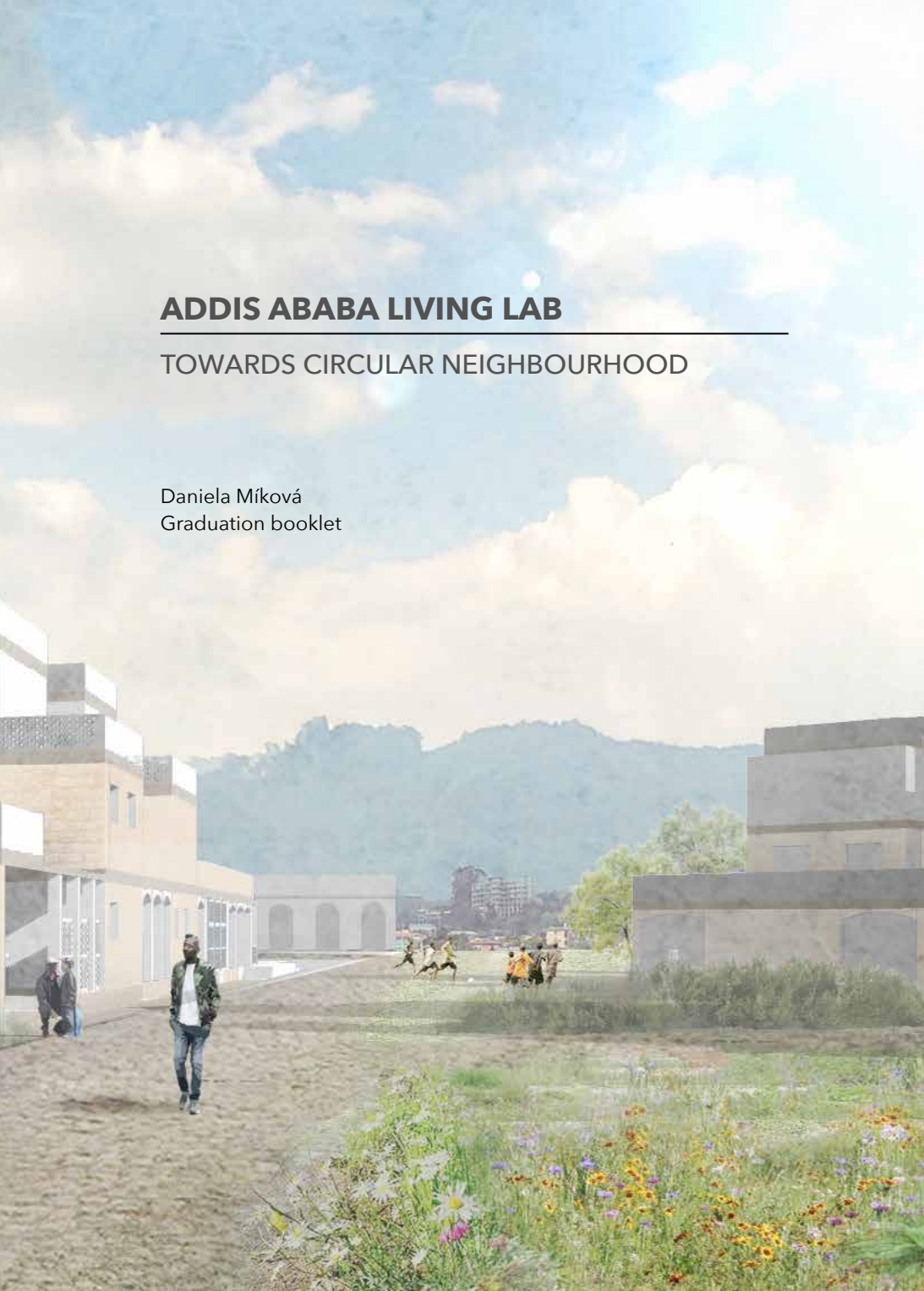
ADDIS ABABA LIVING LAB

TOWARDS CIRCULAR NEIGHBOURHOOD

Daniela Míková
Graduation booklet



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TOWARDS CIRCULAR NEIGHBOURHOOD

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4426404
Master's Thesis

TU Delft
Faculty of Architecture
Architecture & Dwelling
Global Housing Graduation Studio
Addis Ababa Living Lab
July 2020

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Ir. Stephan Verkuijlen

Acknowledgements

I would like to thank this way my parents for the unwavering support throughout my study years and dedicate this thesis to my grandmother, who believed that education is invaluable and made my studies at TU Delft possible.
I also thank my tutors Nelson Mota, Harald Mooij and Stephan Verkuijlen and all my friends for all the help and support on the way.

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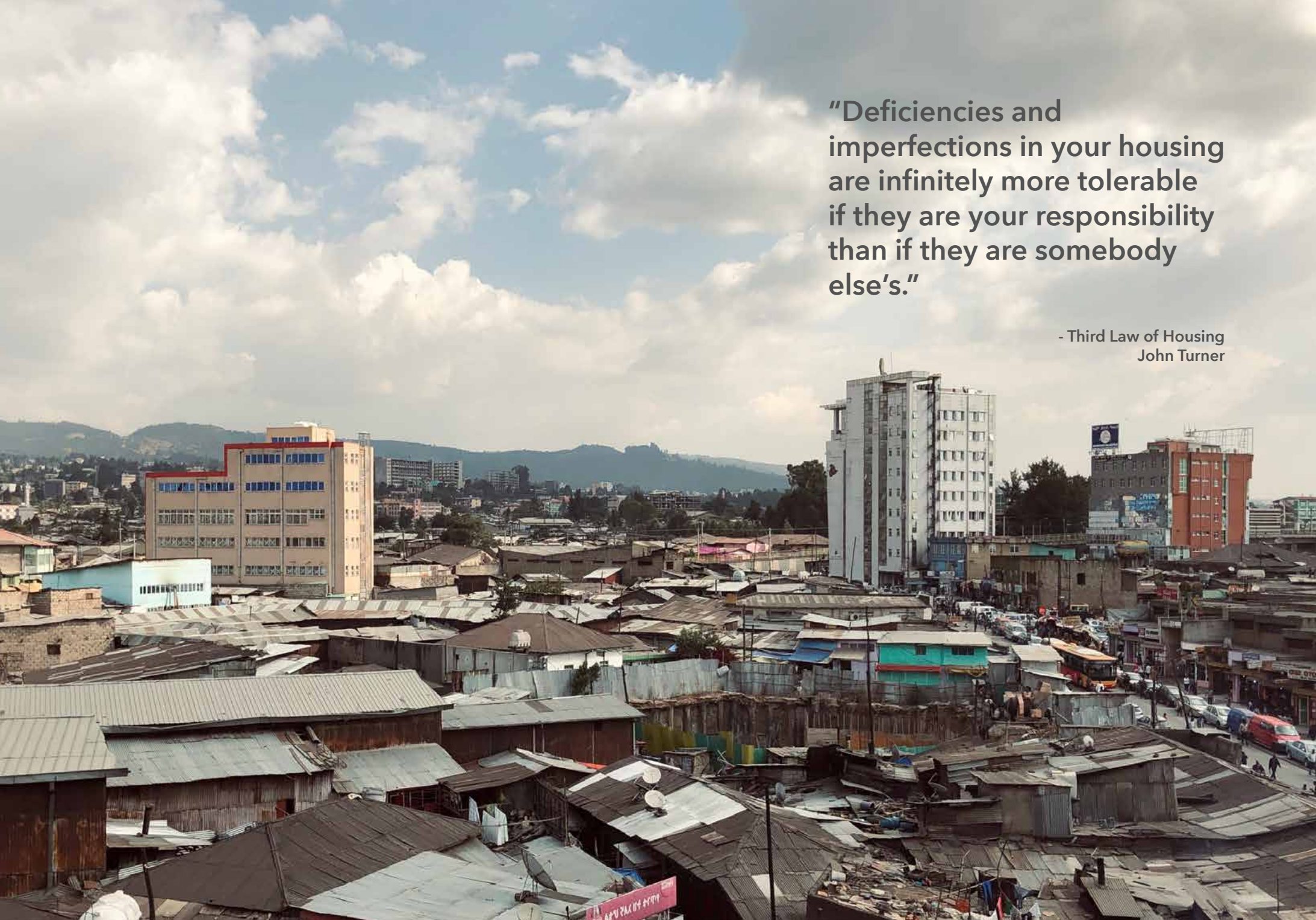


"Deficiencies and imperfections in your housing are infinitely more tolerable if they are your responsibility than if they are somebody else's."

- Third Law of Housing
John Turner

MARKET STREET
Addis Ababa

RESEARCH & BACKGROUND

Ethiopia

Ethiopia has always differentiated itself by being an independent and free state. As the most populous landlocked country in the world it has always maintained its sovereignty as well as uniqueqly preseved cultural heritage dating back thousands of years.

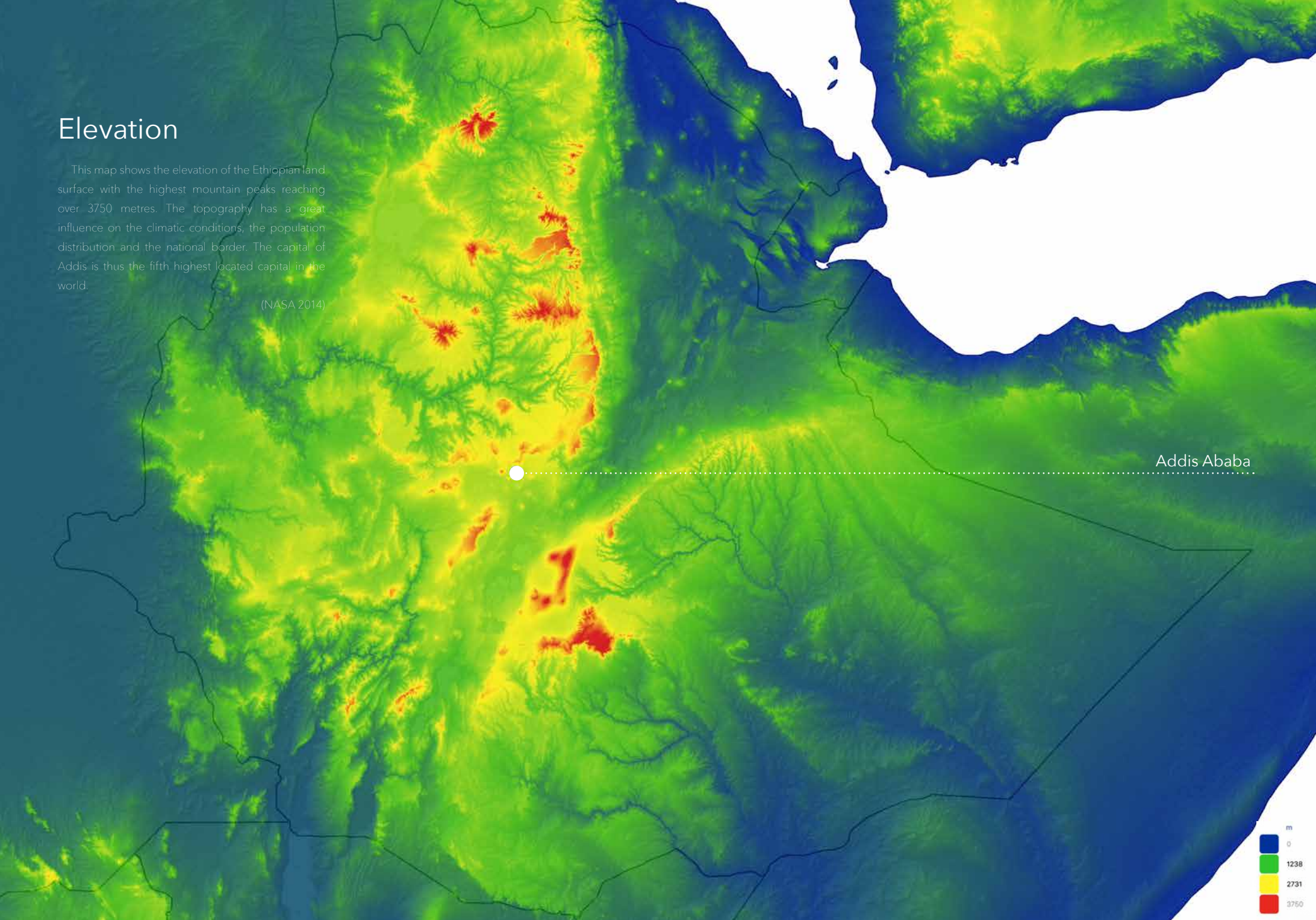
The second most populated country of Africa with 110 mil inhabitants comprises highly diverse ethnic groups that migrate to the capital for work. As a result the primate city of Addis Ababa accounts for 30% of the country's urban population.

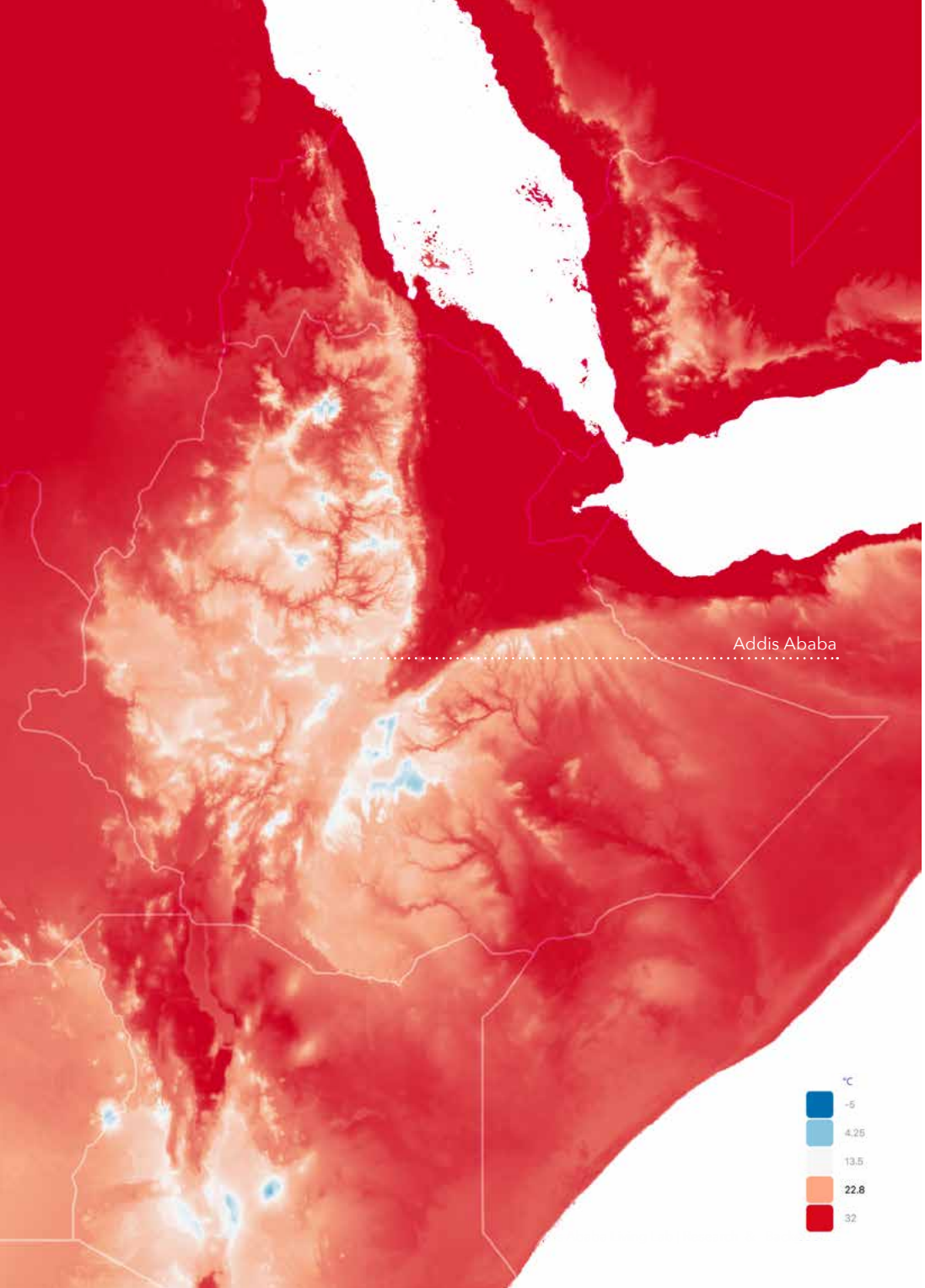
Due to the accelerated population growth the country faces number of challenges such as housing shortage, rising unemployment and deepening poverty.

Elevation

This map shows the elevation of the Ethiopian land surface with the highest mountain peaks reaching over 3750 metres. The topography has a great influence on the climatic conditions, the population distribution and the national border. The capital of Addis is thus the fifth highest located capital in the world.

(NASA 2014)



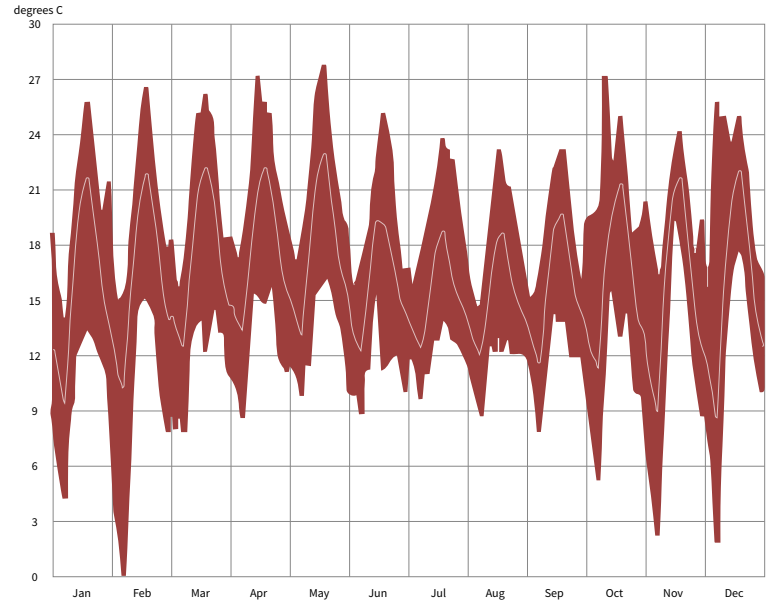


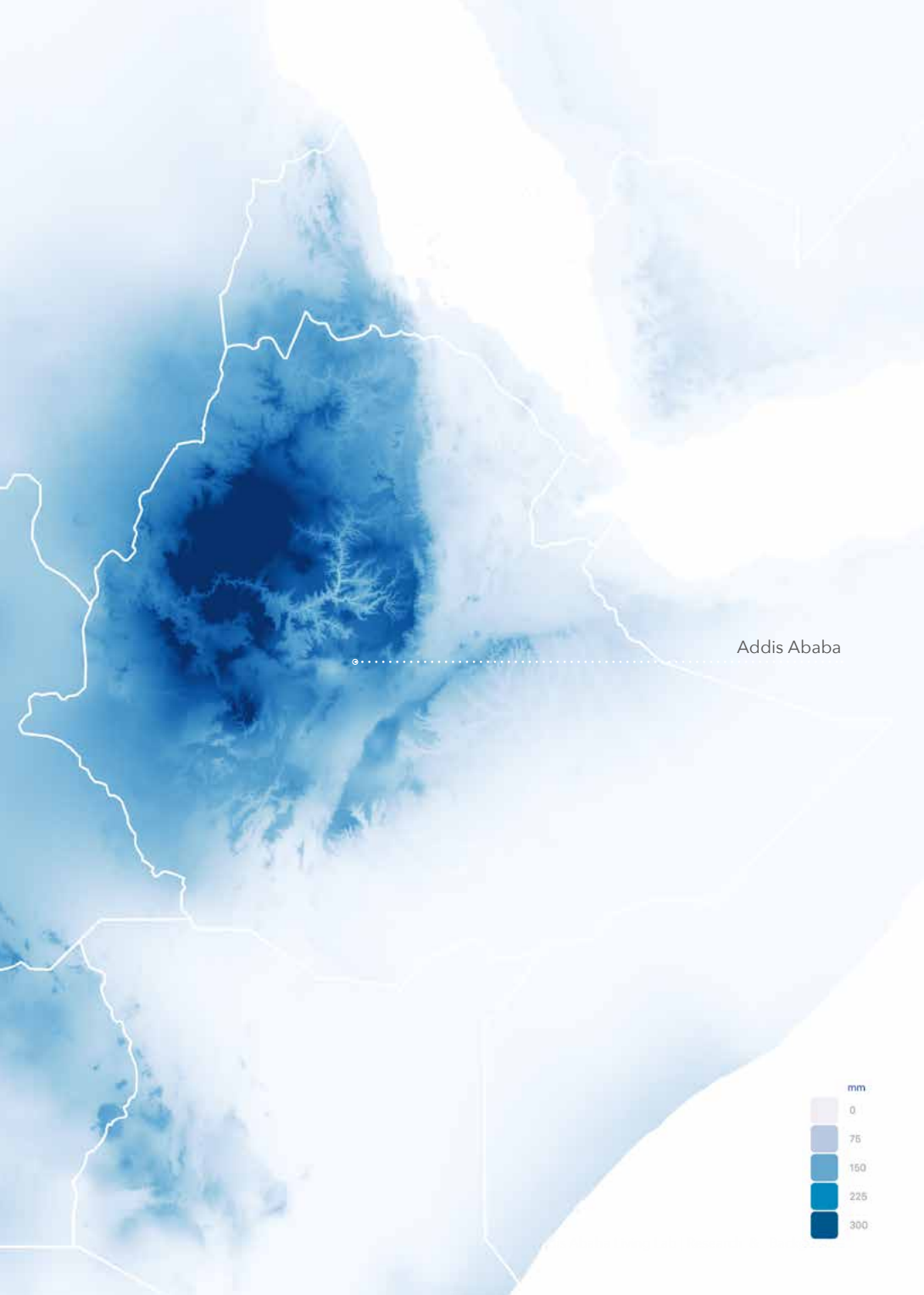
Climate conditions in Ethiopia

There are multiple different climatic regions in Ethiopia ranging from equatorial desert to a humid subtropical climate where the altitude plays a major role. Addis Ababa is situated at an elevation of around 2400 metres and has the climatic type of a subtropical highland climate.

In the diagram below the maximum and minimum temperature range of Addis Ababa. On the horizontal axis the months within a year are shown, and within every month an average 24 hour cycle is plotted.

The average temperature of 16 degrees celsius doesn't change much during the year, however, during the summer season there's a little drop.





