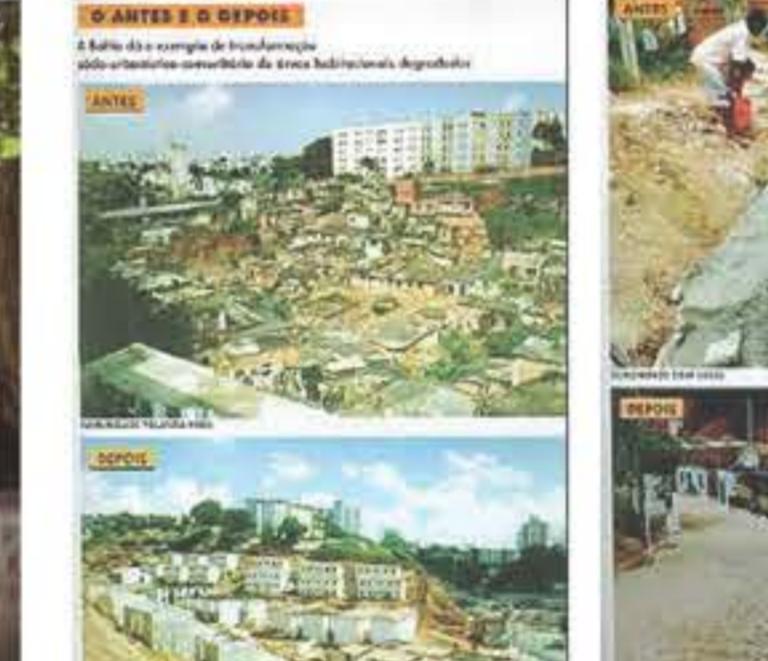
INCREMENTAL UPGRADING

What is Urban Upgrading?

Massachusetts Institute of Technology, What is Urban Upgrading?, The World Bank Group, 1999.

https://web.mit.edu/urbdesign/upgrade/what-is-upgrading.htm

[ARCHITECTURAL CONTEXT]



CONTEXT OF VISUALIZATION/DISSEMINATION

| | |
|---|---|
| Relocation of Residents to Resettlement | Sites that were already outside of the city. Governments not only had to start removing clearing lands and resettling immediately, but also later had to finance public transportation to facilitate access to employment in the center city. |
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HUMAN HABITAT NOT ARCHITECTURE

"Giving life a chance"

Revisit: Aranya low-cost housing, Indore, Balkrishna Doshi

Mokdad, Marjan, "Revisit: Aranya Low Cost Housing, Indore - Balkrishna Doshi," Architectural Review, 12 July 2021.

https://www.architecturalreview.com/buildings/revisit-aranya-low-cost-housing-indore-balkrishna-doshi

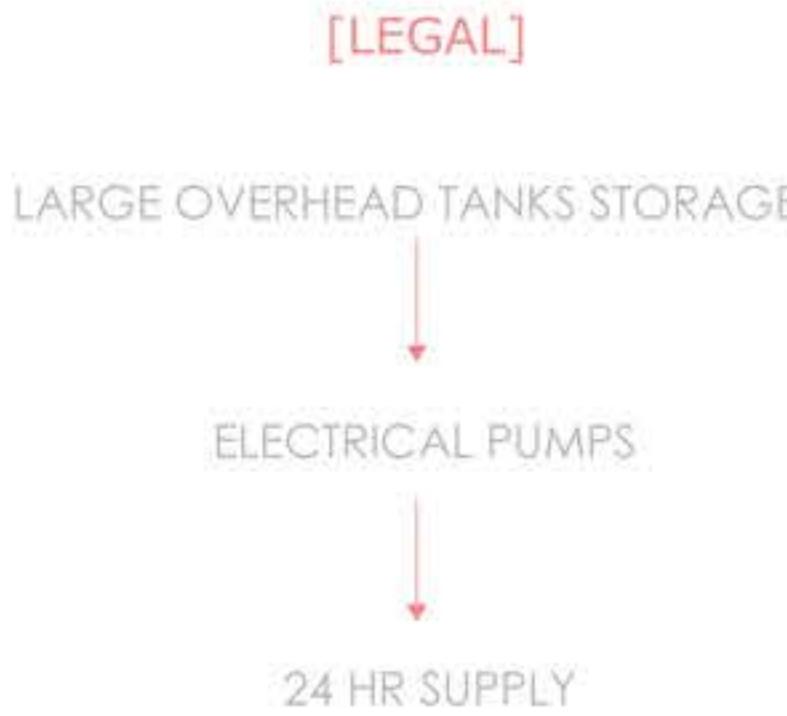
[CONTEXT OF VISUALIZATION/DISSEMINATION]



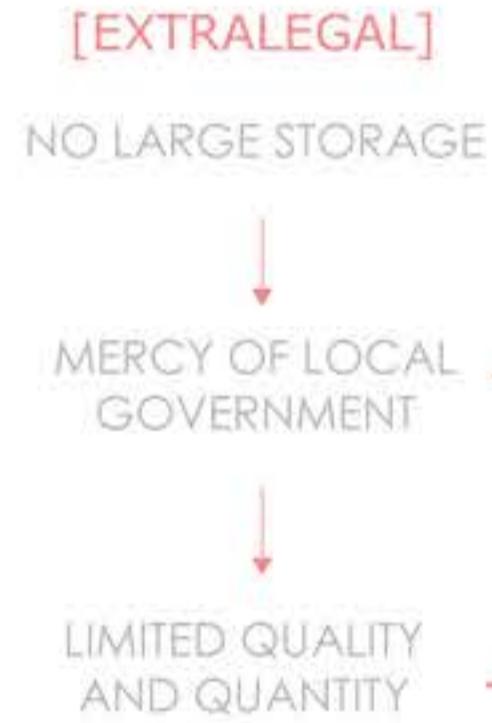
W04_Context | ANUSHA VARUDANDI | ARC 6541 THESIS 01 | FALL 2021 | Prof.SHALL

