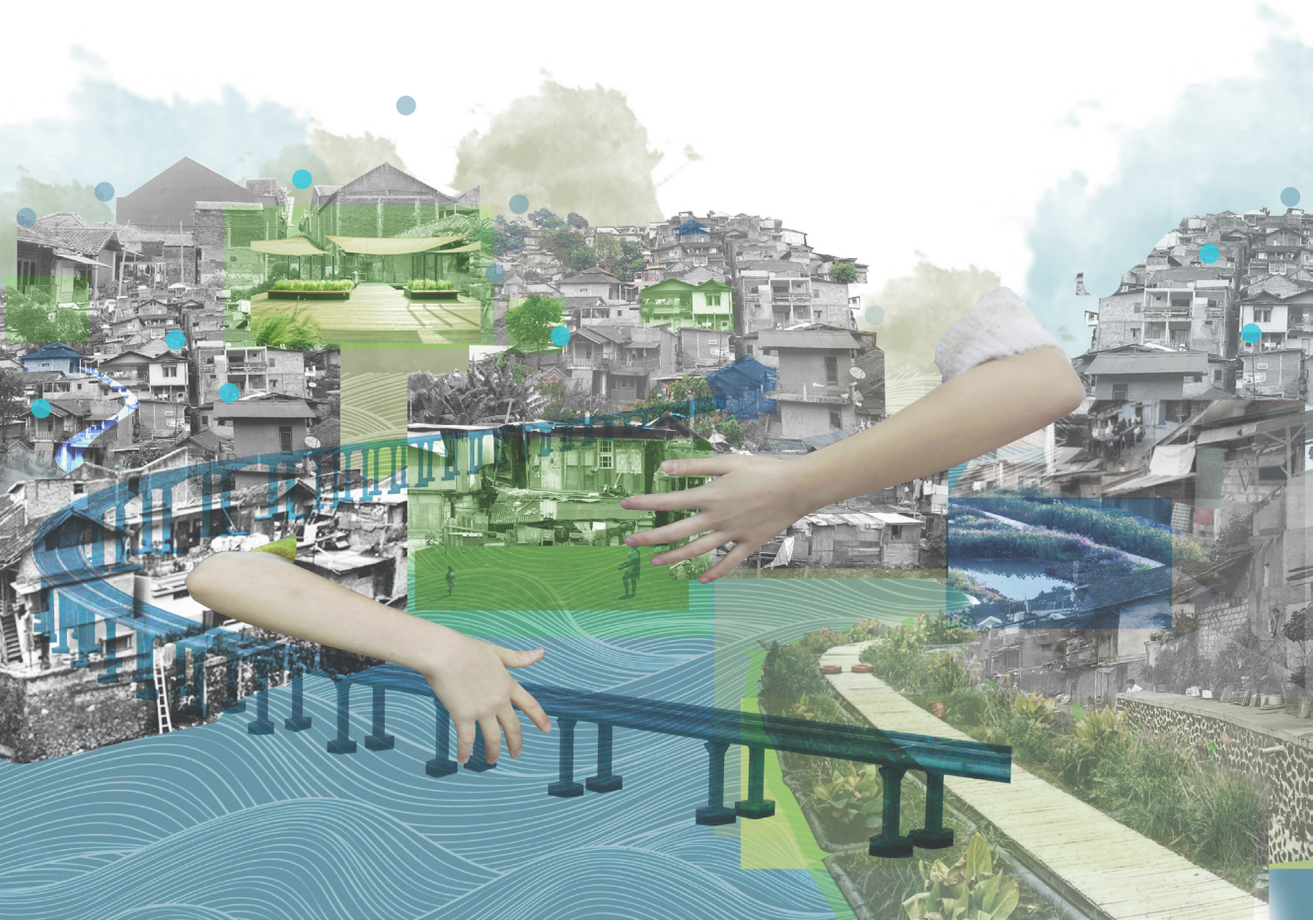
MOSAIC GARDEN CITY



redefining the relation between people and nature
by structuring water management through landscape infrastructure
in an informal settlement, Kampung Tamansari in Bandung

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00 ABSTRACT

Slum population has increased continuously in global south. It expands onto precarious land such as floodplains, lagoon areas and so on leading to deficiency of basic facilities.

Bandung is the third most populous city in Indonesia with around 26,000 slum dwellings. Kampung Tamansari in Bandung is the densest informal settlement located along the Cikapundung river. During the Dutch colonial era, this area was meant to be a part of the green corridor under the Garden city scheme. However, the concrete mass now uprooted the green. However, since the area is located at lower level than planned area, it is hard to expand existing infrastructure into the area.

Lack of infrastructure in informal settlements and densification have led to the environmental degradation and have disconnected people from nature. Treating the river as an open sewage, people directly discharge their waste into it. Clogged ditches with garbage as well as cemented pavements which restrains water from going into the soil results in flash floods. Therefore, nature and human activities enter a vicious cycle which requires the redefinition of this relationship.

This research aims to reconnect people and nature by improving their living quality through ecosystem service. It is based on two main research fields. First, Ecopolis gives a structure to create self-governing ecologically sustainable city. Tjallingi's Ecopolis strategy helps to look into the site based on three different perspectives: area, flow and participation. Kampung Naga is used as a case study to understand how Indonesian cultural landscape creates a circular water system. Next, Kampung Tamansari is used as a showcase to explore how the ecopolis strategy can be applied into the context of a developing country. It shows how people can change their recognition of the potential of nature and how can their activities positively influence in nature in a long-term.

The design strategy starts from place making for green spaces. Relocation is considered in this stage. Relocating houses are arranged in North Kampung as creating three types of enclosures (enclosure, semi-enclosure, expanded semi-enclosure). Each enclosures are transformed into different green patches to serve different ecosystem service and make people responsible to maintain the spaces.

Green patches consist of kitchen garden, pit-forest and riverfront park. Kitchen garden is built in enclosure space which offers basic facilities using dry-toilet module which can recycle human faeces, generate electricity and store rain water. It lets people create their own kitchen garden to overcome food insecurity. Pit-forest is permaculture system using plant-based ecosystem service combined with organic waste management. River front park is the most open space which connects people to the river. Furthermore, it shows users visible circular water system.

On the other hand, these three green patches work together as one stormwater management system. It links each other and create complementary network. Moreover, it transforms current highly linear water flow into circular water flow.

This green patch strategy can be applied to other informal settlements in the similar contexts. When it is replicated, it will not only build rich ecosystem service in the informal settlement but also create mosaic garden city, Bandung in a city scale.

Keyword sustainability, on-site strategy, urban metabolism, informal settlement, Ecopolis, ecosystem service

READING ITINERARY

Chapter 1 introduces the context and problem field of the project, the research objectives, research questions, and relevance in the social and academic lenses. It consists of the context of garden city and how people recognise the nature in the past and nowadays.

Chapter 2 includes the methodology and the theoretical framework - ecopolis - and explains how the theoretical framework is applied in the project.

The aim for Chapter 3 is to understand the site by contextual reading of the site and investigating the site through three different lenses proposed by Tjalingi. Firstly, general layer analysis is conducted to understand the site. Next, kampung Tamansari is separately studied with each lense. In the end, the analysis leads to the conclusion according to Ecopolis strategic framework. The design site will be decided. Afterward, general design principle is suggested.

In Chapter 4, based on the conclusion from Chapter 3, design strategy is built in terms of water management and productive landscape. Afterward, design principle underly ecopolis concept is built which can be replicable to the other similar context. It shows how spaces can be interwoven to reinforce ecosystem and how it affect to the bigger scale.

Chapter 5 implements the spatial design. It focused on north of Kampung Tamansari in detail which is represented as a new mosaic garden city. It shows different spatial qualities in each site.

Chapter 6 functions as the conclusion of the design, containing a critical reflection and final recommendations. Design will be reflected by a spatial value and UN goals.

[Fig. 0.1] segregation between river and informal settlement, and between informal settlement and city center in Kampung Braga & Cikapundung River

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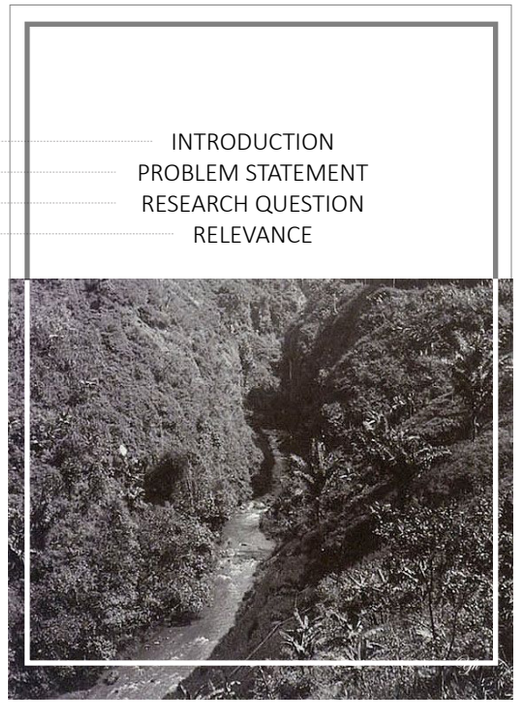


01 INTRODUCTION

1.1 Introduction: Lost Garden City

1.1.1 Lost Garden City

Bandung city in West Java, Indonesia is called 'Paris of Java'. As garment industry has grown since Dutch colonial period, fancy outlet and boutique shops attract Indonesian people and neighbouring countries such as Malaysia and Singapore. Meeting the increasing tourist industry as well as environmental concern the city has changed economic lanes from garment and manufacturing business to tourism. Many touristic attractions have opened especially North of Bandung and its suburban areas, utilising natural resources, i.e. Lembang floating market and Dago water fall, etc.

However, when tourists walk along the shopping districts, they just pass by a few narrow dark allies. These allies are so hidden that people cannot recognise them. People might ignore the flaws in the vicinity of the posh stores. When you walk through the dark fusty alley, you can realise that informal settlements coexist very close to stores as well as the Cikapundung river within a second. These few accessible allies constitute the sad reality of Bandung's two coexisting, but contrasting worlds. The river exacerbates the already contrasting relationship between decorated outlets and slum areas. Informal settlements are developed on the riverbank with the rear end of the house facing the river which is completely disconnected from its surroundings and the city. Moreover, the river has been abused because water is contaminated by human manure which is untreated sewage disposal and solid waste such as plastic.

Ironically, around 100 years ago, the Cikapundung River, located in the valley, was the key element for a garden city plan which aimed to create a healthy city with. Many plantation landlords and European expatriates visited Bandung because it was a pleasant resort. Soon, they were mesmerised by the hilly vista and beautiful landscape along the river. *The City worked as a garden.* They settled down in north Bandung which has beautiful scenery. As the city became bigger due to this phenomenon, the Dutch government decided to plan Bandung as a new capital with the concept of the garden city.

The mountain climate created more comfortable environment than the Batavian typical monsoon climate. The clean river flowed along the steep and meandering mountainous topography and made picturesque scenery. It also acted as a green corridor. People considered Bandung to be a healthy city because Jakarta was thought as a relatively unhealthy city due to vulnerability to diseases from the very hot and humid climate.

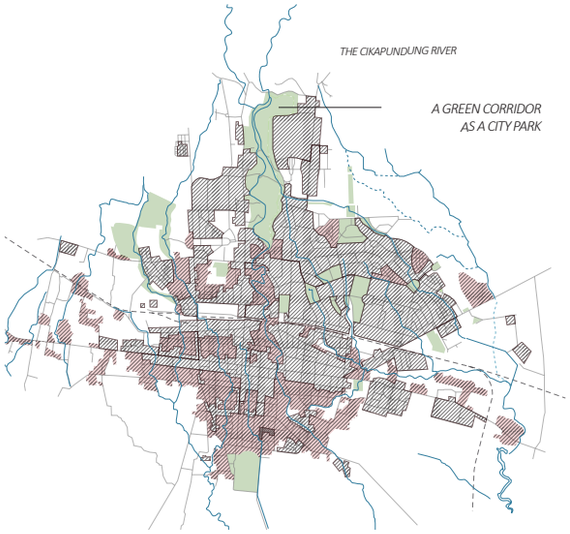
Now, in contrast, the Cikapundung river has no green colour. There is only murky brown water surrounded by high density of informal settlements on the upright angles of grey riverbank. The river is filled with garbage and people cannot see the river.

Out of sight, Out of mind.

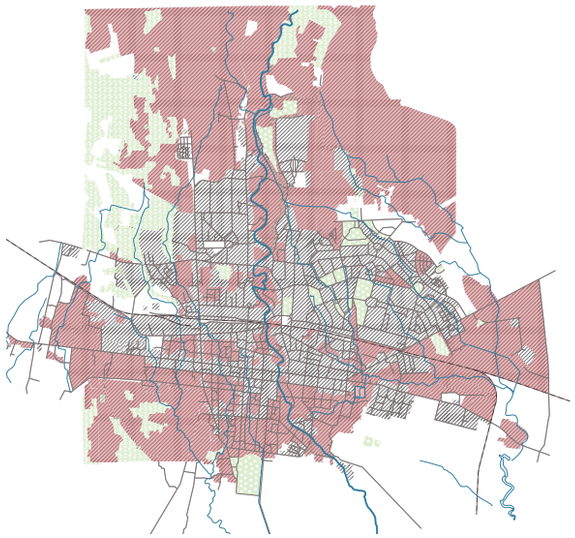
[Fig. 1.1] Garden City Bandung and its surroundings

1 TEA PLANTATION 1923
2 DAGO 1915
3 GEDUNG SATE
4 DEWI SARTIKA PARK
5 BRAGA STREET
6 CIKAPUNDUNG RIVER

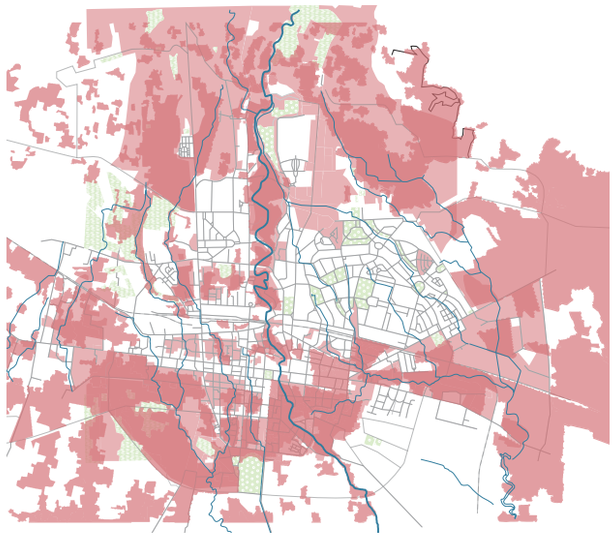
1933

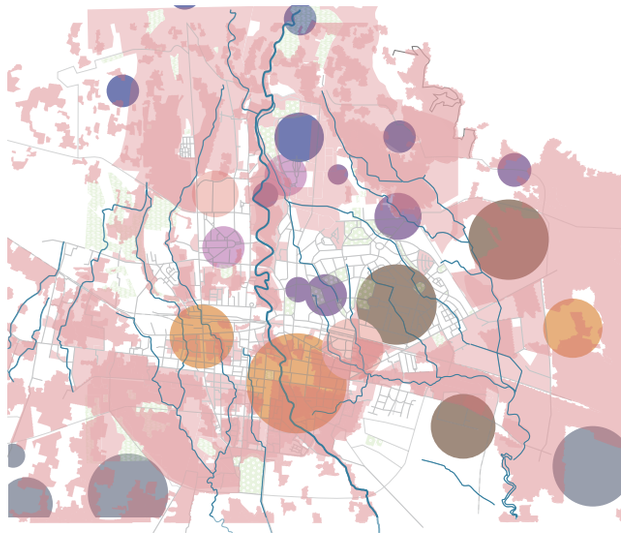


1989



2018





Strategic Location of Kampungs in Bandung
: near economic activities

GREENSPACES ARE OCCUPIED BY KAMPUNGS

When we uncover the layer of economic opportunities such as education, goverment, and industry. Most of the kampungs are located next to the river or streams.

Education Building
Government Building
Industry
Service
Military

KAMPUNG
COLONIAL BUILDINGS
GREEN SPACES
RIVER
ROAD
RAILWAY

N

1km

[Fig. 1.2] Garden City Bandung and its surroundings

1.1.2 Transformation of the Kampung

Kampung is an indonesian word which is basically defined as a village. When it comes to traditional kampungs, it is close to a community or an organization to take care of the village by themselves. Kampungs have spacious area with beautiful nature. This research looks into a traditional kampung, Kampung Naga, as a case study in Chapter 2.4.2.

However, kampung often means informal settlement or slums in the city nowadays. Poor urban settlements which has spurred by Indonesia's rapid urbanisation. (Smoke ,1997) Kampung in cities is highly densed (Fig. 1.7) and congested. That is because kampung is an unstructured, unorganized. Kampugs are developed as an informal settlement in relation to the broader socio-economic system. (Sihombing, 2004)

After Jakarta, Bandung has the second highest levels of urban population living in informal settlements; some 26,000 plus dwellings with an estimated population of 120,000 residents (Tarigan et al, 2016). Many of these informal settlements are located alongside railways, the airport, industrial areas and inner city commercial areas where economic activities happen.

It can also be realized as a settlement in an urban area without infrastructure, planning or urban economic networking. Poverty and poor of quality of life are the features of kampungs.(Sihombing, 2004)

[Fig. 1.3] Street as a public space (gang)
[Fig. 1.4] Hous right next to the river embankment
[Fig. 1.5] Laundry using public water from borehole
[Fig. 1.6] Informal economic sector in Kampung

[Fig. 1.7] Urbanization from 1986 to 2015

Since Bandung city is planned by dutch government, Bandung have grown as a city. In 1894, the construction of the railway from Batavia to Bandung was completed, and afterwards, Bandung slowly gained a significant increase in population (Siregar 1990)

Since the 1980s, urbanisation is accelerated and it changes people's daily life and created urban challenges. Bandung City demonstrates high population growth, reaching around 3.5% per year. In 2031, the population of Bandung City is projected to be 4.1 million (Tarigan 2016).

1.2. Problem Statement

1.2.1 Vulnerable areas for living

In view from economic opportunity, informal settlements are on opportunistic locations. However, it is not the good location for living a life. As it is mentioned in Chapter 1.1.2, the settlements do not have proper infrastructure and amenities. As a result, those who live there have suffered from floods, unsafe and unstable watersupply, no watste treatment system etc. When we uncover the layer of economic opportunities such as education, goverment, and industry. Most of the kampungs are located next to the river or streams.

Urban service improvement and urban infrastructure development generally lagged behind the everincreasing demand brought about by the urbanization processes outlined above (Roberts, B. and Kanaley, T. 2006). City plan could not catch up with immigration. They hardly accommodate the people and offer basic infrastructure facilities.

1.2.2. Lack of Water Infrastructure

People have especially suffered from the water in Bandung due to floods and lack of clean water. They cannot get the clean water fron centralized water supply. The local water company(PDAM) that is responsible for tap water distribution in Bandung city only supplies 46.91% of the public need for clean water (Sari et al, 2018). Even places with centralized water tap is unstable.

After using the water, only 35% of the city of Bandung, mainly the east side, is connected to a centralized wastewater treatment plant (Ginkel, 2015). As a result, residents who live near the river, discharge waste water directly into the water. Or they use a septic tank but it has problem because of poor maintenance.

[Fig. 1.8]LACK OF BIODIVERSITY
mainly hard solid structure along the river

[Fig. 1.9] WATER POLLUTION
blackwater flows into the river without treatment

[Fig. 1.10]WASTE DISPOSAL
clogging the river

[Fig.1.11] DISCONNECTION
houses are against to river side

Water Supply

Water supply changes depending on seasons. People seek the water sources themselves which results in many problems. Firstly, there is no regulation on digging wells. Indisciriminate ground water usage causes water stress especially during the dry season. Also, due to untested water sources, people are exposed to water related diseases such as diarreah.

[Fig. 1.12] Supply water by water tank

[Fig. 1.13] common well in Kampung

[Fig. 1.14] Water market

Sewerage

Informal settlement residents live in poor surroundings. A common toilet are shared with 5 to maximum 20 households together. They throw both solid and organic waste directly into the river because there is no space for collecting waste and no water treatment system. Also clogged ditch is the reason of flooding.

[Fig.1.15] Clogged Ditch

[Fig. 1.16] Common Toilet in Kampung

[Fig. 1.17] Direct discharge waste water to the river

1.2.3 LACK OF GREENSPACE

Social Aspect
: from agricultural community to urban community

Indonesia is basically an agricultural-based country. People used to live in the surroundings of river and forest and utilize its natural resources. However, after urbanization, the emergence of a new modern occupational structure have allowed and encouraged people to move off the land into non-agricultural work since the modern occupations have nothing to do with nature. Now people live in grey environments.

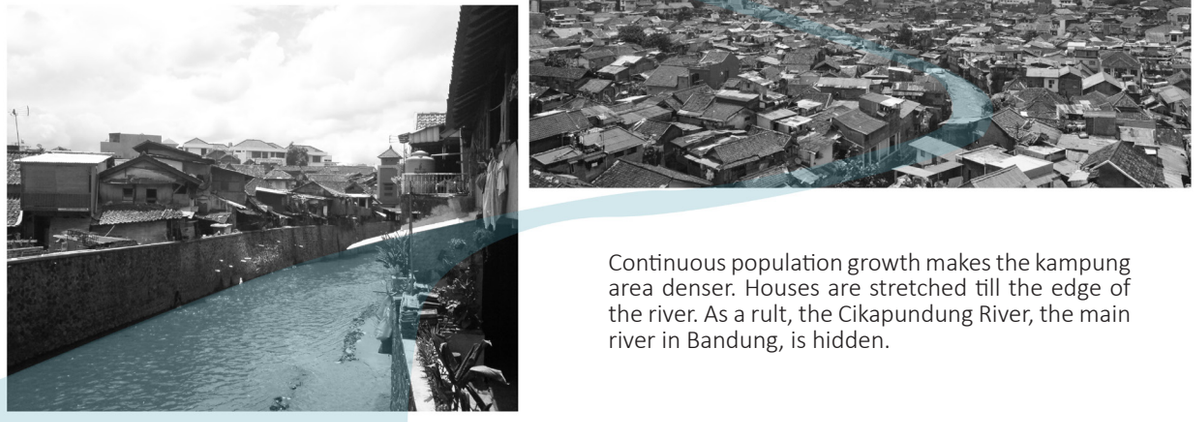
Thereby, characteristics of Indonesian community changed as well. Kampungs have gone through a transformation. Urban poor settlements which has spurred by Indonesia's rapid urbanisation(Smoke, 1997).
This urbanization gives another meaning to the kampung, now, 'Poverty and poor of quality of life are the features of kampungs'. The kampung is an unstructured, unorganized and informal settlement in relation to the broader socio-economic system(Sihombing, 2004).

Environmental Aspect
: Grey City

The reputation for Garden city bandung has been faded away, turning into grey city. Rivers and streams in the city are canalized or covered with concrete slabs to secure the spaces.

Although Bandung municipality has worked for making more green public space, it's hard to find green in Kampung since there is no openspace for vegetation. Riverplains are taken by informal settlements. The rivers are canalized.

Unsustainable exploitation of natural resources has resulted in the loss and degradation of species and ecosystems (Keniger, 2013).



[Fig. 1.18] Hidden Cikapundung River

Continuous population growth makes the kampung area denser. Houses are stretched till the edge of the river. As a rult, the Cikapundung River, the main river in Bandung, is hidden.

1.2.4 PROBLEM STATEMENT

Lack of water related infrastructure and densification in informal settlements has led to environmental degradation, thereby disconnecting people and nature.

This situation forms a vicious circle which further damages the urban river and depletes the quality of daily life.

[Fig. 1.19]
Bandung view from Pasar Baru

1.3. Research Question

1.3.1. Objectives

Nature is inevitable in our existence. However, we have physically a long distance from it and we take advantage from it. Ruthless overexploitation of natural resources accelerates environmental degradation in the city. The metabolism system of the city is hidden underground or is happening in unnoticed suburban areas. The centralised system such as water treatment plant, landfill and so on is unattractive and avoided by people. That is, people do not want to face to how sustainable chain works.

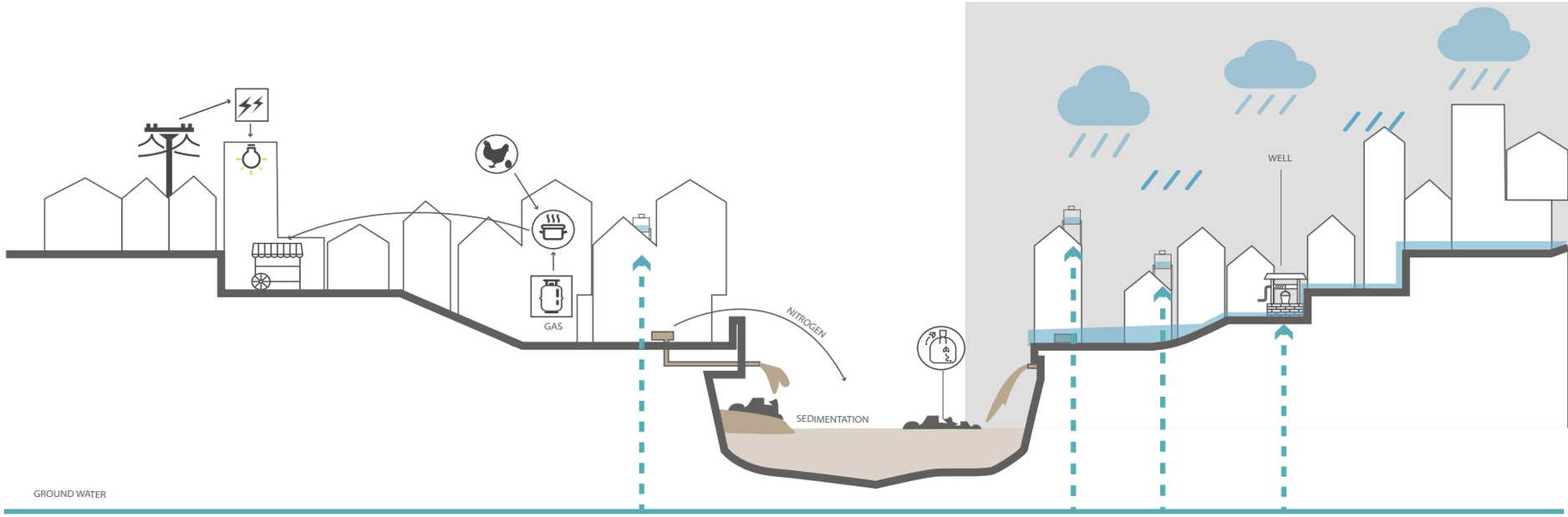
The main objective is to patch up the disconnection from nature within the city by framework and spatial intervention. This framework and spatial interventions are not designed from scratch, but utilise cultural landscape heritage and local social structures.