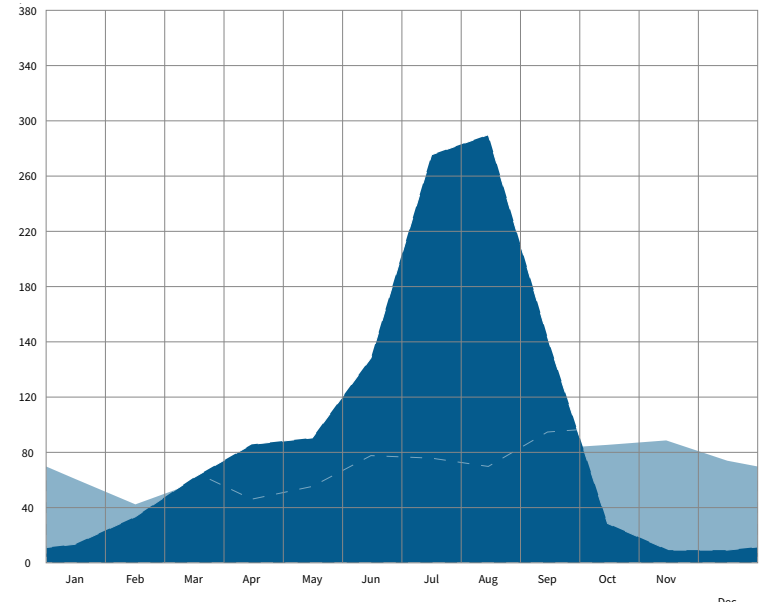
Precipitations

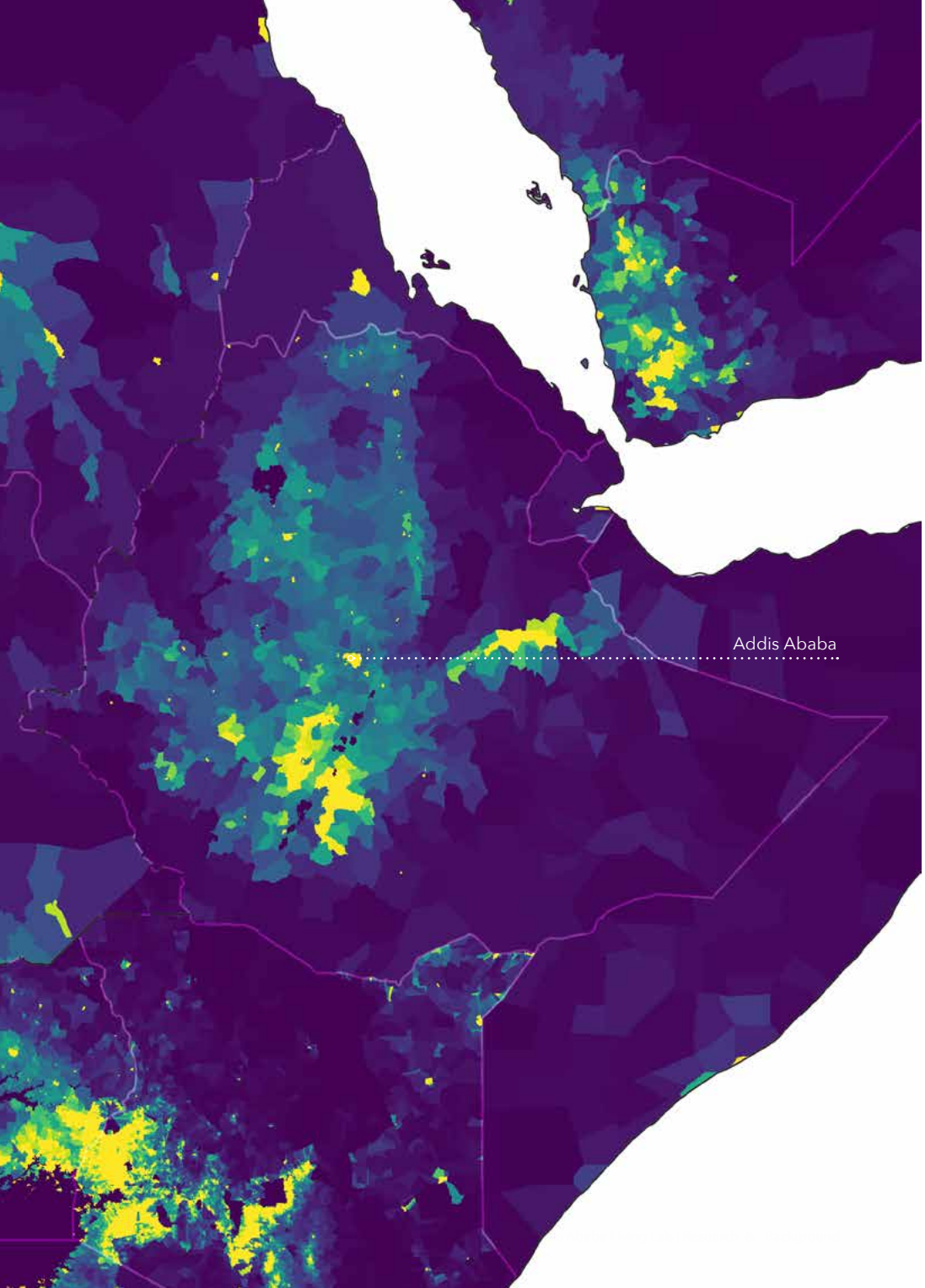
Addis Ababa has two seasons: a wet summer and a dry winter. In the months of July an August it can rain up to almost 300 mm per month. For a comparison the lighter blue graph on the background shows the monthly precipitation of Amsterdam.

(World Weather Information Service 2019)

The strong correlation between topography and precipitation is evident in the map representing the rainfall in the month of July.

(Fick & Hijmans 2017)

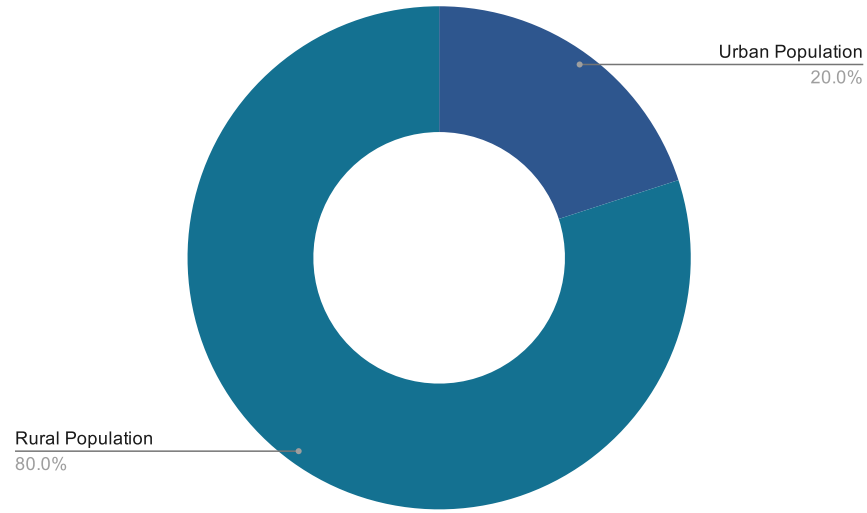




Population density

Ethiopia is one of the least urbanized countries in the world. With an urbanization rate of 20% at the moment of 2019 it ranks 175th of 188 listed by the World Bank (World Bank 2019). Nonetheless, it hosts in around a 110 million inhabitants. This means that there are 88 million people living in rural areas. The map on the left shows the population density in people per square kilometers. The yellow areas indicate regions with over 500 inhabitants per square kilometer. The map makes visible that most of the people inhabit the Ethiopian high plateau.

(CIESIN 2018)



Population density

The distribution of people living in urban areas in Ethiopia is very unequal. From the 20% of urban population almost 30% is living in Addis Ababa, with 3 352 000 inhabitants. The second largest city was Mekelle with 441 991 inhabitants. The radius of the circles illustrates the amount of people living in one city.

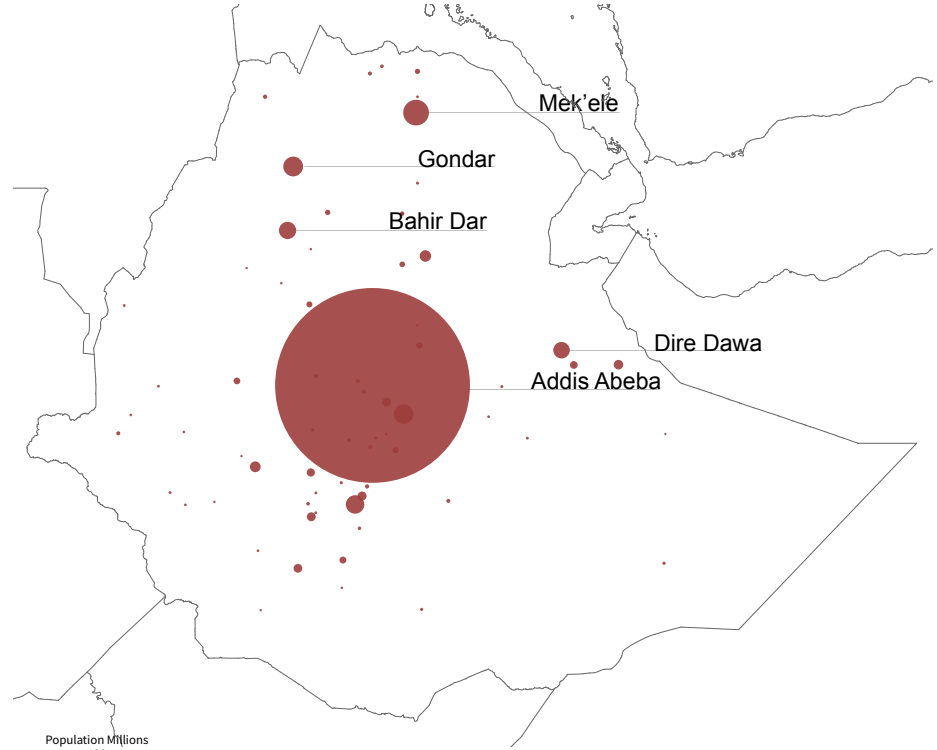
(Central Statistical Agency 2007)

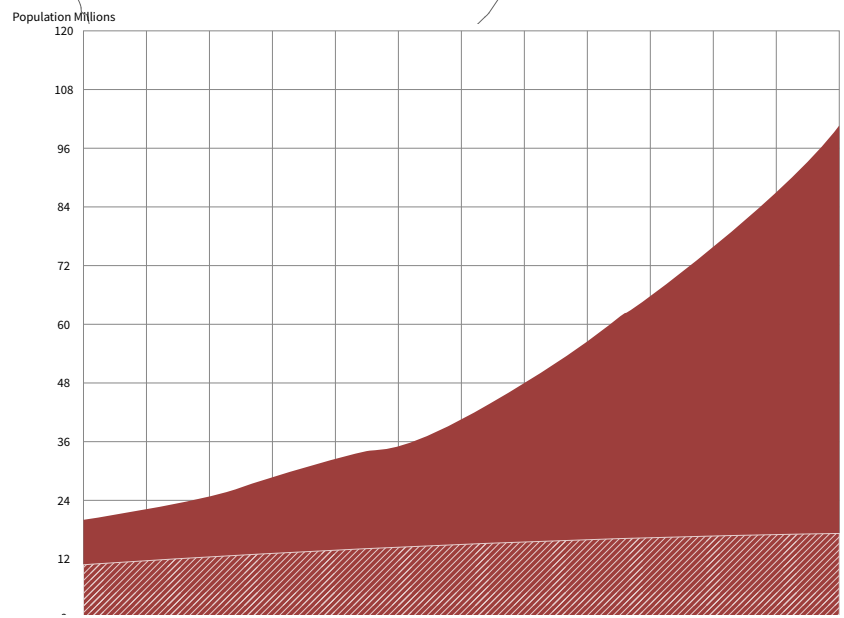
As of October 2019, The current population of Ethiopia is 112,976,188, based on Worldometers elaboration of the latest United Nations data. Since 1955 the population quintupled from 20 000 000, see the bottom graph.

(World Bank 2019)

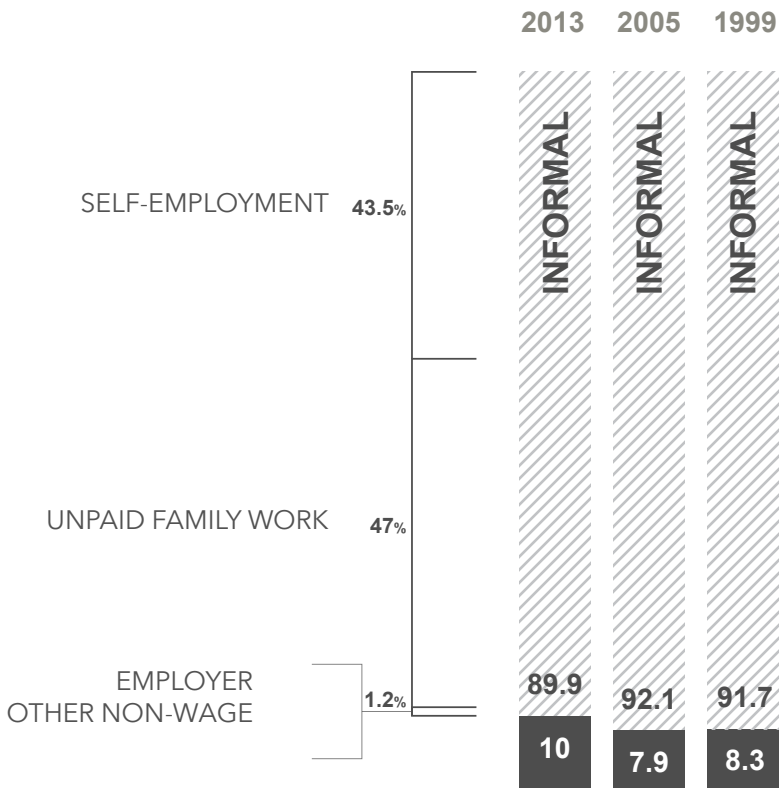
In comparison to the Dutch population which is shown in a thin white line. The diagram clearly visualizes the rapid population growth in Ethiopia. The infant, child, and maternal mortality have fallen sharply over the past decade, but with the fertility rate only slowly declined, therefore teh population continues to grow rapidly. Ethiopia's rapid population growth is putting increasing pressure on land resources, expanding environmental degradation, and raising vulnerability to food shortages.

(Worldometers, 2019.)

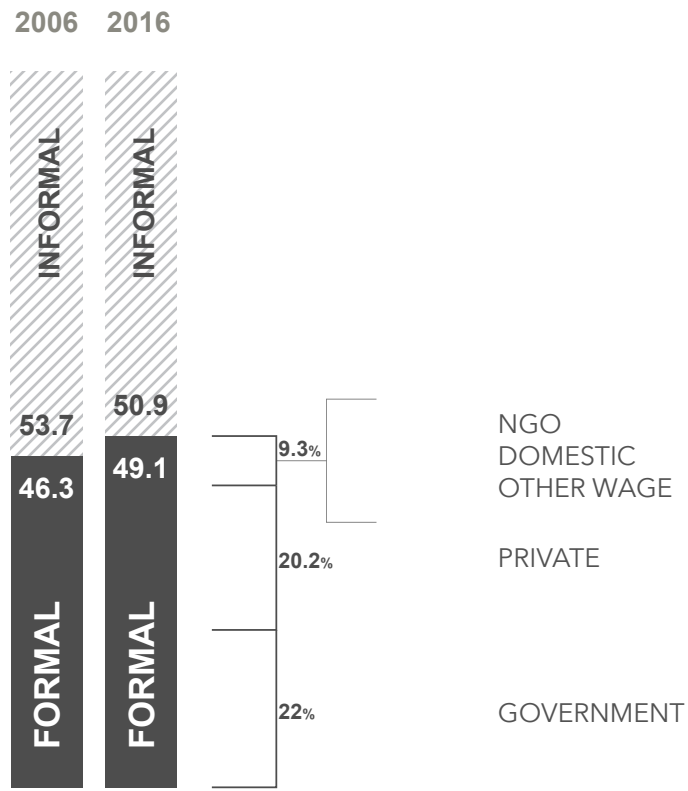




Formal / Informal income



Rural

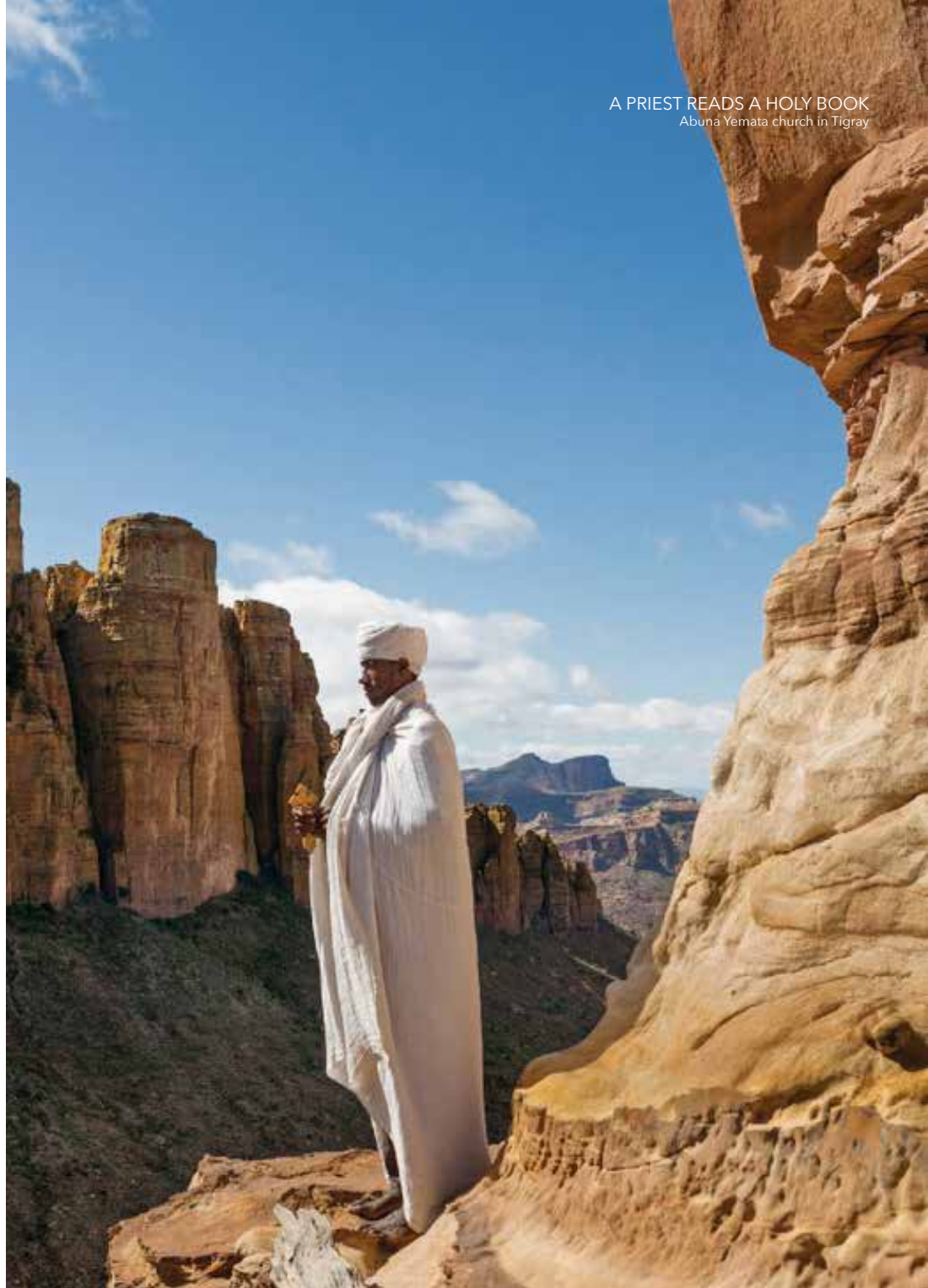


Urban

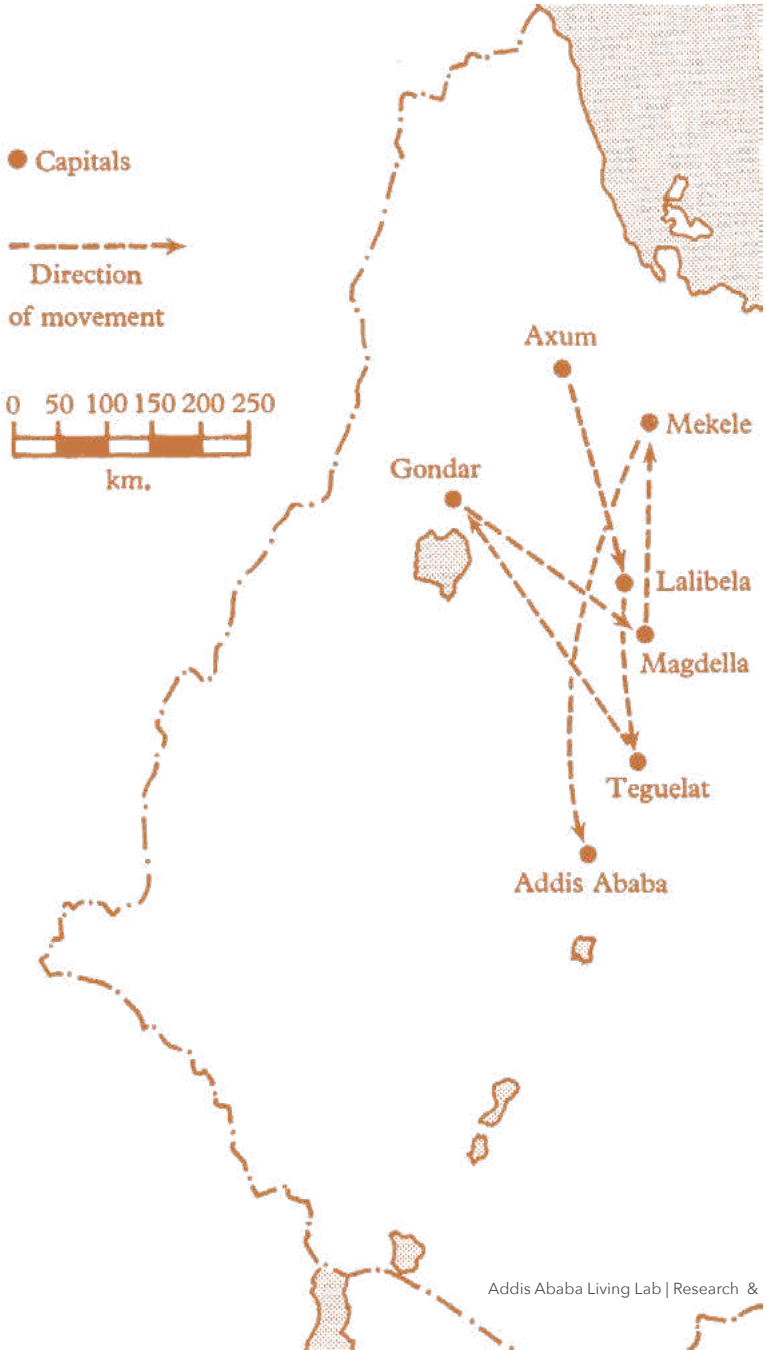
Religion

According to the national census conducted in 2007, over 32 million people or 43.5% wer reported to be Ethiopian Orthodox Christians, over 25 million or 33.9% were reported to be Muslim, 13.7 million, or 18.6%, were Protestants, and just under two million or 2.6% adhered to traditional beliefs. (Ethiopian Census, 2007)

In general, most of the Christians (largely members of the non-Chalcedonian Ethiopian Orthodox Tewahedo Church) live in the highlands, while Muslims and adherents of traditional African religions tend to inhabit more lowland regions in the east and south of the country. The numerous indigenous African religions in Ethiopia operate mainly in the far southwest and western borderlands.