"Here we see that every space given used, structures are meant for going up, go down, and sideways, and decisions are not taken in caps, just as deep, shaded patches of walled cities or medieval towns not only help to insulate the interior but also provide an extension of the human into the public sphere." "We don't talk about families, we talk about rooms. That's how we think about architecture, not about buildings." "There are different ways of thinking that machines, society, program does." "Aranya development approach was that every space gets used, structures are not just for going up and down, and decisions are not taken in caps, just as deep, shaded patches of walled cities or medieval towns not only help to insulate the interior but also provide an extension of the human into the public sphere." "The implementation of the idea of ownership was innovative and effective, especially in terms of infrastructure improvements in a slum area." "Developed in Bombay, India, the Incremental Housing Strategy is intended to allow districts to improve organically without uprooting communities. The architects have developed three house typologies consisting of simple forms that allow for later expansion. The success of this strategy relies in the deep understanding and coordination with residents currently residing in them. The construction implementing the existing organic pattern doesn't disrupt, but amplifies the presence and identity of residents. In addition, the scheme begins to introduce a strategy of how to provide outdoor spaces within each unit to achieve small-scale improvements on an off-street scale. Compared to RPM housing, which simply creates a vertical form, upgrading focuses on improving life quality first. Upgrading or urban improvement is often a vertical form, which is a waste of space. It's a package of basic services: clean water supply and adequate sewage disposal to improve the well-being of the community. But fundamental is legitimizing and "regularizing" the properties in slums of insecure or unclear tenure. This strategy allows residents to reside and continue living in their community in addition to improved lifestyle without disrupting their daily ways of living."

[HOW LEGAL GET WATER VS EXTRALEGAL]



[SOURCE]



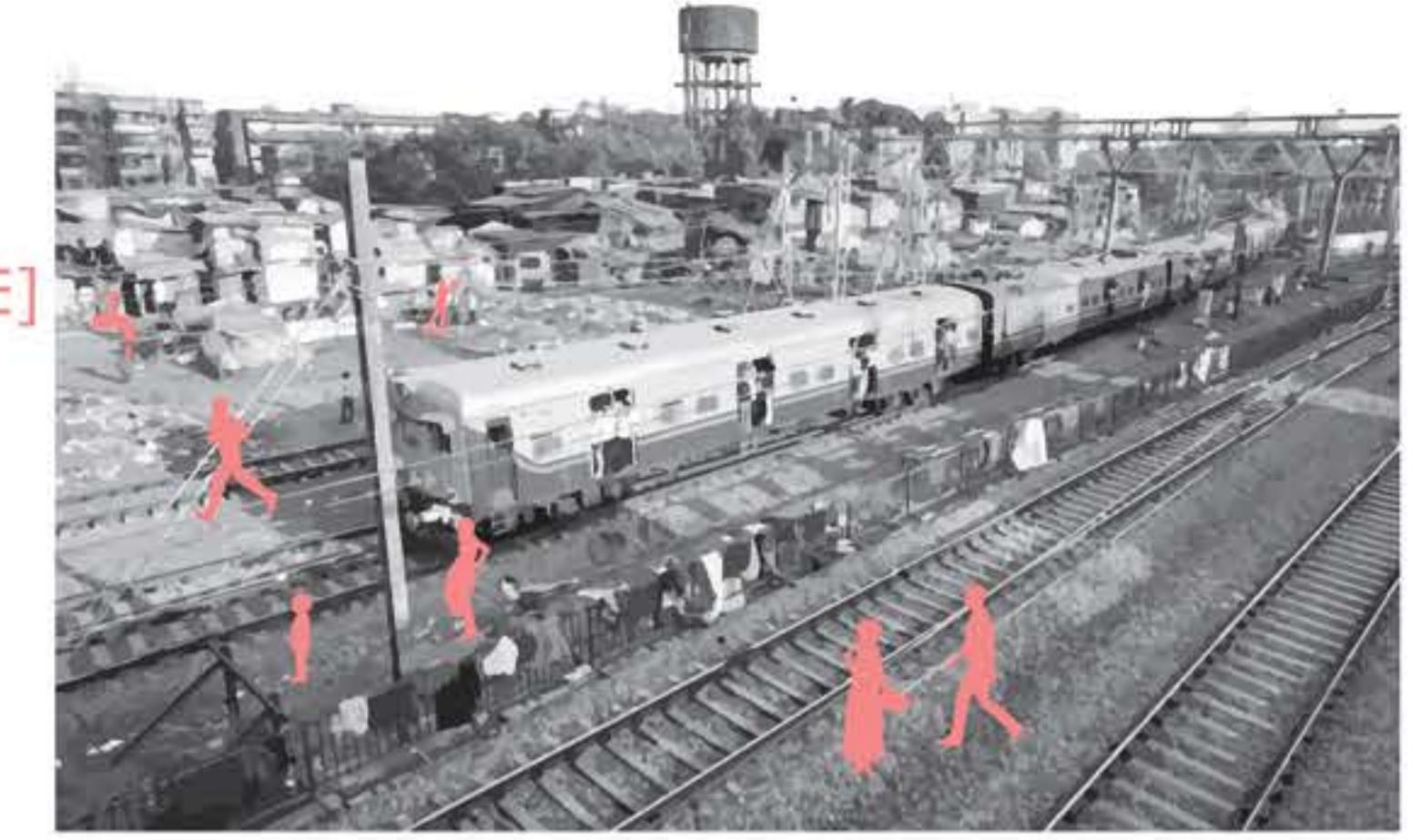
Ability to store vast quantities of water in overhead tanks to which the water is pumped up by electrical pumps. Thus, they receive a 24-hour supply of water regardless of the time the municipal corporation releases water. Poor communities are completely at the mercy of the local government in terms of both the quantity of water supplied, the quality, and the time it is released.