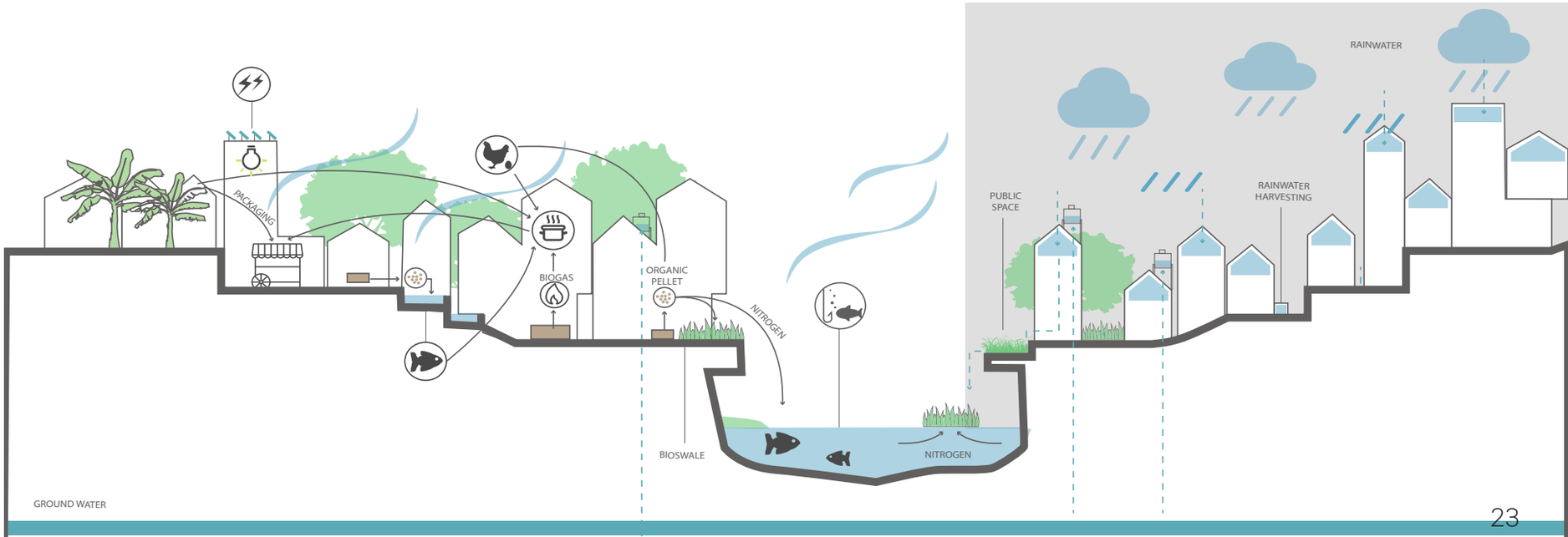
Design is especially considered in the context of an informal settlement in Bandung. Moreover, it could catalyse ion to nature along the river and reduce burden of centralised system by creating decentralised closed-loop water system.

On this point, the thesis explores how a dense city can accept more greenspaces which provide environmental and economic benefits to preserve the environment.

Reconnect people and nature
by improving the living quality
through ecosystem service

[Fig. 1.20] Current situation of Kampung Tamansari and Cikapundung River (top)
Proposed design for Kampung Tamansari and Cikapundung River (bottom)





1.3.2. Research Question

What kind of landscape architectural design intervention
can ***improve the water management***
and living quality *in informal settlement, Kampung Tamansari?*

[Fig. 1.21] Water Circularity in Kampung Naga, West Java, Indonia

Sub-research question

Q1. How the relationship between people and nature/water management in Indonesia create the cultural landscape?

Q2. Which urban metabolism principles could be applied in the current linear water flow?

Q3. What kind of landscape strategy can create awareness for people to preserve *green spaces* from informal settlement expansion?

Q4. Which design strategies can be replicable in the similar context of other Kampungs?

1.4. RELEVANCE

1. Social Relevance

Historically, the Cikapundung river and its surrounding was an important green corridor when Bandung was planned as a garden city. Due to rapid urbanization, however, informal settlements settled down along the river. Nowadays, there is a lack of basic facilities and it creates unhealthy environment. Therefore, the river has been degraded by inhabitant's unconscious behaviour - trash dumping, discharge waste water etc. - and the river is hidden by kampungs. This unattractive river is disconnected from people.

This graduation project proposed a hybrid of garden city and landscape infrastructure from the beneficial aspects to solve social and environmental issues. It will cause a resurgence the of garden city and its idea. Moreover, the design intended to interweave each elements: stakeholders, urban metabolic flows, and sites. It helps to reinforce the relationship between nature and people for long-term sustainability.

2. Academic Relevance

Mostly in global south, society is radically changing from an agricultural society to urban society by rapid urbanization. It disconnects people from nature. To reconcile with each other, spatial intervention provides many opportunities to link people to nature in the project.

At the same time, the lack of infrastructure's capacity brings mainly societal, health and environmental issues. Toward a sustainable healthy city, the project explores the city and possible solutions in terms of the ecopolis concept. This perspective guides urban metabolism and landscape as infrastructure which could be proposed as alternatives.

Ecopolis is considered to interweave intricately spatial quality into other layers - stakeholders and flows - to reinforce the links between people and nature for long-term maintenance of being operative. To achieve this goal, a decentralised closed-loop water system is explored, using natural topography. Also, a productive landscape is considered to exploit landscape value to offer economic, ecological, social, and spatial contributions.

[Fig. 1.22]Maturation Pond in Bojongsoang Waste Water Treatment System
Only waste water treatment plant in Bandung which covers 35 % of Bandung in habitants.
source: Oni Hartono

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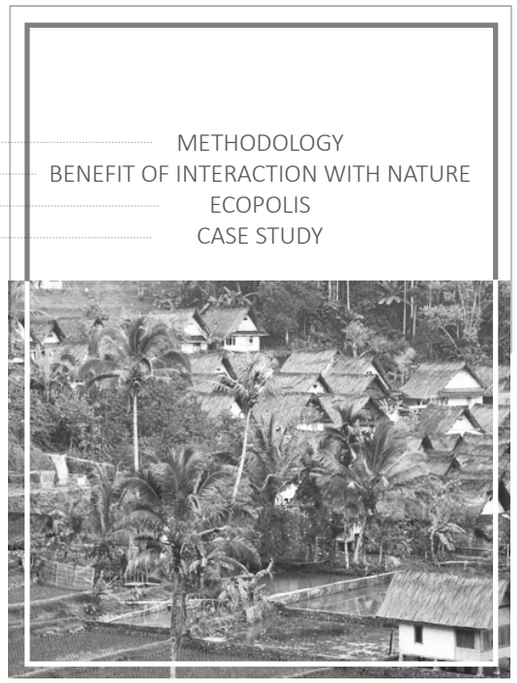
36 CASE STUDY



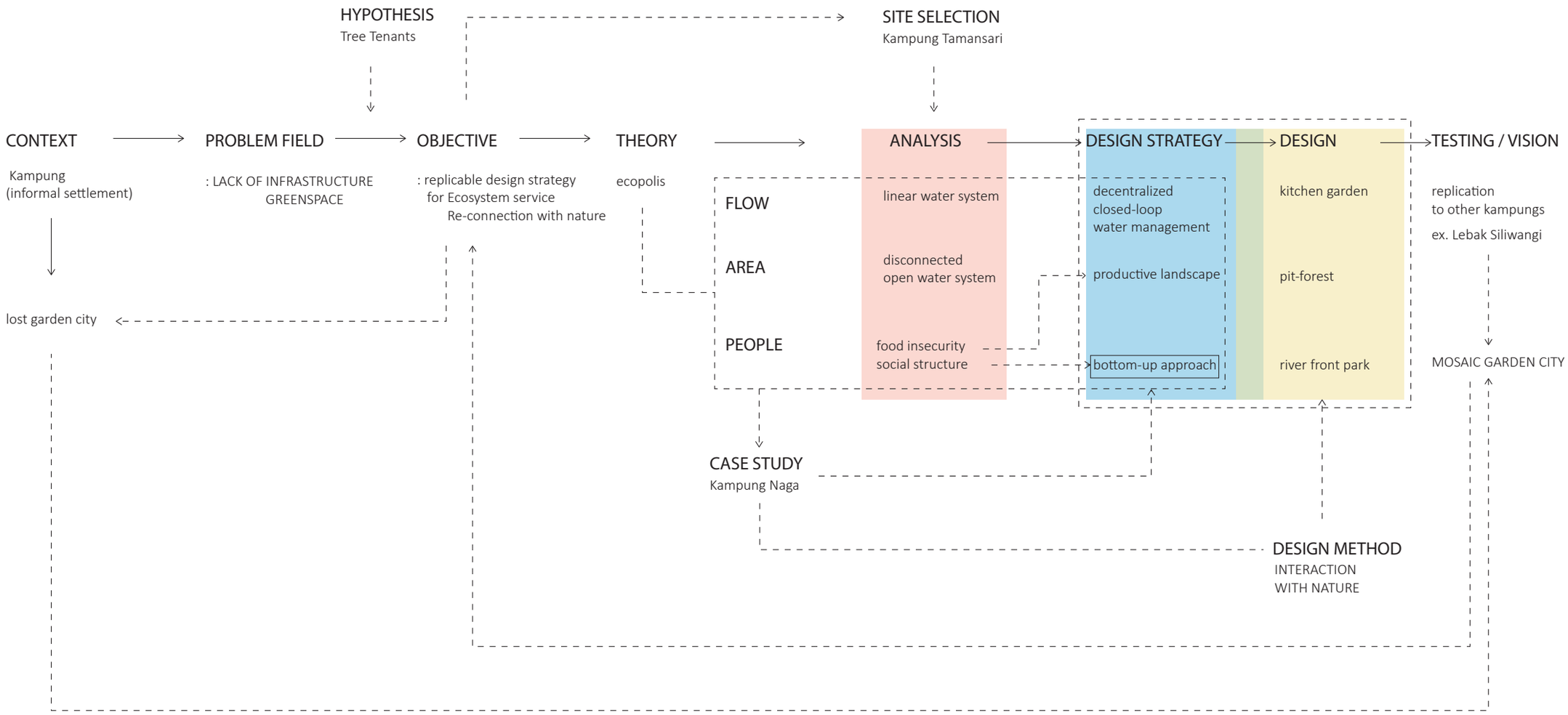
02 RESEARCH FRAMEWORK

2.1. METHODOLOGY

The methodology is based on the Ecopolis theory(T-jallingii, 1995) to solve the problems in informal settlements. Bandung will be explored as an example of healthy future city.Basically three layers- flow, area and people- guide the research and design.

The transformed ecopolis strategy will be applied in order to bridge a gap between people and nature, and kampung (informal settlement) and formal settlement by improving living condition in kampung. The design method is based on circular water management using landscape value.

[Fig. 2.1] **Research** Methodology



2.2 BENEFIT OF INTERACTION WITH NATURE

2.2.1. Ecosystem Service(ES)

Ecosystem Service(ES) is defined as the benefits which people obtain from ecosystem.(Wrattem, et al., 2013) According to Millennium Ecosystem Assessment, there are four functional characteristics. Firstly, ecosystem service supports ecological supports in abiotic layer such as water and nutrient cycling, soil formation, and soil retention and so on.

Next, ES provides its goods and services for human consumption including energy resources and food production. Third characteristic is regulating essential ecological process through biogeochemical cycle, which deals with water purification, erosion control and waste treatment. It relates to urban ecological footprint. Lastly, cultural service offers aesthetic and spiritual values with maintenance of human health. A recreational site is one of representatives.

ES is easily regarded as for rural areas which has relatively broad open area. That is, the ecosystem idea is implemented far away from where we live. However, urban ecosystem plan in a city helps remind people that we cannot help living without the ecosystem and its services.

2.2.2 Nature within City

The city is part of nature,
We are part of the city.

In the past we have thought that cities are independent from the nature. We believes that we can control every natural resources through constructing infrastructures. It have appeared in the division between natuer and city, and between nature and people. To build houses, we cut down forests and paved the ground. We use vehicles using oil for convenience. Toxic gas and dust released from the vehicles choke our lungs.

However, now we realized that cities are part of nature and cities are the habitat of our species (Alexandros, 2013). That is, more we try to keep nature away from us, more we will lose our safe and healthy habitat.

[Table. 2.1] Urban Ecosystem Service according to Green Typology

sustainability dimension	landscape / function	street tree	lawn/ parks	urban forest	cultivated land	wetland	stream	lake/ sea
ecology	air filtering	x	x	x	x	x		
	microclimate regulation	x	x	x	x	x	x	x
	noise reduction	x	x	x	x	x		
	rainwater drainage		x	x	x	x		
	sewage treatment					x		
Social Sphere	recreation	x	x	x	x	x	x	x
	cultural value	x	x	x	x	x	x	x
	sense of identity	x	x	x	x		x	x
Economy	provision of land for economic activities				x		x	
	commercial activities		x		x			x

2.2.3 Interact with Nature

Type of Interaction between people and Nature

Interaction between people and nature are divided into three (Keniger et al, 2013). Which is Indirect, Incidental and Intentional interaction. Indirect interaction is sometimes considered as passivity. However, it is physically passive yet can lead to intense mental activity and reflection(Kaplan, 2005). For example, view from the Window substantially reduces a sense of being distracted and disorganized.

Incidental interaction is an unintended result of other activities, such as seeing street trees when you walk along a path. Unlike indirect interaction, the interaction must be physical. It could arouse a lot of interest of nature by making city more greenery. Furthermore, nature is important because the environment conveys information for people to understand and seize an opportunity for exploring their neighbourhood.(Kaplan, 2005)

Lastly, intentional interaction is literally to experience or to be in nature directly with activities such as gardening or recreation. The intent to interact promotes sustainable behaviours such as in the form of conservation volunteering.

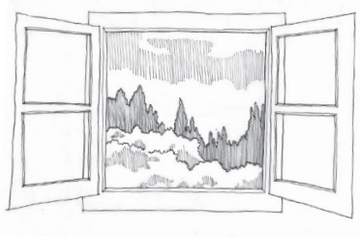
Benefits of interactiong with Nature

Interaction with Nature brings intangible benefit (physical health/cognitive benefit/spiritual benefit/social spiritual) and also tangible benefit like food supply and money. The latter is related to ecosystem service.

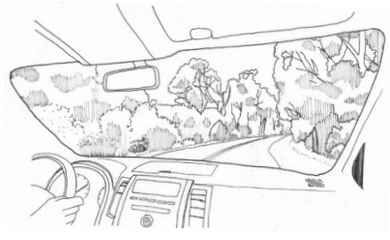
Especially one of cognitive benefit is that nature near their neighbourhood influence childrens' attitude toward nature in later life. They have more affinity to nature from a sustainable perspective.

About tangible benefit, it is clearly seen that some disadvantaged neighbourhoods in developing countries largely depend on kitchen gardne as a source of food and income.

[Fig. 2.2] Type of Interaction with Nature



Indirect Interaction



Incidental Interaction

Intentional Interaction

2.3 ECOPOLIS

The term ‘Ecopolis’ is drawn from ‘eco’(strictly, from the Greek oikos – house, but conventionally understood to mean ’ecological’) and ‘polis’(a self-governing city ‘where people come together, not just by birth and habit, but consciously, in pursuit of a better life’(Mumford, 1991). The term implies that ecology could be maintained only when people try to take care of their environment for the ecosystem, which is not automatic.

Paul F. Downton(2009) proposed four different cities according to the ‘Geometry’of urban fractals: Conventional Modern city, sustainable city, ecocity or green city, and ecopolis. In this order, in terms of urban ecology and sustainability of the city conventional modern city is the worst, and ecopolis is the most ideal city. There are several distinct differences between ecocity(green city) and ecopolis.

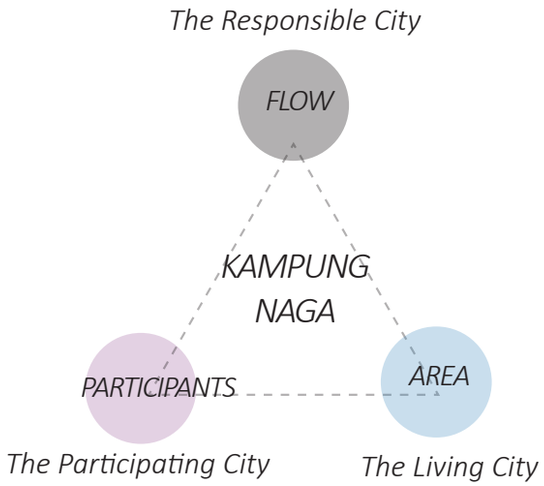
Ecopolis is more dynamic and is well integrated than ecocity. Ecopolis includes not only biotic but also abiotic as a part of urban ecosystem connectivity to create habitat. It orients cradle-to-cradle resource management beyond recycling and re-use resources. As ecological services are extended through scale, ecopolis nurtures bioregional functions from protecting bioregional function which ecocity does. (Downton, 2009)

As a result, ecopolis tries to achieve independent closed organic cycle including energy, water and the other resources. It makes circularity of urban metabolism. To catalyzing it, a high level of community participation is necessary from design stage to maintenance.

2.3.1 ECOPOLIS STRATEGY

Ecopolis can be fulfilled when an environment offers ecosystem services, and when people are able to consciously maintain the environment at the same time, and vice versa.
In order to find suitable plan for ecopolis, Tjallingii (1995) designed a threefold strategies framework. These three-fold fields are flows, sites/areas, and participants. These fields match each of them with ‘the responsible city, the living city, and the participating city. Each perspective has different object, problems and objective. In the end, it creates an Ecocity when they seek a balance.
The three different perspective helps to work in a balanced and integrated way. The elaborated ecopolis strategy framework[Fig.] works as an evaluation guideline after project is completed.

Tjallingii argues that the participation city is the most important aspect to maintain ecopolis as a condition for the other two city. On the other way around, this project regards ‘the living city’ as a condition and focuses on how the living city can create the other city layer from a landscape architecture point of view.



[Fig. 2.3] Three action-oriented integration perspectiv es (Tjallingi, 1996)

THE RESPONSIBLE CITY
From the perspective of flows, it pursues the responsible city. It is concerned with sustainable flow management with an integral chain of flows of energy, water, waste and transportation. Its main problem is caused by steady or blocked flows. Therefore, the aspect of the city addresses economical in use, re-use, re-newable and infinite resources and responsibility for quantity and quality of flow based on ecodevice model. This study mainly deals with water flow. But energy flow, and waste flows are partly intervened to reinforce the water management.(Tjallingii, 1995)

THE PARTICIPATING CITY
When citizens show environmentally friendly behavior as well as know environmental awareness, the participating city can be fulfilled. To attract people to participate, we need economically and socially attractive space by creating conditions for the operation of the market. Also, visible ecological relationship is efficient for people to recognize the problem and to involve in ecopolis. (Tjallingii, 1995)

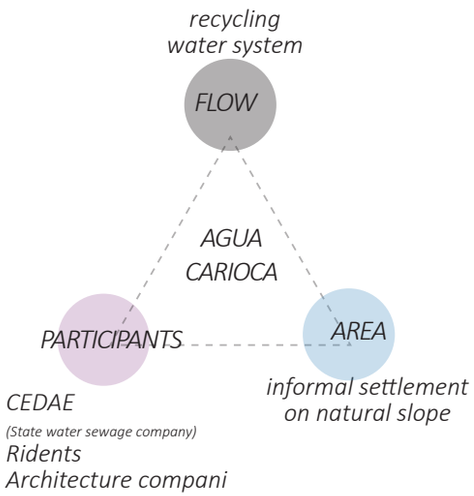
THE LIVING CITY
Two aspects of ecopolis – the responsible city and the participating city – are basic principle which can be applied in general situation. Unlike them, the living city (area) is the most flexible aspect. Even though the principles are same with other cities, living city represents different areas to solve the problems according to the local environment and culture, and people. Tjallingi suggests to use of local natural and cultural potential should be priority. It does not literally mean cultural landscape, but ecological potentials for future habitat. Next, city needs to build spatial structure for ‘flow management’ and create healthy habitat both for people and for flora and fauna. The latter
Living city not just aims to become greener and more decorative. With a tangible structure, it should bring about an integrated chain of flows and should make people maintain the city so that outdoor space can function for either preventive or create opportunities. (Tjallingii, 1995)

[Table.2.2] Ecopolis Strategy Framework (Tjallingi, 1996)

motto	THE RESPONSIBLE CITY	THE LIVING CITY	THE PARTICIPATING CITY
object	flows	areas	participants
social objective	- production - quality	- usefulness - attractiveness	- prosperity - well-being - justice
problems	- depletion - pollution - disturbance (push-off problem)	- health problems - damage to functions - loss of differentiation of plant and animal life	- alienation - indifference
‘ecopolis’ objective	- sustainable flow management - planning for prevention	- sustainable use of areas - planning with local potentials	- sustained commitment to ecological relationships - planning for self-organization
policy theme	- integral ‘chain’ management - source directed policy	- spatial and area directed management - effect directed policy	- target group poilcy

Tallingi's Ecopolis Strategy is not directly applied to following case studies. However, examples are chosen, considering informal settlement context and water management to build own principle.

The case studies are conducted according to three aspects: flow, area, and participation. Two projects are Agua Carioca in Brazil and Kampung Naga in Indonesia. Especially Kampung Naga is also an important case study for answering what the west javanese cultural landscape is.



2.4.1 Agua Carioca, Brazil

Agua Carioca system is introduced for Rio de Janeiro which face to water problems of pollution and scarcity. It provides various design solution for different scales and different environments to solve water issues.

AREA. In a community scale, design proposes houses in a chain using natural topography. Constructed wetland in front of houses provides not only public space but also deliver purified water to downstream houses. As a result the wetland provides small habitat for plants and animals. It works as a stepping stone to connect people to nature by creating opportunity to swim and recreation in the river.

Different scale and location have the same principle – usually using constructed wetland – but is adapted to different condition with a small transformation. On the hilly landscape, terraced landscapes are created and function as a buffer zone against landslide. On the downstream region, electricity generated from solar panels helps to pump up to recycle water.

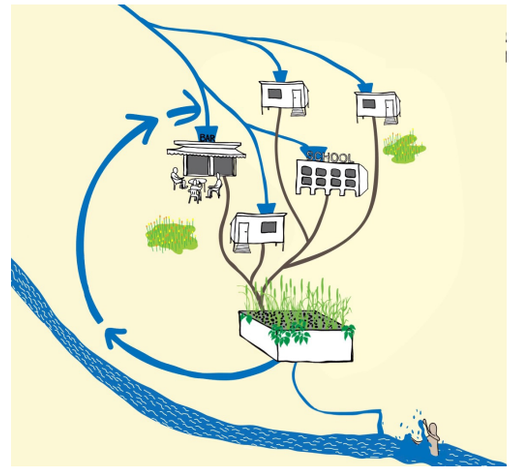
[Fig. 2.4] Three ecopolis perspectives in Agua Carioca (left)

PARTICIPATION. The plan has considered users' involvement. More interesting thing is that the projected conducted with participation of all stakeholders. Various actors from bottom-up to top-down, such as researchers, activists, local residents etc.) are interviewed to underpin the project.

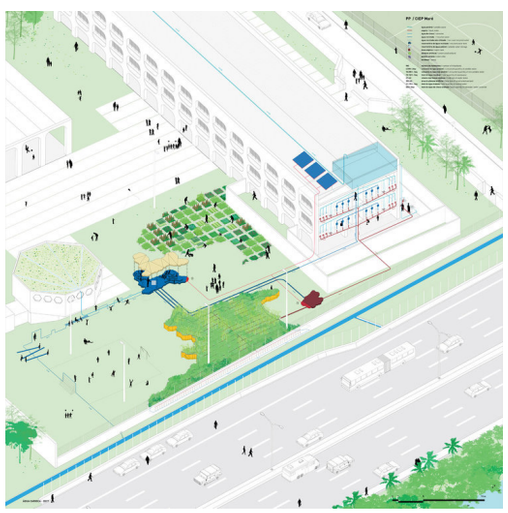
Change from secluded linear water management to visible water management structure draws people's attention and encourages their participation. Diverse strategies aroused people's empathy to involve the new water management.

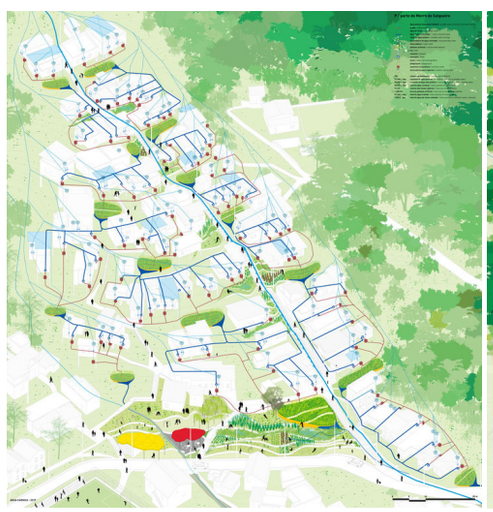
At building scale, a school is designed to show students visible water cycle as an education method. Constructed wetlands near houses give attractiveness to nature and public spaces.

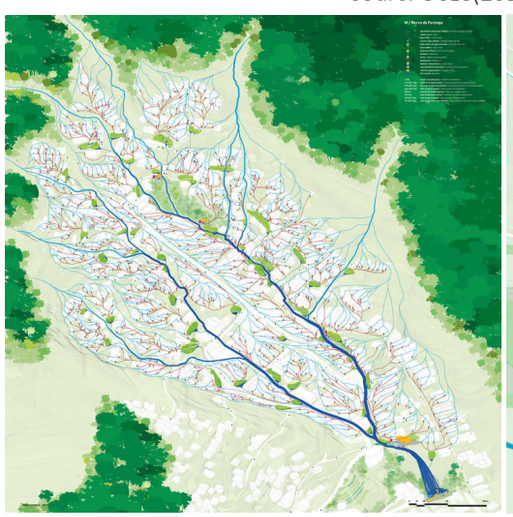
FLOW. The water chain is designed through scales from XS(building) to XL(region). It aims to create closed loop water system and it is holistic at the same time. The chain links from a building scale to regional scale. With an on-site/decentralized water purification system, the water can be reused on the site.