A PRIEST READS A HOLY BOOK
Abuna Yemata church in Tigray



Wandering capitals and settlements

Ethiopian capitals in history would appear as masses of white tents and rural huts, which were positioned withou a specific order. However, they were extremely structured and similar to each other, despite the constant moving throughout the centuries.

In fact, as you can observe in the map to the left, the capital kept shifting both for miliary and cultural reasons. Within the same capital, the situation would look different throughout the year.

In fact, during the rainy months the king would leave the capital (throughout the night so that no one could attack him) to travel towards more pleasant destinations.

(Horvath, 1969)

MENELIK'S II PALACE
in 1934

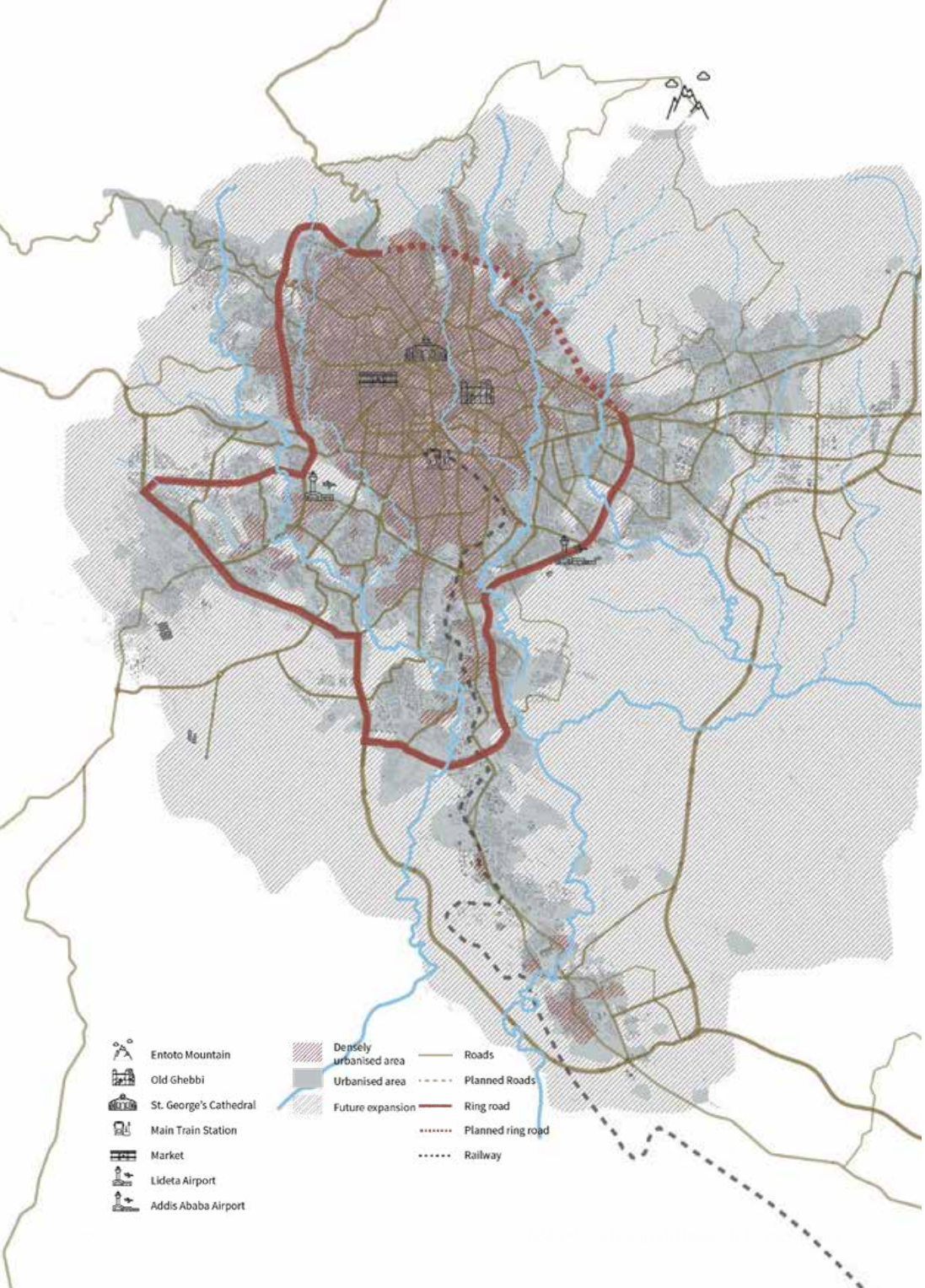
Addis Ababa as the capital

Addìs Ababa, namely "new flower", is the name that the emperor of Ethiopia Menelik II chose for this city in 1889.

In fact, he decided to found a new capital, wider and more modern than the previous one, Entoto. Entoto was a traditional African city, that is closer to a large rural village than a city: it almost had no masonry houses and was a collection of groups of huts with no real streets or squares.

According to Britannica, for the new capital a fairly flat terrain was chosen, but always on the plateau: Ethiopia, moreover, extends over a very high plateau and Addis Ababa (2,400m above sea level) is the African capital at the highest altitude. Both to make the place more pleasant and healthy, and to have plenty of firewood available, a eucalyptus forest was planted. It was also thought that they were a defense against the mosquitoes that transmit malaria. For the most part, eucalyptus trees still exist, though the city now has around 2,500,000 inhabitants and has expanded far beyond the edge of the forest.

Since 1970, Addis Ababa had a sudden development: hundreds of thousands of people poured into the capital, abandoning the regions most affected by a series of severe famines and the wars that involved the country. Many of the new inhabitants reside in informal settlements.



Urbanisation today

In the period around 2000, the population of Ethiopia grew rapidly. This is coupled with a high prevalence of urban poverty. The city suffers from a high amount of homelessness, urban decay, a high degree of unemployment and a shortage of infrastructure and basic services.

(UN-HABITAT, 2010)

At the end of the 90s, it became evident that the Ethio-Italian master plan was not capable of the threats and problems arising in the city. The plan lacked proper policy environment, legal framework, and flexibility. This resulted in the establishment of the Office for the Revision of Addis Ababa Master Plan (ORAAMP) in 1999 to transform the Ethio-Italian master plan into sustainable urban development, considering the social and physical environments. The ORAAMPS master plan uses structural plans; a general development framework, together with action-oriented plans; instruments to promote participation and partnership between the relevant actors.

(Mahiteme, 2007)

The revised master plan aimed to expand between already settled areas along trade routes with housing and mixed development. Mostly, these expansions are primarily occupied with state-led condominium apartment housing neighbourhoods. Besides, Addis expanded informally by migrants who are coming from the inner city and looking for affordable land for housing. However, there are others whose main goal is land speculation.

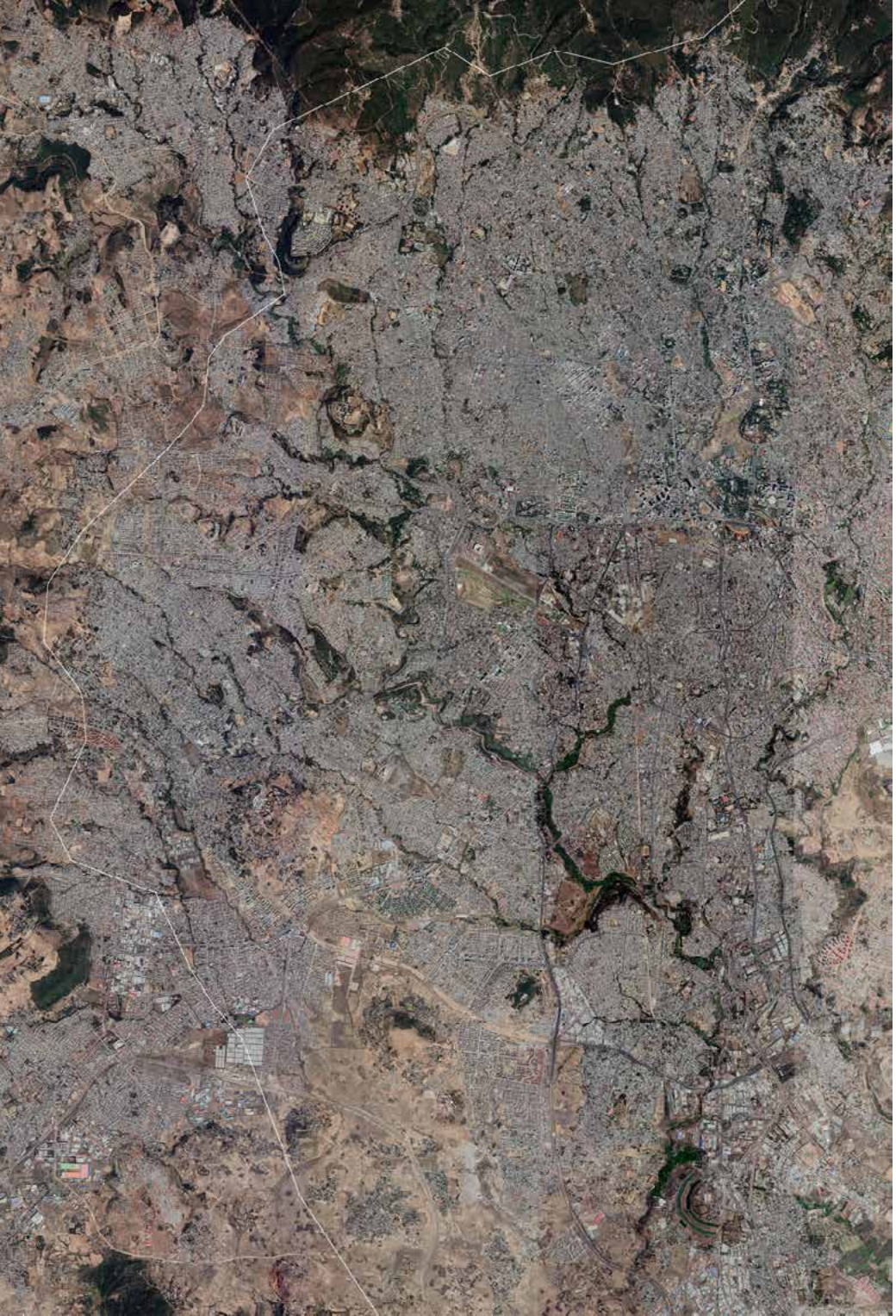
(Alemayehu et al., 2018)

Moreover, one can see how the North-south axis with its industrial expansion towards the south has expanded even further in the southern direction, beyond the Akaki-Kality industrial area. However, this is not only a place for industry anymore, but it is also a place that accommodates condominium housing projects and a university campus.

(Alemayehu et al., 2018)

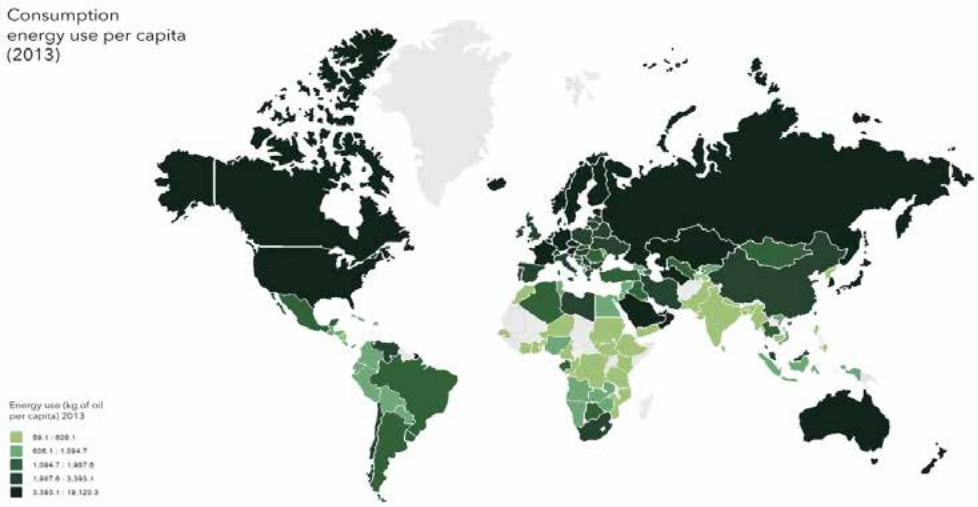
Furthermore, the city expanded along the other access roads of the city in the East and the Southwest directions. These were the areas where the main housing development areas were proposed in ORAAMPS master plan.

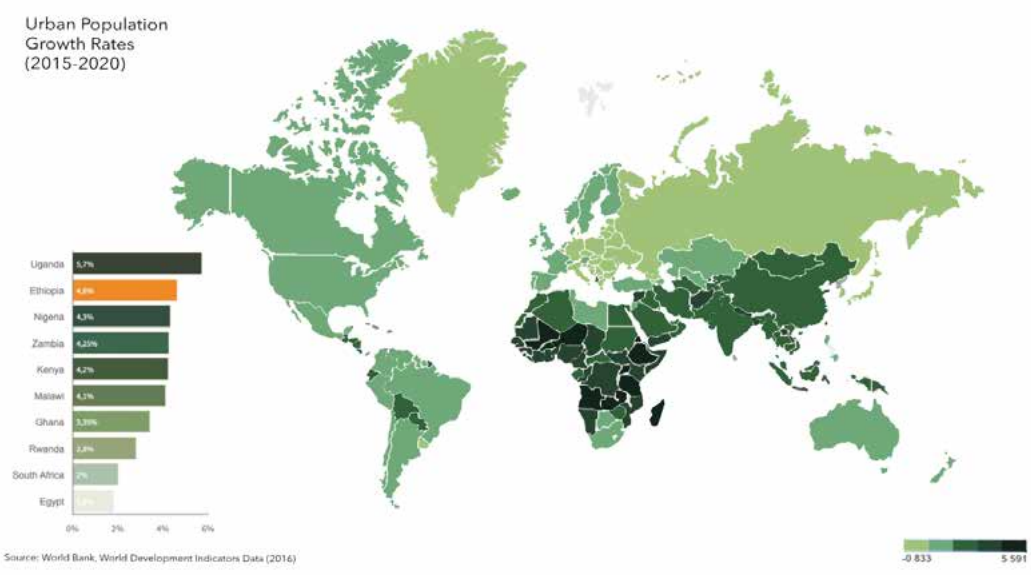
(Tufa, 2008)



ABANDONED CONTRUCTION
Addis Ababa

PROBLEM STATEMENT
&
RESEARCH QUESTIONS





Introduction

Africa is justifiably called the most circular continent with the lowest ecological footprint. People have an inherent understanding of reusing materials and valuing available resources, moreover local communities are often highly collaborative which is crucial for applying any circular strategies. However, these practices are not only connected to traditional ways of life but also to poverty and low living standard.

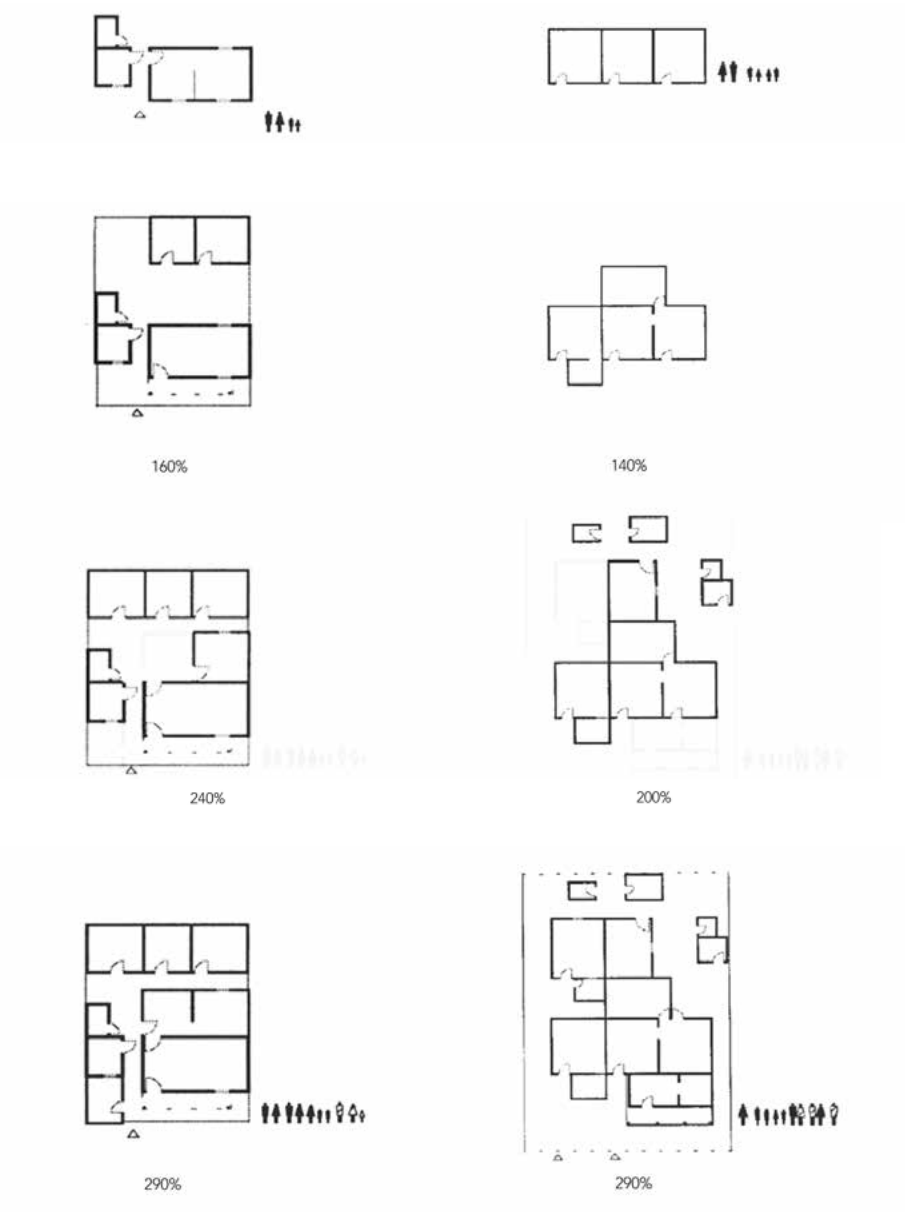
Many developing countries act today mainly as centres of global production but due to the accelerated population growth they are also about to become the global drivers of consumption in the near future. This presents a significant number of challenges in the Global South including Addis Ababa, an Ethiopian primal city and home to 30% of the country's urban population.

Rapid urbanisation, caused by many migrants from rural areas seeking livelihood in the urban centres result in the overall housing shortage, rising unemployment and deepening poverty without a strong legal and institutional framework.

Problem statement

The general problem stems from the fact that the low-cost housing provided by the government is unable to accommodate the increasing housing needs of the poor. Therefore, the vast majority of dwellings are being constructed and modified mostly through self-help activities.

This results in higher densities and overcrowding putting strain on the already overloaded infrastructure exposing people to health and physical risks and an overall low standard of living including insufficient public services, especially clean water and sanitation.



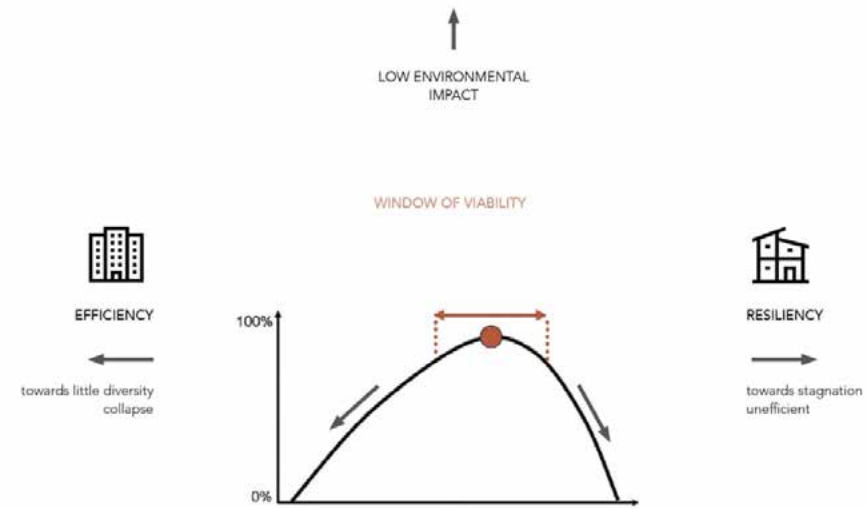
(Schifferau, 1998)

Resiliency vs. Efficiency

It's essential to find a solution to the urgent need for new urban housing that could translate current social cultures to physical environment, avoid further ghettoisation and provide sufficient accessibility of amenities, infrastructure and employment.

Seeking the balance between resiliency and efficiency at a low environmental cost requires adopting modular, adaptive and resilient design principles that would enable affordable quality housing. For instance, the sites and services scheme can provide such a solution by combining efficient use of resources and community participation.

By extending the house according their own needs the dwellers also increase the market value of the property without no cost to the government. Many community-driven strategies are nowadays embraced in Europe in the pursuit of transition from linear to circular economy.



CURRENT STATE OF THE RIVER
Kolfe Keranio, Addis Ababa

Site and Strategy

Large part of a community of about 500 families was resettled in this 'sites and services scheme' neighbourhood in the 80s from the area of today's Sheraton hotel in the city centre Specific problems of this neighbourhood arise from the self-help invariably horizontal extensions system resulting in the lack of urban land and congested internal and external spaces.

Moreover, the use of the extensions is mostly residential due to prohibition of commercial activities by the government preventing the inhabitants from developing any other functions in the neighbourhood contradicting one of the integral patterns of their lifestyle.

Even the potentially beneficial presence of a water source in the form of a river has minor positive impact due to the pollution and dense informal settlements subjected to regular flooding.

Elevating the low standard of living in the neighbourhood by improving its infrastructure, public spaces, and design approach could impact the social cohesion of the area and impact its surroundings by shortening the proximity of job opportunities and lacking amenities.

Many community-driven strategies are nowadays embraced in Europe in the pursuit of transition from linear to circular economy.

By applying circular principles in built environment such as land restoration, resource recovery, sharing infrastructure, promoting compact urban growth or water efficiency and remanufacturing of materials on the neighbourhood level could improve the chances for a long term resilience as well as affordability.

Mapping present positive patterns and developing new ones can be done on three different levels - community, infrastructure and construction.

Patterns

Firstly, for the project to be at least partly community-driven and to preserve the current social network sufficient communal and public spaces should be provided. On the flip side to respect the inhabitants' strong sense of privacy various thresholds and transitional zones in the neighbourhood require attention, as well.