[TRUCK TANKS]

[TRAVEL] → [SOURCE] → [COLLECT] → [TRAVEL] → [STORE]

[SOURCE]

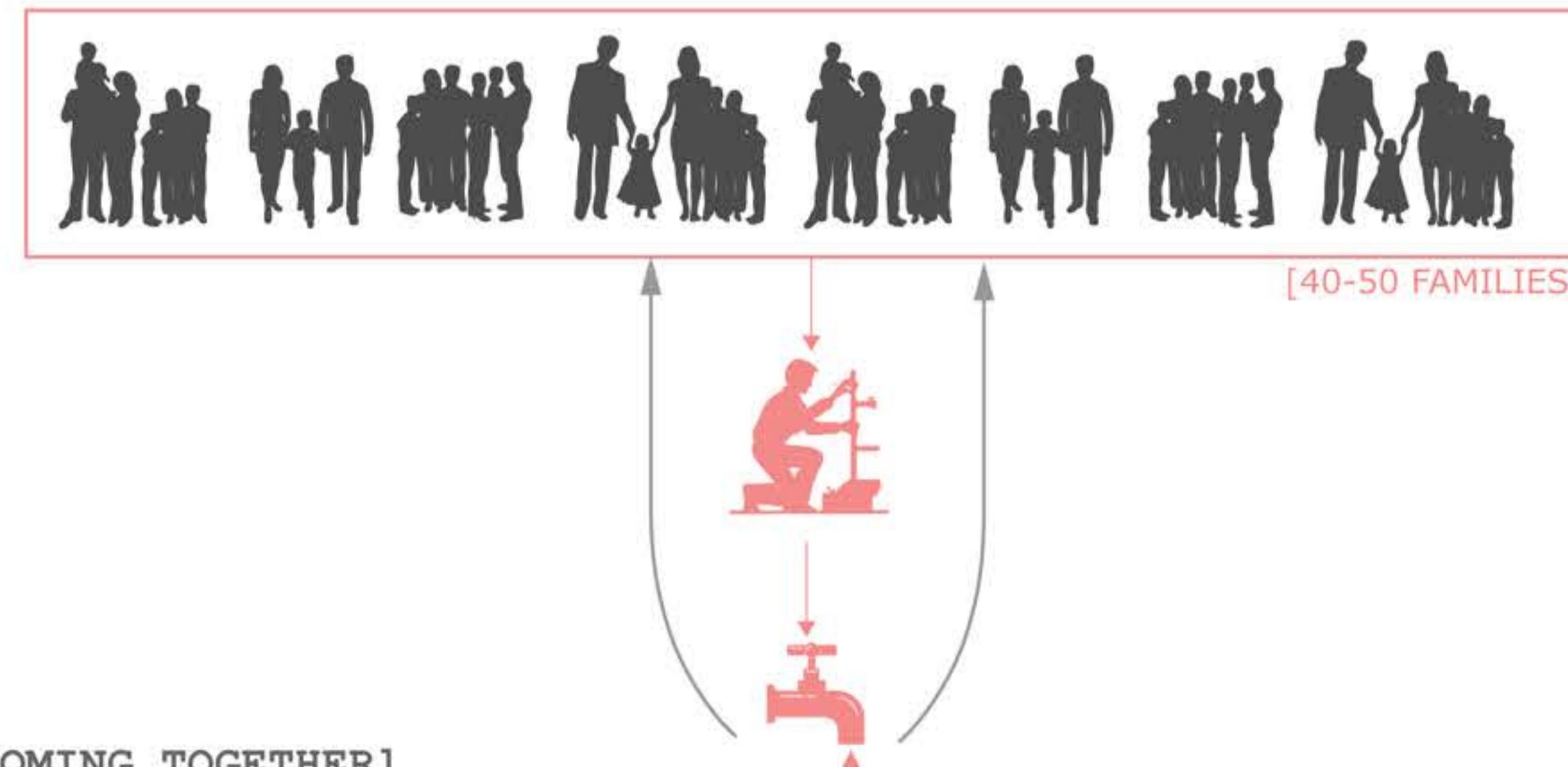


[NEW RAILWAY] → [CUTS VEHICULAR] → [LONG DISTANCE]

[INFRASTRUCTURAL BLOCKAGE]

The new railway line has cut them off from the main road. There is no vehicular approach to the slum now. To go anywhere, they must cross two railway tracks and watch out for fast trains that suddenly appear on the horizon without a warning. Their closest water source is 150 metres away. To access it, they have to cross these tracks.