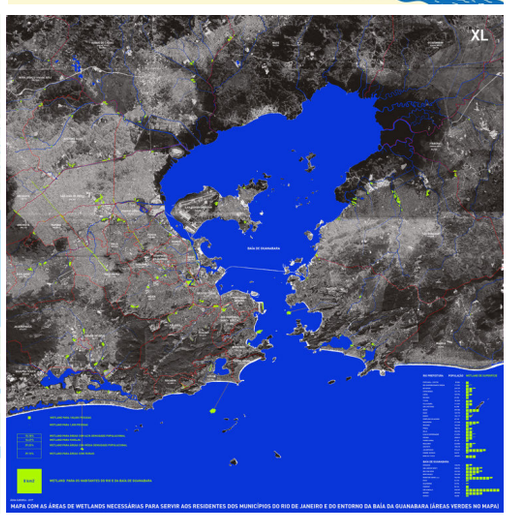


[Fig. 2.5] a unit of closed loop system (right)
[Fig. 2.6] Agua Carioca Plan through Scale (bottom)
sourc: Ooze(2017)





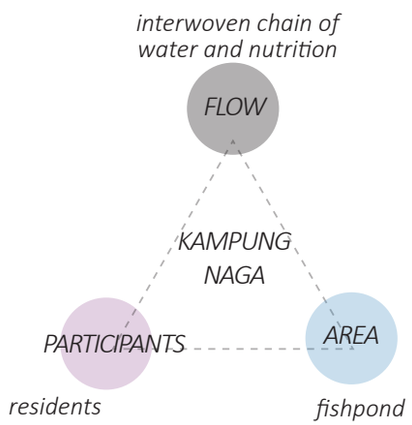




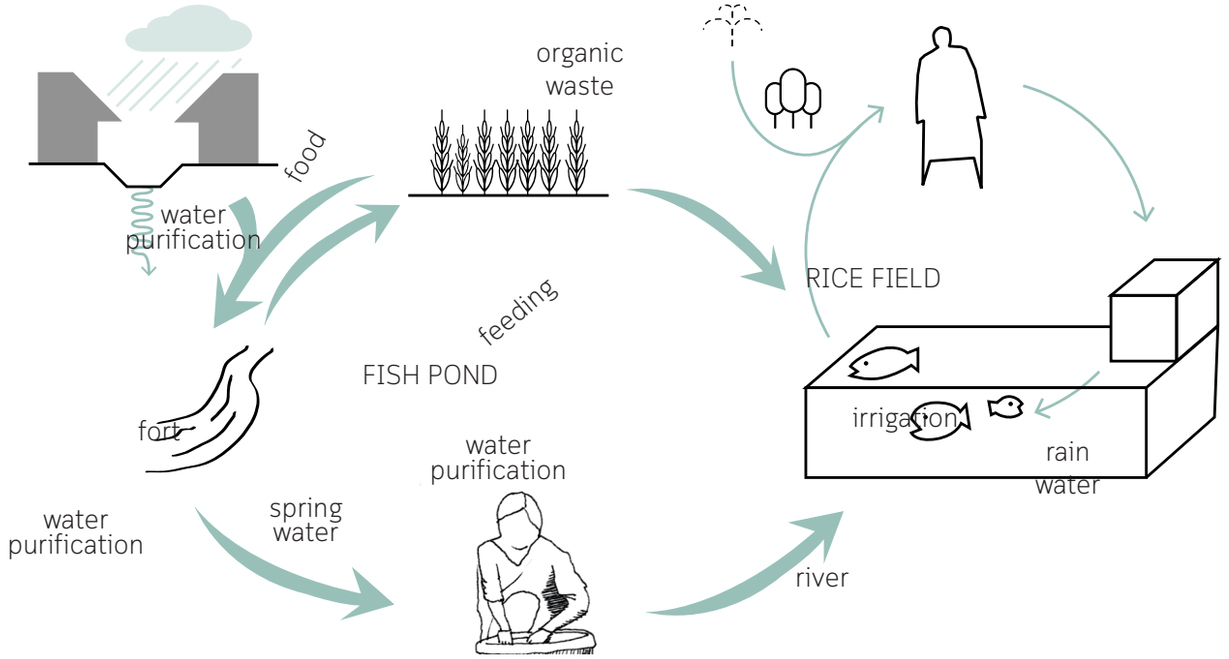
2.4.2 Kampung Naga, Indonesia

Kampung(village) Naga is located in West Java near Bandung. The village is not within urbanization's reach yet. Residents still conform to nature and conserve traditional life style as circular ecology including water system.

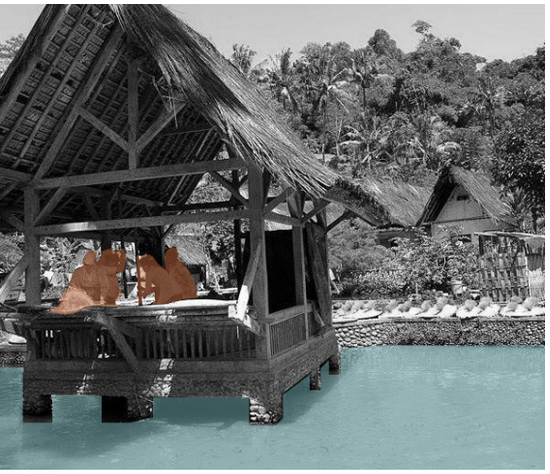
Javanese culture are mainly based on agriculture. They created the landscape according to their daily life. They do not depend on the resources outside of the village. Their aims are to live with self-sufficiency. It is represented as a part of nature and it is represented on the village plan and myth. They clearly notice about the limited capacity of ecology and intentionally control the number of residents. It helps to maintain the whole system.



[Fig. 2.7] Three ecopolis perspectiv in Kampung Naga



[Fig. 2.8] Circular Ecological System in Kampung Naga
Kampung Naga's circular system interconnects each flows together



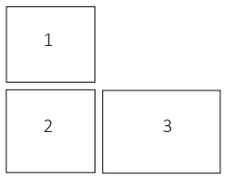
PARTICIPATION. Peple willingly maintain this circular system. Firstly, people have strong cohesion and cooperation. The community is strongly controlled to keep certain amount of population due to capacity of natural sources. Fish ponds reinforce the ecological relationship between people and nature. Make their memory in the site

Kampung Naga has extremely rich resources which seem infinite. Interestingly, those who have settled down in the village recognize that they have limited regeneration capacity. That is why people keep a certain number of residents and maintain the system for hundreds of years. It shows people understand completely how nature works and people position themselves as a part of nature. It is represented in the form of myth so that they appreciate the benefit from nature.

FLOW. The community uses clean water sources from the Ciwulan River and ground water. Water from the river is used for taking a shower, toilet and washing activities while ground water from springs and fresh water is used to cook and drink. Clean water treatment in Kampung Naga is done naturally through the roots of trees and mud settling fish ponds.

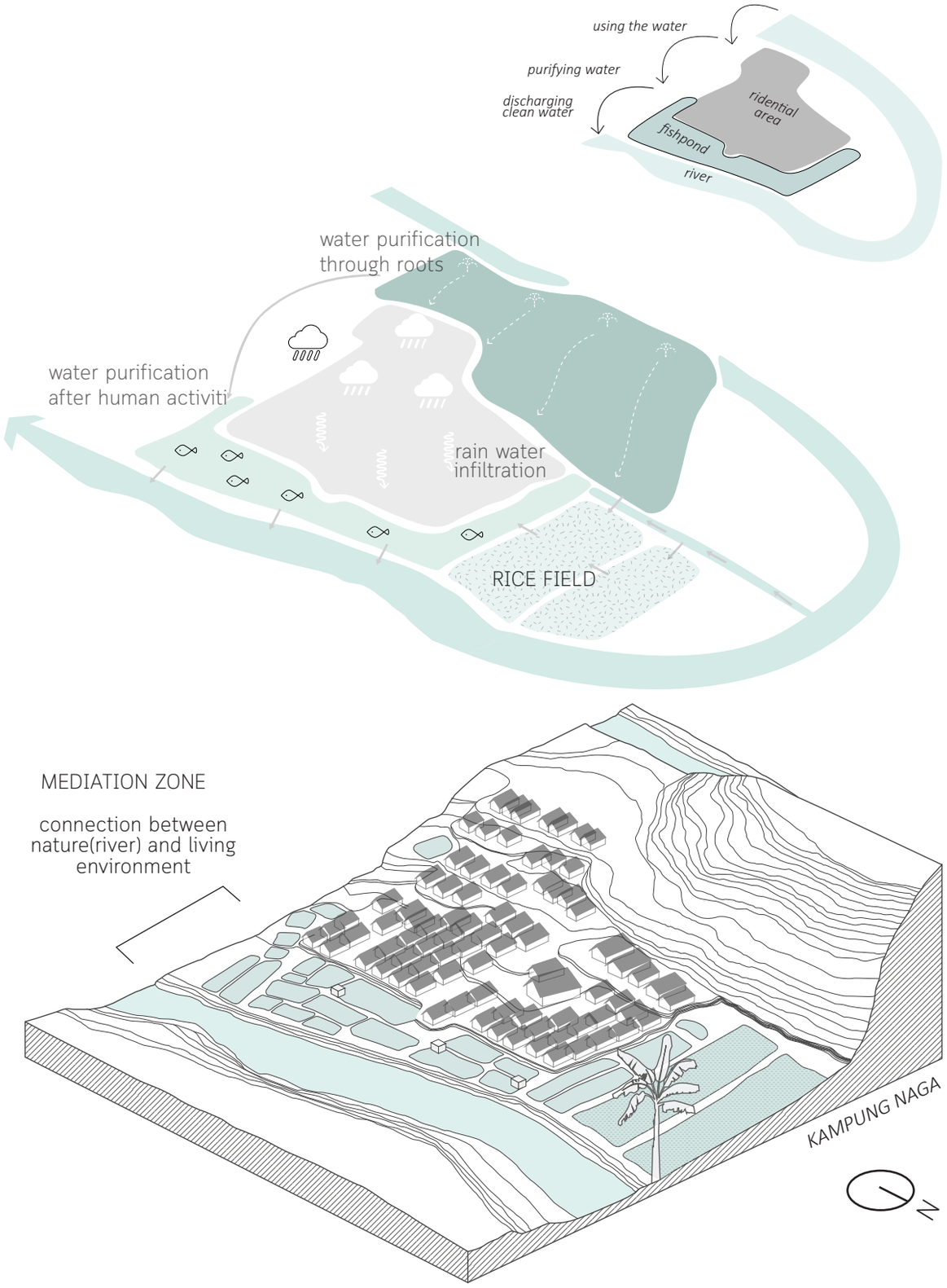
Clean water in Kampung Naga is processed by the community before being used, especially water from Ciwulan River because it contains mud. River water flowing into the fields and channels will be filtered naturally by the grass and rocks which are found there. Then, this water is filtered again in the pond sludge filtration.

Circularity in Kampung Naga extends to ecological system beyond water system which covers nutrients and sanitation. These elements are closely related each other and make continuous flow. The capacity has balanced by climate, topography and human control.



1 working space on the fishpond
2 washing on the fishpond
3 toilet on the fishpond

Many daily activities are happening near the water. Farmers To feed the fish, people thresh the rice on the fish pond. They use the toilets on the fish pond, and wash their clothes and dishes there as well.



[Fig.2.9] Strategic position for circular system

AREA. The location of Kampung Naga relates to circular water system. Clean water sources are at the highest contour so that water is free from pollution coming from residential waste.

Water of the upsteram river is used as a source of clean water. The people of Kampung Naga choose springs from the hill which is next to the settlement to keep it from becoming dirty as well as to have better accessibility. Rain water is not used for daily life. Instead of using it, rain water is guided to the small channels, made of permeable gravel from the river, by orientation of the roofs. Its infiltration contributes to recharge the groundwater.

Lastly, fish ponds purify the water after using for daily activity and discharge purified water into the downstream of the river

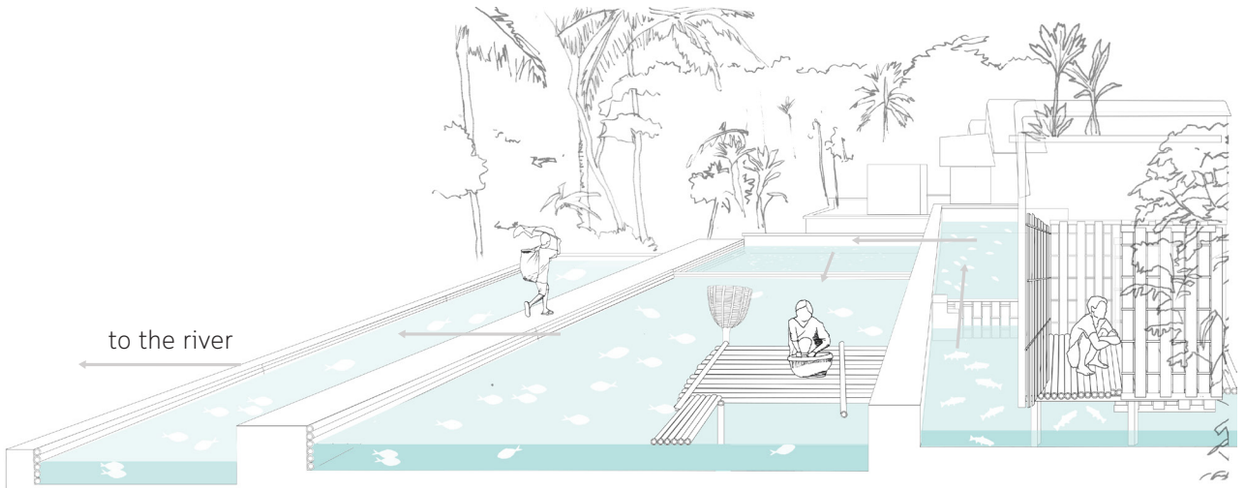
FISH POND. Fish pond is a key component in Kampung Naga circular water system. Fish ponds are mostly located between Ciwulan river and residential area. On the fish pond, there are toilets where fresh water keeps flowing. Many daily activities happen on the fish ponds.

Firstly, people use toilets here. Toilets are divided into two different types according to urine and feces. It decides where small and big fish need to live. Continuous fresh water keep toilets clean and odourless. Also, fresh water is connected outside of the toilet. It is used for cleaning ingredients for cook, washing the dishes and so on. Dirty water is purified in the fish pond by schools of fish. Clean water is discharged to the downstream of Ciwulan River.

Interesting thing is the fish pond not only contribute to non-linear water cycle but also build an ecological system in a circular way. Human excreta feeds fish and the fish provides food resources to the people.

VALUES OF SUSTAINABILITY

Circularity in Kampung Naga extends to ecological system beyond water system which covers nutrients and sanitation. These elements are closely related to each other and make a continuous flow. The capacity has balanced by climate, topography and human control.



[Fig. 2.10] Section of Fish pond and toilet

44 BANDUNG CITY
50 KAMPUNG TAMANSARI
62 CONCLUSION FROM ECOPOLIS PERSPECTIVE

03 CONTEXT IN BANDUNG

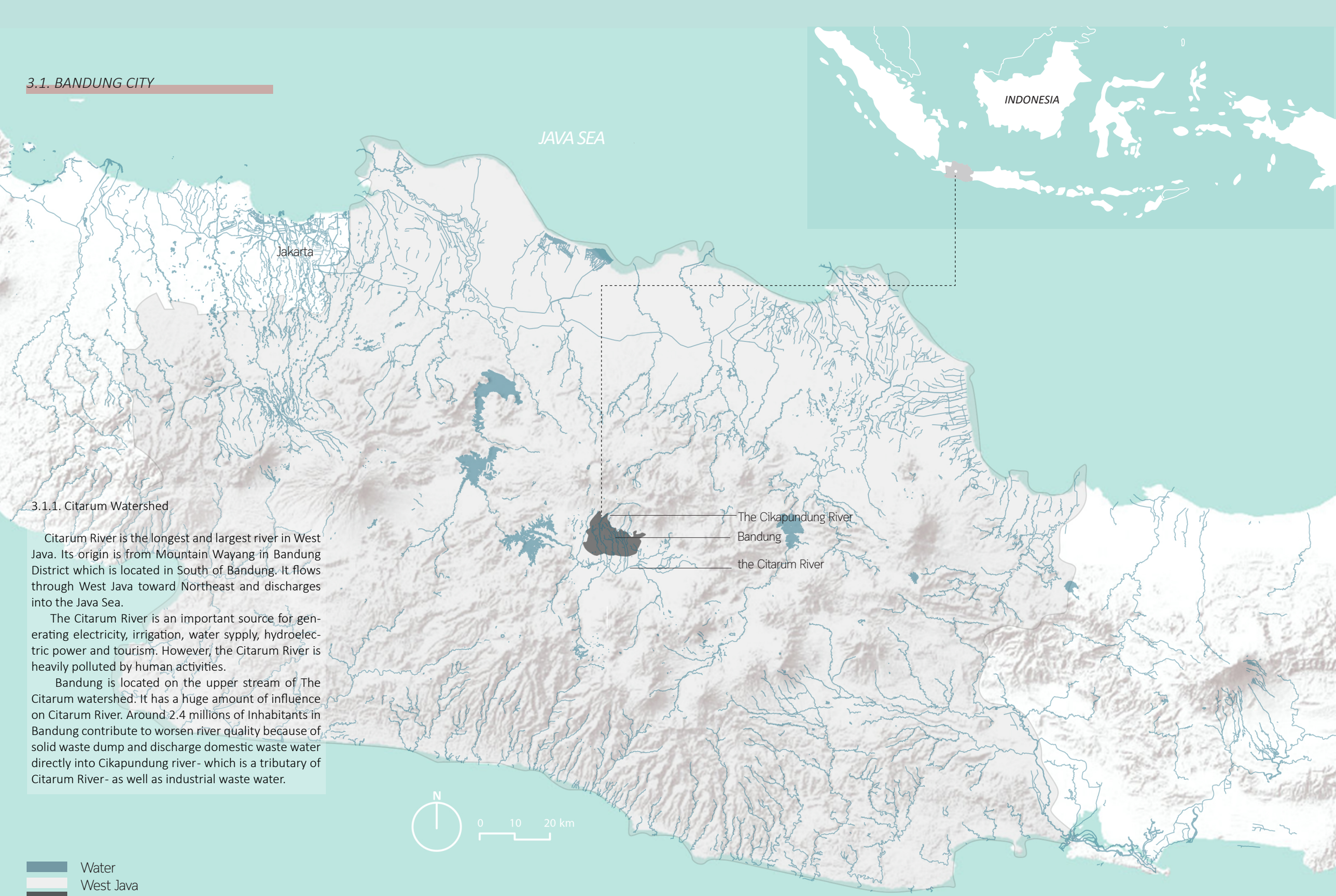
3.1. BANDUNG CITY

3.1.1. Citarum Watershed

Citarum River is the longest and largest river in West Java. Its origin is from Mountain Wayang in Bandung District which is located in South of Bandung. It flows through West Java toward Northeast and discharges into the Java Sea.

The Citarum River is an important source for generating electricity, irrigation, water sypply, hydroelectric power and tourism. However, the Citarum River is heavily polluted by human activities.

Bandung is located on the upper stream of The Citarum watershed. It has a huge amount of influence on Citarum River. Around 2.4 millions of Inhabitants in Bandung contribute to worsen river quality because of solid waste dump and discharge domestic waste water directly into Cikapundung river- which is a tributary of Citarum River- as well as industrial waste water.



[Fig. 3.1] Location of Bandung

3.1.2. Short History of Bandung

Bandung is surrounded by volcanos and the mountains created fertile soil condition in these regions. Average altitude of Bandung is around 768 metre above sea level, it has relatively mild and cooler climate than most other Indonesian cities.

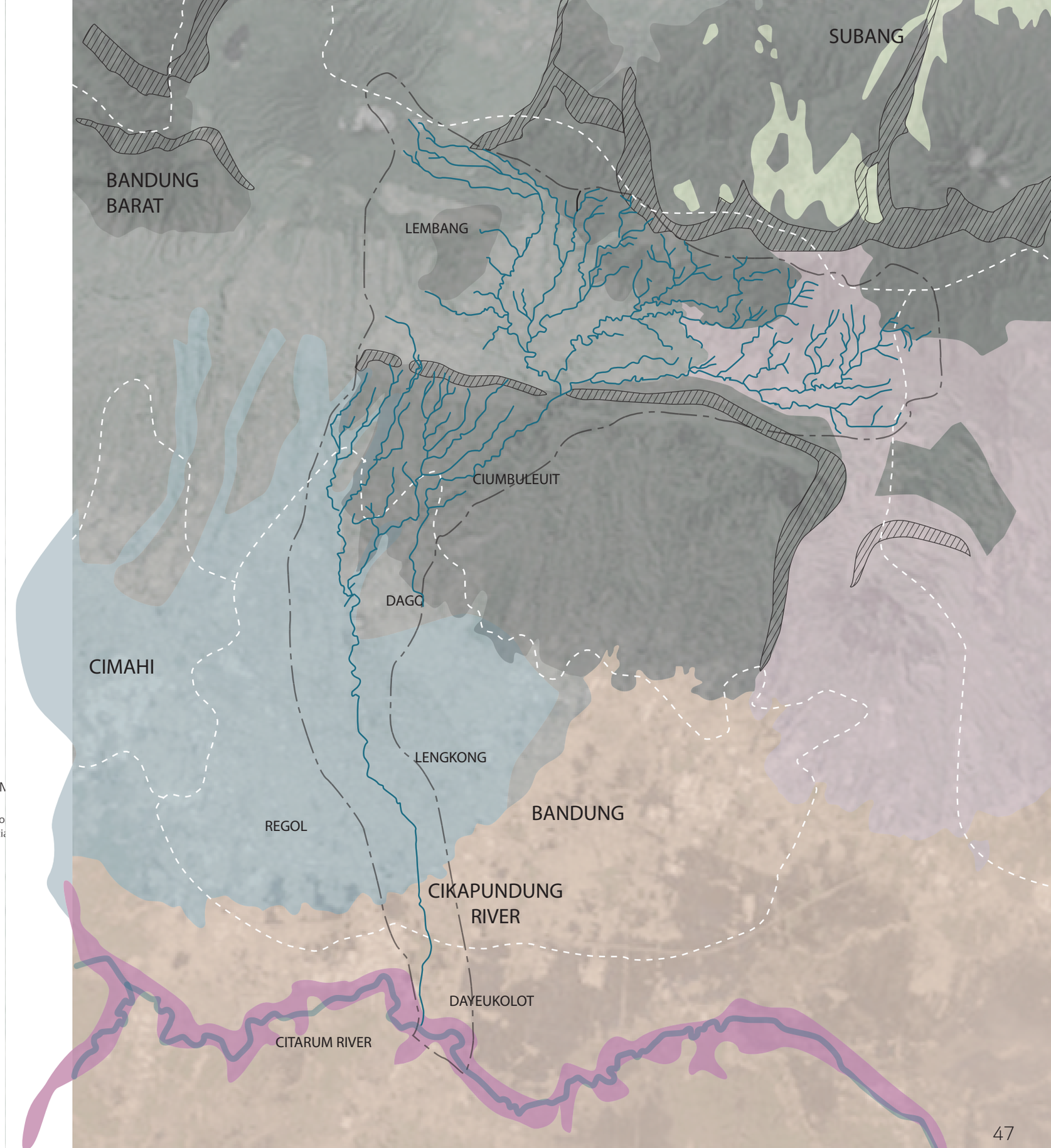
Because of tje mild climate and fertile soil(now East side of Bandung), the Dutch east company had run tea plantation business in the north Bandung. As a railway connected East and West Java, Bandung became an important onshore transportation hub. It triggered European expatriates and plantation landlords to visit Bandung as a pleasant resort. They settled down in North because of its hilly vista and beautiful landscape. It brought about a Garden city plan.

3.1.3 Green Corridor, Cikapundung River

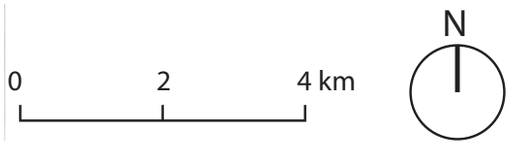
The Cikapundung River is one of thirteen tributaries which joins the Citarum River. Cikapundung river is the largest river in Bandung and traverses from North to South of Bandung. Because of Mountaneous topography and different elevations from 600 to 1,500 m above sea level, the river has various appearances although it reaches only a length of around 29km, which is relatively short compared to other rivers. Especially North Cikapundung valley with steep slopes and beautiful forests was designated as a green corridor of Garden city plan.

The green corridor played a role as a bridge to connect the beautiful nature with green space in Bandung city.

However, the green corridor was replaced with informal settlements. Cikapundung river is full of stinking garbage and organic waste. At a city scale, Bandung also could not exploit its own landscape value so it is now covered with grey houses and asphalt roads.