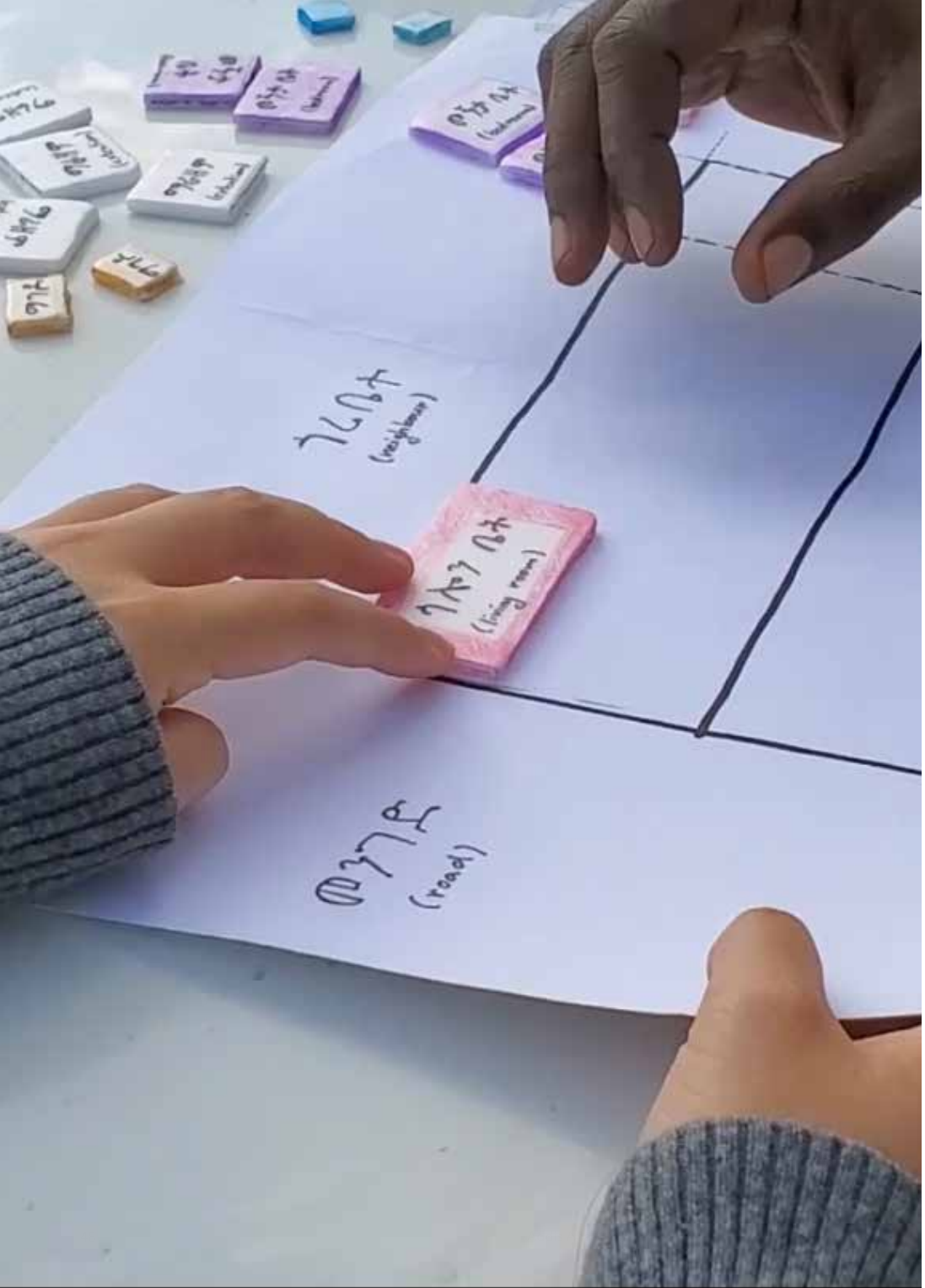
Secondly, water management in the area and revitalisation of the riverbank should be addressed as well as future of transport, alternative energy sources and waste treatment. The now informal commercial zone of the market could create more space and opportunities for the already present home-based economic activities.

At last, the materiality and construction of the housing is an essential part of a new circular design.

Reuse of current materials and technologies is important as well as looking for alternative building materials that are not scarce and don't need to be imported such as stone and soil.

However, improving the level of construction technology and know-how of the residents is essential for a future vertical development while embracing the self-build tradition.

Recycling old material and incorporating them into the dwellings is also a present pattern, however, a desire for higher quality and permanent materials is pervasive and should allow vertical extensions.



Research questions

Many positive circularpatterns are already embedded in current lifestyle for generations7 enabled by the neighbourhood's strongest characteristic, the invisible interdependent social network, raising the following question:

What is the potential of alternative circular design strategies and solutions while integrating present informal social network, patterns and values in low-income neighbourhoods in developing countries?

How could it be implemented in the case of widely self-help build neighbourhood in Kolfe Keranio, Addis Ababa, with the goal of sustainable built environment, affordable but resilient housing design, infrastructure and enhanced social cohesion?

Due to the informal sector of the economy present in many African cities the resulting 'lateral information and decision network' provides the inhabitants with resources the western countries have long forgotten about.

Therefore, integrating values and principles of circularity in the built environment would mean translating current positive patterns in a way that would also provide a higher living standard but wouldn't drastically change the people's way of live.

NEIGHBOURHOOD

CLUSTER / PRECINCT

DWELLING

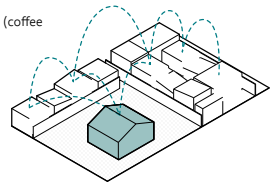
COMMUNITY

CURRENT

- established 'Sheraton' community
- communal funding of weddings and funerals
- shared central green space, field and restaurant
- appropriation of public space (e.g. attained front gardens around the neighbourhood)
- commercial activities in the local markets
- shared traditions (coffee ceremony etc.)

POTENTIAL

- shared amenities around the neighbouhood
- community centre / multipurpose space for celebrations
- available formal commercial space
- monument of place of significance to support identity of the neighbourhood

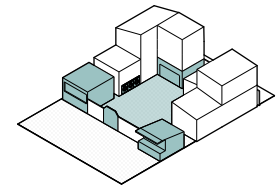


CURRENT

- appropriation of outdoor space and renting extensions
- shared courtyards with other tenants
- shared facilities
- shared entrance / gate to a property
- sporadic informal commercial activities in front of the house

POTENTIAL

- adjusting shared areas for communa function
- providing access to the street and ground floor
- opportunities for commercial activity on the property
- design for clustering of more hoseholds

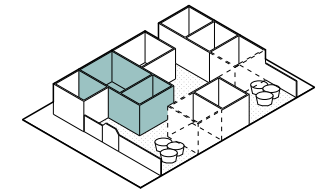


CURRENT

- home-based economic activities
- multipurpose rooms and spaces
- adjusting and repurposing original functions within the house

POTENTIAL

- incorporating home based economic activities in the design purposal
- flexible space for growth of the family or frequent visitors



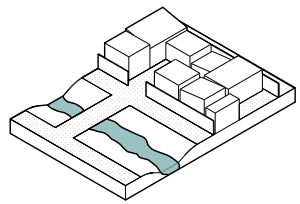
INFRASTRUCTURE

IRRENT

multipurpose markets on the perifery of the site
network of gutters
garbage collection
shared transport in the form of minivans rather then individual cars
school and church nearby the site

POTENTIAL

- more amenities needed in the area
- river bank renewal, revitalisation
- alternative transportation
- water treatment (rainwater harvesting, filtration, waste water treatment)
- biowaste collection
- alternative sources of energy

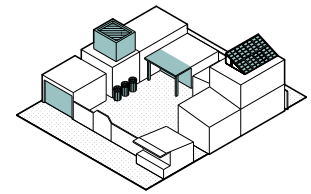


CURRENT

- original 'sites and services' scheme including water source, toilet and 2-5 rooms
- direct access to a collective or local road
- an access to a gutter on the street

POTENTIAL

- future necessity for parking
- waste treatment within the cluster
- adjusting the protection to climate conditions round the year (porches etc.)

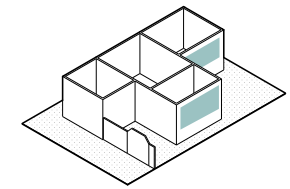


CURRENT

- adjusting the rented space to the inhabitants own needs
- minimal usage of appliances
- minimal usage of energy and water
- minimal waste production
- no vehicular transport

POTENTIAL

- improved electricity supply through renewable sources
- improved water treatment, water pressure in the households
- aerated kitchen and washing spaces



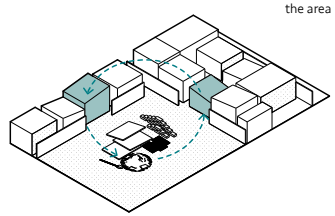
CONSTRUCTION

CURRENT

- re-using of materials
- collaborative self-help building activities
- use of local materials for 'chika' houses

POTENTIAL

- local remanufacturing of materials
- stock management
- material banks
- local production of building materials
- compact urban growth, densification
- creating more work opportunities in the area

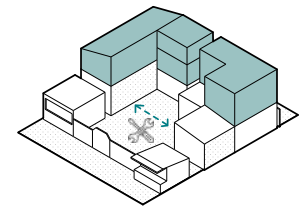


CURRENT

- sharing walls between clusters and dwellings
- collective maintanance, repair and upgrades
- horizontal extension significantly densifying the plots

POTENTIAL

- renewable energy production
- sharing knowledge and tools for self-help construction
- flexibility of spaces and potential for repurposing them within the cluster
- vertical expansions

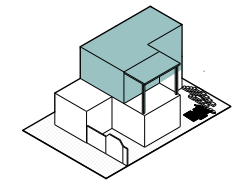


CURRENT

- local materials for 'chika' houses using the 'wattle and dub' technique
- repurposing materials and intergrating them in the contruction (plastic sheets, pieces of corrugated metal)
- self-help built extension with no cost to the government

POTENTIAL

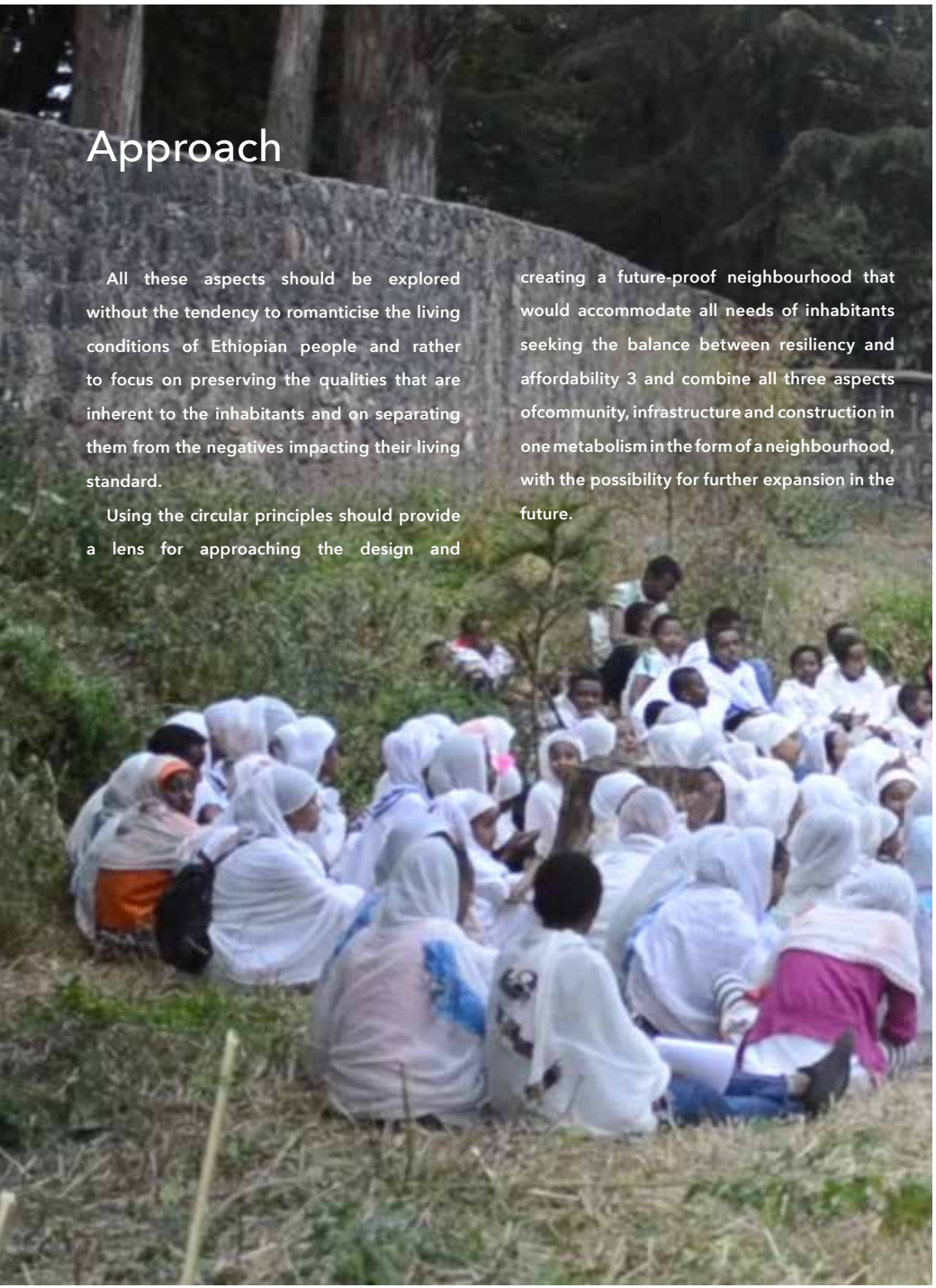
- use of stone and soil as local building materials (compressed earth blocks)
- improving knowledge of building vertical structures
- excluding imported (corrugated metal) and lacking materials (eucalyptus wood)
- modular building techniques



Approach

All these aspects should be explored without the tendency to romanticise the living conditions of Ethiopian people and rather to focus on preserving the qualities that are inherent to the inhabitants and on separating them from the negatives impacting their living standard.

Using the circular principles should provide a lens for approaching the design and creating a future-proof neighbourhood that would accommodate all needs of inhabitants seeking the balance between resiliency and affordability 3 and combine all three aspects ofcommunity, infrastructure and construction in one metabolism in the form of a neighbourhood, with the possibility for further expansion in the future.



INFORMAL SHOP
Kolfe Keranio

LOCATION

Kolfe Keranio

In the context of the whole city of Addis Ababa the area of Kolfe Keranio is a quiet large district on theperiphery spreading along the highway encircling the centre making it easily accessible.

Urban context

Visiting the site in person presents a striking comparison toonly reading a plan without any street views. At first sight it is not clear how isolated the site is from its surroundings.

To the south it is a fenced police academy, to the east river bank with two points to cross and to the west is a busy shopping street with a dead end and a hill. Making these the two main access points and that's also where the two busiest markets take place.

Another striking aspect quite clear from the map is the urban tissue of the site which if very inorganic. If we look at the main destinations of locals no only from the site which are the church and school and the two markets it does present some awkward route not to mention that the streets are very long and indistinct. Moreover there are only two points of connection across the stream. Therefore the goal was to create a more continuous routes for the residents throughout the site.

CURRENT INORGANIC URBAN TISSUE

ORGANIC PATHWAYS

CURRENT ROUTES OF LOCALS TO MARKETS, SCHOOL AND CHURCH

SUGGESTED URBAN TISSUE

MASTERPLAN

- CURRENT SITUATION -

357
PLOTS

650
HOUSEHOLDS

2540
INHABITANTS

194m² =
AVERAGE PLOT

1
FLOOR

FSI
0,5

HOUSEHOLD ENTRANCE
Kolfe Keranio

4 DESIGN

Masterplan

The data of the original site present a very dense neighbourhood at first sight, hoowever, what is not readable directly from the plan is that all extensions and densification is happening solely on the ground level, congesting all available space and still reaching the FSI of only 0,5.

The new situation that could be reached by the proposal is only a starzing point without the further selfhelp development that would follow.

The proposal is then not only raising the number of families that could live in this area to 190% of the current situation counting the informal ones too, but also creating more open public space and for the dwellers, while raising the number of dwellers to about 4800 enabling accommodation of all current residents while welcoming a number of new ones increasing the FSI to about 1,5.

MASTERPLAN

- PROPOSED -

332
PLOTS

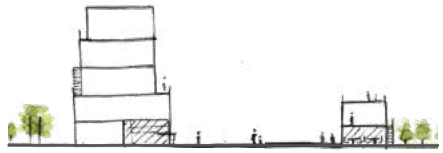
1250
UNITS

4852
INHABITANTS

1 UNIT = **3,9**

5
FLOORS

FSI
1,5

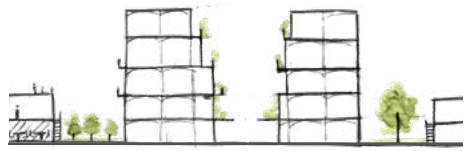


Street hierarchy

While drafting the masterplan the original logic of the streets is mostly preserved to take advantage of some of the present infrastructure but the hierarchy of the streets is way more diverse as well as adding more variety to the public spaces.

The two current informal markets are accommodated on the periphery as before to preserve this very lively entrance to the calmer centre of the neighbourhood.

There are the main vehicular streets and main access roads and secondary roads, that would be accessible only to the residents.



Street hierarchy

The third level of street are the semi public passages through the block, whose access can regulated but which are often continuous and provide many shortcuts for the locals as well.

The above mentioned pedestrian green corridors should enable more organic movement throughout the neighbourhood. Especially the paths and the revitalised riverbank area would be adjusted to relaxation purposes and as a flooding buffer zone during the rain season and rain water harvesting to reduce stormwater runoff, because inn most parts of the city, rivers are considered to be just sewage lines and garbage disposal sites.

Facilities

The new masterplan aims at the community by providing more amenities such as playgrounds, kindergarten, available commercial space or even space for possible urban farming. In the heart of the site should be a community centre equipped with library and material bank connecting the riverbank with a large square with a football field that would create a larger place of significance that would enhance the identity of the neighbourhood and where could also events organised by the residents could take place and replace the impromptu tents they currently build for for the events they sponsor collectively.

PROTECTION OF PRIVACY

EXTENSIONS

INFORMAL BUSINESS ACTIVITY

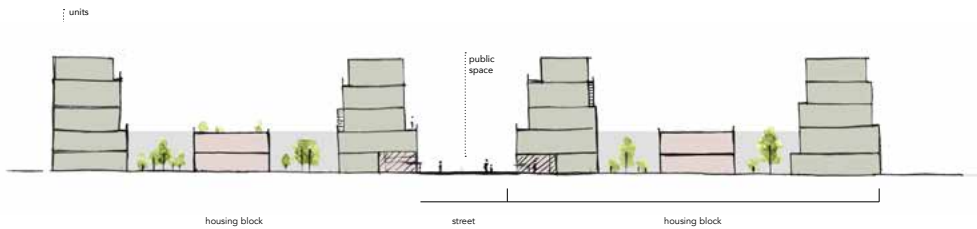
Current thresholds

The thresholds and transition zones in this project were an important topic, especially due to the entirely different environment and the fact that people might perceive these qualities differently than for example in western countries. The patterns differ naturally in the countryside and the city, however around Addis it is apparent that local people value their privacy immensely and protect it by putting up very high metal sheet fences with barbed wires.

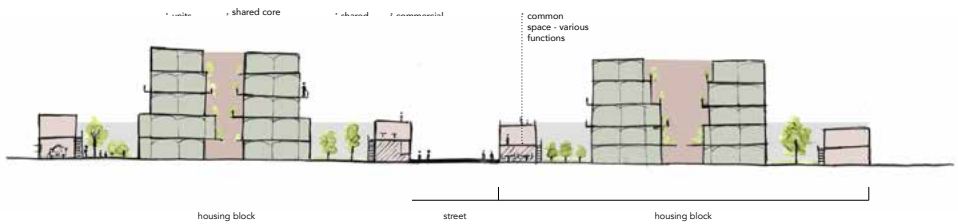
At first sight it appears to be due to security reasons, however, it is mostly due to the use of the outdoor space as a natural expansion of the dwellings where inhabitants do many daily things such as cooking and washing.

Because of that the basic block was on purpose designed in a quiet introverted manner to ensure the general requirement for privacy from public space but also to keep the precinct of the block or a whole cluster as flexible as possible.

A REGULAR BLOCK



AN 'INSIDE OUT BLOCK'



Pedestrian precinct

defining the block and its thresholds

The appearance of the block is defined by the patterns in combination with the very clear ambition of many interviewes people around the neighbourhood striving to do their business whether it was as an illegal shop on the street or a laundry washing business in their household, or just a lady sitting in front of her gate with a sewing machine waiting for her customers to pass by. All of that is currently banned in this area.

The result is a reversed design of the basic block where keeping all of this activity connected to the street was a priority as well as keeping this open space within the core more sheltered placing the circulation in the central space. Moreover, to preserve the current scale of the street and it as low possible to fit into the context of the site and keep this intimate feel of the streets.