[INSTANCE 2] COST: N/A TRAVEL: 150 m TIME: 15-20 MIN AMOUNT: 2 Liters PER DAY



[COMING TOGETHER]

Around 40 or 50 families have struck a private deal with a local plumber. They have paid between Rs 700 to 1000 to access a water connection in the slum. Here water comes at different locations, for a few hours every day. Some of the women say that they are able to fill six to eight handis a day from this source. The women say that they must get 10 to 15 handis a day. They do not mind if 15 families get together and are provided one water connection. At present, MP Nagar families spend up to Rs 60 a month on buying water.

[INSTANCE 3] COST: RS 700-1000 + RS 60 PER MONTH TIME: FEW HOURS A DAY AMOUNT: 6-8 Liters



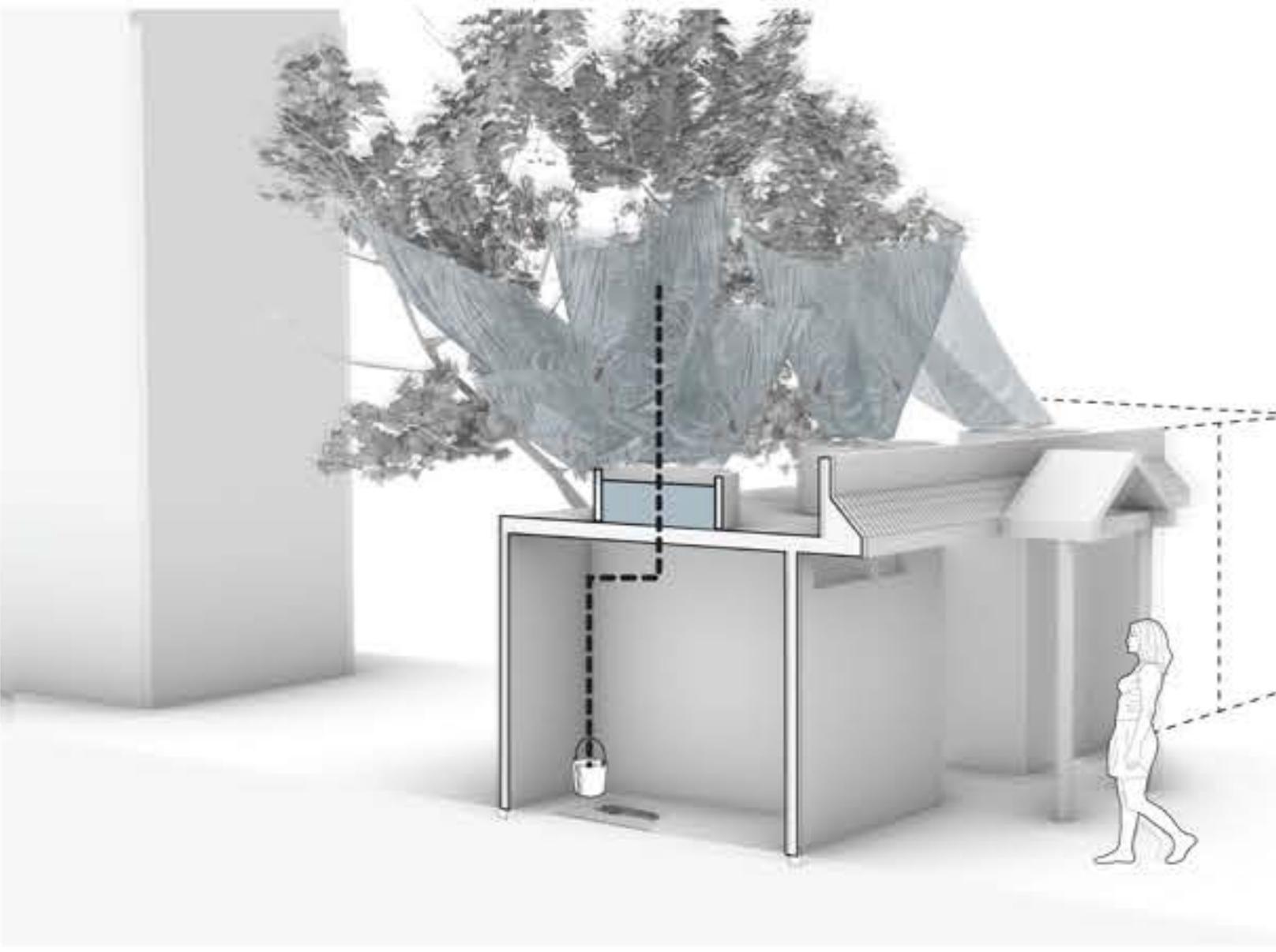
[GUTTER WATER]

Taps are attached to pipes which run adjacent to the gutter. To collect water from these floor level taps, the women must either carry a plastic pipe with them to attach to the tap or a mug in which they fill the water before pouring it into their handis. It is a long and tedious task. Given the weight of the handis and the distance they must walk, they can fill at most one or two handis a day. Each trip takes them at least 15 to 20 minutes.

[INSTANCE 4] COST: N/A TRAVEL: 150 m TIME: 15-20 MIN AMOUNT: 2 Liters PER DAY

SMALL SCALE INTEGRATED WITH EXTRALEGAL

[WASHING CENTER]



"I'M GOING TO GO WASH MY CLOTHES"

Redevelopment of the public toilet will consist of an off-grid system utilizing rainwater collection by use of existing materials to supply needs for relief in addition to community needs such as bathing and doing laundry.