[Fig.3.2] Bandung Geological M

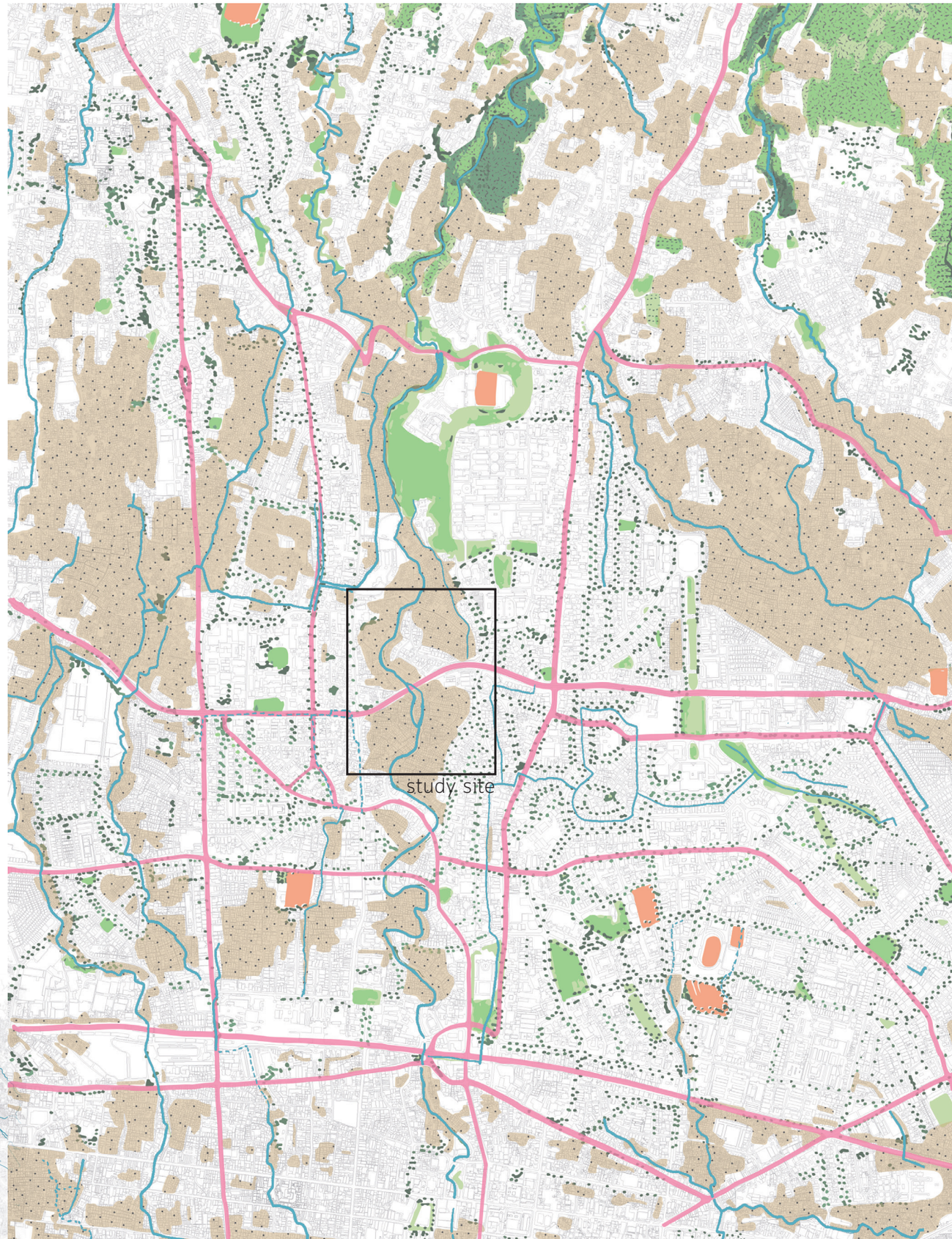


3.1.4 North Bandung

The city is weaven vertically with rivers and horizontally with transportation network. However, kampungs block the connection of natural connectivity. In addition, there is imbalance of green space: which is mainly concentrated in the north and the east side from the Cikapundung River.

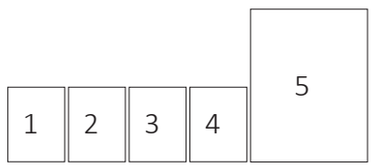
Reversly, the kampung can be transformed into a natural medium to connect green infrastructures and enrich the urban ecosystem. Rivers passing through the kampungs can be integrated with new green spaces. All kampungs are connected by horizontal green corridor which utilise existing road structure. That is, two different linear structures strengthen nature in the city.

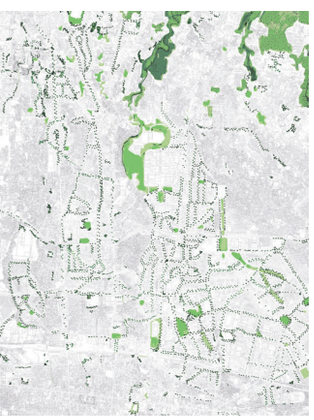
This research explores replicable design strategy which can be applied to similar contexts, kampungs (informal settlements) next to the rivers. This design approach will reconnect fragmented green spaces in the city.

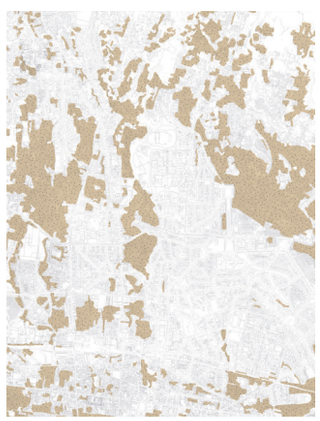


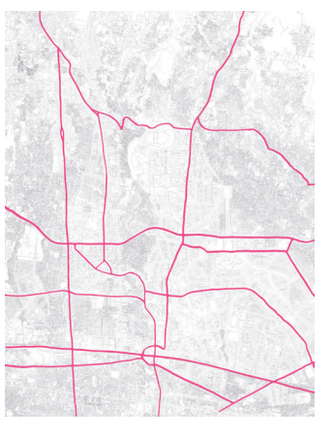
[Fig. 3.3] North Bandung Natural and Built Structure

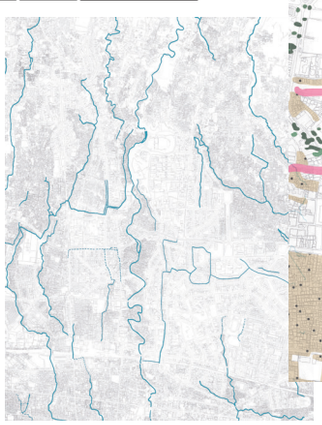
1. green space
2. kampung (informal settlement)
3. Transportation Network
4. Water
5. Natural and Built structure











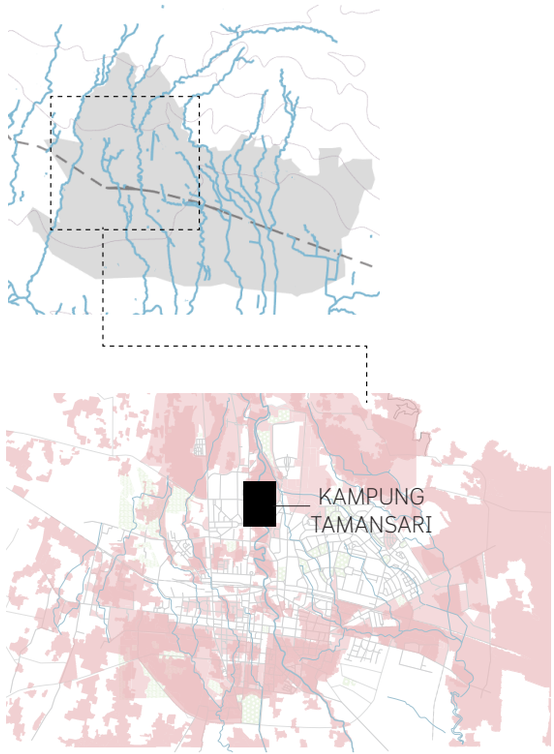
3.2. KAMPUNG TAMANSARI

3.2.1. Kampung Tamansari

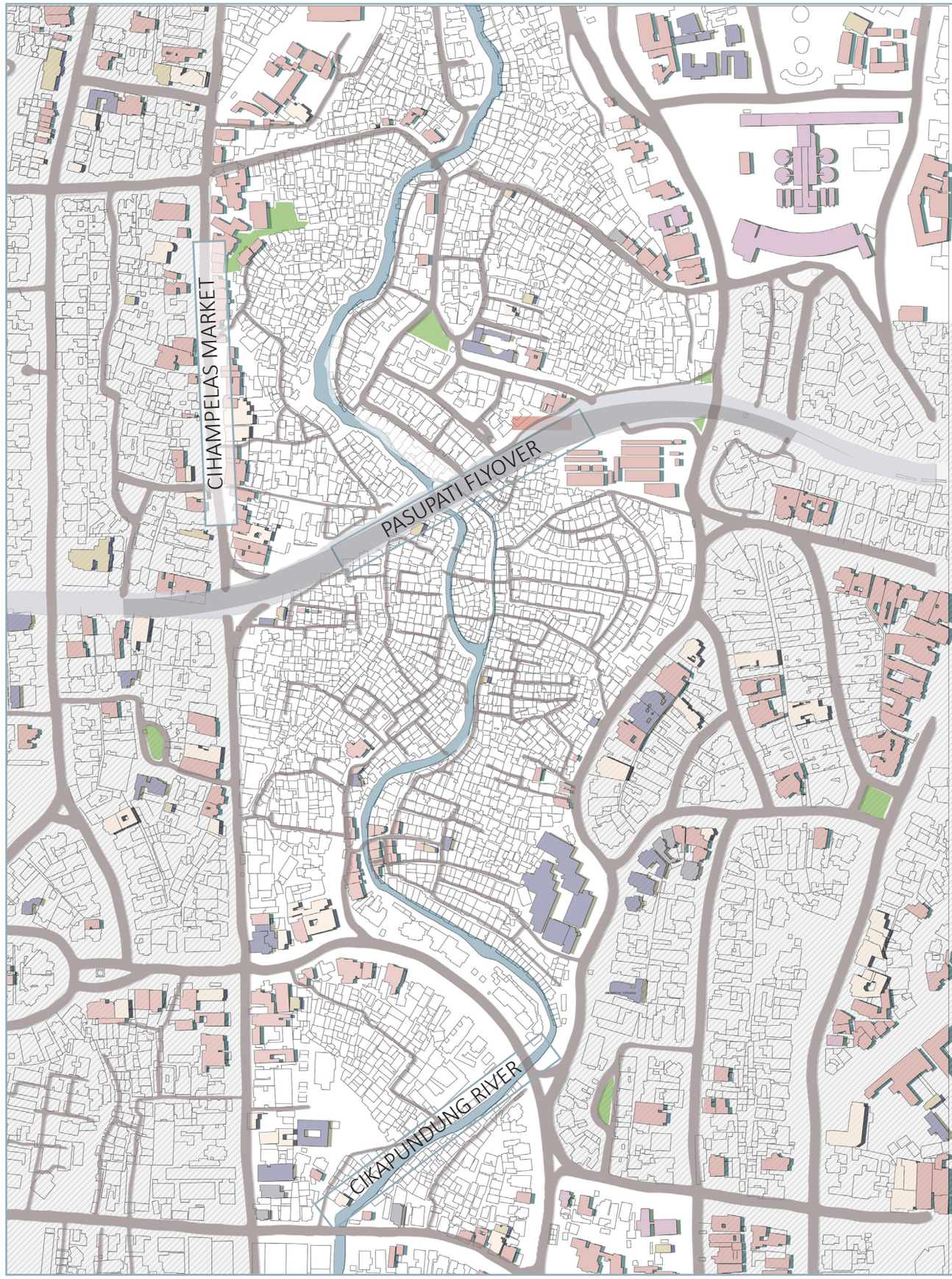
Kampung Tamansari is an informal settlement located in North Bandung. The location was supposed to be a green corridor and It used to be a traditional West Java Kampung with rice paddies and fish pond. People could even drink water from Cikapundung River (Reerink, 2015).

However, rapid urbanization resulted in high density in the kampung. The only open land is narrow allies. Green space is only 1.1% in the kampung. The rest of space is occupied to accommodate houses for approximately 29,000 residents. The Highest density is 800 people per 0.65 Ha in the island.

Like other kampungs in Bandung, kampung Tamansari is surrounded by a European villa district and is close to city center. It has many economic opportunities including educational institutes, commercial buildings, markets etc. Moreover, Pasupaty flyover passes through this area.



[Fig. 3.4] Location of Kampung Tamansari



[Fig.3.5] Building Use Map in Kampung Tamansari

EUROPEAN VILLA
ECO DISTRICT
CIKAPUNDUNG RIVER
ROAD
EDUCATION INSTITUTE
GOVERNMENT OFFICE
INDUSTRY
COMMERCIAL-BUILDING
SERVICE
RELIGIOUS BUILDING
PUBLIC GREEN SPACE

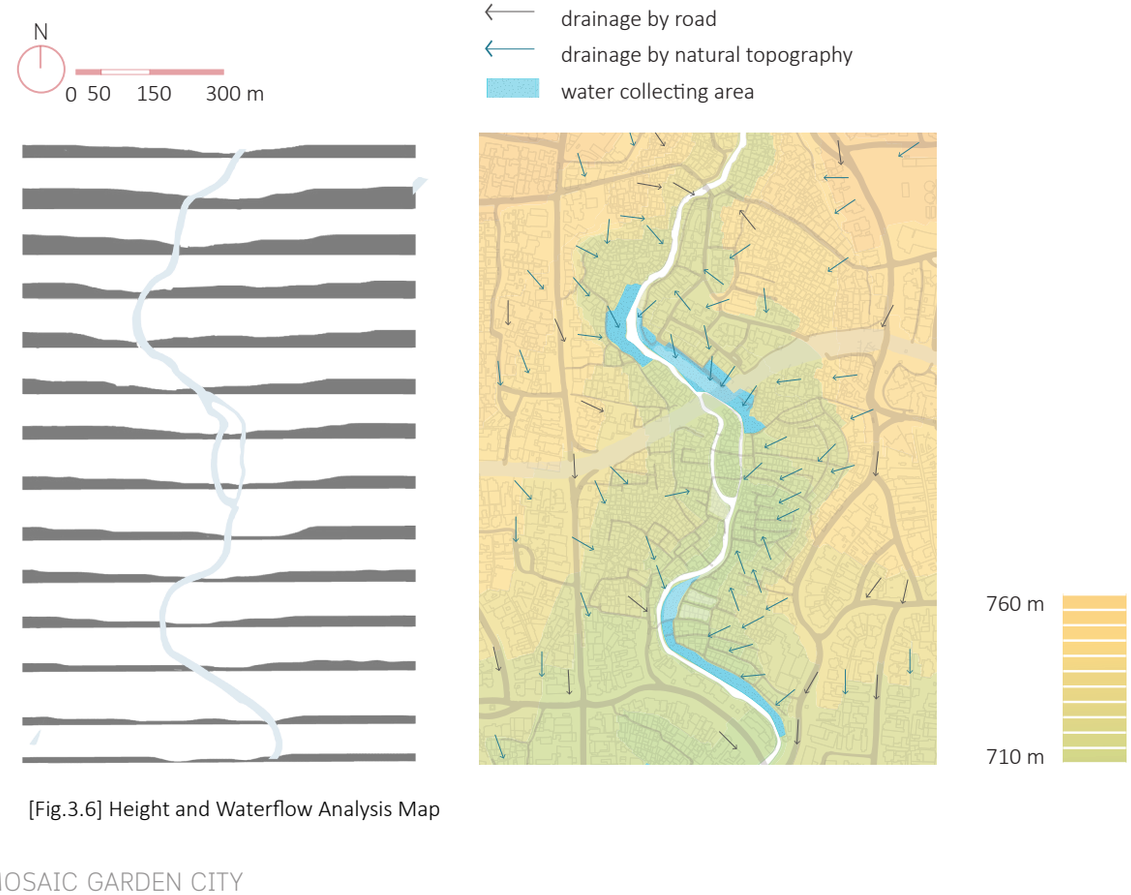
0 50 150 300 m

3.2.2. **AREA**: Landscape Analysis

Topography

Kampung Tamansaris' inclination is between 15 and 30%. River always flows from North to South. Due to its slope, the water flows one-way and the river is free from flushing pollutants and soil into rivers and streams.

Storm water flows from formal planned districts toward Cikapundung river through Kampung Tamansari. Mainly there are three water collecting areas but its outlet is blocked with house and caused floods inside the kampung



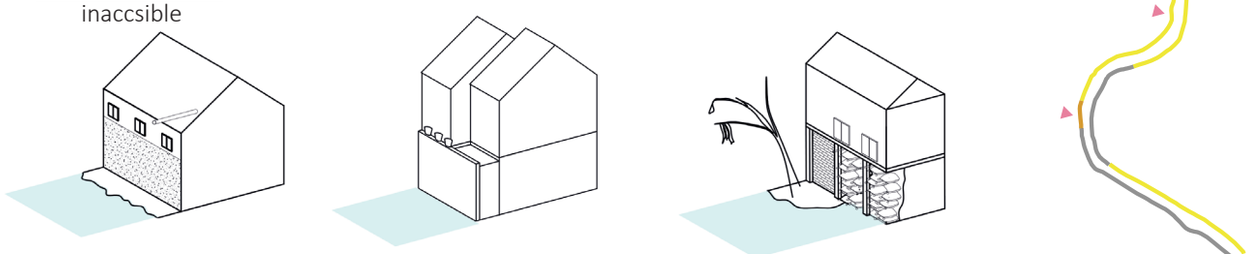
[Fig.3.6] Height and Waterflow Analysis Map

[Fig. 3.7] Aerial View of Kampung Tamansari
Source: Paul Jon (2017)

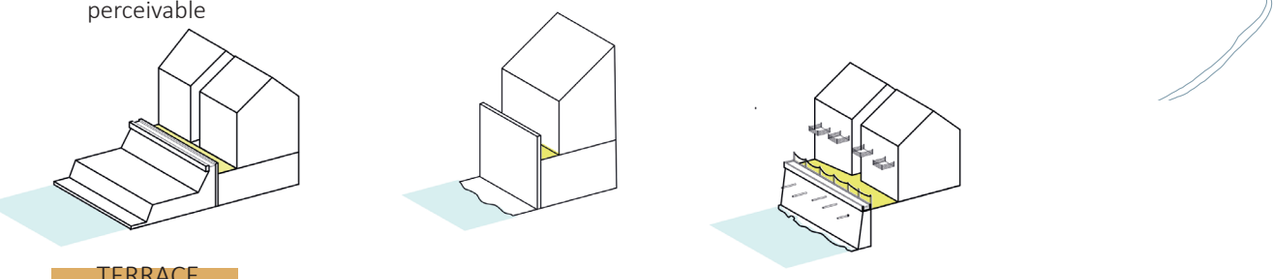
Waterfront Typology

There are three types of waterfront typology in Kampung Tamansari. Firstly, houses next to the river block the accessibility as well as vision. People cannot perceive that there is a river over the house. Next, In walkway people could see the river. However, it is not able to touch or interact with nature. Lastly, terrace typology offers opportunities to get in touch with nature for fishing. But the way to access is dangerous and structure is unstable. It is necessary to reinforce the structure.

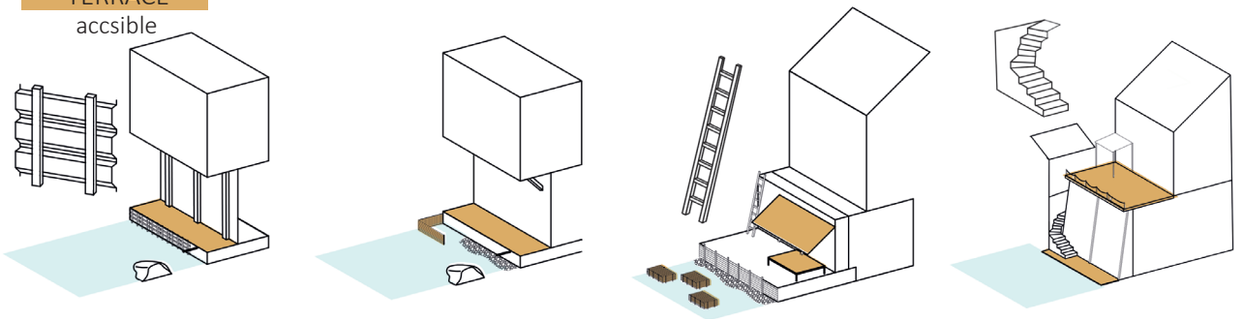
HOUSE
inaccsible



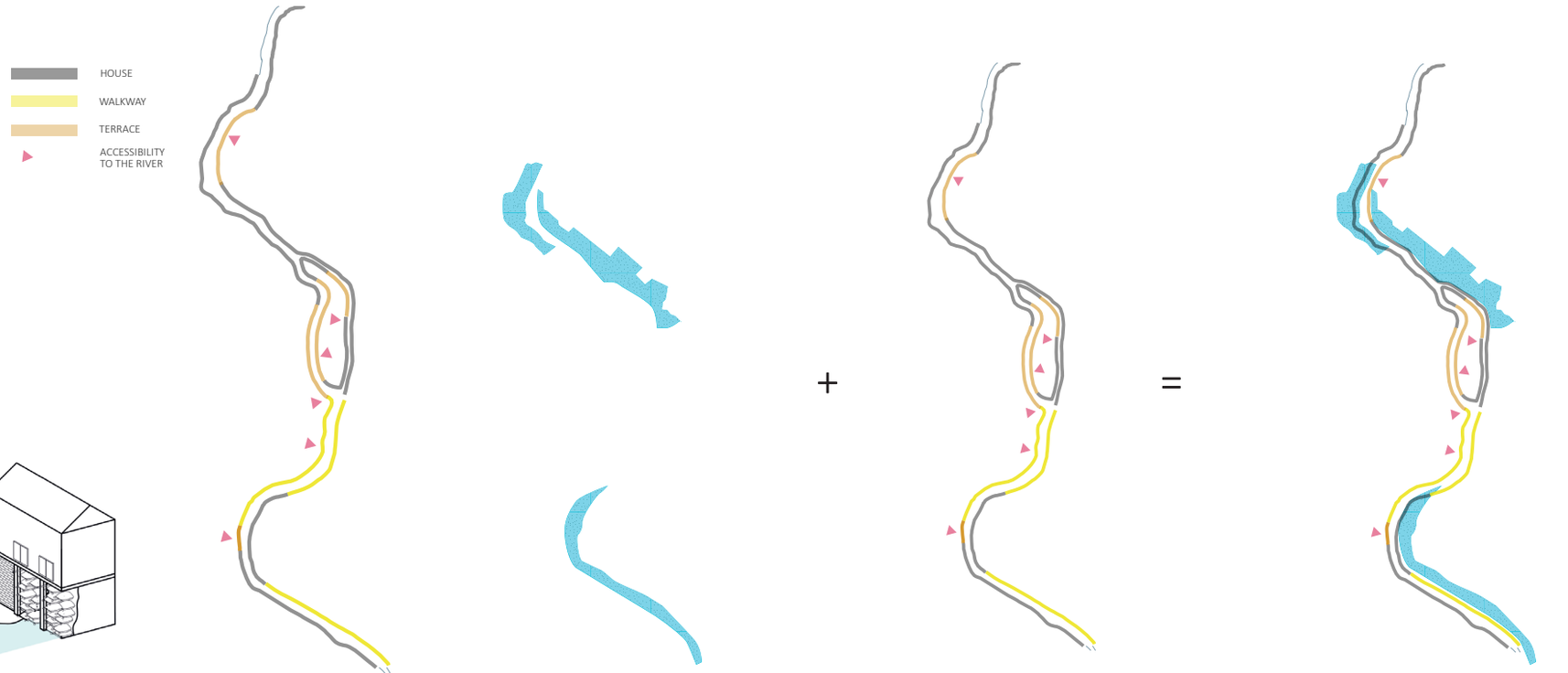
WALKWAY
perceivable



TERRACE
accsible



[Informal Settlement Challeng]



[Fig. 3.8] Clogged Water Flows
Houses on the embankment impede natural water flows into the Cikapundung river.
These houses block South- North accessibility.

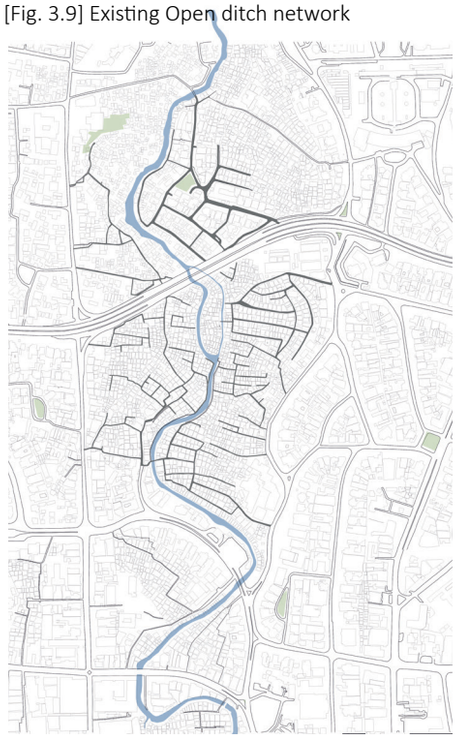
Disconnected Drainage System

Drainage system in Kampung Tamansari relies on open ditches next to streets. However, ditch structure is not completely connected each other. There are some dead ends. This poor connection causes flood inside of the kampung, combining with clogged ditches by domestic solid waste. To solve the problem, there are some tendency to cover the ditch with concrete slabs.

To prevent from flood, spatial and participatory approaches are considered. Firstly, to connect the existing ditches is important in a spatial aspect as water adaptive landscapes. Also, open spaces are required to slow-down storm waters and to infiltrate water into the ground. It would be merged with other function such as orchard.

Another programme in the place appears to create visible flows and ecological relationship which encourages people to involve managing drainage system.

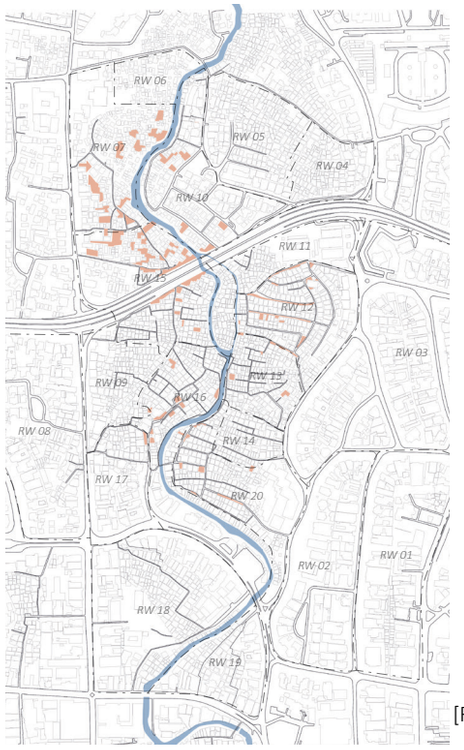
[Fig. 3.9] Existing Open ditch network



Open Areas

Kampung Tamansari has rarely open spaces. However, there are relatively more open spaces in RW 07 and Part of RW 15. These spaces can be a potential spaces for relocation of houses next to the river.

These open areas need strategy on future challenges like densification. To deal with them, appropriate design of green space persuades residents that why we need green and open space in the community.



[Fig. 3.10] Empty lots in kampung Tamansari

Spatial quality in Kampung: Enclosure

Kampung is the extremely compacted area. It creates its own unique characteristics.

Narrow allies allow only people to walk. Even, motorcycle, which is the most common transportation in Indonesia, can access to only few streets in Kampung. This dinstinctive spatial atmosphere helps people escape from the noisy and busy urban environment and gives calm and peaceful atmosphere.

Moreover, even though there are some spacious public spaces, it is still surrounded by many element such as houses, the river, or other elements like walls. Basically, there are enclosure inherent in almost every spots in kampung.

[Fig. 3.11] The most open area in Kampung Tamansari

A chain of water management is basically linear in Kampung Tamansari. It has deficient recycle and purification in the cycle.