There are many variations of the basic block in different urban contexts and transition zones around the clusters and provide space for the dwellers to stay in touch with the ground level. If the residents embrace the courtyard can still be changed from a very closed of version to this welcoming semi-open courtyard and to blur the


Coca-Cola
Pepsi

COMMUNITY

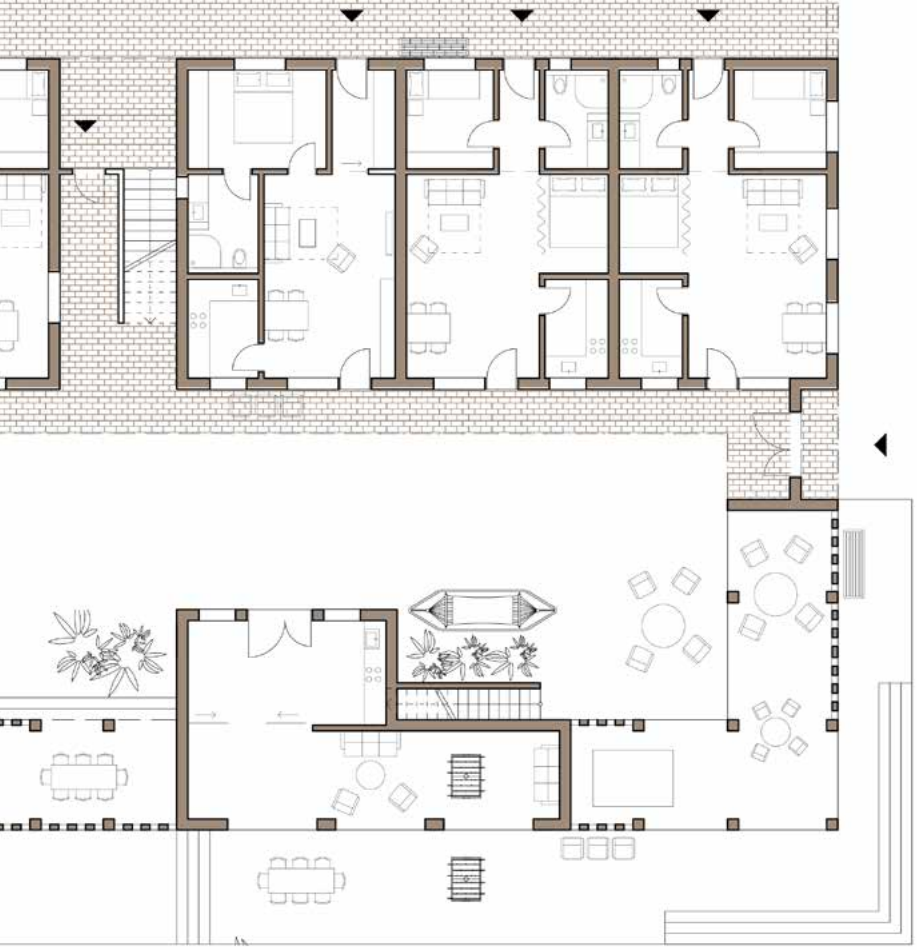
- adjusting shared areas for communal function
- providing access to the street and ground floor
- opportunities for commercial activity on the property
- design for clustering of more hoseholds

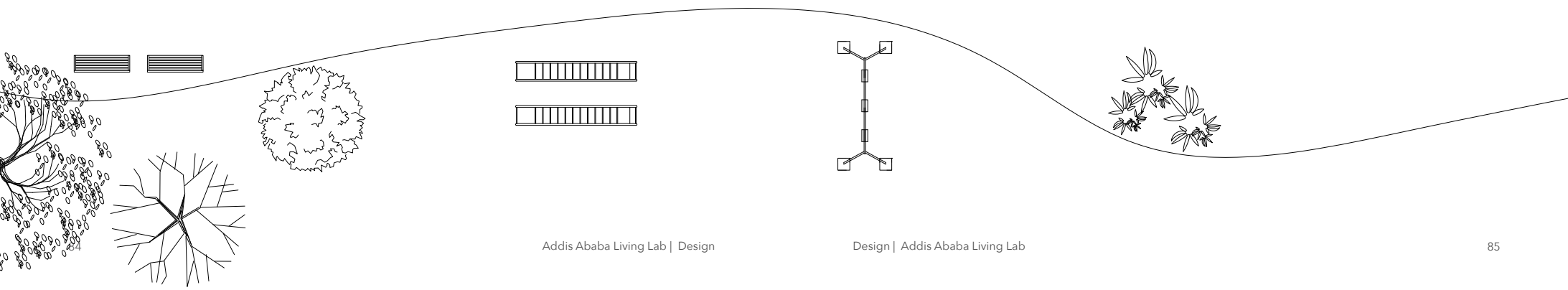
INFRASTRUCTURE

- future necessity for parking
- waste treatment within the cluster
- adjusting the protection to climate conditions round the year

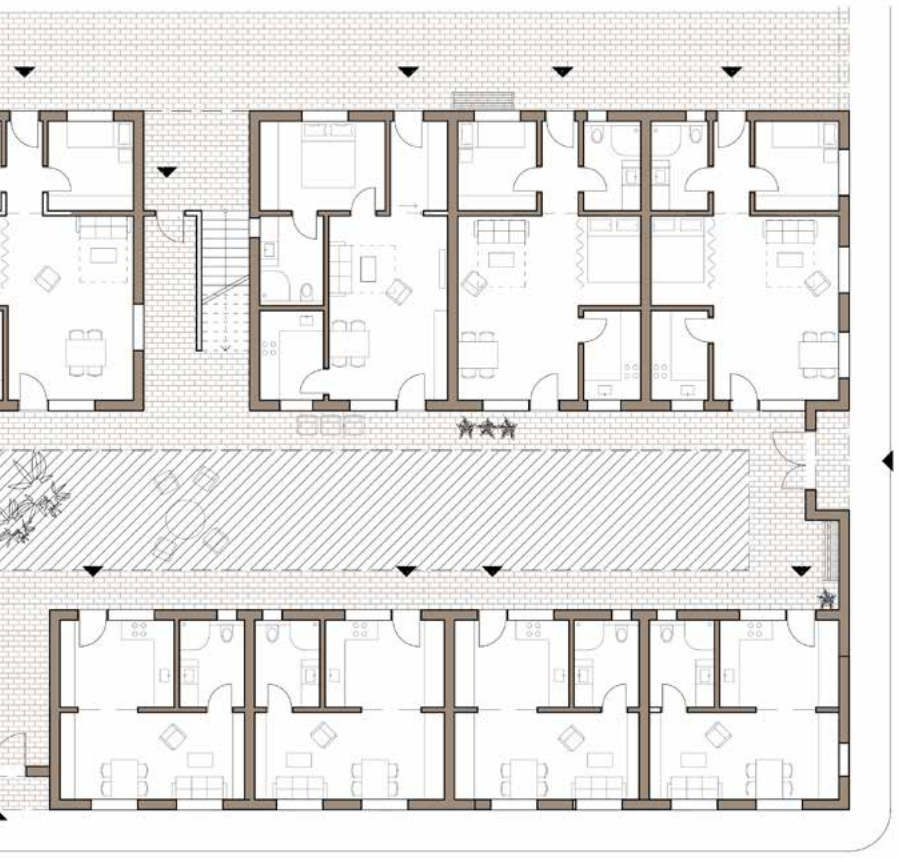
CONSTRUCTION

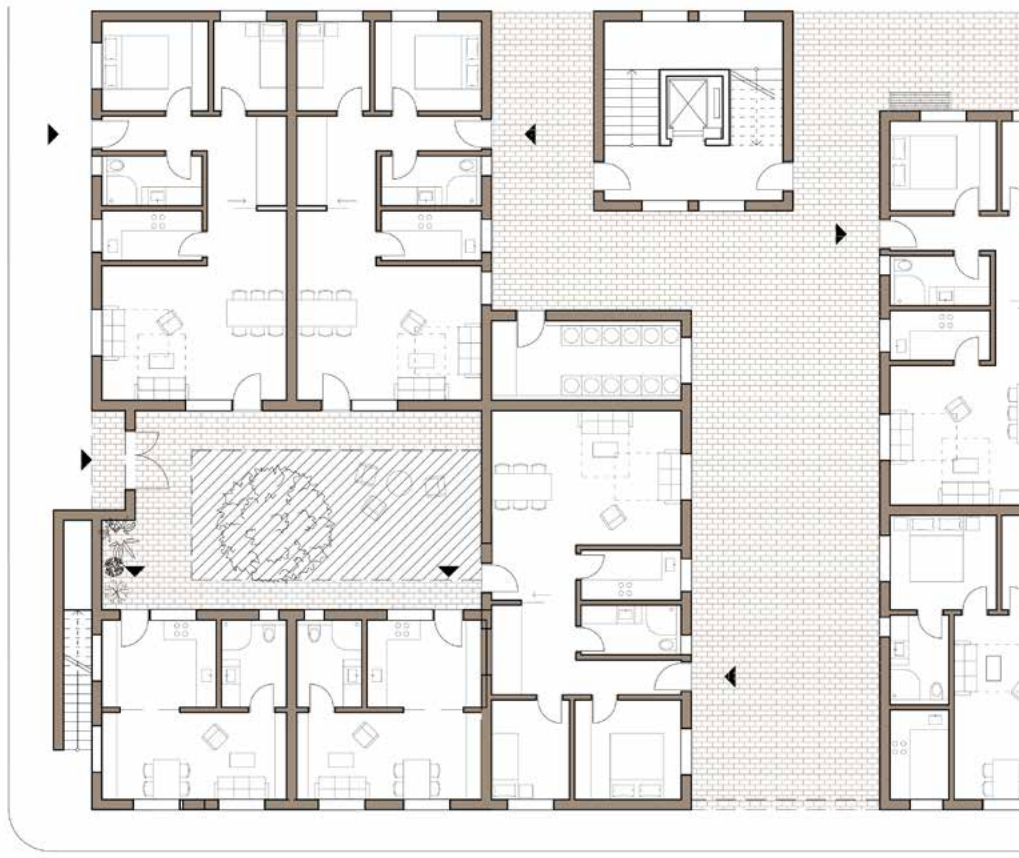
- renewable energy production
- sharing knowledge and tools for self-help construction
- flexibility of spaces and potential for repurposing them within the cluster
- vertical expansions





COMMUNAL COURTYARD OPEN
TO ITS SURROUNDINGS





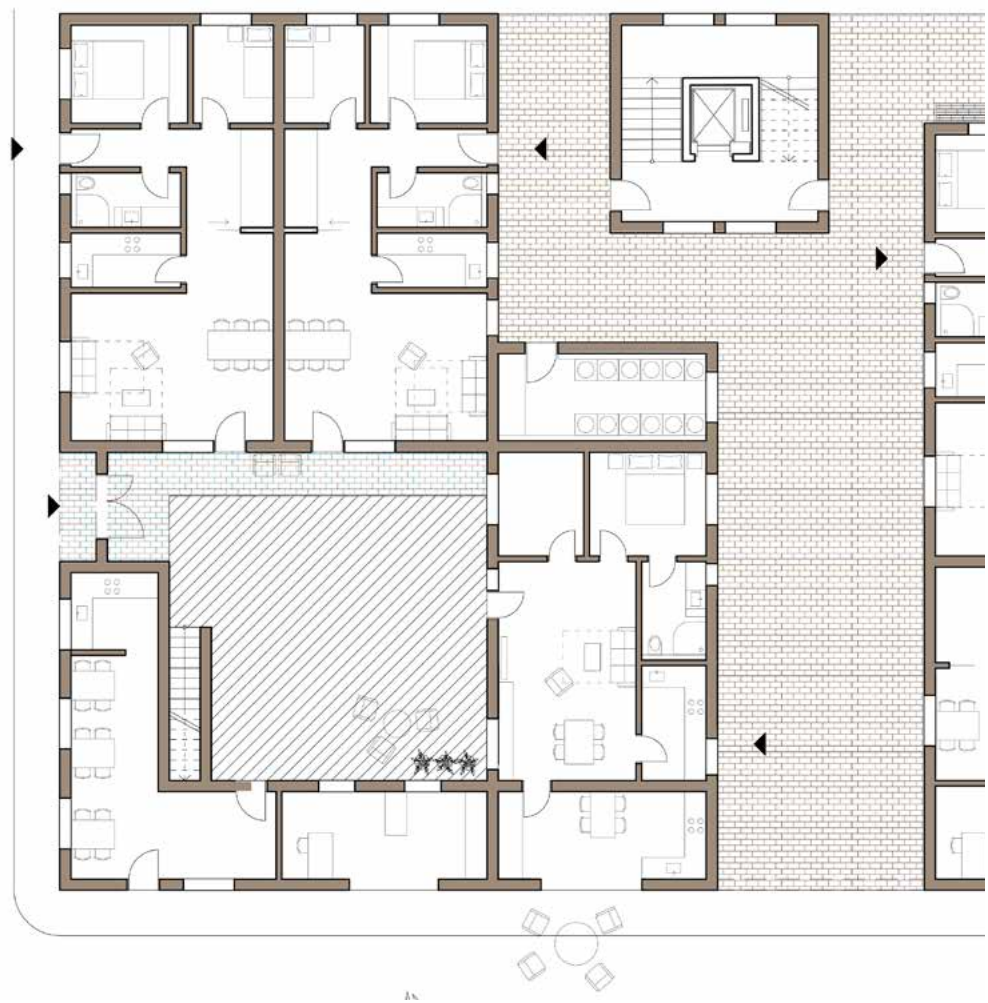
Variation & adaptability

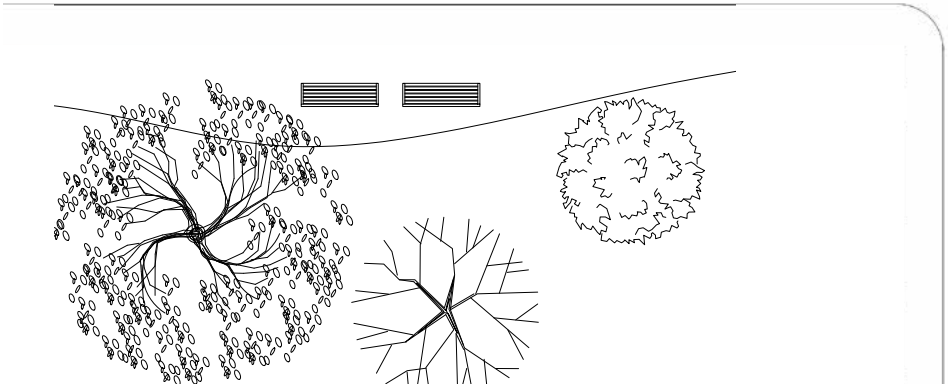
There are many variations of the basic block in different urban contexts and transition zones around the clusters and provide space for the dwellers to stay in touch with the ground level. If the residents embrace the courtyard can still be changed from a very closed of version to this welcoming semi-open courtyard and to blur the line a bit or more housing if necessary. Or a mix of all three scenarios.

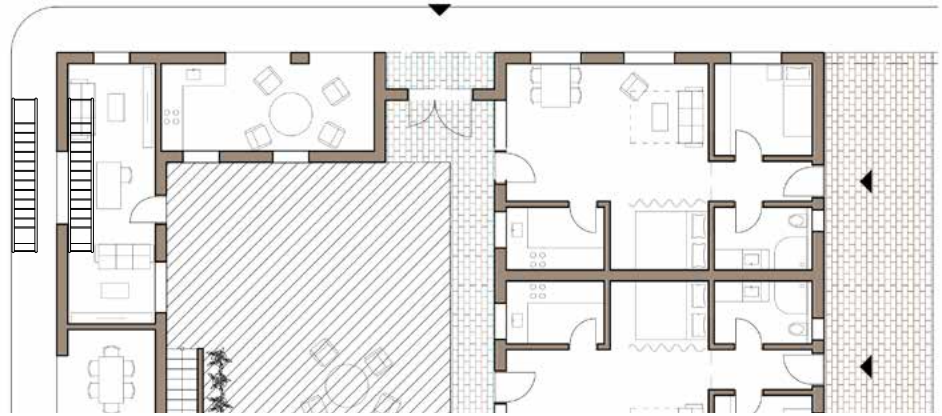
Noticeable is the inherent tendency of the locals to appropriate space immediately and collaborate on expanding their dwellings. Therefore, an original design or intention might change drastically over time which is unavoidable especially with such an open design difficult to fully control.

These are just suggested scenarios of how the next stages could look like. The development could be influenced for example by the community centre material bank where people could be given options and tools and consequently consider expanding their dwellings in a similar manner. That's also where the reuse and repurposing of the material already present on the site could take place.

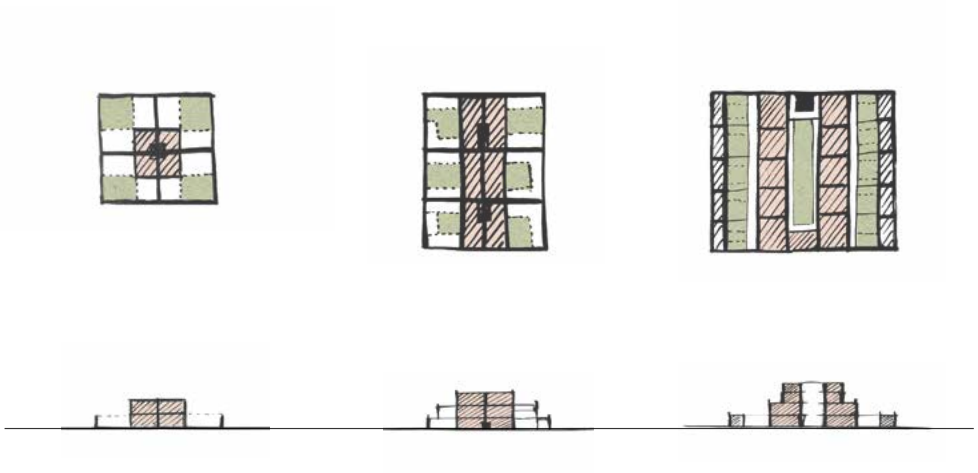
COMMUNAL COURTYARD WITH EXTRA
AFFORDABLE HOUSING UNITS







COMMUNAL COURTYARD WITH
COMMERCIAL SPACE



Block evolution

The evolution of the initial block that shows that the overall goal was to keep the private dwellings compact in the middle while increasing the quality of the surrounding variety of shared spaces. Resulting in a dense block structure that comprises various residential typologies with mixed forms of tenure and still allows the residents to share resources, time and knowledge within, which is a common theme throughout the whole project on all scales.

COURTYARD TYPE A

23 UNITS

ACCESS TO COURTYARDS: 12 UNITS

TERRACES: 11 UNITS

COURTYARD TYPE C

11 UNITS

ACCESS TO COURTYARDS: 6 UNITS

TERRACES: 5 UNITS

SECTION A

COURTYARD TYPE B

14 UNITS

ACCESS TO COURTYARDS: 8 UNITS

TERRACES: 6 UNITS

Ground floor plan

four courtyard typology

The initial block ground floor plan consists of four courtyard buildings connected on the ground level by two perpendicular semi private passages that are possible to close over night and a circulation core.

Section B throughout the units and the widest point and a secondary staircase. The quality of this space is important because it serves as an access point to most of the units.

Section A illustrates the receding structure from the central space to let the daylight in as well as white paint to reflect the light.

There are three courtyard typologies that can be combined in different ways. 23 / 14 and 11 units per courtyard.

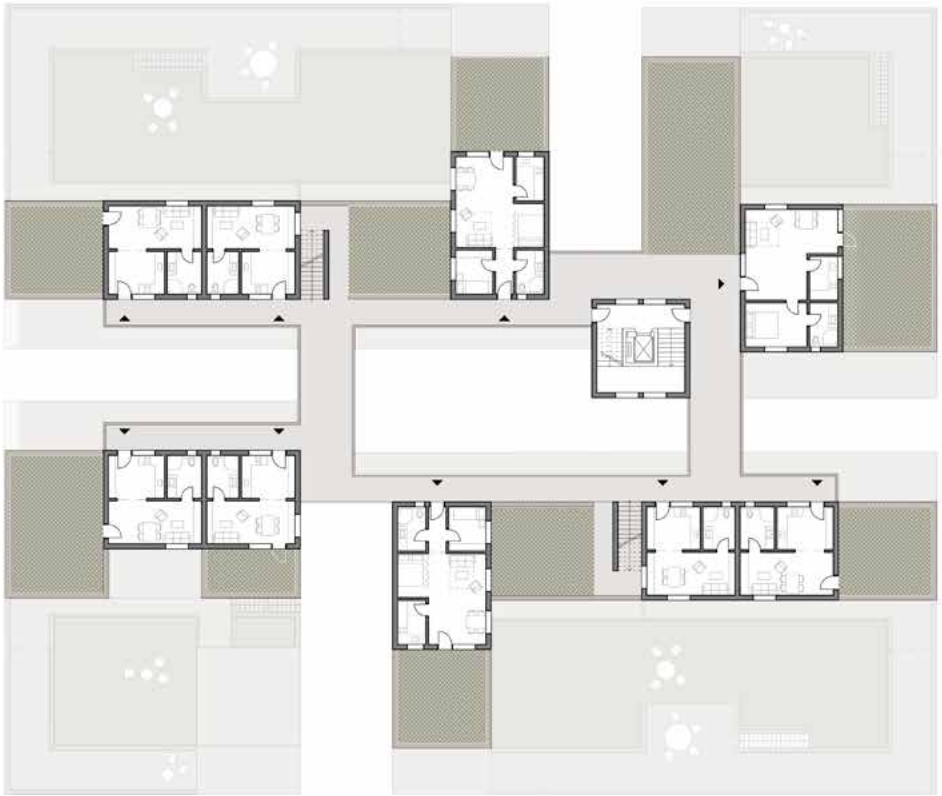
The goal was to allow all people to have an access to an outdoor space, whether it be a terrace or a garden that would allow expanding into the outdoor space as is common around Addis.

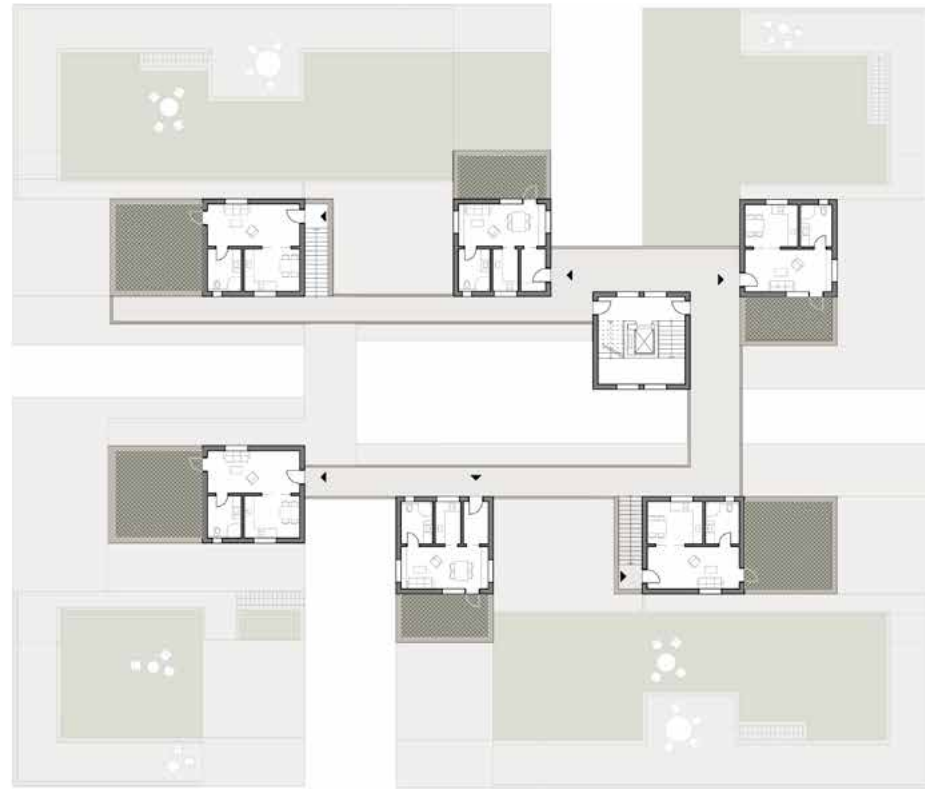
The ground and first floor units are connected to the ground floor only through these staircases and these are also the units that have direct access to the courtyards. That means that the courtyards are accessible to 13, 8 or 6 families at the same time.

The upper three floors are accessed through the circulation core or one of the two staircases and have spacious terraces, however the size of these units is more modest due to the possibility to expand it to almost double its size.