GREEN BELTWAY



"I'M GOING TO GET SOME WATER"

Main purpose is to create a space for residents to clean and gather affordable water through a system of vegetative water filtration.

VERTICAL GARDEN ALLEYWAYS



"I'M GOING TO GET SOME VEGETABLES FOR DINNER"

Vegetables and herbs will grow over time converting these alleys used for this passageway into spaces of accessible, healthy produce and a source of vegetation for life.

CONSTRUCTED MANGROVES

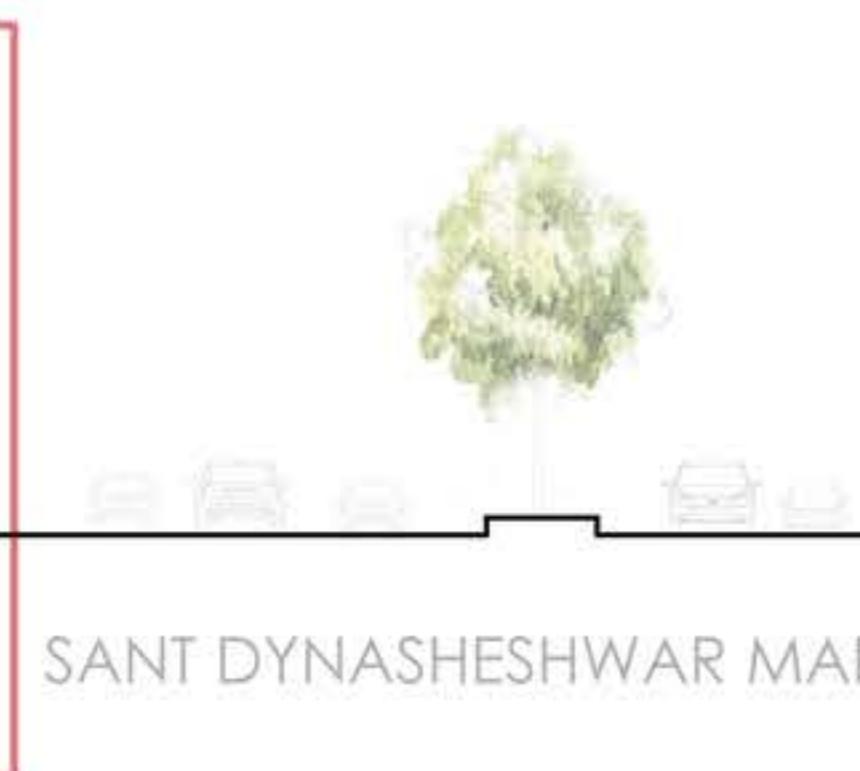


"I'M GOING TO ENJOY THE FRESH AIR AND VIEW"

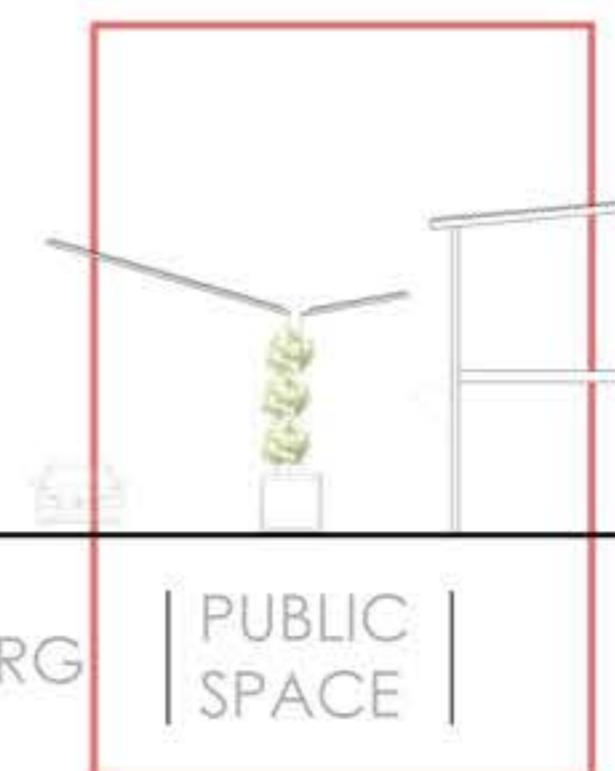
Long term investment along the canal's edge would be the revitalization of river pollutants through actions small actions overtime. The outcome is creating an ecosystem for constructed mangroves that will revitalize the water to its natural purpose.