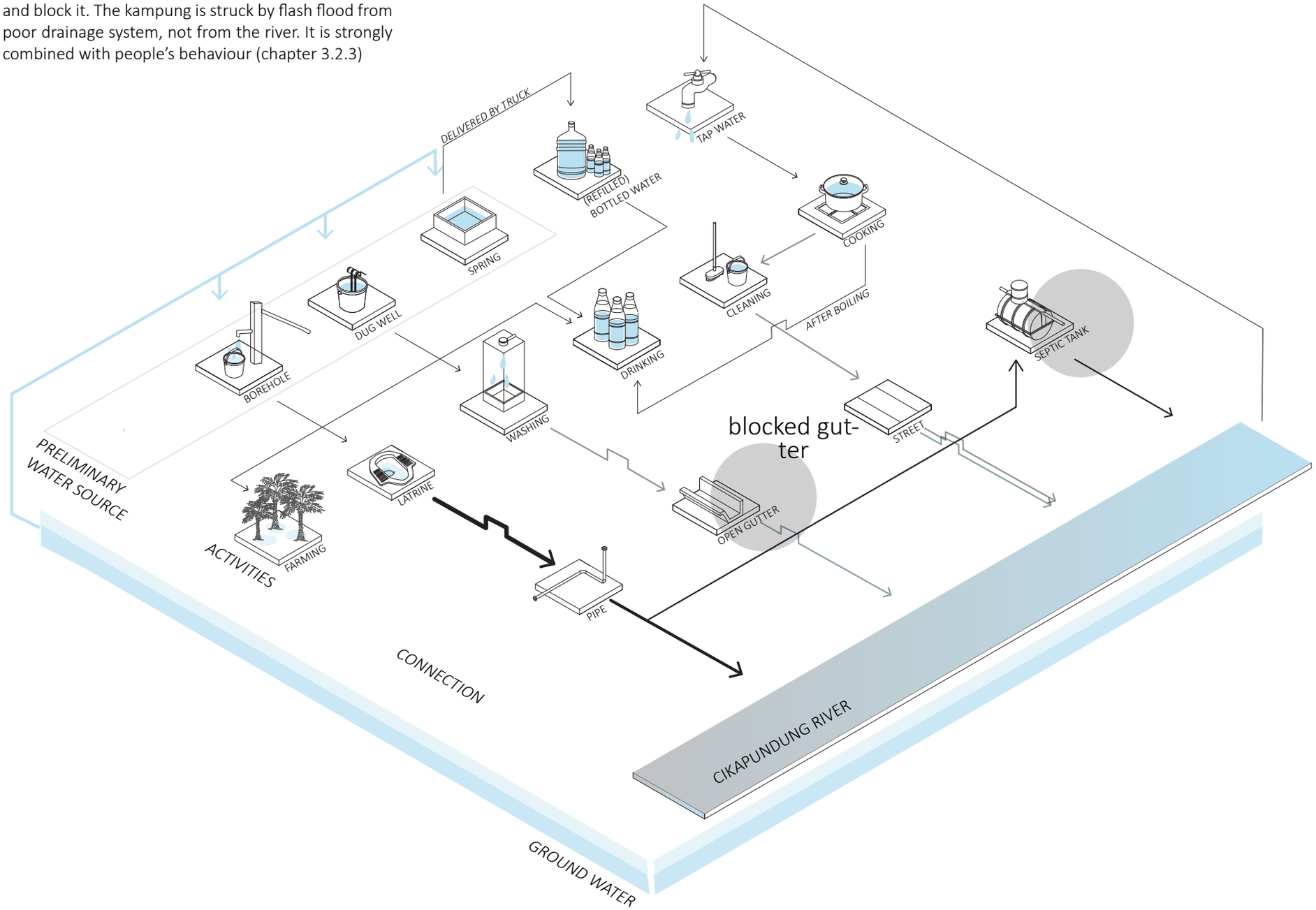
Unstable water supply from centralized water supply let people find other water sources using not only spring water but also borehole and well. Lack of regulation on digging well produce the negative outcome, resulting from high dependence from ground water. The overexploitation of groundwater imposes a burden on groundwater cycle.

So far, rain water is not considered as a potential water source. Even it cannot infiltrate into soil since ground was paved with asphalt and concrete. It is rarely find ecosystem service.

Water chain in Kampung Tamansari is closely related to other flows as well. Waste water(black, grey and storm water) is not connected to centralized water treatment system. Even though a few household uses septic tanks, it is possible to cause soil pollution due to maintenance problem. Unfortunately, most of residents directly discharge the waste water into the river, and dump solid waste as well because there is no space for waste collection center.

While unsafe water promotes people to drink only bottled water for safety reason, these plastic bottles deteriorate ecological flow in Kampunt Tamansari and Bandung as well. In Kampung Tamansary, 2,5 million litre of waste per a day goes to the river directly. That is why river is seriously polluted and treated as an open sewer.

Furthermore, there are open ditch along allies. But it does not function well. There are two reasons. Firstly, the open drainage system is not disconnected each other. Secondly, people throw garbage into the ditch and block it. The kampung is struck by flash flood from poor drainage system, not from the river. It is strongly combined with people's behaviour (chapter 3.2.3)



[Fig. 3.12] Existing Water Chain

3.2.4. PARTICIPATION: stakeholders

Community: RT - RW system

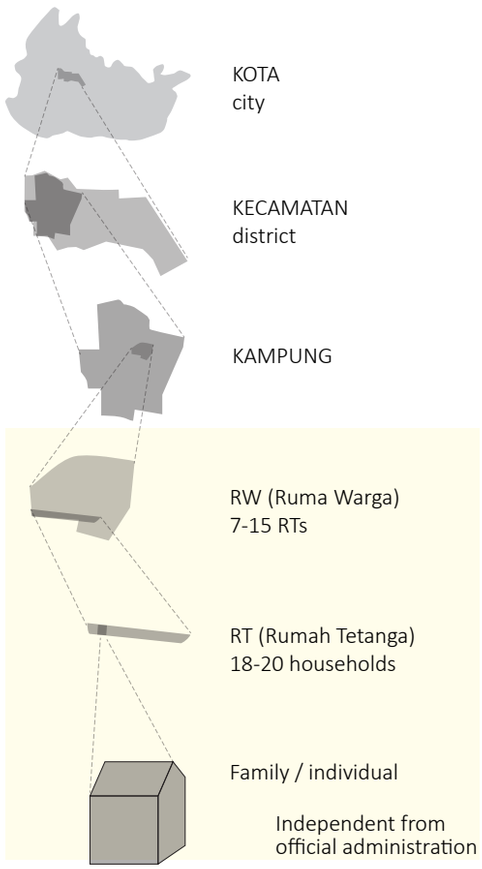
RT and RW are Indonesian's indigeneous close-knit community organization. It is not administrative. Instead, these are the lowest strata of self-governing dministration related to daily social life of citizens. It is powerful system which can reach to every household.

RUKUN TETANNGA (RT)

RT (Rukun Tetangga) is the smallest unit and consists of a few (18-20) household. It works in order to maintain cooperation. Monthly the head of RT holds a meeting with residents to discuss community issues such as daily life, environment, and waste etc.

RUKUN WARGA (RW)

A RW(Rukun Warga) usually has 7 to 15 RTs. They organize meeting every 2 or 3 months with heads of each RT. They collect opinions together and deliver to higher administrative level. Then, 10 to 15 RWs affiliates to each sub-districts.

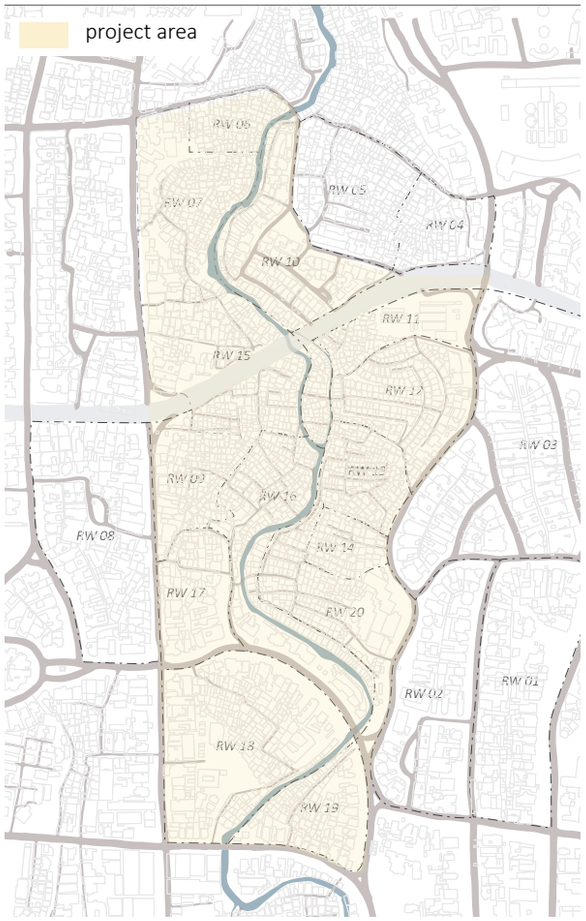


[Fig. 3.13] RT-RW social structure

Kampung Tamansari consists of 20 RW. Among them, project deals with RW 4 - 7, 9, riverfront of RW 11-17 and 20, which are informal settlements. As usual kampung, people has close relationship in their community. Inhabitants have a strong will to improve their living environment. They displayed plant pots on the street. They want to solve waste issue and water-related problems.

FOOD INSECURITY

At the same time, green space is another layer of the project. The green spaces are planned as a productive landscape because families which live here in poverty are subjected to food insecurity caused by the rise of food prices. these are shown on the north side of kampung tamansari. (Ridwan et al, 2017)



[Fig. 3.14] RW Boundary in Kampung Tamansari

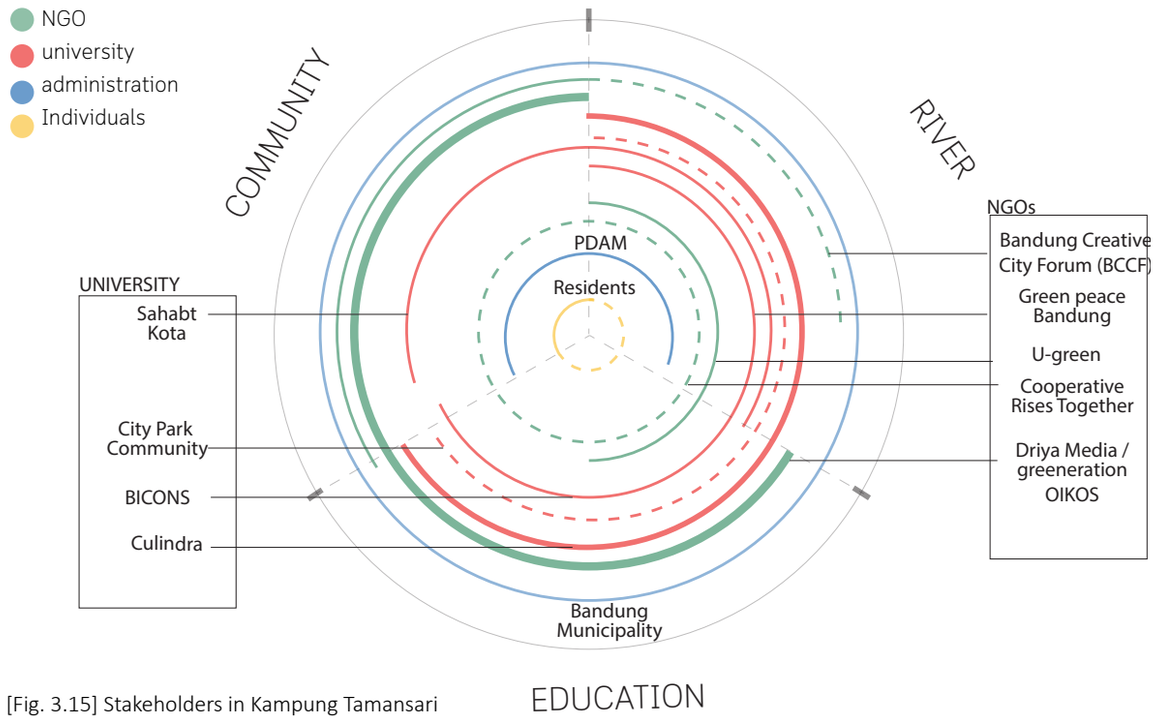
Other Stakeholders

Kampung Tamansari has many affected and affecting stakeholders. Bandung municipality covers broad issues in this Kampung; however, it is relatively less influential. PDAM deals with water-related problem and help to improve quality of both river and water supply in community. Natural topography and existing infrastructure are obstacles.

Residents show the highest affecting and affected factors as a member of this community based Indonesian community system. Potential could be unlocked through other stakeholders' involvement.

University is another key stakeholder because young population group in Bandung is large. As they get educated, there is a stream that they face to social issues and contribute their knowledge to the city in order to solve problems, focusing on education. It is likely that programmes offer long-term solution.

NGOs are working overall the city. Currently, they do not have many programme for Cikapundung river itself. They work for economy, environment, and community etc. But there are few programmes for Cikapundung River. When we operate them, it can work as a catalyst for interacting people with nature by combining with the river.



[Fig. 3.15] Stakeholders in Kampung Tamansari

3.3. Conclusion from Ecopolis Perspective

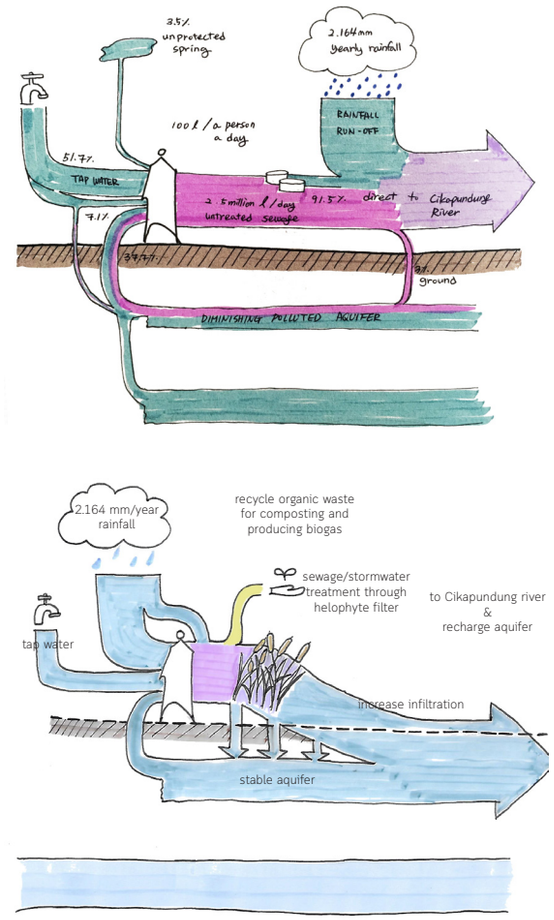
FLOW

Currently, Kampung Tamansari has a linear water-flow which cannot handle water pollution and poor drainage system. Increasing green openspace can transform linear water flow into circular water chain by increasing the capacity of water infiltration, adopting phytoremediation and finding renewable water resources.

AREA

Rainwater falls evenly to the ground everywhere. As raindrops came to the ground, water are collected in lower ground according to gravity. Naturally, lower ground need more space to contain the water. The lower ground is, the larger spaces is required for water. River- the lowest and largest area in kampung Tamansari- is destination of rainwater.

The green space can not only mitigate water issues but also form emotional and economic bonds between nature and inhabitants in order to maintain the ecosystem service. It contributes to improve living quality in the habitats. Flora and fauna appear to be richier.



[Fig. 3.16] Linear water flow in Kampung Tamansari (top)
Proposed Circular Water Chain (bottom)

[Table. 3.1] Problems and Goal from Ecopoils Perspective

	FLOW	AREA	PARTICIPATION
CAUSE	- linear water flow - lack of infrastructure	- no open / green space - lack of infrastructure	- indifference to nature
RULT	- unsafe water - unstable groundwater - polluted river	- polluted river alienation from formal settlement	- clogged ditch - flash floods - disconnection with nature
POTENTIAL	- one-way flow according to topography	- natural topographpy	- close-knit community
OBJECTIVE	- decentralized circular water chain	- clean river - more open space connect to nature and to formal settlement	- improved living quality - organization for amenity

PARTICIPATION

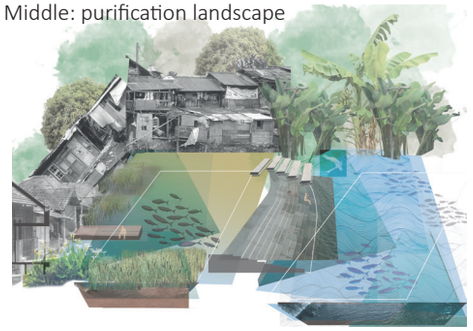
Independent and self-organized social structure - RT and RW - shows the possibility to start the project with bottom-up project. Many other stakeholders like NGOs and University could support them. Involvement in the project could increase the ownership and place attachment. That is, proper participation plan is required according to stakeholders by understanding their interests. Clear ownership claims responsibility to each social groups and are able to maintain in the long term.

CONNECTIVITY

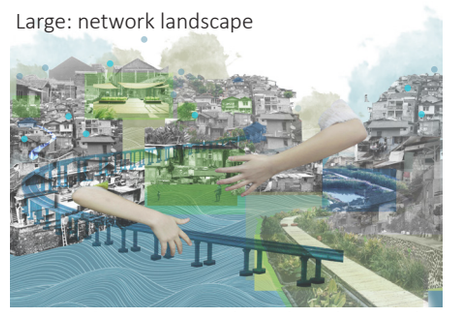
Each spaces need to be designed with its own clear feature for stakeholder's interest (Table.3.2). Designed green spaces gives people to have place attachment, which makes interaction between nature and people. At the same time, green spaces associate complementary interaction to build integrated drainage network and ecosystem service in order to make an entire systsem.

Small:productive landscape

Middle: purification landscape



Large: network landscape



[Fig. 3.17] Intervention through Scale according to function

[Table. 3.2] Involved stakeholders per each scales

	PARTICIPATION		FLOW / AREA	
SCALE	STAKEHOLDER	STAKEHOLDER'S INTERT	BLUE (water management)	GREEN (connect to nature)
SMALL	RT RW NGOs	economic benefit improve well-being stable water supply	rain harvest	orchard kitchen garden
MIDDLE	RW NGOS PDAM	- water-related infrastructure - space for waste	catch water for water retention	recycle-hub tiny forest
LARGE	municipality NGOs citizens	cultural landscape public space diverse ecology tourism	purification and reuse the purified water	openspace for community

degree of participation

72 HYPOTHESIS: GREEN AND BLUE TENANTS
73 MOSAIC GARDEN CITY
74 ECOPOLIS IN BANDUNG
76 FLOW: INTEGRAL WATER CHAIN
78 AREA: RECONNECT WATER NETWORK
84 : ENCLOSURE
85 : GREEN PATCHES

04 DESIGN STRATEGY

4.1. Hypothesis: Green and Blue Tenants

"The underlying concept is that tree tenants help to recreate a balance in urban environments where rainwater is unable to penetrate the cement and asphalt cover. tree tenants turns the floors of buildings into fertile ground, purify water and thereby pay their rent."

- Hundertwasser-

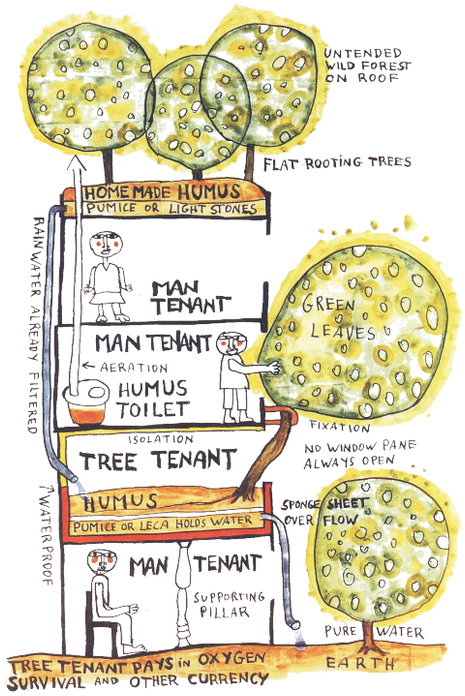
4.1.1 Tree Tenant

Hundertwasser(1973) stated about tree tenants in his five skin theory. He claimed that tree tenant can pay his rent in much more valuable currency than humans: improving the city climate and well-being for dwellers, reducing echoes of the city nose and create quietness, giving shades, restoring ecology. Besides, Tree tenant is a symbol of reparation by restoring a visible tiny piece of nature which is illegaly taken away in a city. The concept of tree tenants shows that even small scale of nature- even one element, a single tree- is enough to change the city. When small interventions are merged, it could contribute more to people.

4.1.2. Green and Blue Tenant in Kampung Tamansari

In this project tree tenant can be developed into other natural elements: water and vegetation. These two tenants constructs spatial quality which helps people perceive nature and take advantages from restored ecosystem service.

In densed informal settlement like kampung Tamansari has still possibility to make a new sense of harmony with nature.

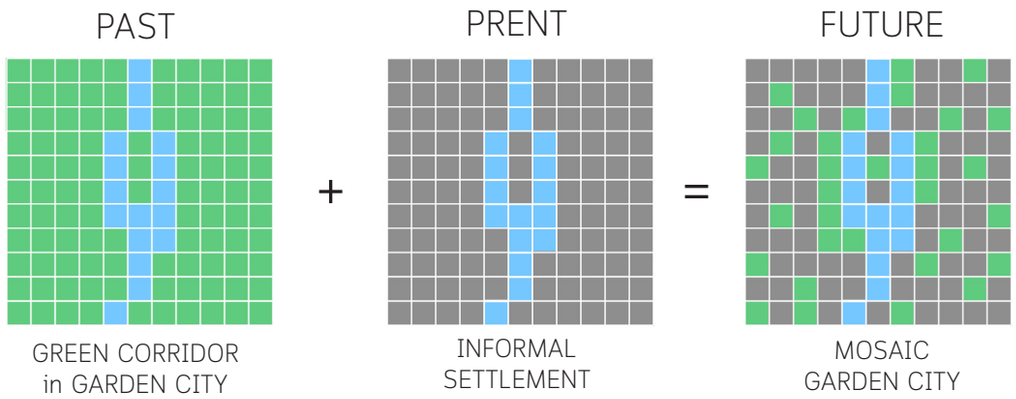


[Fig. 4.1] Green tenants
source: Hundertwasser

4.2. Mosaic Garden CIty

Mosaic garden city is a new concept which can be applied into Kampungs. Small green patches are plugged into a dense Kampung. This contrast in spatial difference gives more dynamic in the city and restore ecosystem service.

This small intervention works as a stepping stone which helps to apply into similar context. It catalyses new garden city in Bandung.



[Fig. 4.2] Mosaic Garden City Concept

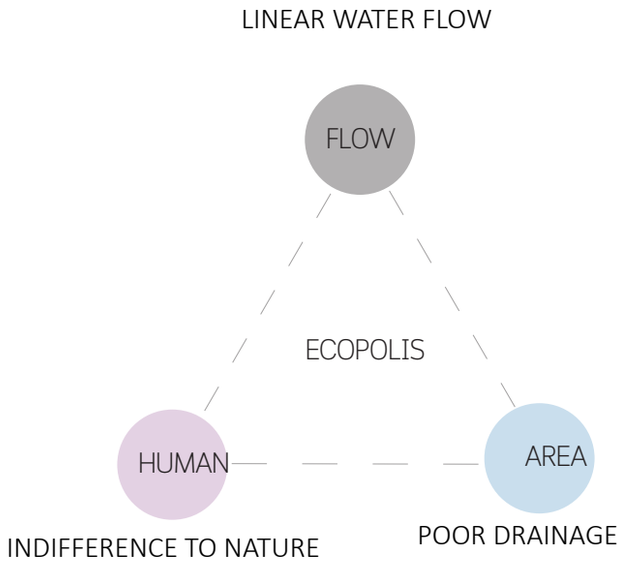
4.3. ECOPOLIS in Bandung

Kampung Tamansari is analyzed under the frame of ecopolis theory in last chapter. This chapter 'design strategy' looks into the way to solve each problems according to three different aspects.

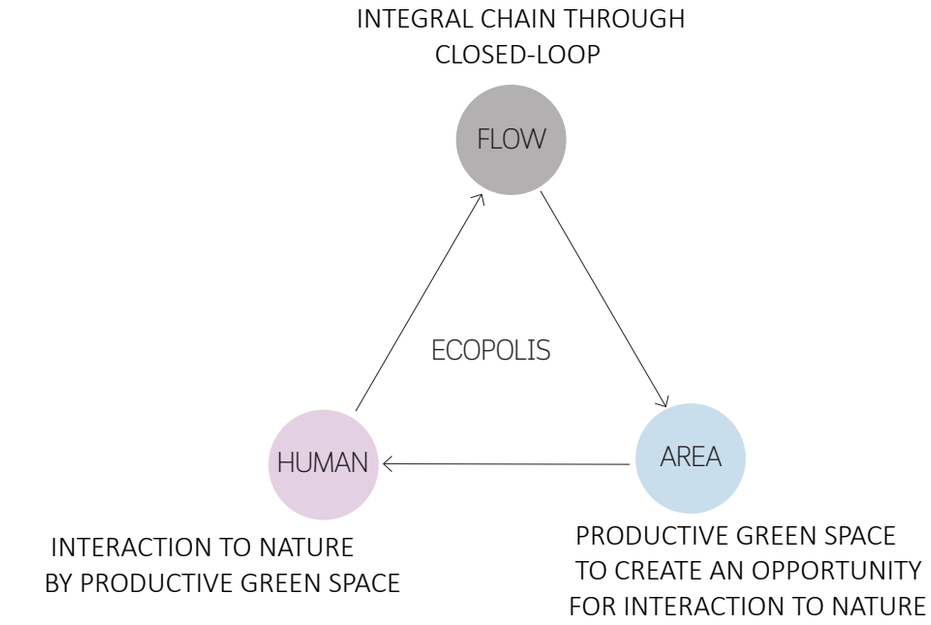
'Flow' works for creating integral water chain. It is interwoven with other flows and make a closed loop water chain.

' Area' focuses on spatial quality in the Kampung to come up with the solution for two different problem fields: water management and making productive greenspaces.

Lastly, the view from human aspect suggests how we actually create and maintin the proposed spaces by residents, even scale up later.