1st and 2nd floor

3rd and 4th floor





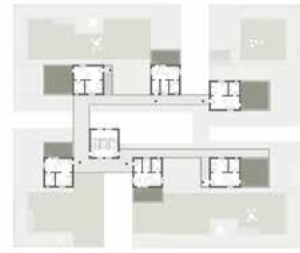
Section AA'


balconies
and terraces
space for
home-based
economic
activities
possibilty to expand
on the roof
access to terrace
from the courtyard
access to
the roof
verandas
for covered
circulation
private courtyard
commercial activity
with a storage space
street
retail
courtyard
dwelling units
passsage
dwelling units
courtyard
retail
street
PUBLIC
SHARED
PRIVATE
SEMI-
PUBLIC
PRIVATE
SHARED
PUBLIC

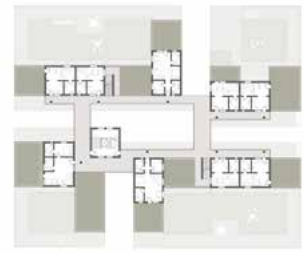
Section BB’

street | dwelling units | passage & circulation | dwelling units | staircase | dwelling units | street

PUBLIC | PRIVATE | SEMI-PUBLIC | PRIVATE | SEMI-PUBLIC | PRIVATE | PUBLIC



4TH
FLOOR



3RD
FLOOR

2ND
FLOOR

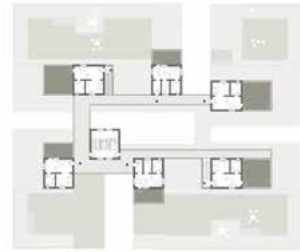
1ST
FLOOR

GROUND
FLOOR

63sqm

units variations

There are three sizes of units varying between 30, 48 and 65 sqm within the block. Each unit has an access to a courtyard or a terrace and location within the block and the number of smaller units grows with the number of floors.



4TH FLOOR

3RD FLOOR

2ND FLOOR

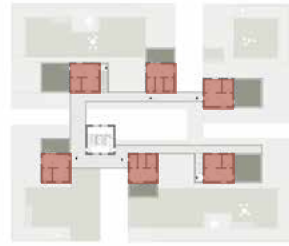
1ST FLOOR

GROUND FLOOR

48sqm

units variations

In the dwellings' design it was essential to incorporate an open flexible active space for growth of the family or frequent visitors or for example for daytime home based economic activities. Naturally aerated washing spaces and kitchens that would be adjacent to a terrace or a courtyard where the informal expansion could take place.



4TH
FLOOR

3RD
FLOOR

2ND
FLOOR

1ST
FLOOR

GROUND
FLOOR

30sqm

units variations

These dispositions are various scenarios but the basic grid is the same, so the inhabitants actually have a lot of freedom to adapt the space to their own needs to make an even larger shared space or more smaller bedrooms etc.

BUILDING TECHNOLOGY

Materiality

locally sourced, reused and imported

Ethiopian soil is rich with high levels of clay particles which makes all excavated earth all around Addis Ababa a potential source of building material. The pressed loam stones could be produced on or nearby the site as well as the necessary workforce and enhance this way the know-how of the locals as well as create new work opportunities. A priority was using locally sourced materials like soil, stone and bamboo as well reusing currently present materials such as corrugated metal sheets and a lot of plastic that's already present on the site.

SOIL

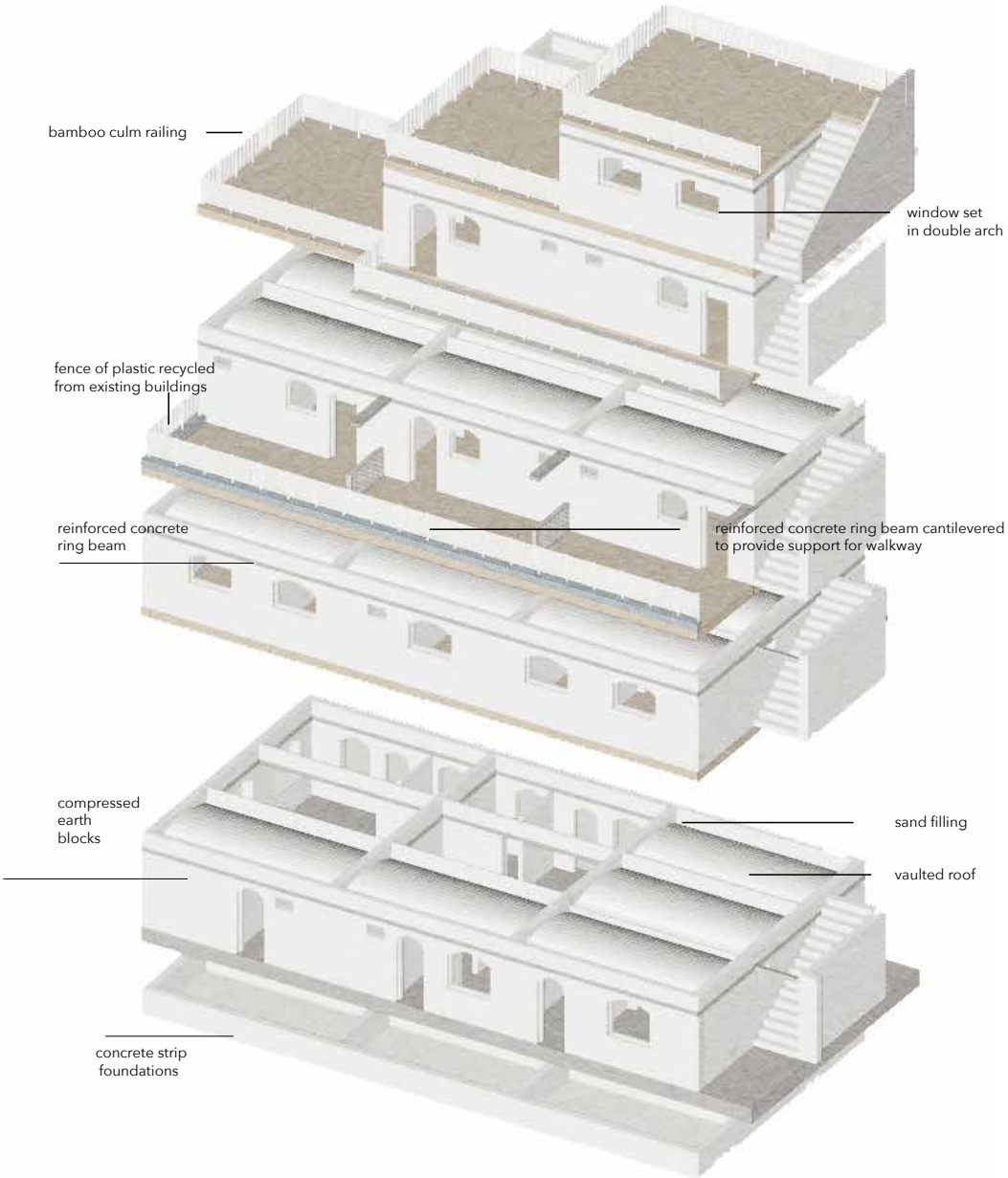
STONE

BAMBOO

REUSED METAL

RECYCLED PLASTIC

REINFORCED CONCRETE

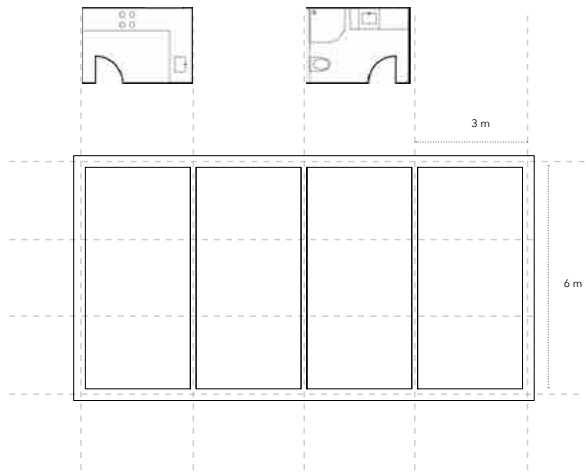


Structure

A priority in the structure was to enable the vertical growth therefore less sustainable elements such as ring beams distributing the weight and cantilevers from reinforced concrete that were necessary for the stability but were kept to a minimum. The load bearing structure is a combination of compressed earth blocks and reinforced concrete elements.

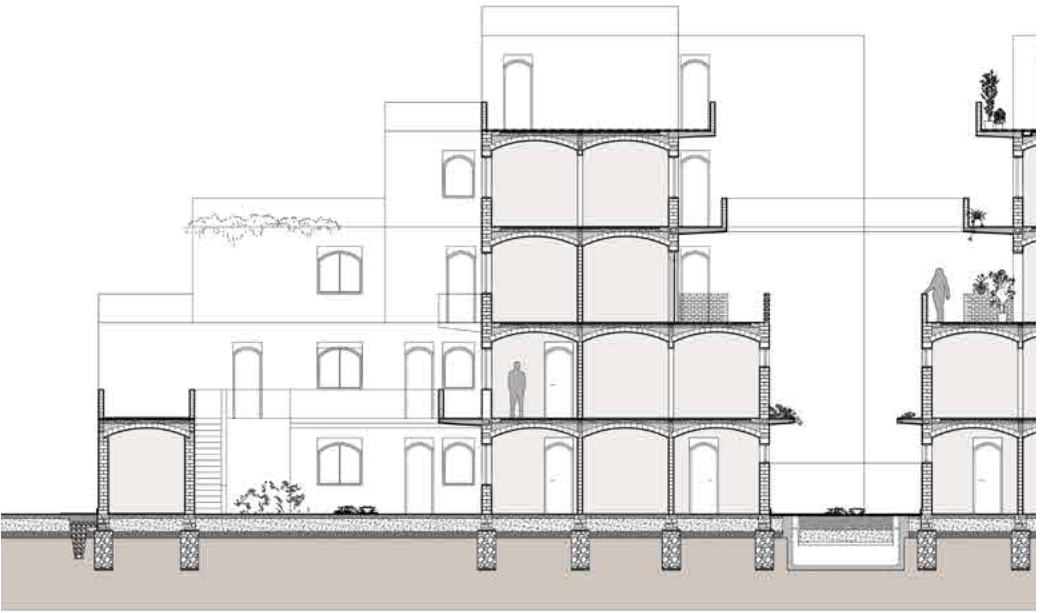
The ceilings are tile vaulted structures using only local materials and the choice of this technique was made due to the minimal formwork and therefore no need for imported materials and minimal carbon footprint.

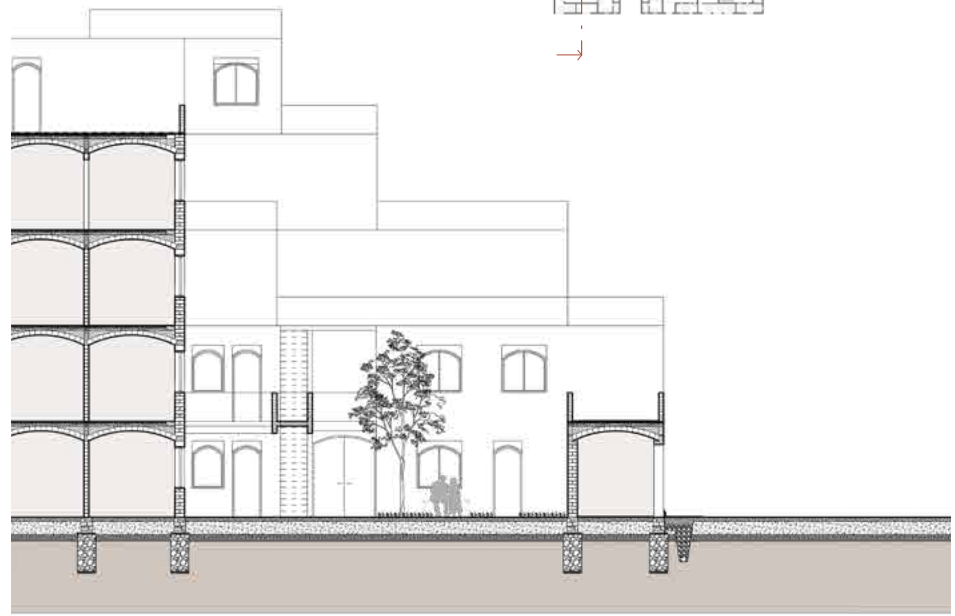
The roof then is the same vaulting technique just bigger bricks topped with a waterproof mortar.

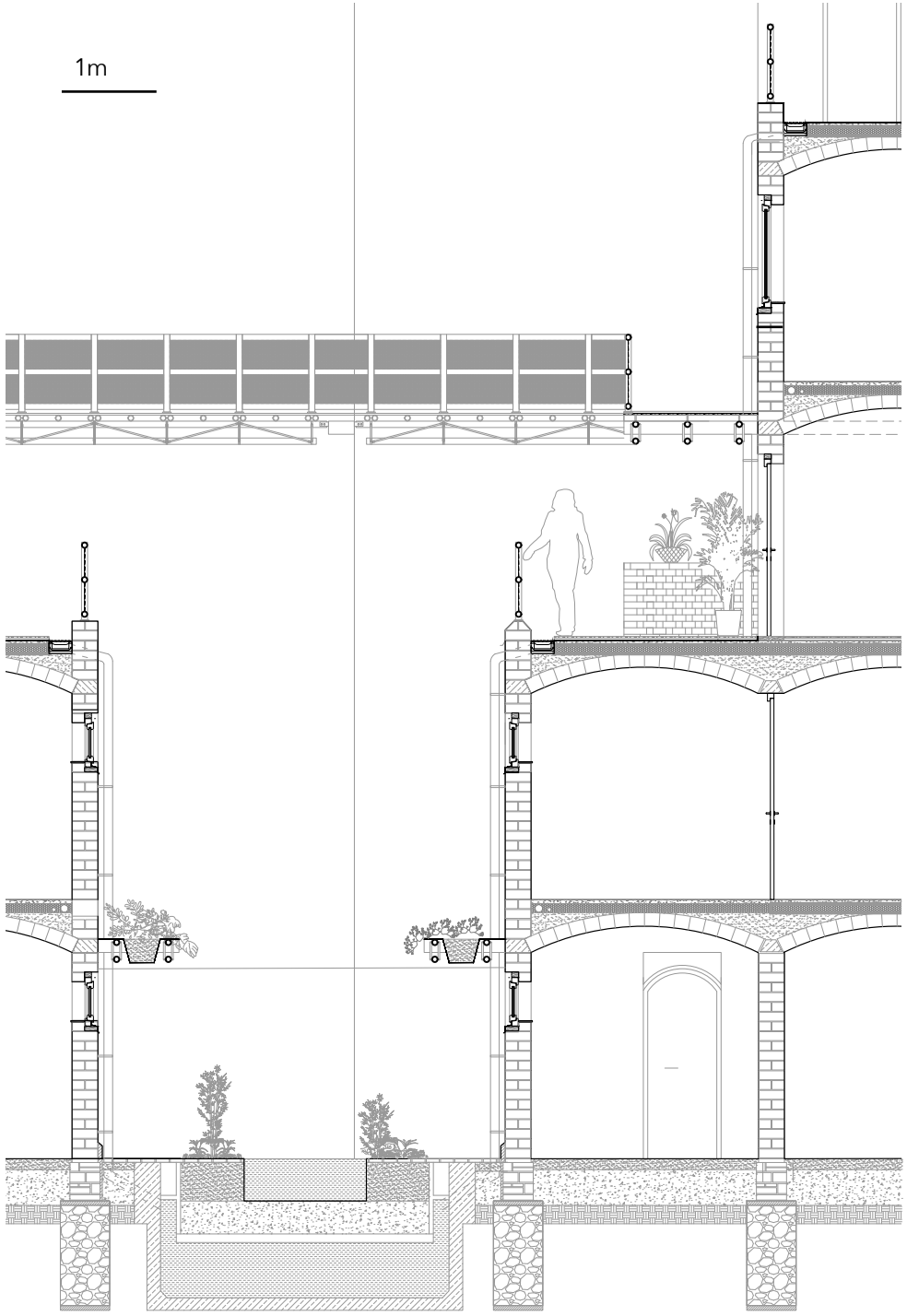


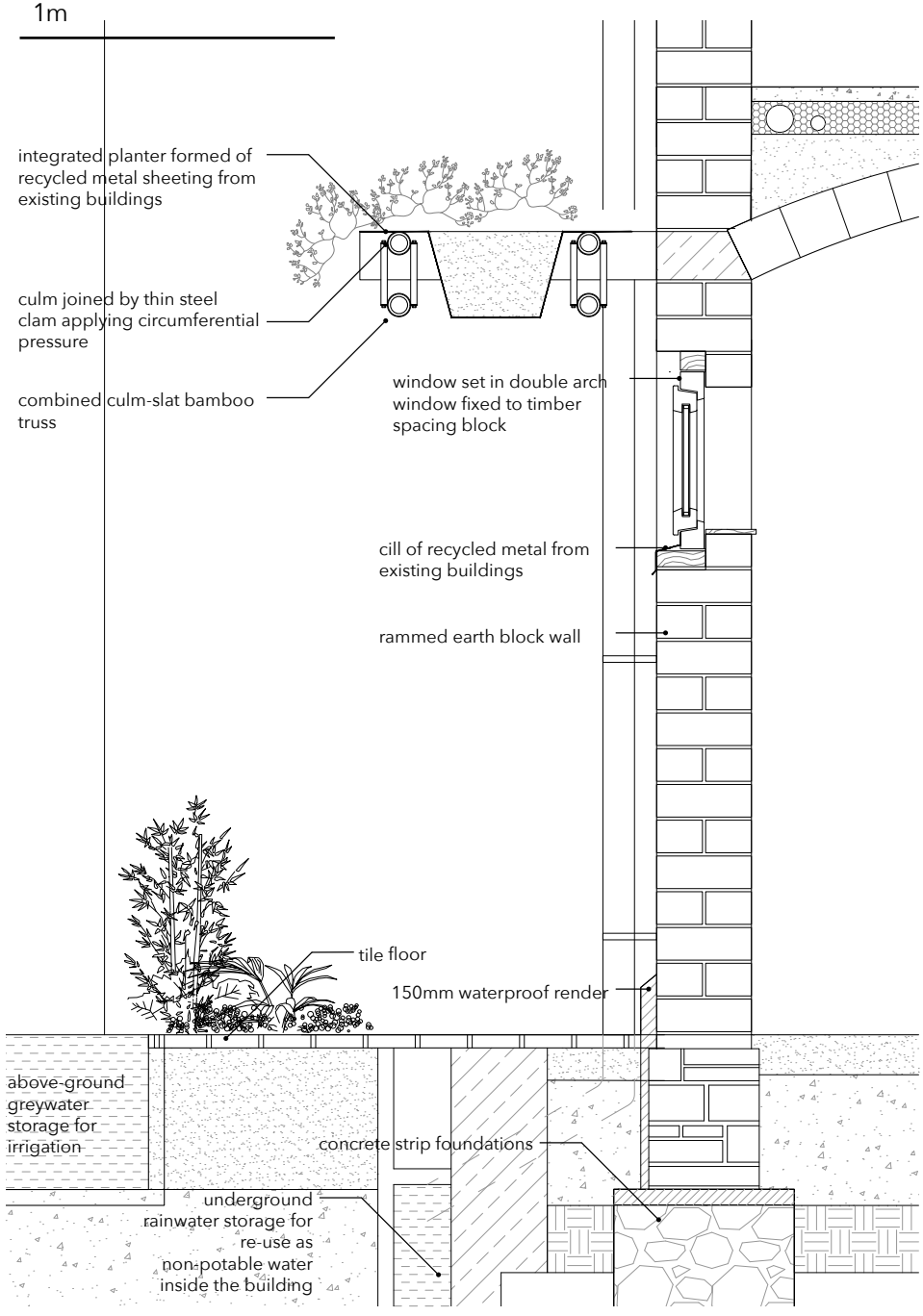
basic grid
1 module 6x3 metre
1 unit 2-4 modules

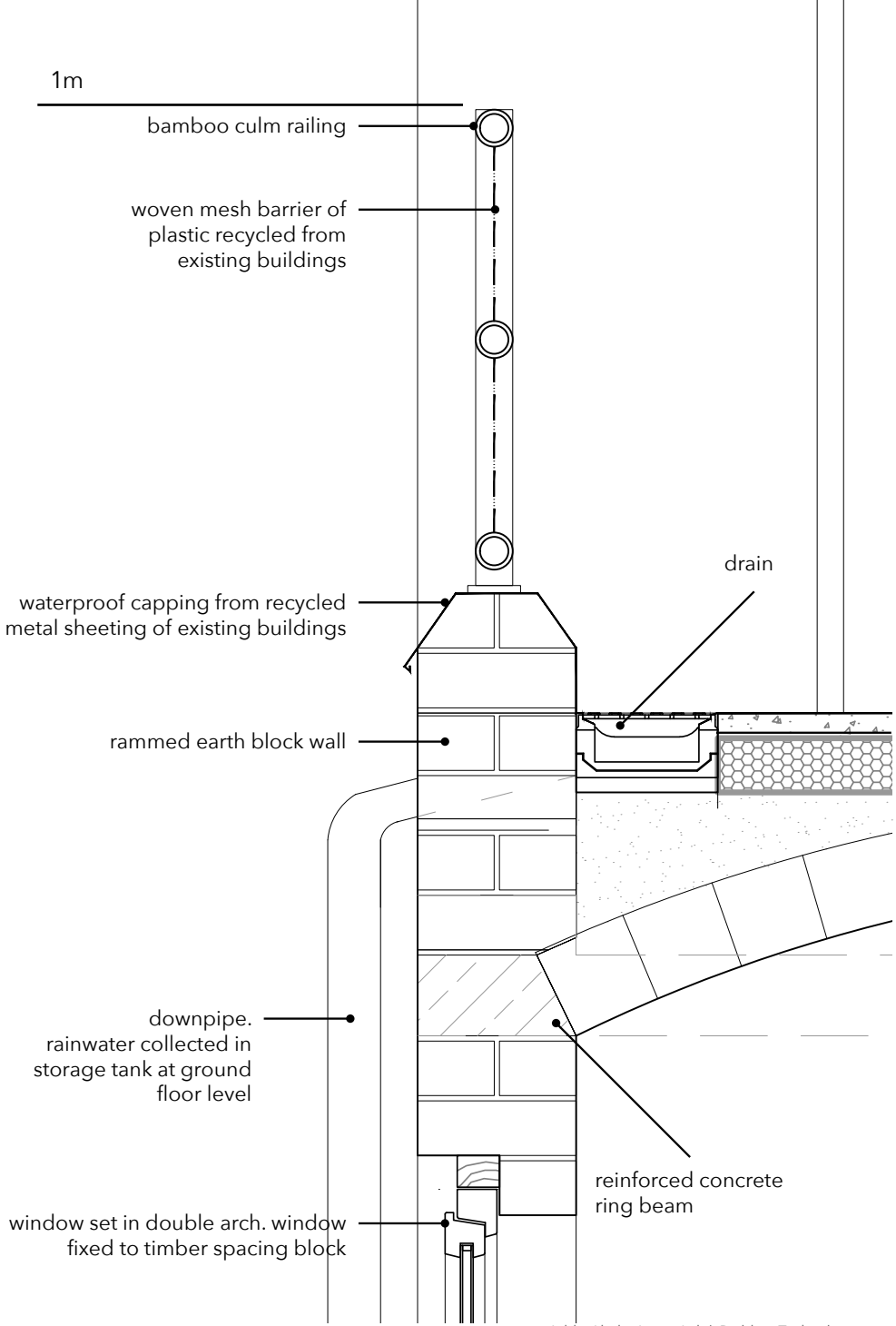
Section AA'