PUBLIC TOILET



SANT DYNASHESHWAR MARG



PUBLIC SPACE



EXTRALEGAL SETTLEMENT

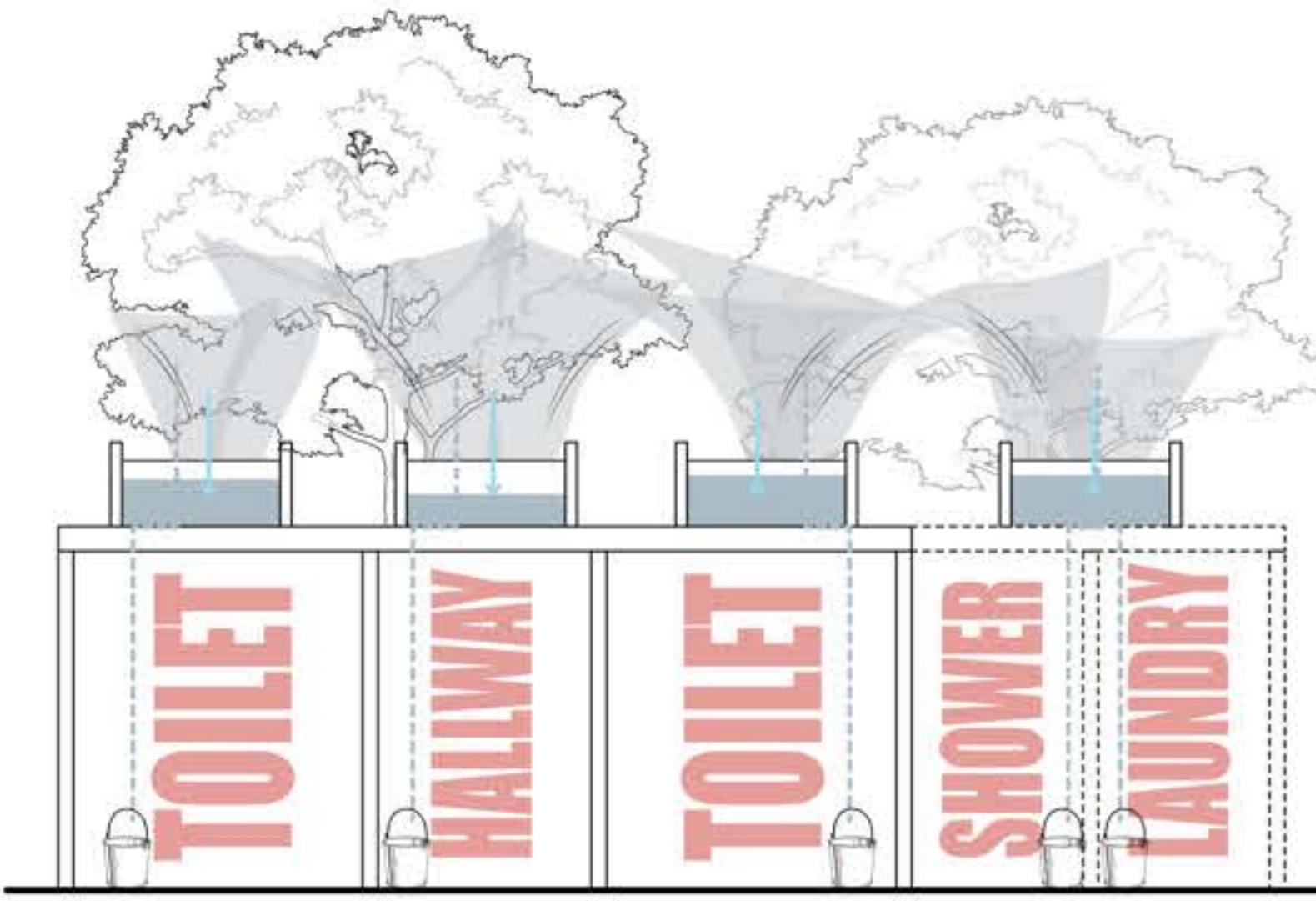


RIVER

My thesis investigates how extra legal settlements have developed, adapted, and sustained themselves with implications for dense urban environments. [c]The goal of this exploration is to develop infrastructures more suitable to the demands of the extra-legal settlement and more attached to the lives of the people who live there. [c]In citing the project, I seek to use current placements of separative infrastructure and architecture to evolve its purpose into a more healthy, effective, and self-sustaining system through interventive design decisions to better serve those living in extralegal settlements.

SMALL SCALE INTEGRATED WITH EXTRALEGAL

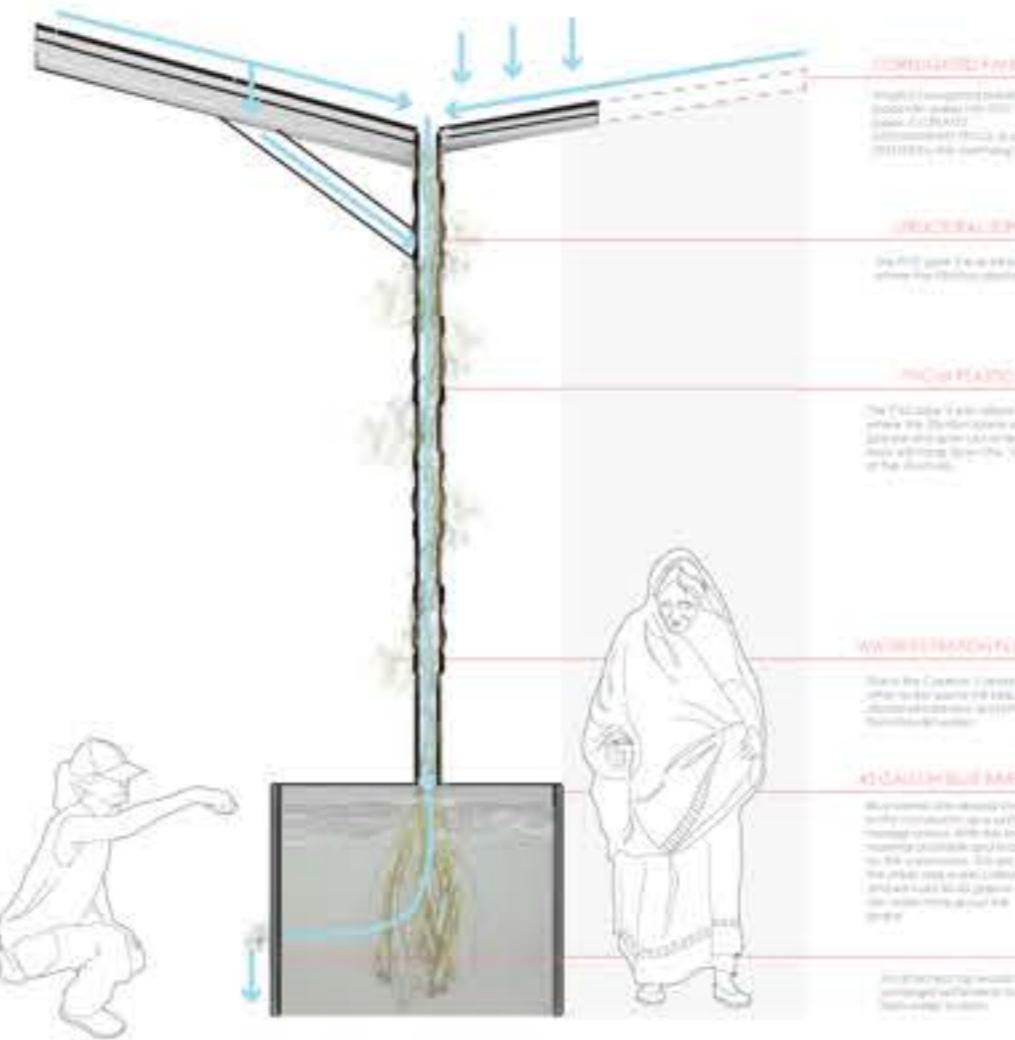
[WASHING CENTER]