[Fig. 4.3] Problems in Ecopolis Kampung Tamansari



[Fig. 4.4] Principle of Ecopolis Kampung Tamansari

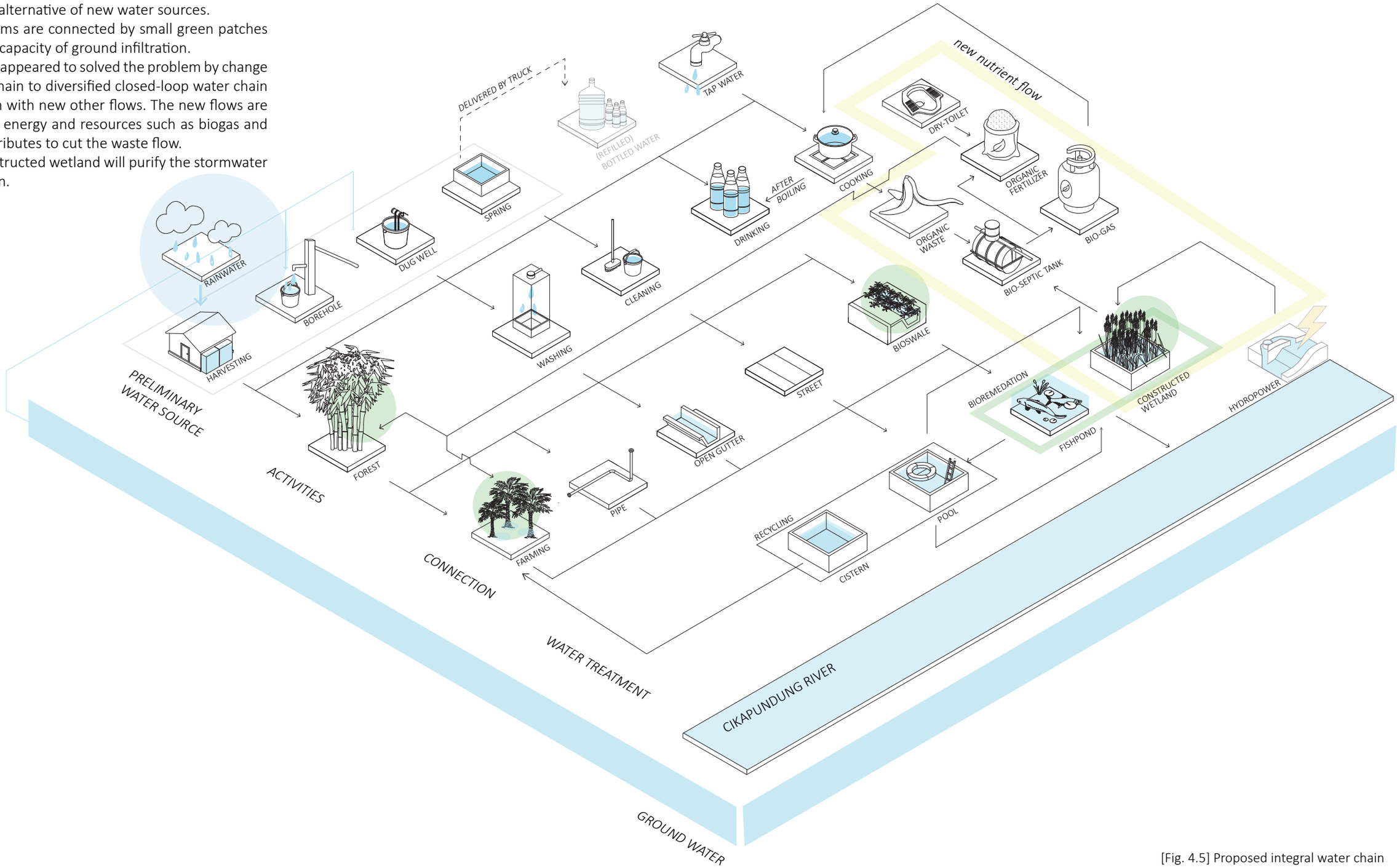
4.4. FLOW: INTEGRAL WATER CHAIN

Water flow in Kampung Tamansari faces to three main problems. Ground water stress are resulted from its over-exploitation by unstable water sources. There are poor drainage network and lack of waste treatment system.(chapter 3.2.2.)

To reduce the burden of the groundwater stress, rainwater is considered as an alternative of new water sources.
Poor drainage systems are connected by small green patches which enhance the capacity of ground infiltration.

These problems appeared to solved the problem by change from linear water chain to diversified closed-loop water chain which is interwoven with new other flows. The new flows are produce renewable energy and resources such as biogas and bio fertilizer. It contributes to cut the waste flow.

Fishpond and constructed wetland will purify the stormwater using bioremedation.



[Fig. 4.5] Proposed integral water chain

4.5. AREA: RECONNECT WATER NETWORK

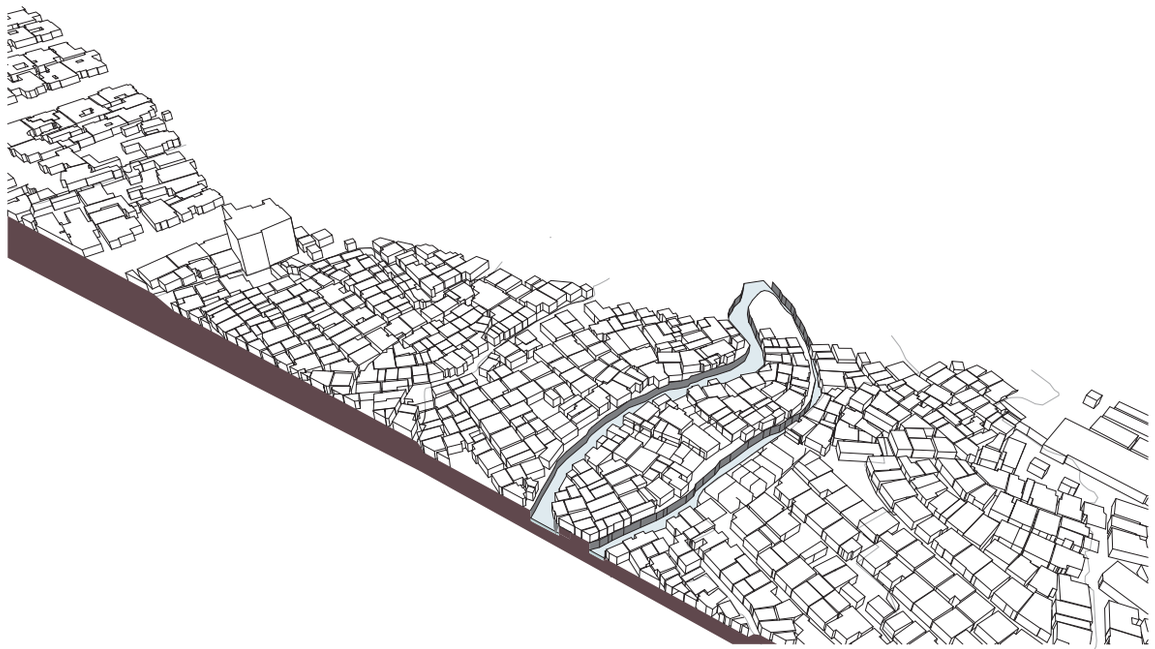
4.5.1 RECONNECTING WATER MANAGEMENT

Based on waterflow research (chapter 3.2.2), we found that water drainage network does not work properly in this area because of disconnection by housing. It results in floods in side of Kampung area.

To solve the problem, the gap between existing open ditches are filled using green spaces. These spaces are opened up by removing existing buildings, which block the water flow.

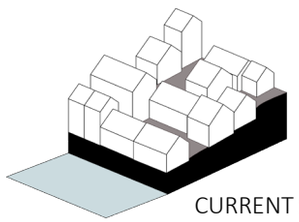
After houses are removed, these open spaces operate the water management more efficiently by offering the water infiltration into the ground, slows down the run-off stormwater, and purify the stormwater.

When it comes to removed houses, relocation strategy will be applied and offer suggestions in chapter 4.5.2.

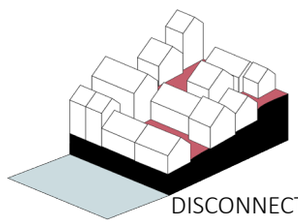


[Fig. 4.6] Current Kampung Tamansari (top)
Proposed Kampung Tamansari green & blue network (bottom)

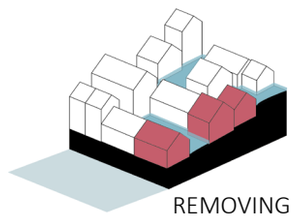
Relocation Strategy



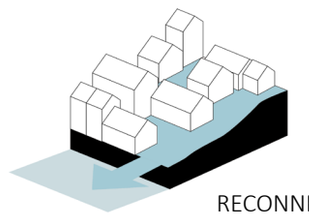
CURRENT SITUATION



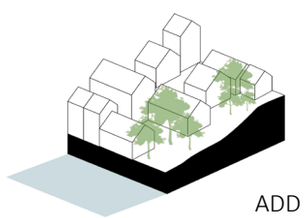
DISCONNECTED DRAINAGE



REMOVING HOUSES



RECONNECT



ADD GREENSPACE

[Fig. 4.7] Strategy for reconnecting stormwater drainage network

N

100 m

Open drainage system is not connected completely and causES floods inside during wet season in the kampung Tamansari. This is because houses are blocked the network. Removing the houses which block the drainage network. Then, the network will be re-linked. Finally, the empty spaces where the houses were demolished can add greenspace and perform extra functions such as increasing the capacity of infiltration of water or spaces for storm water purification.

4.5.2. PLACE MAKING: RELOCATION

Kampungs are basically close-knit community and low-income people settled down near their economic activities. That is why the houses to be removed for the water management are planned to relocate in the north side of Kampung Tamansari. It has relatively more open spaces compared to the rest part of this kampung.

When we consider feasibility of the project, relocation gives the priority about selection of houses to be moved in the context of informal settlement. Process of relocation is developed incrementally by community participation.

The new open spaces can be a new opportunity as a productive landscape. People require to overcome their food insecurity and other water-related problems. At the same time it can offer amenity for local residents. The project creates the green space, which is built in the empty lots, called green patches.

Relocation area will offer better liveability for new neighbors surrounded by green patches. The space is more greenery atmosphere which could also provide them practical benefits from the nature.

[Fig. 4.8] relocated houses and place for drainage network

4.6. AREA: ENCLOSURE

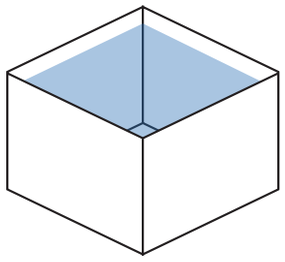
Enclosure is the most outstanding spatial quality in the site. Relocation of the houses results in subdivision of the enclosure with three types: enclosure, semi-enclosure and expanded semi-closure.

First type is the enclosure that a space is entirely surrounded by houses. It creates the most private atmosphere.

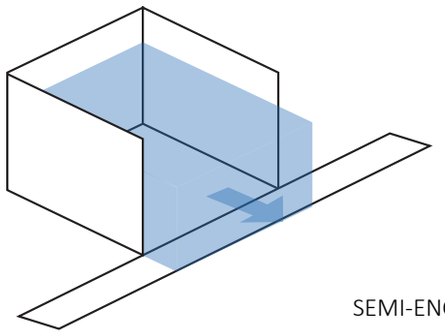
Next, semi-enslosure is formed by three or two sided of houses and another side faces to the alley which connect to public space. It brings about transition from private to public space.

Lastly, expanded semi-enclosure means literally expanded version of semi-enclosure. It is surrounded by multiple houses and river. It creates public atmosphere and gives directional implied space which shows the connectivity to the other expadnded semi-enclosed space at the same time.

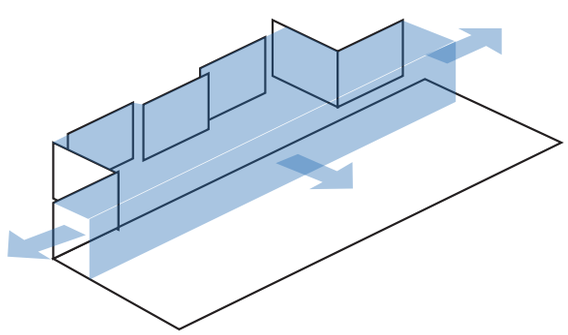
The repetition of enclosed spaces create multiple courtyard and improves dynamic spatial quality in the kampung.



ENCLOSURE



SEMI-ENCLOSURE



EXPANDED SEMI-ENCLOSURE

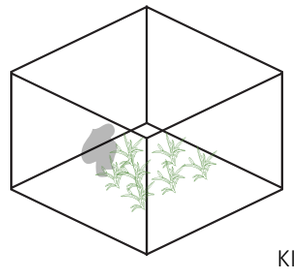
[Fig. 4.9] type of enclosure

4.7. AREA: Green Patches

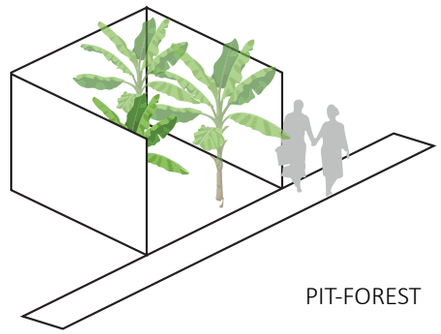
Type of enclosure gives different fuctions to each space. These spaces are translated into different green patches: kitchen garden, pit-forest, and riverfront park.

Each Green Patches play role as a productive landscape which can support food security to dwellers and gives the ownership which can improve the volutary participation for keeping the spaces. Another role is to be a part of water chain. In addition, these spaces are create different interactions with the nature.

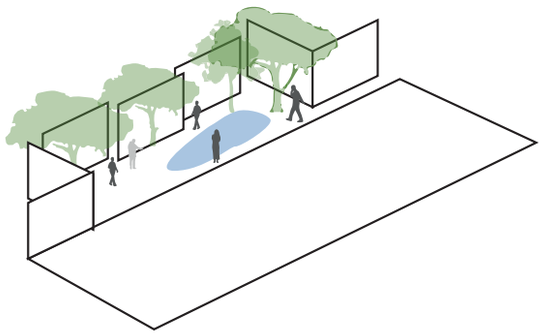
Green patches are the green spaces which are built in the empty lots after building relocation. These are work as a landscape to create the environment for reconnecting with nature in a dense village. Different spatial conditon of green spaces are designed by consideration of the main users in each space.



KITCHEN GARDEN



PIT-FOREST



RIVER FRONT PARK

[Fig. 4.10] different users according to degree of enclosure

82 MOSAIC GARDEN CITY
84 GREEN PATCHES
90 KITCHEN GARDEN
94 PIT FOREST
102 RIVERFRONT PARK
114 ECOSYSTEM SERVICE
116 PEOPLE: BOTTOM-UP APPROACH
120 VISION: MOSAIC GARDENCITY

05 DESIGN IMPLEMENTATION

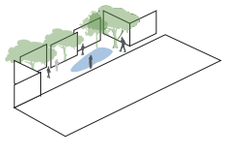
[Fig. 5.1] Location of Green Patch in North Kampung Tamansari

5.1. Mosaic Garden City

North Kampung Tamansari was the experimental site which creates new urban system in the project.

Open ditch system is defined perpendicular direction to the contour and the river. New streets are designed together along the ditch system. And relocation houses are planned based on the streets so that it creates different green patches.

That is, rearranged new buildings in the kampung create different atmosphere: enclosure, semi-enclosure, and in order to create three different green patches



THE CIKAPUNDUNG RIVER

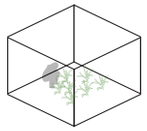
RIVERFRONT PARK

THE CIKAPUNDUNG RIVER

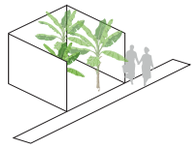
Sedimentation Pond

Permeable pavement

[Fig. 5.2] Three green patches in Kampung Tamansari



KITCHEN GARDEN

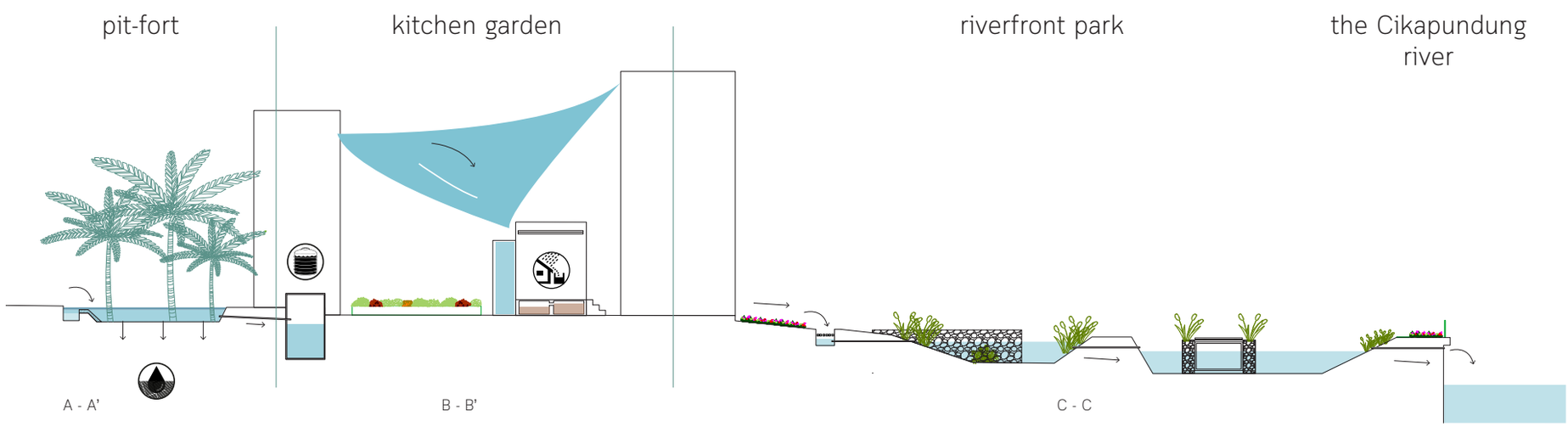


PIT FOREST

Water Management in Kampung Tamansari

Green patches works together as a stormwater network. When it rains, stormwater flows into the pit-forest. Stormwater slows down and infiltrate into the ground. The rest of water will be stored in the cistern which is under kitchen garden. When rains harder, stormwater flows directly to the river through riverfront park since riverfront parks are connected to open ditches.

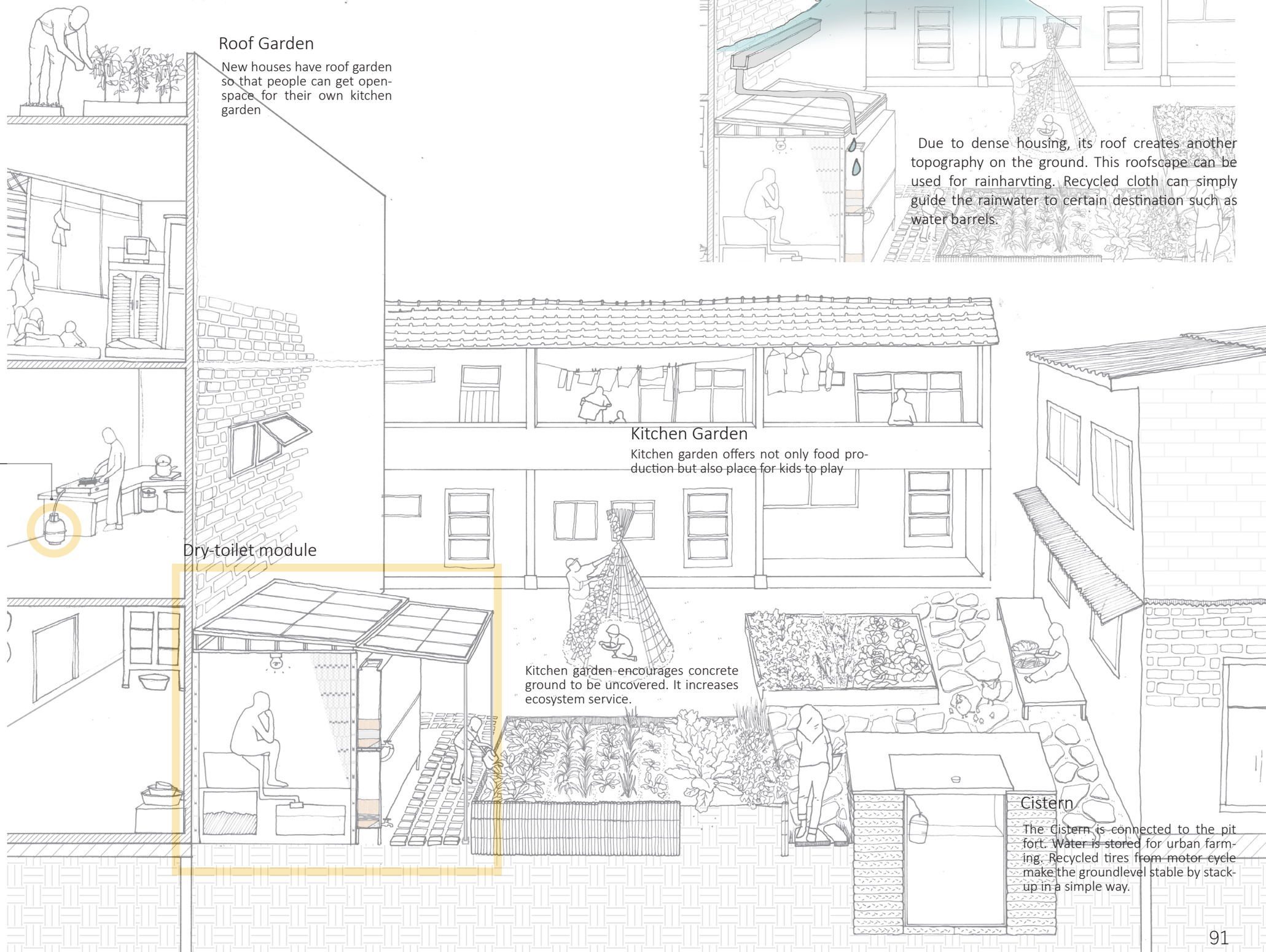
But, also a trench is aligend to contour-lines next to the riverfront park. It collect the stormwater runs on the ground which cannot reach to ditches. In the riverfront park, water is purified Using bioremediation before it flows into the Cikapundung river.



[Fig. 5.3] Water management in green patches

5.3 KITCHEN GARDEN

Kitchen garden gives strong ownership to the family who shares the kitchen garden. Owners could grow the preferable or favourite vegetables. As using rooftop as a second topography Rain harvting will secure getting stable water sources.



[Fig. 5.4] Example of Kitchen garden

Dry Toilet Module

A dry-toilet module offers basic facilities such as dry-toilet, water storage, and electricity from solar panels. It helps people to maintin kitchen garden by composting human faeces for bio-fertilizer.

Solar Panel

Electricity light up the lightbulb in the toilet and control the temperature to accelerate composting speed

Urine Diversion Toilet

After composting for 6 months above 20 °C , Faeesc can be used as a fertilizer

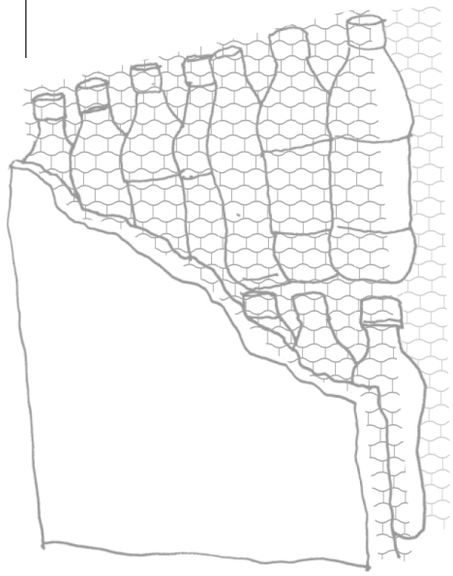
Urine can be used as a liquid plant fertilizer without extra treatment

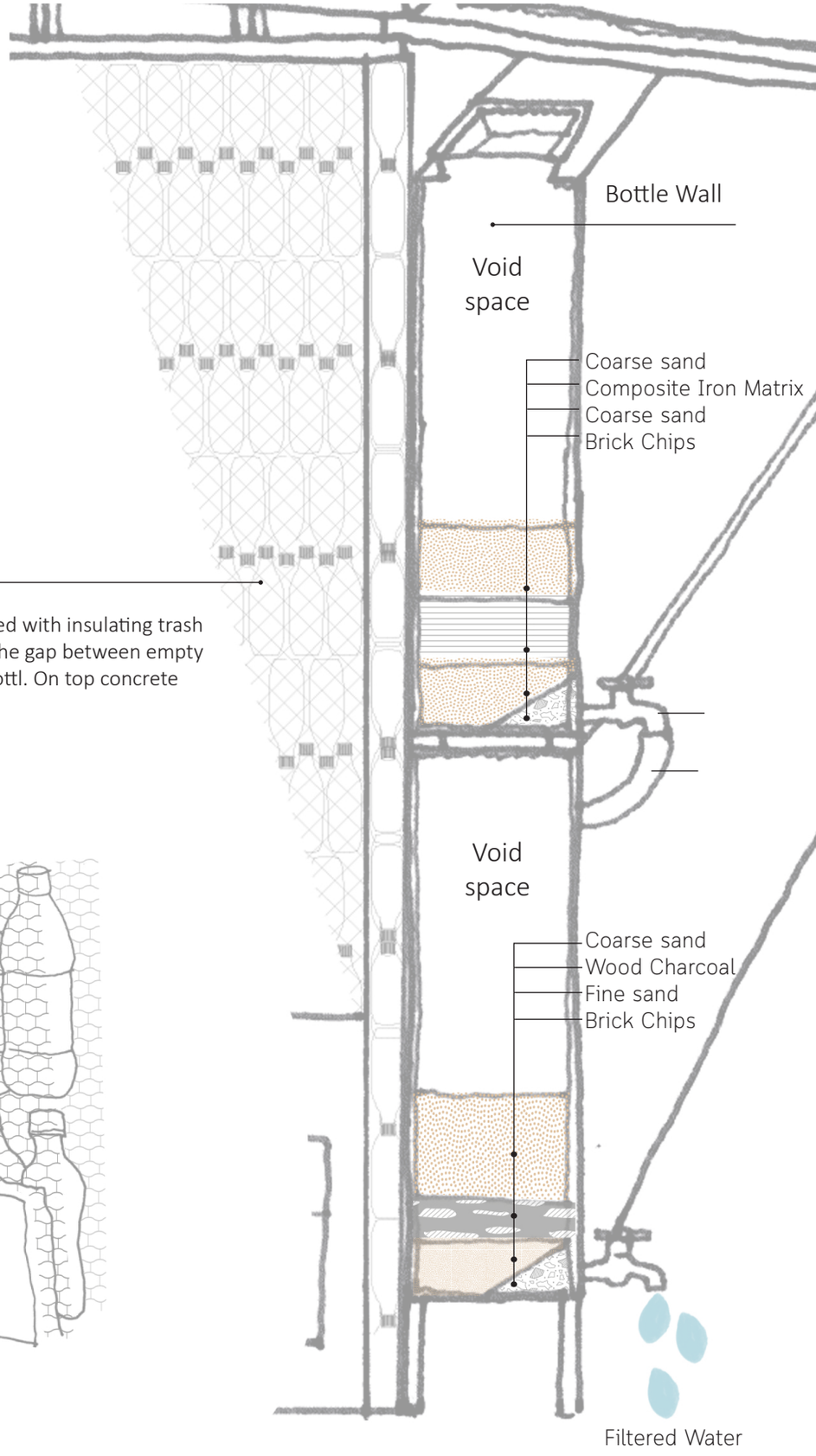
Faec

Urine

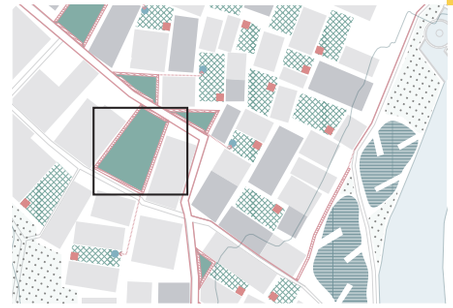
Bottle Wall

Empty plastic bottles are filled with insulating trash and with plastic bags to fill the gap between empty bottl. and bird net fix the bottl. On top concrete layer is added.