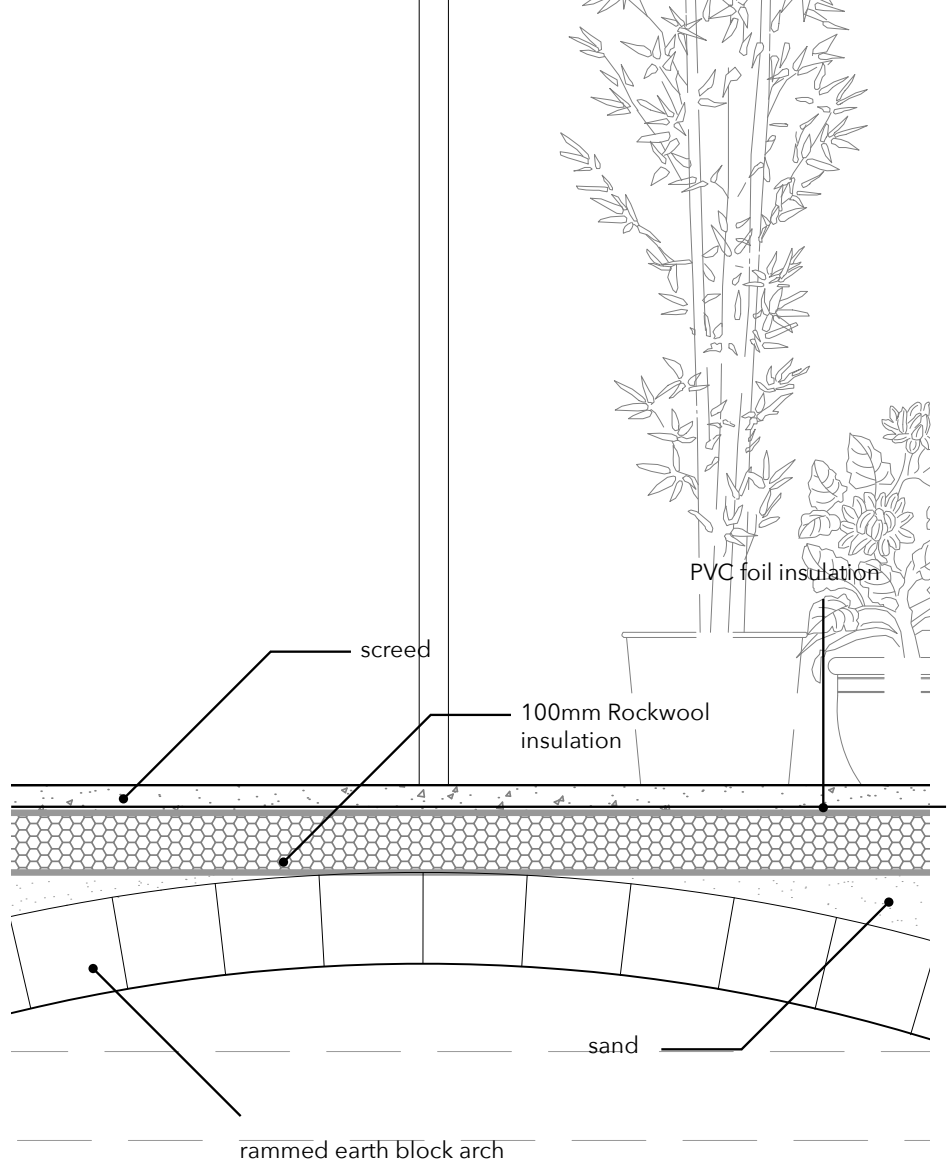




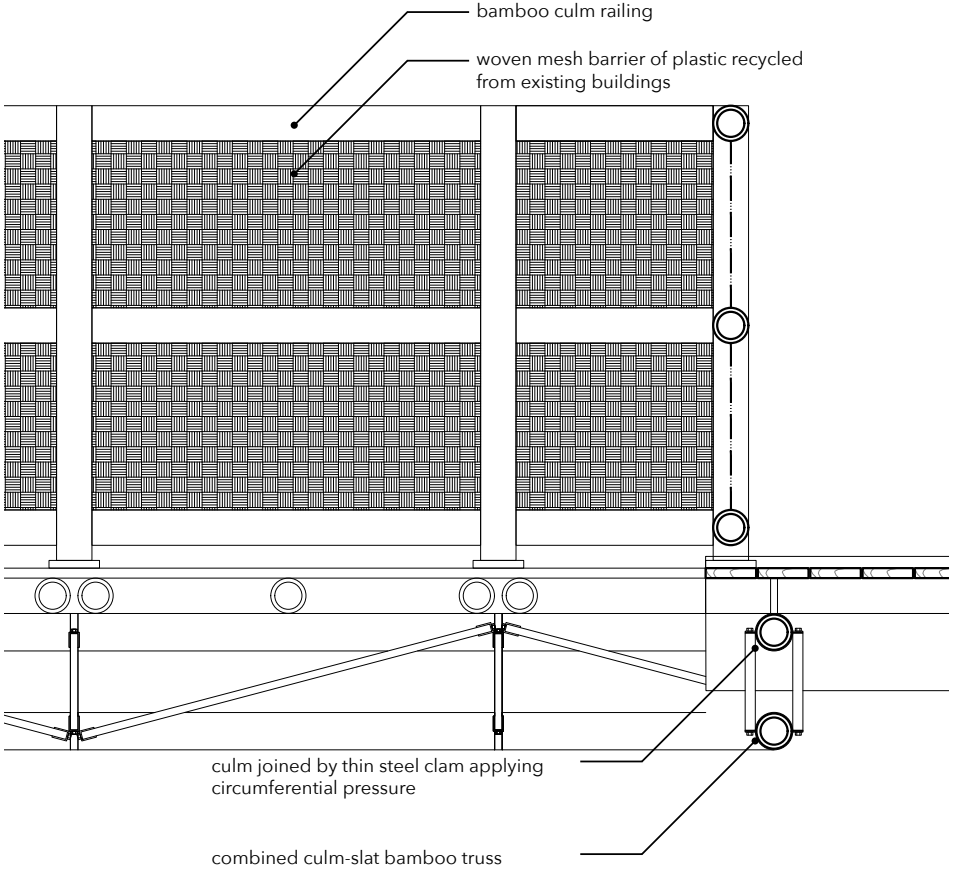

1m

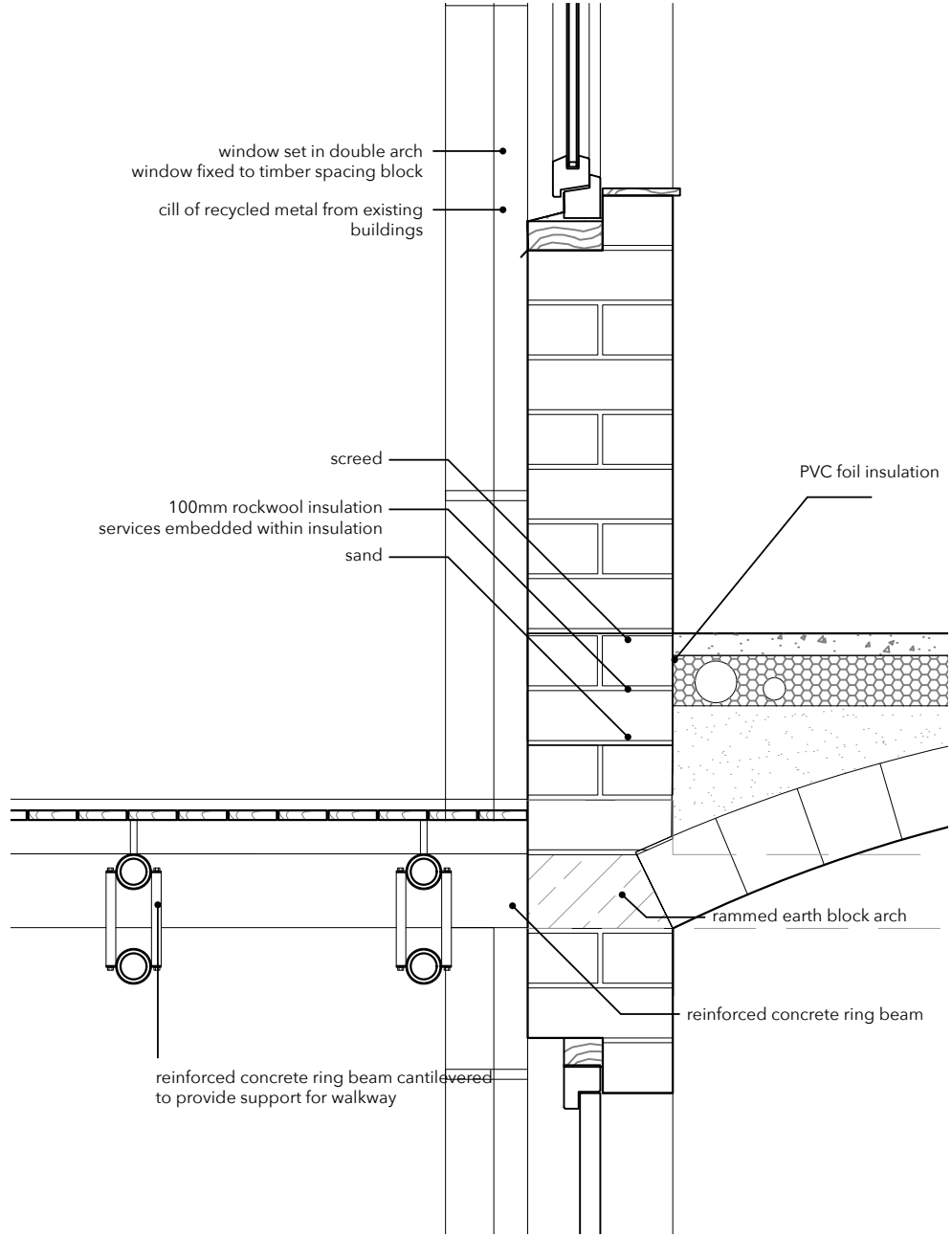

1m
integrated planter formed of recycled metal sheeting from existing buildings
culm joined by thin steel clam applying circumferential pressure
combined culm-slat bamboo truss
window set in double arch window fixed to timber spacing block
cill of recycled metal from existing buildings
rammed earth block wall
tile floor
150mm waterproof render
above-ground greywater storage for irrigation
concrete strip foundations
underground rainwater storage for re-use as non-potable water inside the building

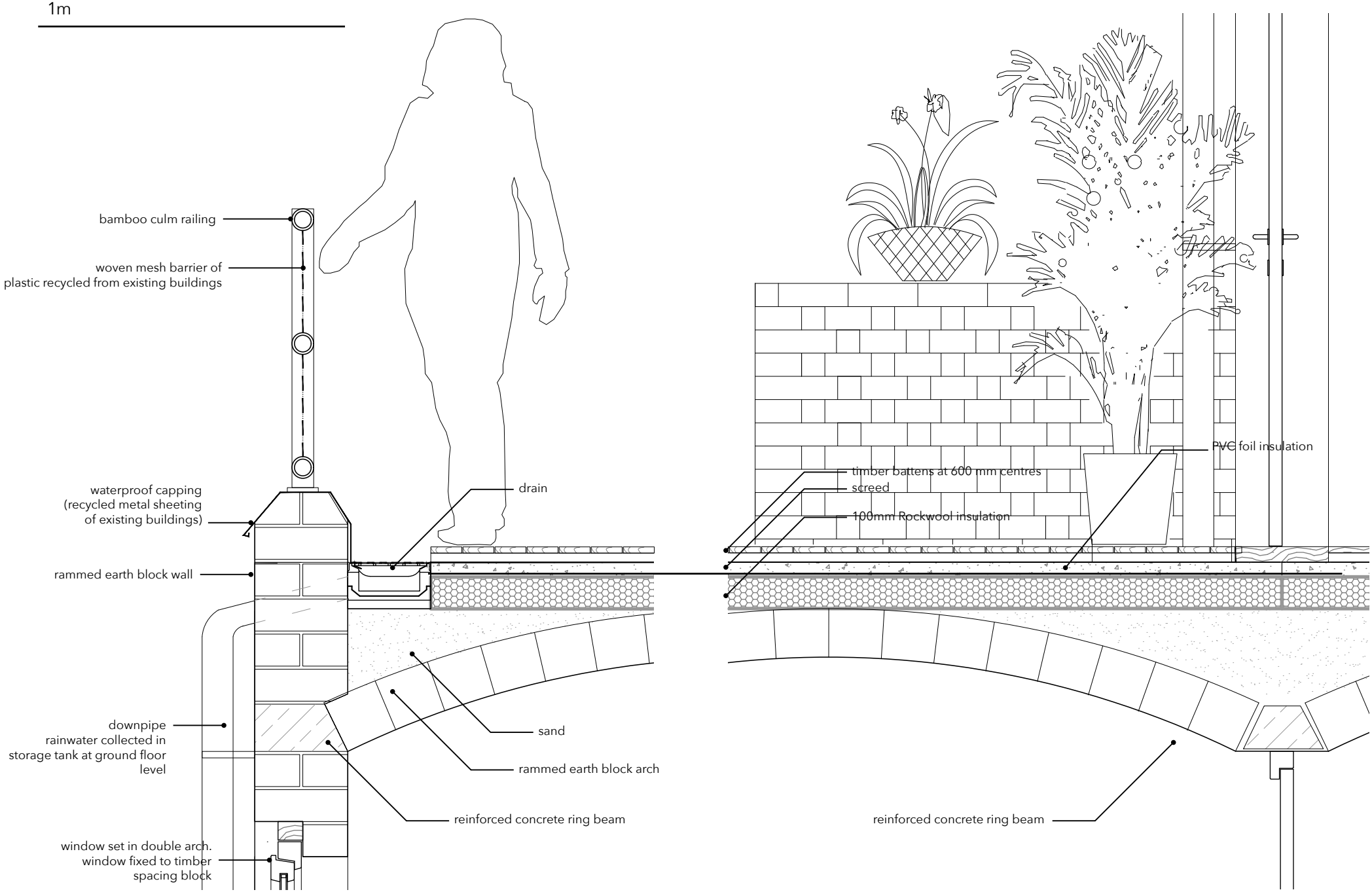

1m
bamboo culm railing
woven mesh barrier of plastic recycled from existing buildings
drain
waterproof capping from recycled metal sheeting of existing buildings
rammed earth block wall
downpipe. rainwater collected in storage tank at ground floor level
reinforced concrete ring beam
window set in double arch. window fixed to timber spacing block


PVC foil insulation
screed
100mm Rockwool insulation
sand
rammed earth block arch

1m


bamboo culm railing
woven mesh barrier of plastic recycled from existing buildings
culm joined by thin steel clam applying circumferential pressure
combined culm-slat bamboo truss


window set in double arch
window fixed to timber spacing block
cill of recycled metal from existing buildings
screed
100mm rockwool insulation
services embedded within insulation
sand
PVC foil insulation
rammed earth block arch
reinforced concrete ring beam
reinforced concrete ring beam cantilevered to provide support for walkway


1m
bamboo culm railing
woven mesh barrier of plastic recycled from existing buildings
waterproof capping (recycled metal sheeting of existing buildings)
rammed earth block wall
downpipe rainwater collected in storage tank at ground floor level
window set in double arch. window fixed to timber spacing block
drain
sand
rammed earth block arch
reinforced concrete ring beam
PVC foil insulation
timber battens at 600 mm centres
screed
100mm Rockwool insulation
reinforced concrete ring beam

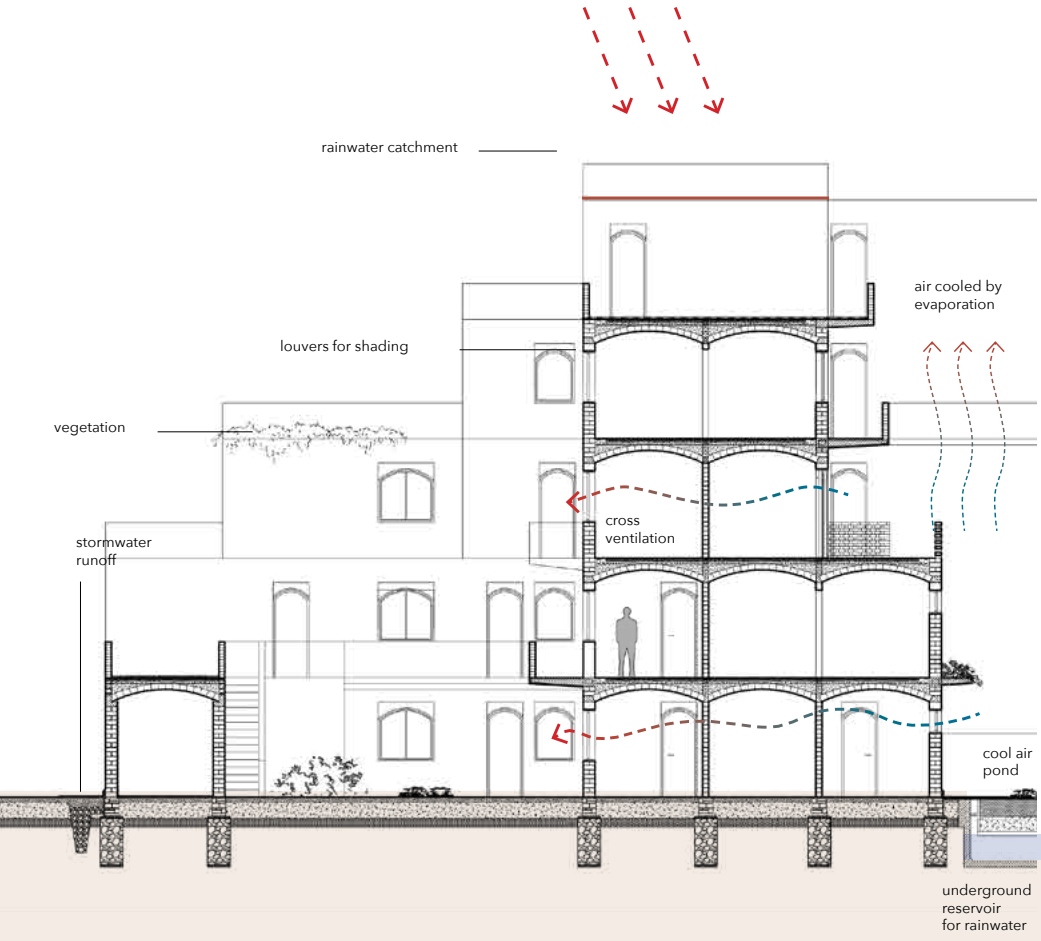
Climate

double courtyard effect

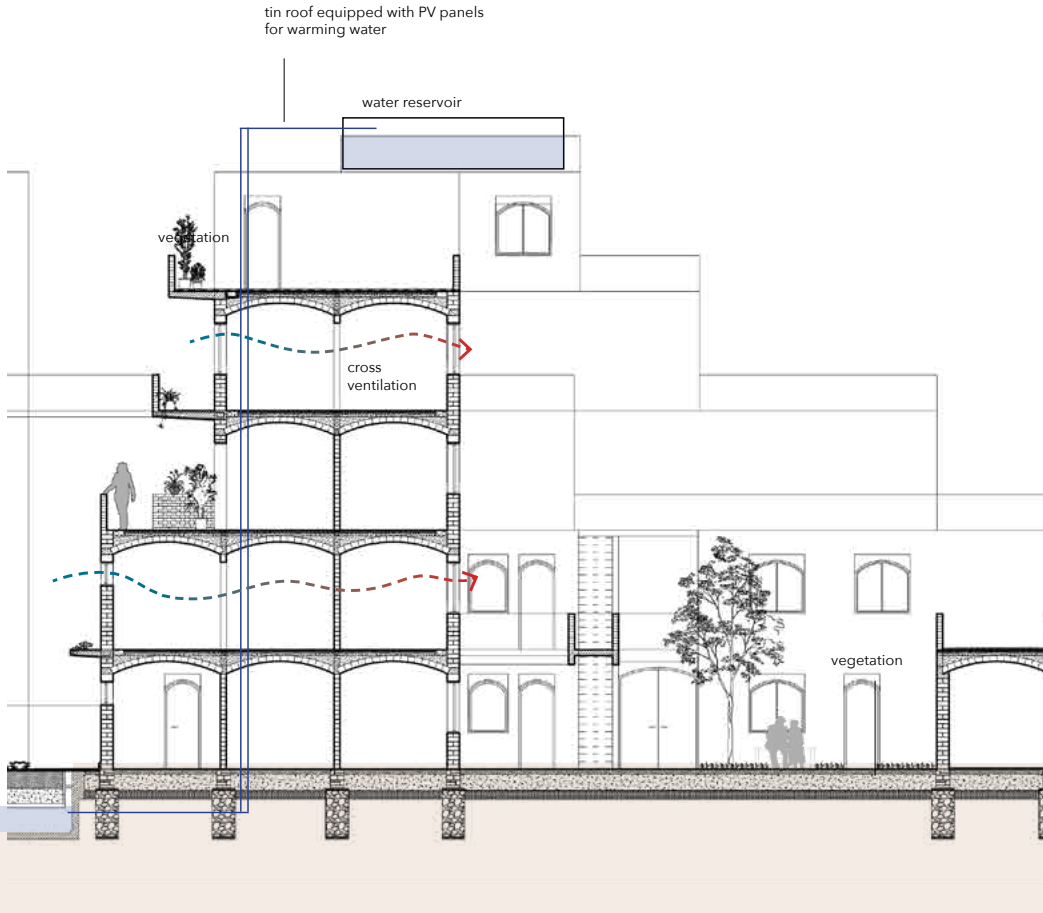
On the roof is a reservoir and rainwater catchment as well cistern underground for a rainwater retention in the central space to make a use of the rain water for irrigation and technical water. It is coveredby recycled material from the site and possibly covered with PV panels to to take advantage of the direct equatorial sunlight and possibly used for heating the water.

The rainwater is stored underground especially due to the uneven distribution of precipitation throughout the year.

Permanent cross ventilation to help regulate the temperature and make use of the chimney effect in the internal patio with greenery and pleasant microclimate also due to the materiality.