"I'M GOING TO GO USE THE BATHROOM"

Resources used to perform these functions are purposely accessible and are used to direct water. Materials consist of tarps, ties, and existing trees using gravity to direct water to water tanks located on the roof. These extensions create a more productive space through accessible action.

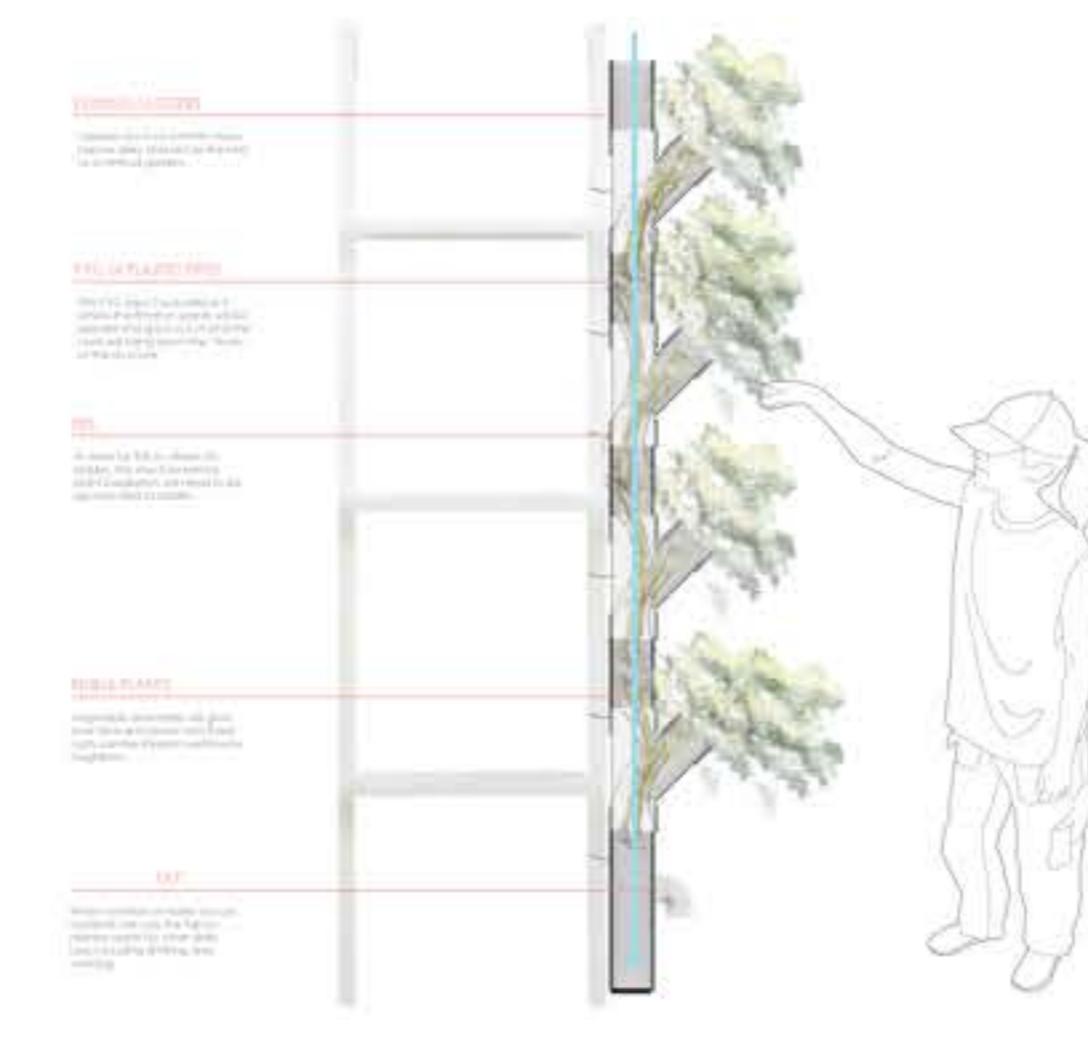
GREEN BELTWAY



"I'M GOING TO GET SOME SHADE AND COOL OFF"

Rain water is directed by corrugated panels to PVC pipes that act as the passageway to blue tanks as the collector. Through hydroponics, water flows through the roots of the plants filtering the water in addition to creating ecological growth.