[Fig. 5.5] Detail of Dry Toilet



5.4 PIT FOREST

Pit-forest belongs to each RT and is used for a small community spaces. As a transition of private-public space, it refreshes the surroundings.

mild microclimate

Open spaces get refresh and cool air. Also, vegetation cools down the microclimate.

to the river

cistern

Pit forests are directly connect to the ditch so that water flows over to the pit-forest and is infiltrated into the ground.

infiltration

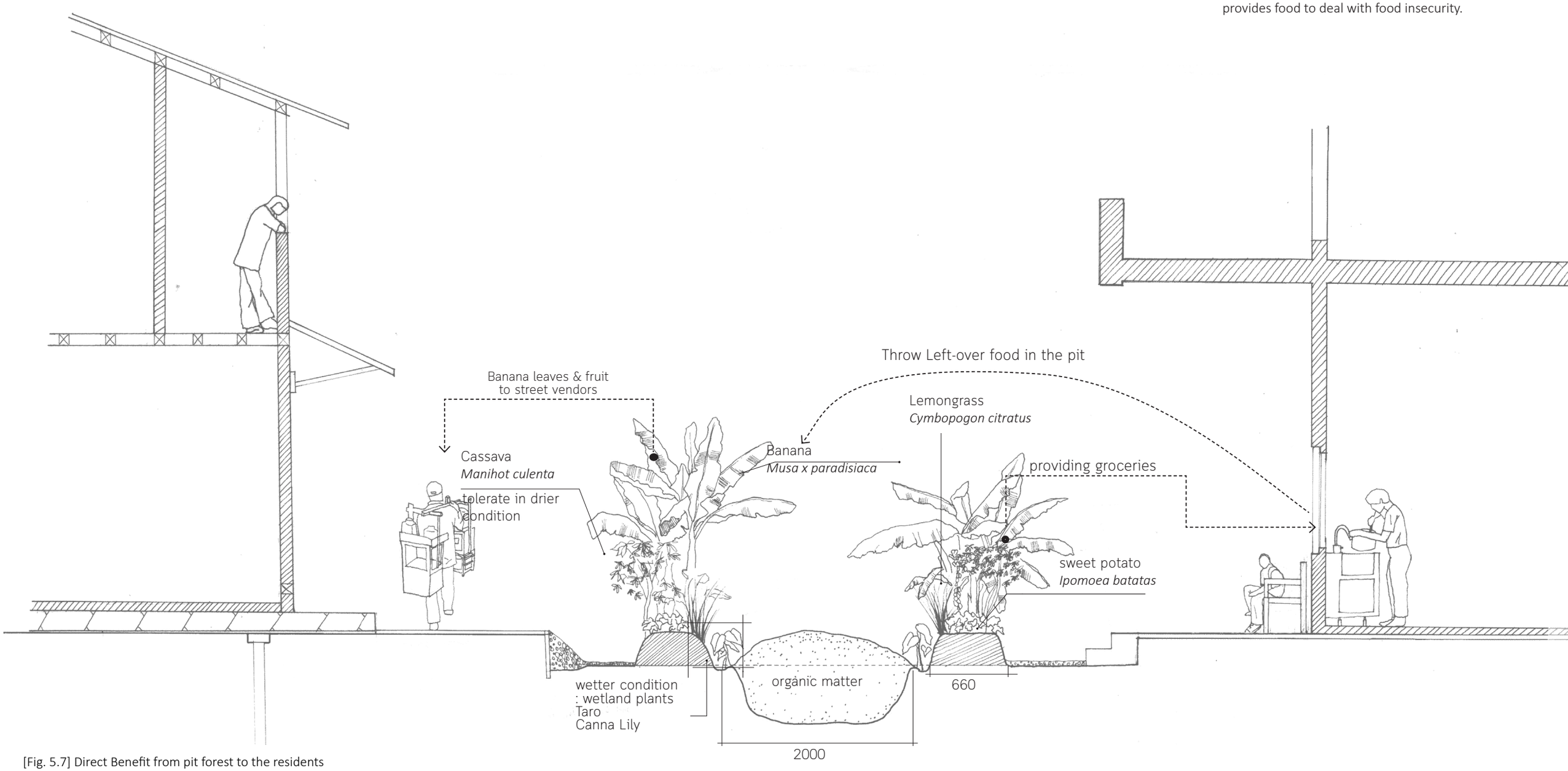
[Fig. 5.6] Banana pit forest

Banana Circle

source: Mollison, B. (1988)

Banana cycle is adapted as a one of scheme for tropical permaculture which us organic matter as an organic fertilizer. Each plants have different functions as well as provid food to deal with food insecurity.

Banana cycle is adapted as a one of scheme for tropical permaculture which uses organic matter as an organic fertilizer. Each plants have different functions as well as provides food to deal with food insecurity.



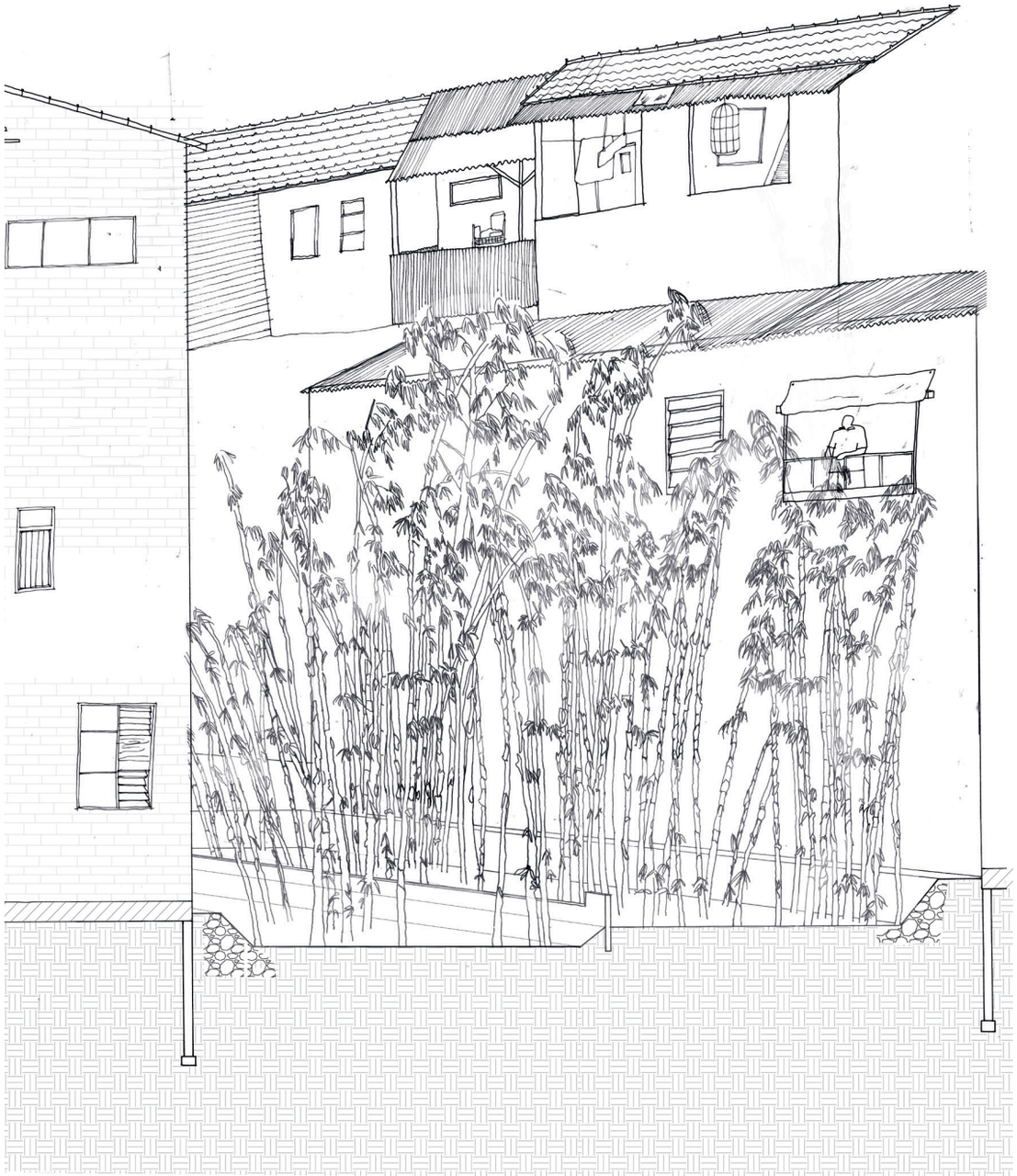
[Fig. 5.7] Direct Benefit from pit forest to the residents

Bamboo Forest

Bamboo trees are of wide use in kampung's daily life. Its shoots are edible and culms are suitable for good building material. Moreover, it is a good resource for biomass. In a perspective of ecosystem service, it is effective in phytoremediating water.

Species of Bamboo in pit-fort should resist flooding and are required to endure humid condition because of the characteristic of pit-forest.

In terms of two feature, four species are suitable in this area: String Bamboo(*Gigantochoa Apus*), Giant Atter or Sweet bamboo (*Giantochloa Atter*), Taiwan Giant Bamboo(*Dendrocalamus latiflorus*), and Spiny Bamboo(*Bambusa Blumeana*).



[Fig. 5.8] Bamboo pit forest

Stage 1.

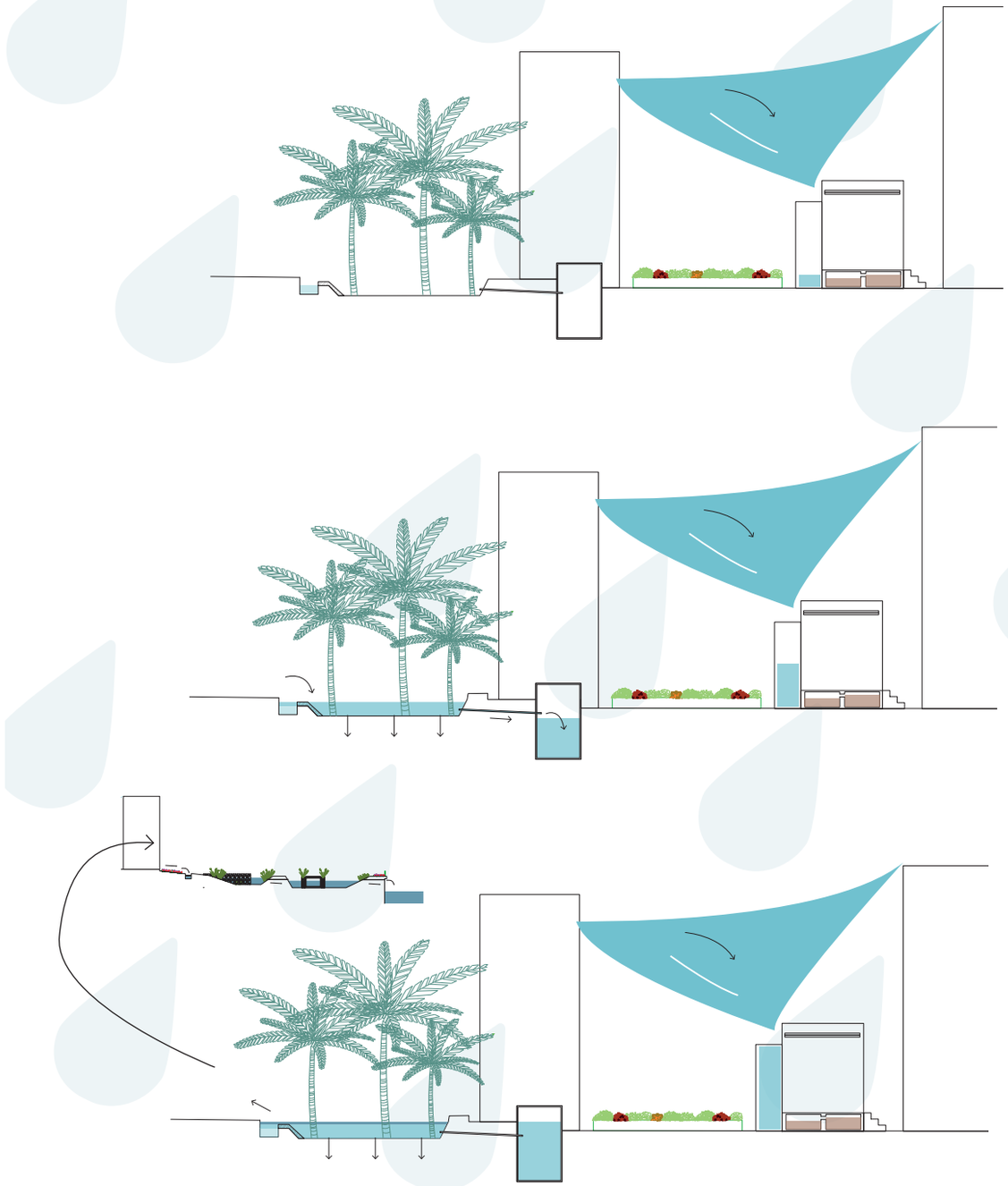
When it starts to rain, only ditch is used for drain water.

Stage 2.

When it reaches the certain amount of water level in ditch, it overflows into the pit-forest. The pit-fort starts infiltrate the stormwater into the ground for water retention. Some water goes into the cistern in a kitchen garden to be used for agriculture later.

Stage 3.

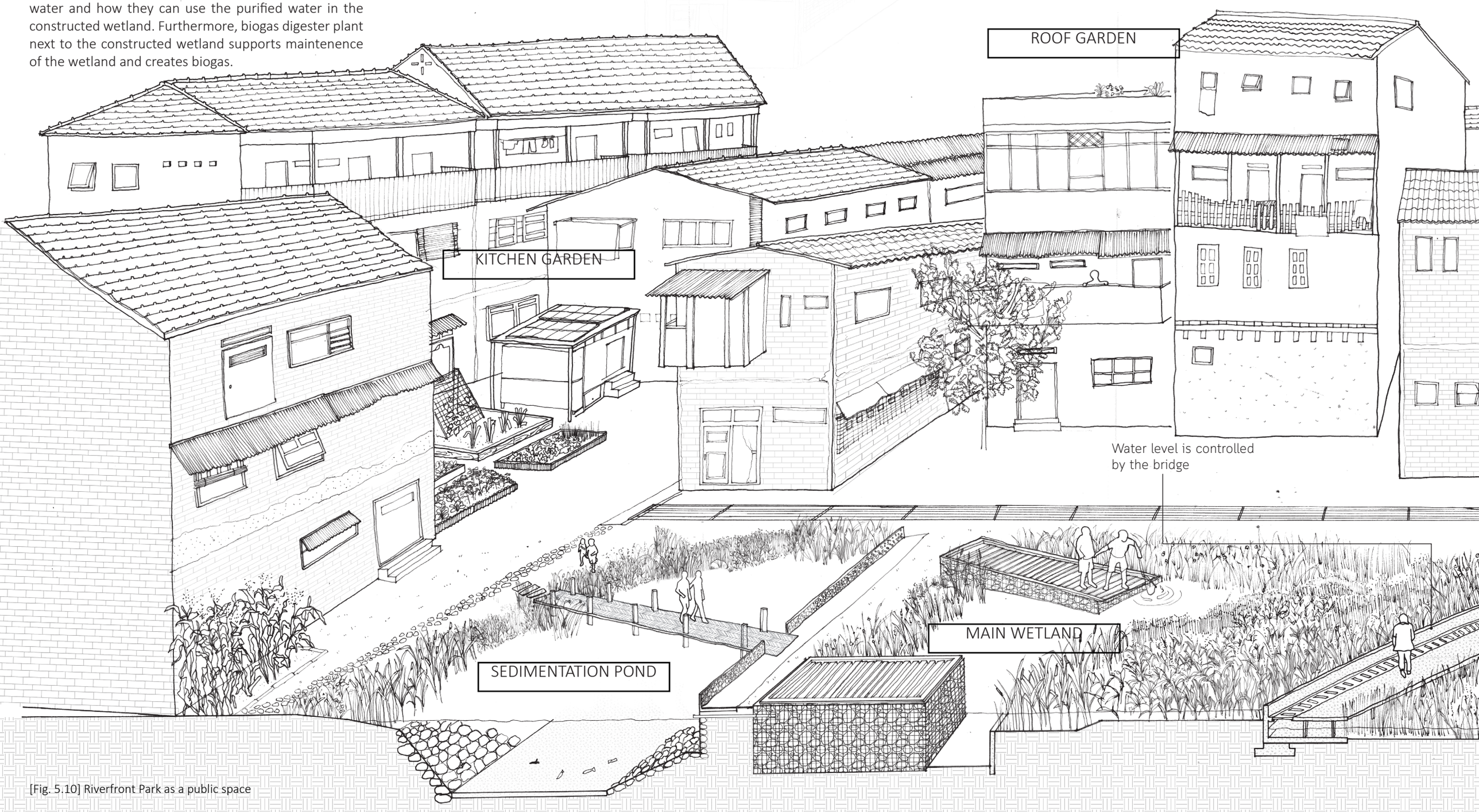
When the water capacity in cistern and pit-forest becomes full, pit-forest does not function anymore. Stormwater flows directly to the river through riverfront park.



[Fig. 5.9] Stormwater management in Pit-forest

5.5. RIVERFRONT PARK

River front park is designed for community level(RW). It is the last collecting point for storm water before going to the river. It shows people the process of purifying water and how they can use the purified water in the constructed wetland. Furthermore, biogas digester plant next to the constructed wetland supports maintenence of the wetland and creates biogas.



[Fig. 5.10] Riverfront Park as a public space

BIOGAS DIGESTER PLANT

SEDIMENTATION RERVOIR

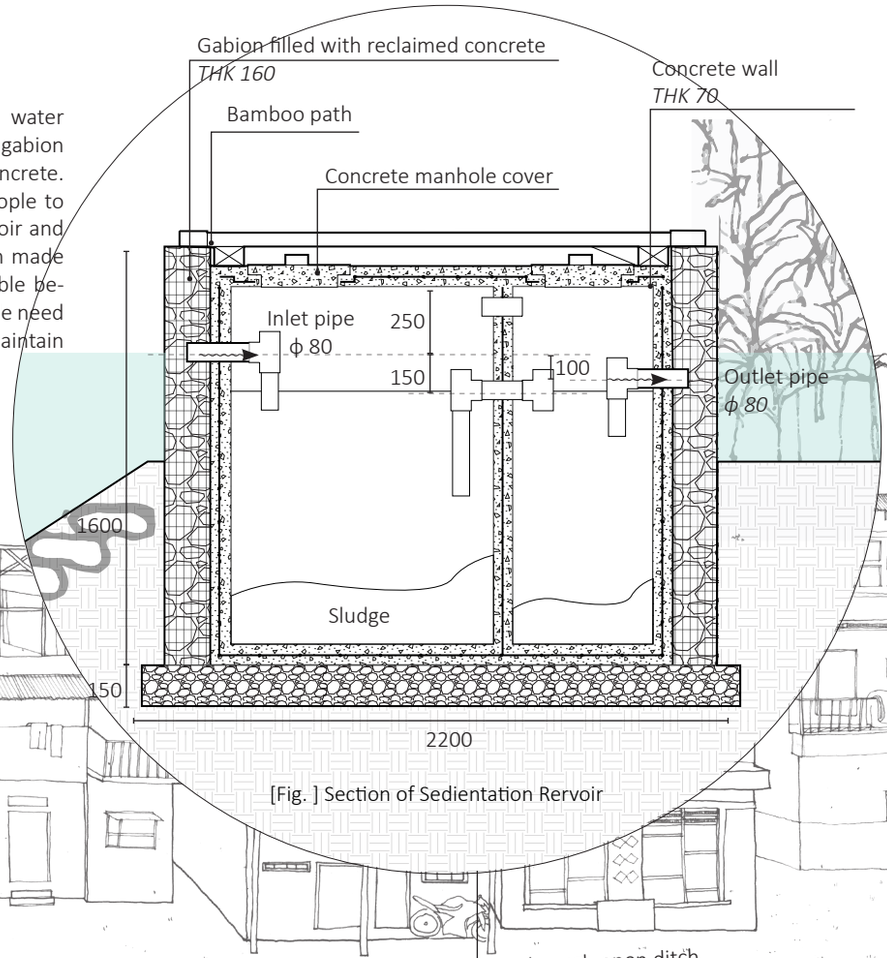
Gabion covers sedimentation reservoir and gives accsibility to people. It is made of re-claimed concrete from demolished buildings.

Constructed Wetland

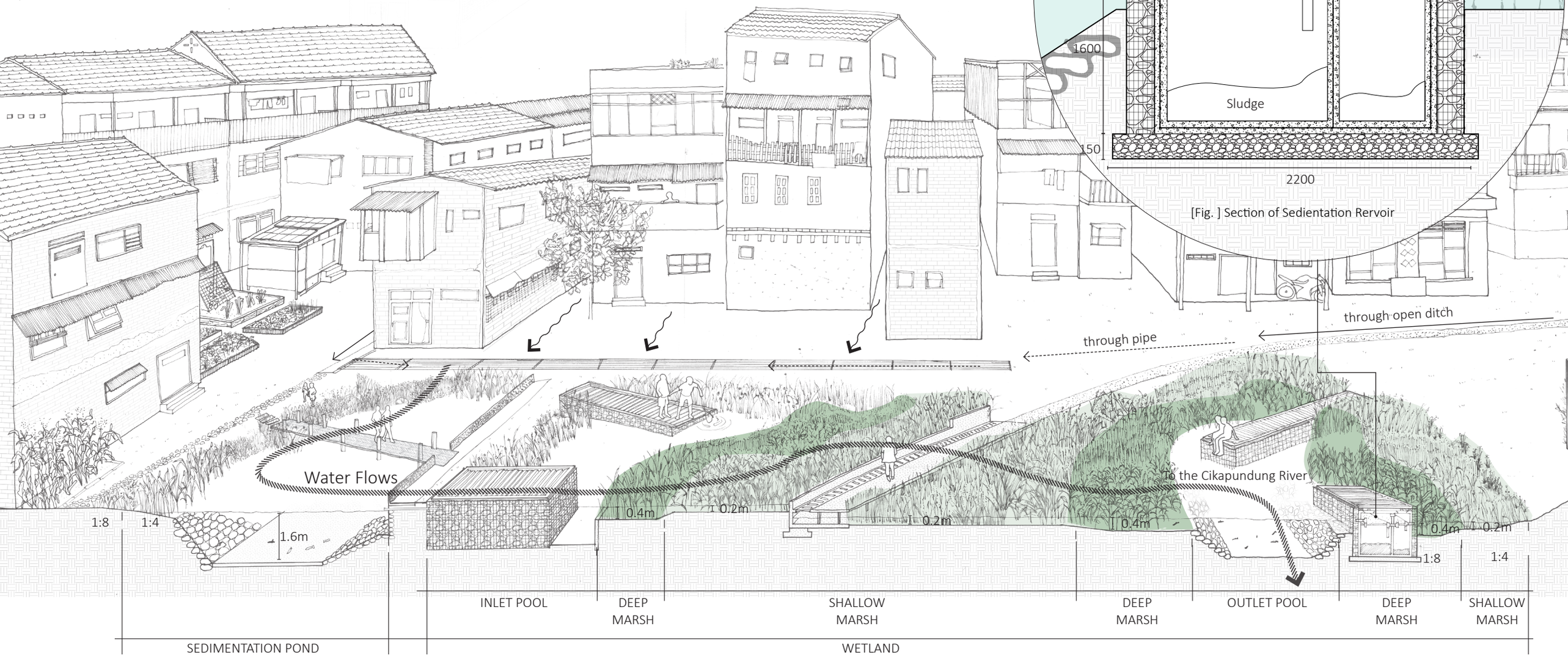
Constructed Wetland provides green space as well as purify the waters.
Firstly trench is aligned to the contour lines so that it can capture the water and transfer to the sediment pond.
Hard edges and dense vegetation in sediment-pond surround the edge of the sediment pond to limit people's accesss because of 1.6m deep water. Instead, pepole can cross the pond through bamboo bridge. Ground on the pond is covered by a concrete slab as an indicator for people to keep the same water depth of the sediment pond when they maintain the pond.
In the Wetland, vegetations are planted perpendicularly to the direction of water flow to maximize the efficiency of bioremediation.

Sedimentation Rervoir

Sedimentation Rervoir purifies water in the wetland. It is covered by gabion walls filled with reclaimed concrete. The gabion structure allows people to walk on the sedimentation rervoir and to be closer to the nature. Path made of bamboo can be easily movable because of lightweight when people need to open the rervoir in order to maintain the sedimentation rervoir.