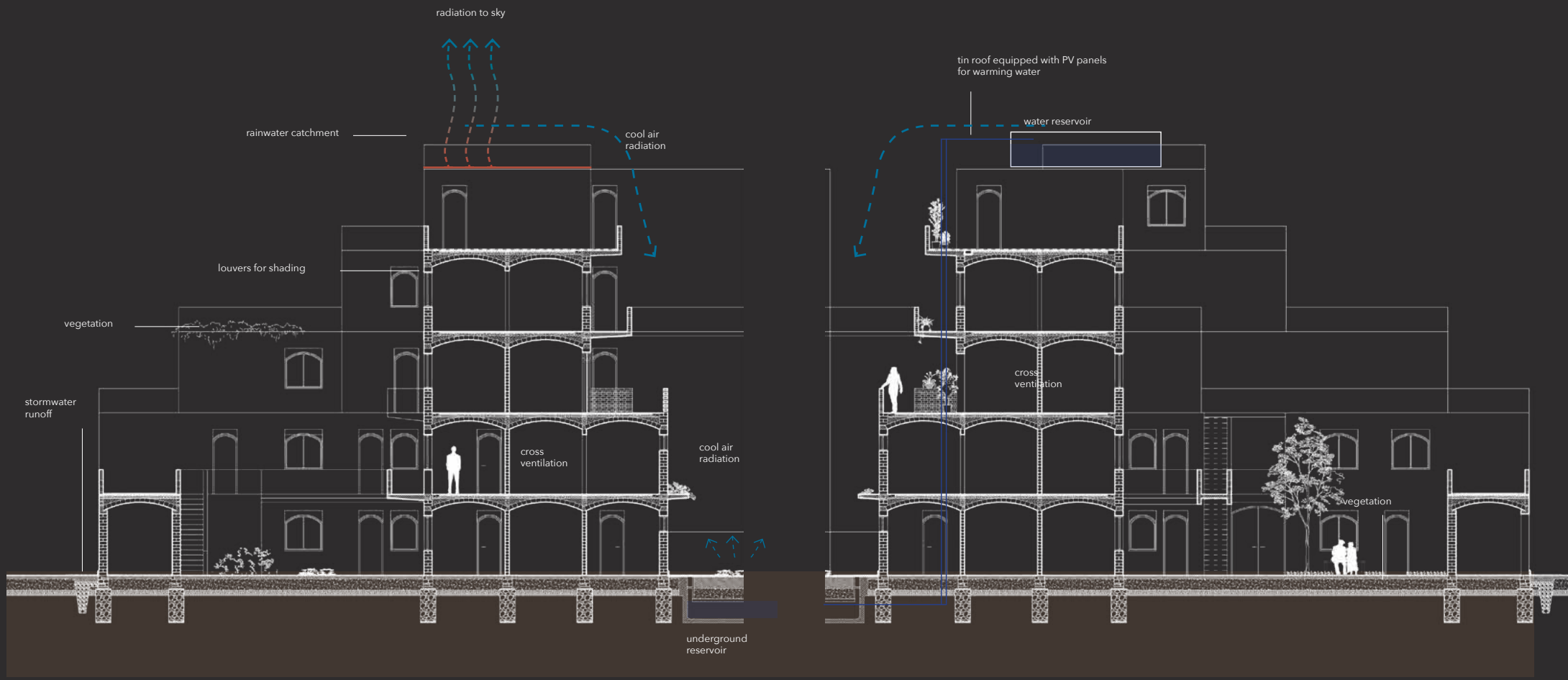
warm courtyard



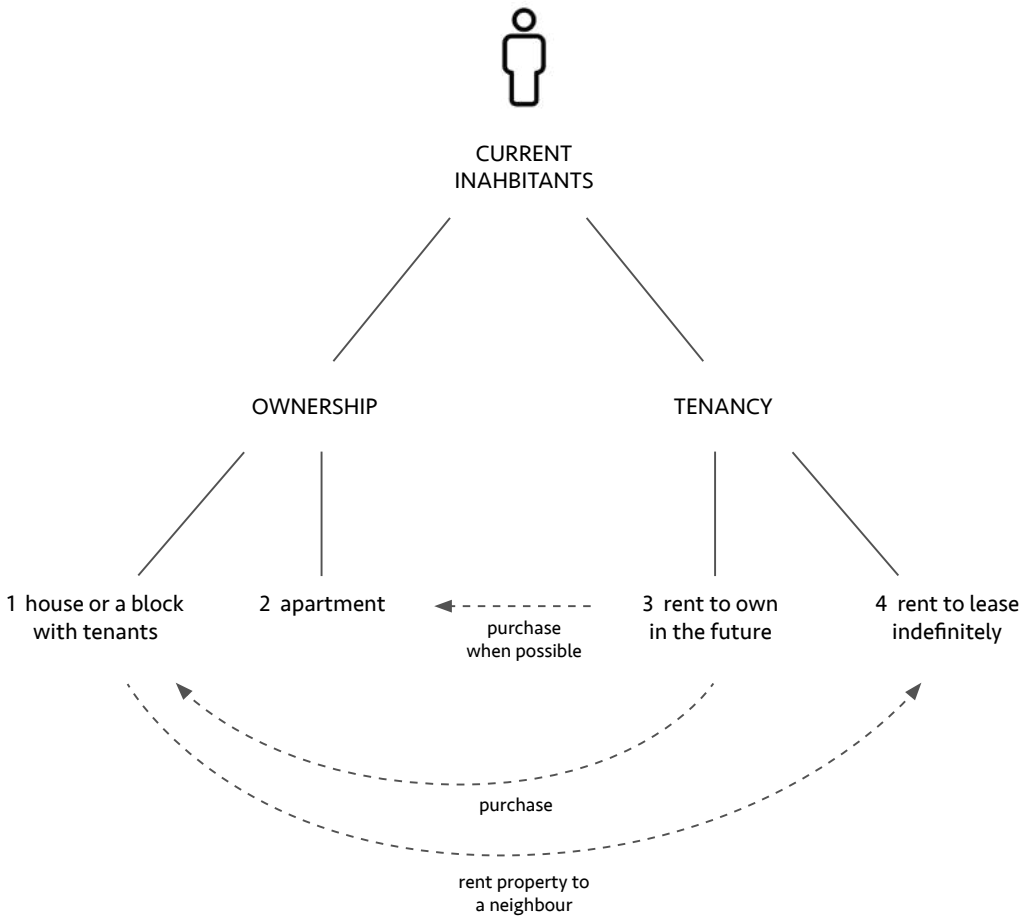
prevasively shaded cool courtyard

warm courtyard

Climate


radiation to sky
rainwater catchment
cool air radiation
louvers for shading
vegetation
stormwater runoff
cross ventilation
cool air radiation
underground reservoir
tin roof equipped with PV panels for warming water
water reservoir
cross ventilation
vegetation
warm courtyard
prevasively shaded cool courtyard
warm courtyard

MANAGERIAL PROPOSAL



COMMUNITY BOARD
REPRESENTING CURRENT AND FUTURE INHABITANTS' INTERESTS

650
HOUSEHOLDS
=
100%

		ESTIMATED NUMBER
1	BUYERS & INVESTORS	
-	inhabitants with capital interested in investing in the housing project	10% about 65 households (36 plots)
-	purchase a house with four apartments, three for rent	
-	renting the apartments to residents interested only in rent to lease	
2	BUYERS	15% about 98 households (53 plots)
-	current inhabitants with the capital to purchase an apartment to live in	
-	no interest in renting it out to other dwellers	
3	TENANTS & BUYERS	45% about 292 households (161 plots)
-	current inhabitants interested in buying their own property but unable to afford it	
-	upon agreement with the FHC sign a lease that would lead to an eventual purchase of the apartment or house	
4	TENANTS	30% about 195 households (107 plots)
-	inhabitants uniterested in obtaining any property due to financial situation or other circumstances	
-	interested in indefinite regulated rent	
-	became tenants of dwellers from group 1	

+392
HOUSEHOLDS
=
160%

5	NEW TENANTS	160% about 392 new households
-	new incoming residents interested in renting an apartment	

Ground floor plan

four courtyard typology

In private sector the development often results in overpriced housing and gentrification In the public sector the housing is underfunded causes people in Addis to return to the slums where they have network and can make living.

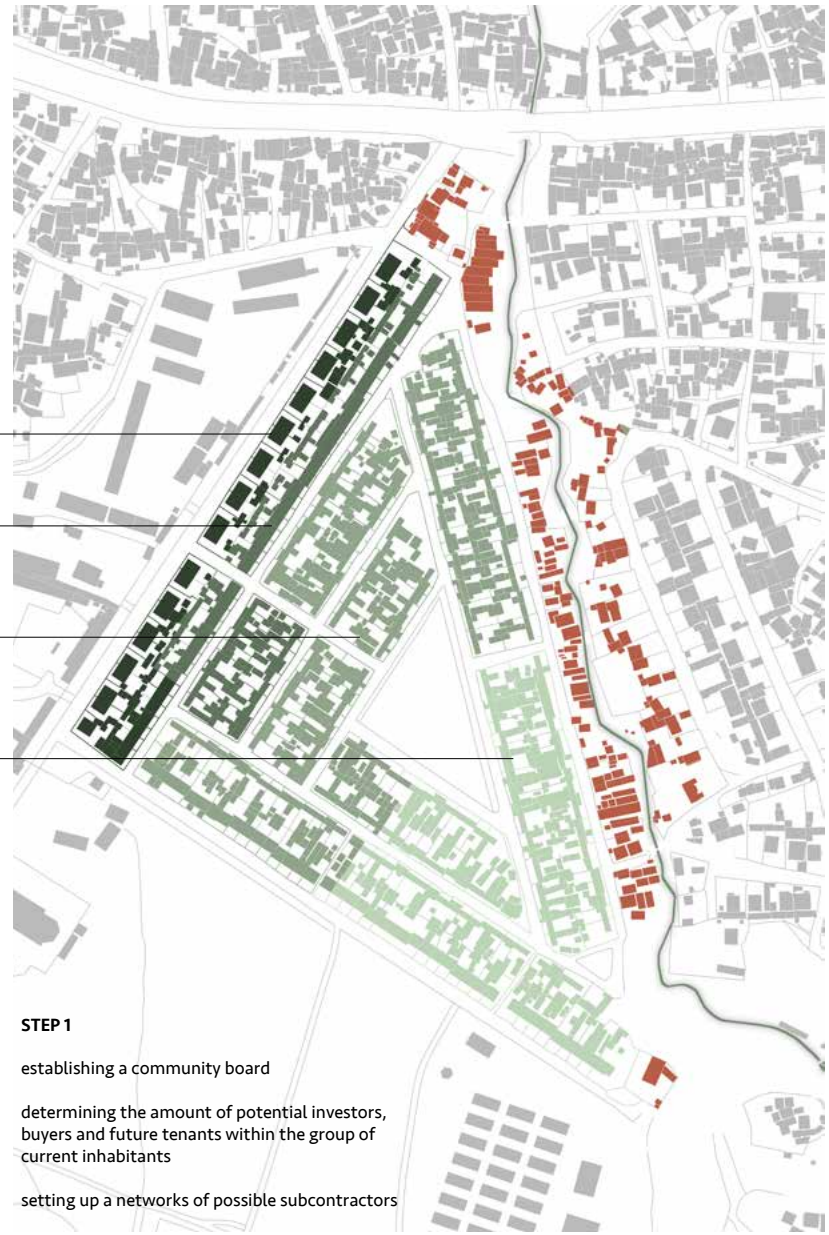
The conclusion was that the citizen sector could work by a creating a distributed network of local actors in the form of a bottom-up initiative supported by an enabling top-down policy and intervention provides the best chance at creating high quality housing and a thriving city.

The two main being the ones that would option for ownership and those who would choose rent to own, therefore having the option to purchase the apartment in the future. This was meant to create opportunity for people in different life situation.

The first step is establishing a community board that would sort of represent and get people acquainted with their options and also gain input on the prototype that would be build in the open central space.

The estimated sizes and definition of these subgroups and are in the table based on an educated that the most people would be interested in a place they rent with chance to purchase at some point in the future,

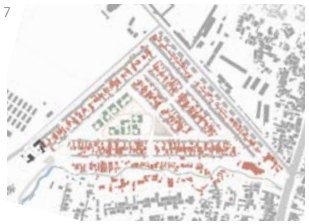
Part of the development plan as well as the urban strategy is not to move any inhabitants out of the site or resettle completely.The idea is of a gradual plot by plot sensitive redevelopment that would disrupt the lives of people as little as possible due to the snowball effect, when starting with a small group of people moving into the prototype as more buildings are constructed more people can move in.



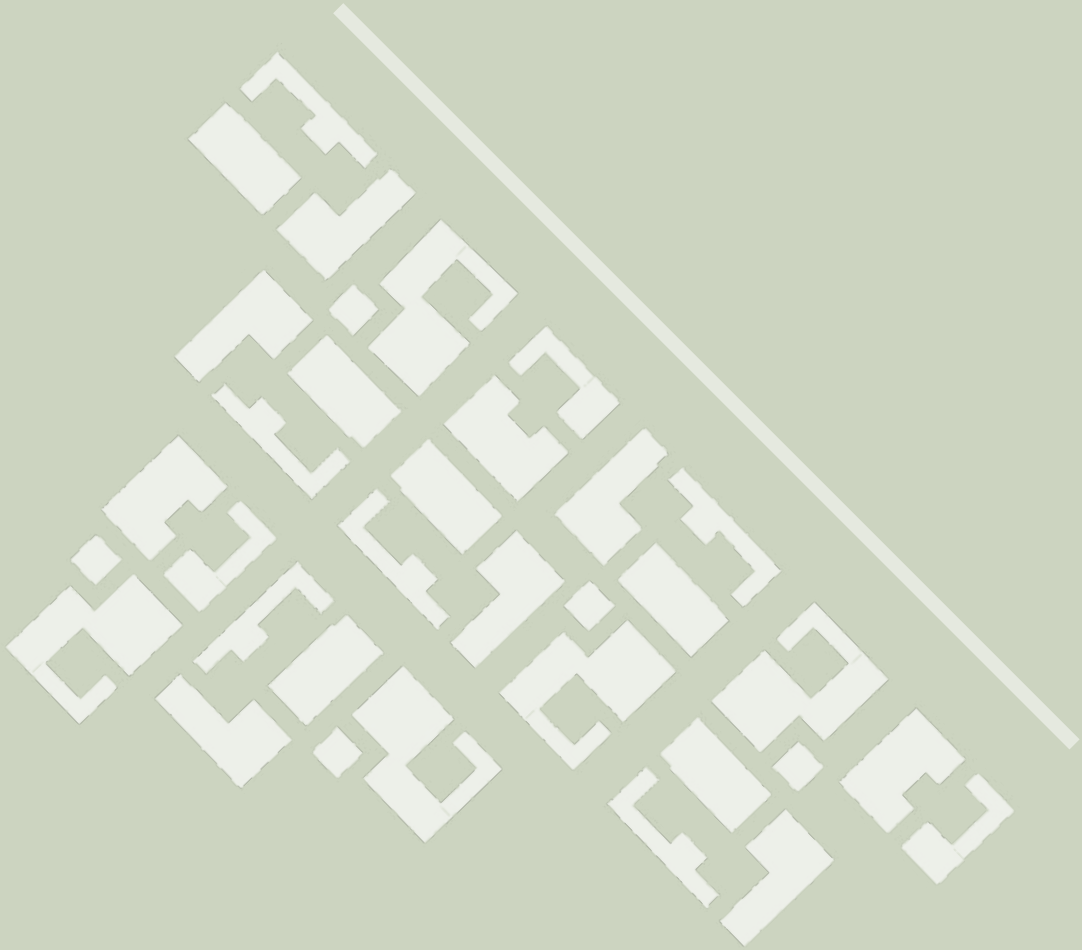
Phasing of the project

plan for the resettlement

PROTOTYPE



FINAL PROPOSAL



The relation between research & design

The name of the project is from an early stage called towards circular neighbourhood which is of course a very general term that fit for me after experiencing the city in person and how many patterns that we are trying to bring back in the pursuit of a no waste economy are still present there and therefore should be preserved. This direction crystallised in the design that explored the possible sustainability, affordability and resiliency of the project.

One of the main goals in housing, especially in the global south is seeking the balance between efficiency and resiliency, that's why the proposal is defined by one core block that can be easily replicated but also easily adapted to specific circumstance which should avoid the rubber stamp effect and support the life span of the building and liveability of the neighbourhood.

So at the beginning of the development what might appear as repetative on a large scale transforms in time and offers infinite opportunities of how it can be adapted and appropriated resulting in a specific and resilient neighbourhood.

(Bredenoord etc., 2014)

Conclusion

The site visit of the site in Addis Ababa showed us that every person strives for something different, accommodating that was a main aspiration of this project.

The goal of the proposal was to develop an overall open plan and open-end design that would provide people with an environment that can develop organically over time by people modifying their dwellings to their own needs.

I believe that by improving the qualities of the area and accommodating socioeconomic variations within that results in a lively and attractive urban space and hopefully a pleasant neighbourhood to live in.

Final reflection

The aim of this reflection paper is to look back at the overall process and preliminary results as well as the initial approach and vision and assess the Addis Ababa Living Lab graduation project. The first version of the envisioned process and goals was drafted at an early stage in the form of the graduation plan, however, the research and design process is unlikely to be assessed accurately beforehand. Therefore, this final reflection should provide a more precise insight of the actual development and diversions that took place in the last stages of the process.

The formulation of the problem statement and research questions defined the starting point of the subsequent design. These questions are based on the experience of visiting the site and preceding research and elaborate on the potential present in the current neighbourhood located in Kolfe Keranio in Addis Ababa.

1) What is the potential of alternative circular design strategies and solutions while integrating present informal social network, patterns and values in low-income neighbourhoods in developing countries?

2) How could it be implemented in the case of a widely self-help build neighbourhood in Kolfe Keranio, Addis Ababa, with the goal of sustainable built environment, affordable but resilient housing design, infrastructure and enhanced social cohesion?

The research had multiple stages, beginning with the general analysis of the wider context. This method provided a necessary background for understanding the context and enabled us to gain valuable data in the upcoming on-site research. In retrospect, this was an adequate preparation that turned out to be well-advised especially due to the short amount of time spent in Addis Ababa. The interaction with locals and observing and experiencing the environment first was positively the most essential part of research in relation to the design phase. The interviews provided a general idea about the lifestyle and everyday practices throughout various income groups. This part was devided between applying the visual

ethnography method in the Gerji area and praxeology on site in Kolfe Keranio. Thanks to that we could assess the local context and develop a programme and stakeholder strategy that would fit the circumstances of the locals.

The approach established during the first phase following the field trip was to map the already existing circular and site-specific patterns as well as alternative circular design strategies that could be reapplied and integrated along with some innovative ones. The strategy was to approach the mapping process on three different levels - community, infrastructure and materiality.

For instance in the case of materiality making use of traditional materials and technologies as well as looking for alternative building materials that do not need to be imported is necessary along with improving the level of construction technology and know-how of the residents, which are essential for future vertical development while embracing the self-build tradition.[1] The community-driven design strategy was meant to ensure social cohesion and appropriation of the space by the inhabitants. In the matter of infrastructure, many aspects needed to be addressed including the water management, riverbank, missing amenities and commercial opportunities in the neighbourhood.

The structure of the initial approach seemed to loose its importance in the upcoming phases due to the interlaced nature of the design that did not allow to separate number of factors and their impact on the design. Thus the initial approach served as a good overview to go back to at later stages but was not kept during the whole process. Nevertheless transferring current patterns, developing new sustainable ones and accommodating aspirations of local people was a priority throughout all the design phases.

To assess if the general approach worked can only be done by looking at the current state of the design. Due to the fact that the project is not being built it does not face certain challenges that would arise during the idealised managerial scenario as well as the administration and organisation of the construction. However, considering only the design process so far the methods used to understand how and why units public spaces and infrastructure should be developed was satisfactory and was turned out to be closely related to the design.

This sequence of methods followed the graduation studio's methodical line of inquiry and therefore stayed closely connected to the studio's original assignment. The Addis Ababa Living Lab is a recurring topic in the Global Housing Studio due to its relevance. The understanding of 'how and why' is coming from the approach that has been tested and proven in the past with a great emphasis on the research leading towards the design stage. This aspect is an inherent part of the faculty's general approach to studio structure and the reason why there is a long research period included in the study plan.

The combination of various methods provided enough information to start the design process due to the various angles that were explored during the research phase. The theoretical part of the research focusing on the complexity of housing studying e.g. chapters form the Housing & Dwelling book of Richard Sennett or articles discussing the issues specifically related to the social housing in Ethiopia set a framework that was later filled in with more detailed observations and personal as well as subjective observations of the students. The research phase thus provided all participants of the studio with a backbone to create their own design that is still based on solid foundations.

That is the reason I believe the initial research stage was essential for all projects to be based in reality as well as the stressed managerial part of the project. Starting with the notion of the current local inhabitants and their well being had a direct influence on the project distributed in time and what impact it would have on the dwellers occupying the plots now. An extra step and possibly the only diversion of the established methodical approach of the studio was an attempt to explore participatory research on a small scale of several locals. Due to tools provided and a longer interviews with plans being drawn by the inhabitants, we were lucky to collect observations of the locals and aspirations they had about their potential housing in the form of drawings and rearranged models of houses. This way we found out that many people can share crucial input but also often stay within the limits of their current homes and environment.

At this point in the design process it is necessary so be critical about the goal set out at the very beginning and still compensate for possible diversions. The most recent feedback following the phase three presentation revolved mainly around developing the project in greater detail as well as defining the spaces between the buildings. A notion of the necessity to work on the transition from public to private space was made. I believe the thresholds within the neighbourhood are also some of the most essential aspects and should be paid

sufficient attention to. Further, the materialisation of the project does not reflect entirely the original aspiration for circularity and should also take into account the materials currently present on the site. This requires more detailed plans for implementing circular principles within the site.

The next important point was the adaptability of the design to the topographical or morphological circumstances. This should be solved on an urban scale and requires certain flexibility of the housing cluster system that still needs to be developed. These are mostly practical issues, however, the overall vision is something that should create an uninterrupted thread throughout the whole project and reflect it on all scales. The ambition to create sustainable and affordable housing while applying circular principles should go hand in hand with the goal to design a quality dwellings and public spaces that the locals could embrace and would not be hesitant to leave current houses.

The final part of the graduation period will be filled with reevaluating the project's original purpose and relevance and working out details. It should present clearly how it deals with the present challenges in the production of affordable housing in Addis Ababa and explore the relationship between governance, design approach and technological aspects. At this stage, it is essential to review the goals set at the beginning of the process, reflect and still possibly focus on problems that have not been adequately addressed yet. The layout and composition of the project should be developed further while keeping the managerial, social, material, technological and typo-morphological aspects developed in earlier stages.

The affordable housing complex presented at the end of the studio should be in line with the design hypothesis developed in the previous semester and based on the research. The integration and further elaboration of the preliminary hypothesis and problem statement should reflect on the societal issues and clearly articulate the answer to the research questions as well as design methods and technological aspects.[2]

The relationship between the urban realm, the cluster and the dwelling unit should be clearly defined by the end of the next stage as well as all the products such as drawings, booklet, presentation and 3D model to present the project in a clear way. The last couple of weeks should wrap up the final phase of the process and tackle the loose ends that have still to be resolved after the P3 presentation and follow-up tutorials.

The risk of creating project that would not be sufficient replacement for the locals or would result in their relocation was present but was paid attention to. Learning about social housing systems in countries such as Ethiopia uncovers a lot that can still be learnt. The decision to choose this topic for my graduation project has from my point of view turned out to be satisfactory early on in the process. One of my personal goals at the very beginning of the studio was to further explore housing design and understanding the way people live outside of my usual environment and expand my knowledge. Due to the context being radically different from my previous assignments the process was necessarily also a new experience. For example taking into account the already dense neighbourhood, the residents' distaste for hypothetical intervention and accommodating strong present social network that relies sometime on illegal activities.

The chance to apply strategies currently applied to housing developed mostly in the western world in an adapted form was a direction that was inspired the analysis and observing present informal patterns that could be incorporated in the future design to preserve people's way of life and invisible social network. Our findings proved that letting people define their environment is important for space appropriation and contributes to social cohesion.

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