VERTICAL GARDEN ALLEYWAYS



"I'M GOING TO GRAB A SNACK"

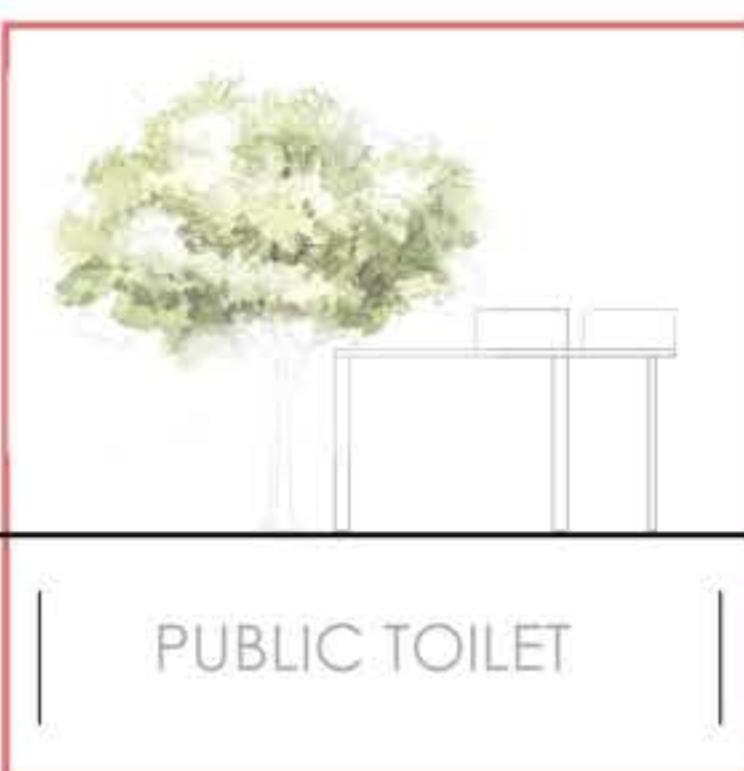
The vertical garden, consists of growing small gardens utilizing bottles and pipes that can attach to elements of shanties such as ladders, and windows.

CONSTRUCTED MANGROVES

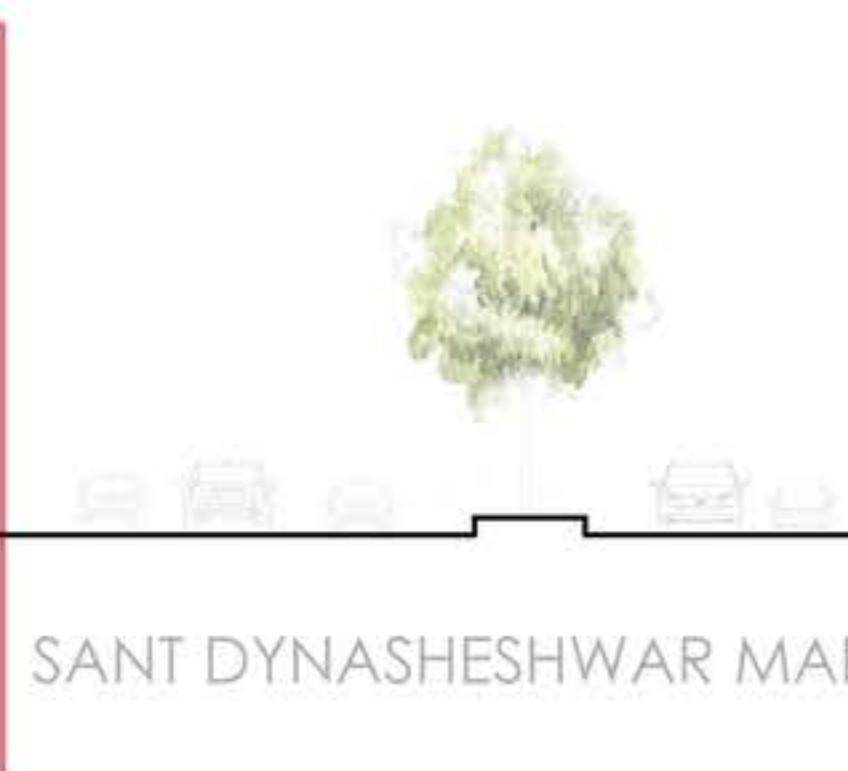


"I'M GOING TO 'GO FISHING'"

Through actions like Plant Bombing, creating floating green islands, and in turn, creating an eco-system for constructed mangroves that will revitalize the water to its natural purpose.



PUBLIC TOILET



SANT DYNASHESHWAR MARG



PUBLIC SPACE

EXTRALEGAL SETTLEMENT



RIVER

Extra legal settlements embody persistence in the form of resiliency. In order to adapt to global development these interventions listed herein intend to introduce and integrate healthier patterns with the people through accessible tools, and designs. The premise fuses current architecture with ecology to provide clean water to extralegal settlers. The long term investment and potential of these interventions is immense and can help fortify this population to change their livelihood for the better more importantly bringing extralegal settlements out of the shadows and into a more prosperous light in the future.