[Fig.] Section of Sedientation Rervoir



[Fig. 5.11] Typology of Riverfront park

PLANTING SCHEME

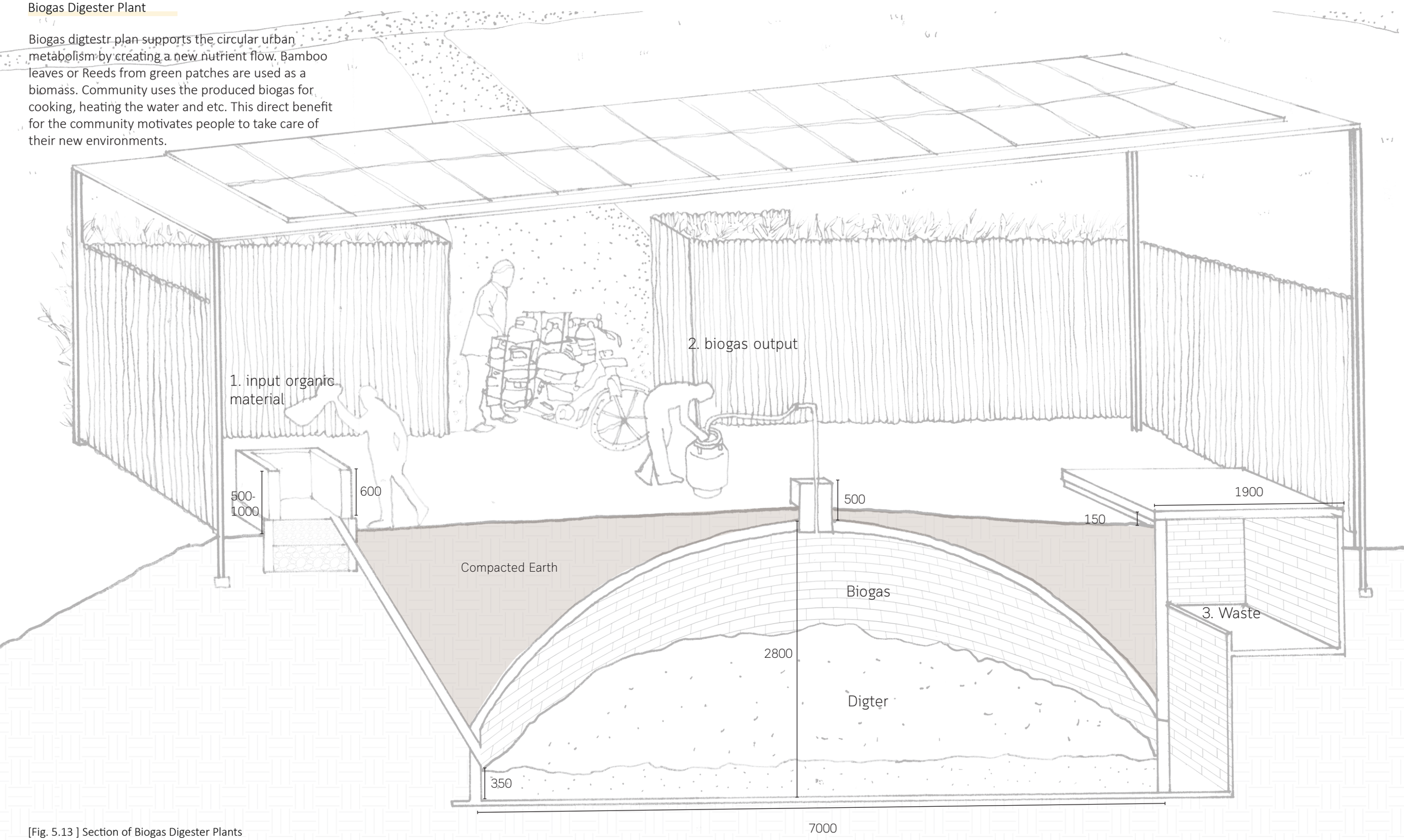
Plants in the Constructed wetland are considered by different marsh zone (shallow and deep marsh). It works with sedimentation rervoir and purify the water. It limits accessibility for people not to enter deep water.

Water purification plants area easily find in Indonesia. Besides, panchax minnow (Aplocheilus panchax) control the mosquito by eating them.

[Fig. 5.12] Water purification plants

Biogas Digester Plant

Biogas digtestr plan supports the circular urban metabolism by creating a new nutrient flow. Bamboo leaves or Reeds from green patches are used as a biomass. Community uses the produced biogas for cooking, heating the water and etc. This direct benefit for the community motivates people to take care of their new environments.



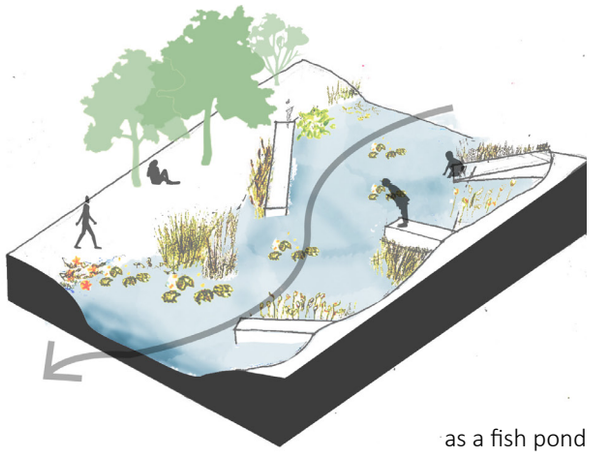
[Fig. 5.13] Section of Biogas Digester Plants

Function of Riverfront Park

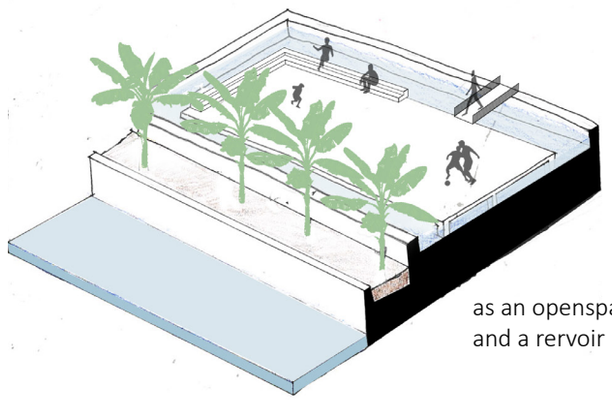
Riverfront parks are planned on multi-functions. Basically it serves bioremedation. At the same time, it provides community to recreational spaces.

Main functions are:
1. show visible water cycle
2. reused purified water for recreation
3. increase the ecological value

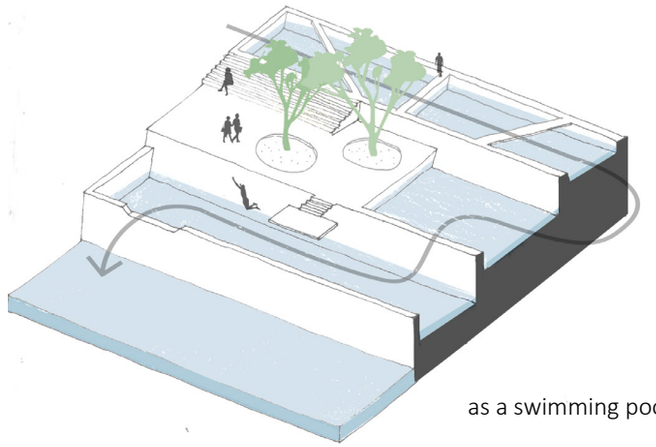
[Fig. 5.14] Riverfront park which is accessible to the river



as a fish pond



as an openspace
and a rervoir



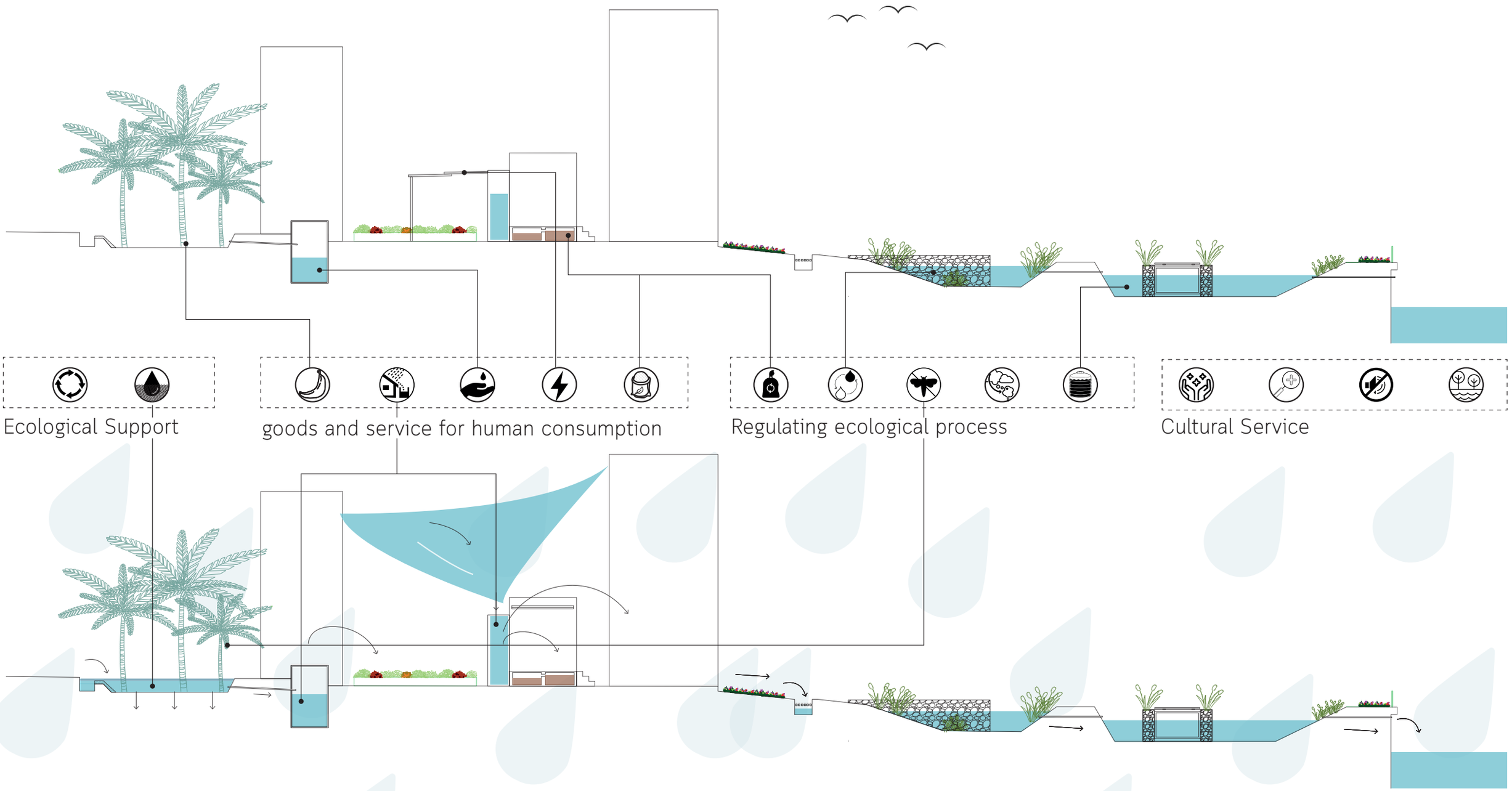
as a swimming pool

[Fig. 5.15] Typology of Riverfront park

5.4 Ecosystem Service

Green patches in Kampung Tamansari brings four benefits from ecosystem service. It creat es-sustainable community and is able to maintain by people's participation.

[Fig. 5.16] Ecosystem service in green patch



5.5. PEOPLE: BOTTOM-UP APPROACH

Based on strong and well-organized social structure (RT-RW system), the project is started and developed by its own community. It is important to make clear vision for community to develop the project further through several times of workshop and meetings. NGOs could help organizing the workshop and looking for expertise to share knowledge. On the stage, people could learn the ecosystem service by starting from taking care of their own small kitchen garden or small planting pots and cleaning their community.

Once green patches are designed, maintenance will be done by community themselves. Continuous community meeting and responsibility is needed. During preparation period people already understand the holistic system of green patches, and therby they try to keep its environment.

Step 2(maintenance) is well-managed, this project could be replicable into the other similar kampungs. To implement the project, promoting this project through events could be a way to attract people to join.

Later on, government are convinced to invest money to the kampungs for bigger and eco-friendly project such as build a hydropower generator or a solar panel for clean energy and make vertical kampungs to keep green open spaces in the kampung.

1. PREPARATION

forest built by the ridents of Babakan Cianjur village
source:Deden Iman(2014)

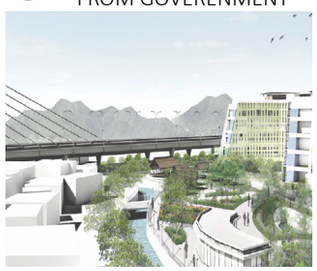
2. MAINTENANCE

Maintain green patches by community (RT & RW)

3. UPSCALING

"kampung kreatif" community development
programme in Kampung Tamansari
source:BCCF (2014)

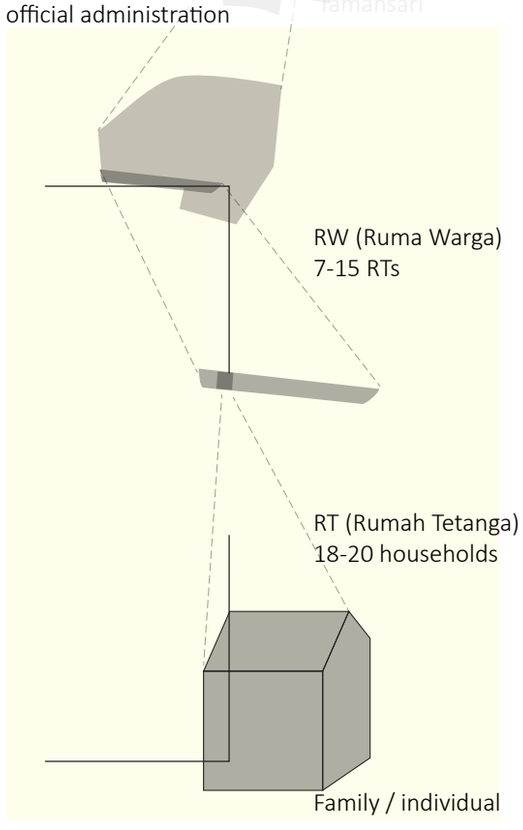
4. INVTMENT FROM GOVERENMENT



Ecodistrict Kampung Tamansari
source: Kota Bandung

testing with people — communication — invtment

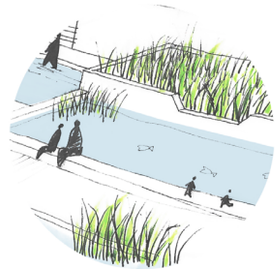
[Fig. 5.17] Process of project development



Clear Ownership of green patches

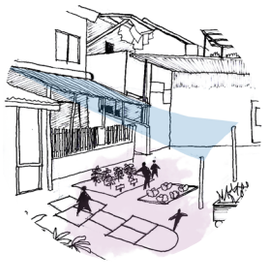
Green patches have clear owners despite its public characteristics. the degree of enclosure distinguisesh the three types of green patch which link each Indonesian unique social structure (RT & RW). It gives sustainability of the green patches.

[Fig. 5.18] Ownership of green patches accoriding to the scales



riverfront park

pit forest



kitchen garden

Stage 1.

Currently buildings are expanded toward the Cikapundung River. New buildings create different enclosureness. Meanwhile, workshop collaborated with NGOs helps to clean the environments and holds the event for learning nature and ecosystem service through kitchen gardening.

workshop
urban gardening
New houses

Stage 2.

Remove the concrete-covered ground and plant the bamboo trees. Existing houses are start to become vertical, people moved to the new spaces and demolished the buildings.

Start Relocation
Remove concrete path
Plant pit-forest

Stage 3.

Bamboo trees are grown and are used for construction. Ground level in the area for constructed wetland is changed through cut and fill process. (5 years)

Constrionction using Bamboo
Change ground level
(Cult and Fill process)

Stage 4.

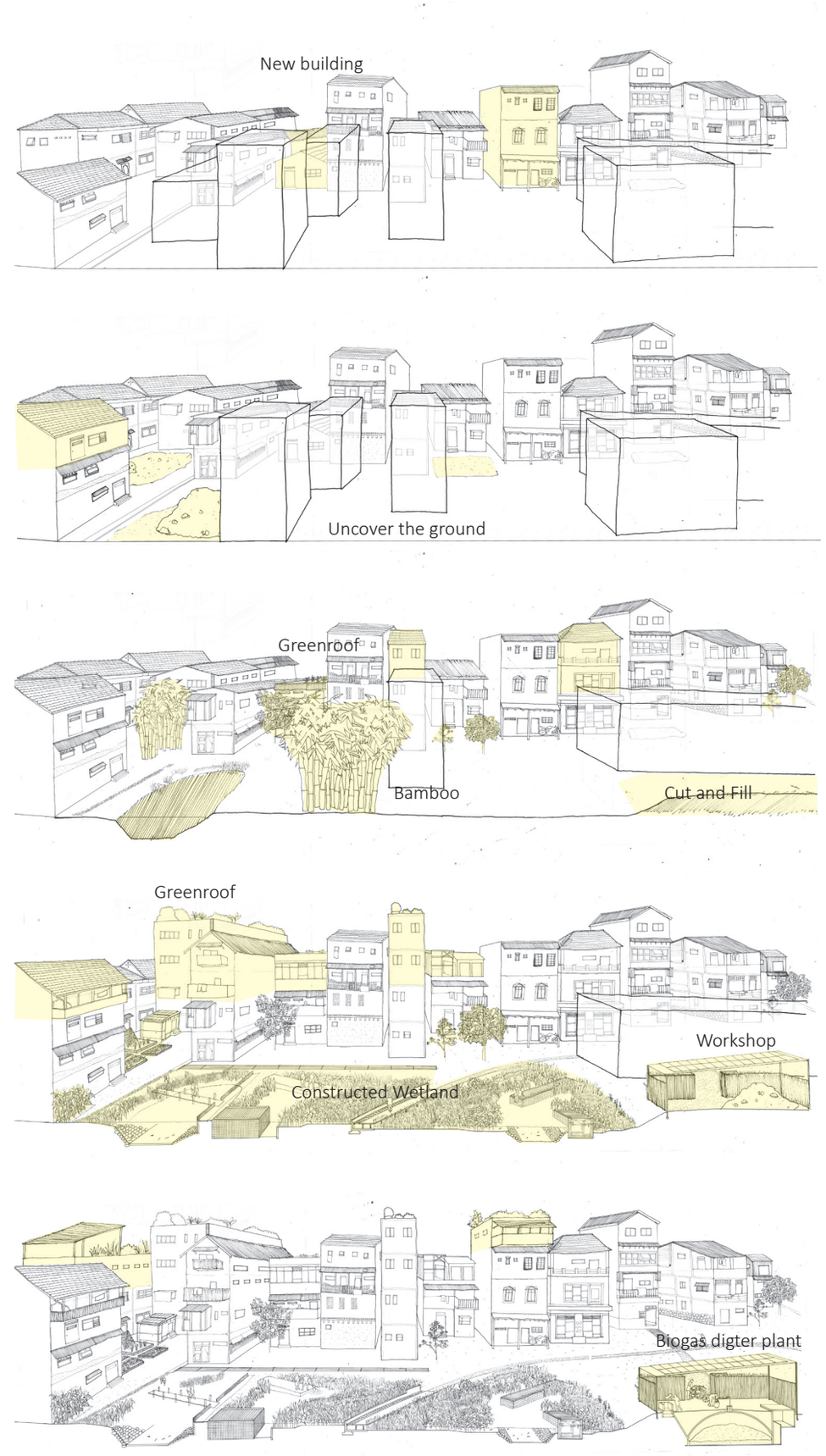
People work in a workshop on the higher ground to build Constructed wetland. Buildings are continuously highrising. New flat roofs are of green. After most of construction is completed, some bamboo forests are transformed into the kitchen garden.

Constructed Wetland
Kitchen Garden
Green Roof

Stage 5.

Biodigester plant is built and people maintain the environment. The kampung Tamansari has eco-tourism programme to share and to promote the strategy.

Biogas Digester Plant
Vertical Kampungs
Eco-tourism



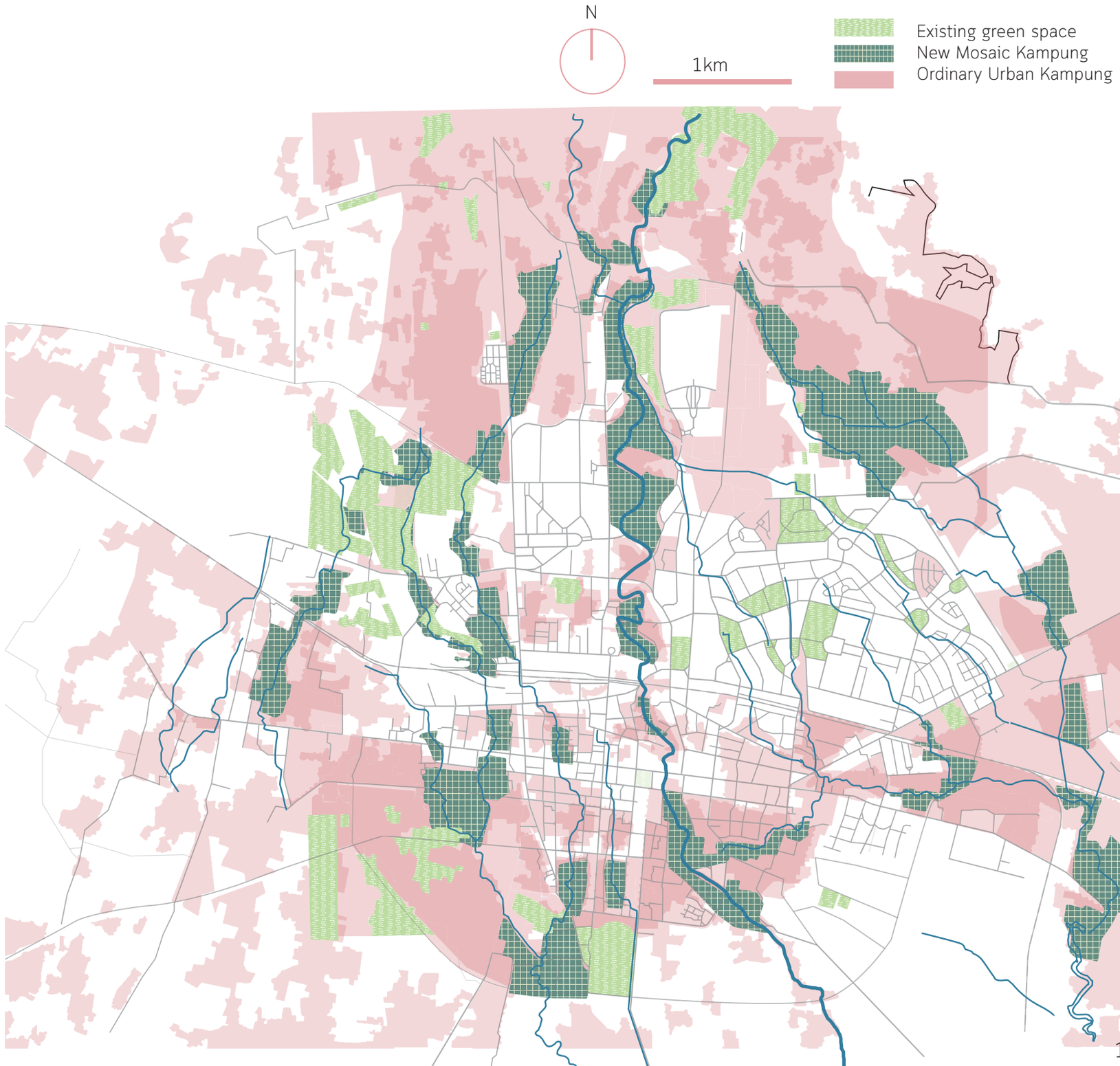
[Fig. 5.18] Incremental Development

5.6. VISION: MOSAIC GARDEN CITY

The project aims to incremental development through time and scale. Firstly, in kampung Tamansari, small plots of green patches grow with relocation and densification in kampungs. When the green patch system works well. Other Kampungs start to adopt the strategy. Slowly, the design strategy applies along the rivers in Bandung.

Even though green patch are just small green spaces. When it is connected each other, decentralized system is created in the Kampung. Further, as the number of new Mosaic kampung (which consists of green patches) increase, Bandung becomes holistic system by expansion to the other areas within the city.

On the process, relationship between people and nature is redefined. In the end, water quality in the rivers is improved and the city can get more ecosystem service in the future.



[Fig. 5.19] Vision of Bandung, Mosaic Garden City

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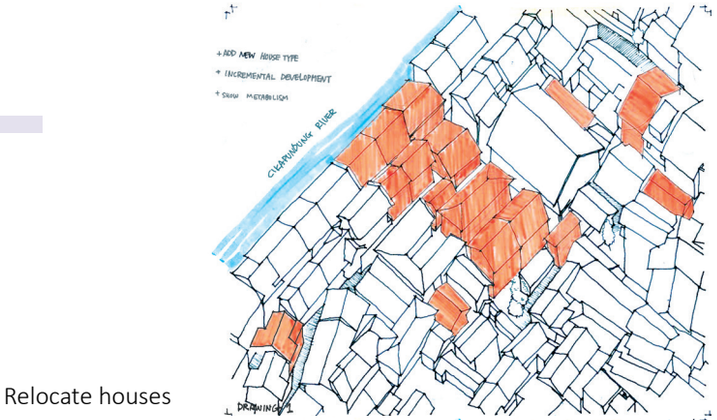
06 RESEARCH FINDINGS

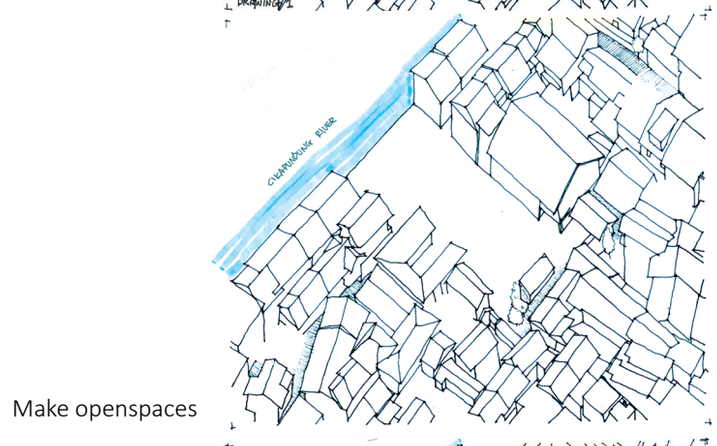
6.1 PROJECT EVALUATION

6.1.1. REPLICATION TO THE OTHER SITE

Kampung Lebak Siliwangi is a Kampung which is located along the Cikapundung River. This Kampung is North side of Kampung Tamansari. It has similar condition with the Kampung Tamansari. Therefore, it is plausible to apply the same strategy to this kampung. Furthermore, it has high possibility to replicate the other kampungs along the rivers in Bandung.

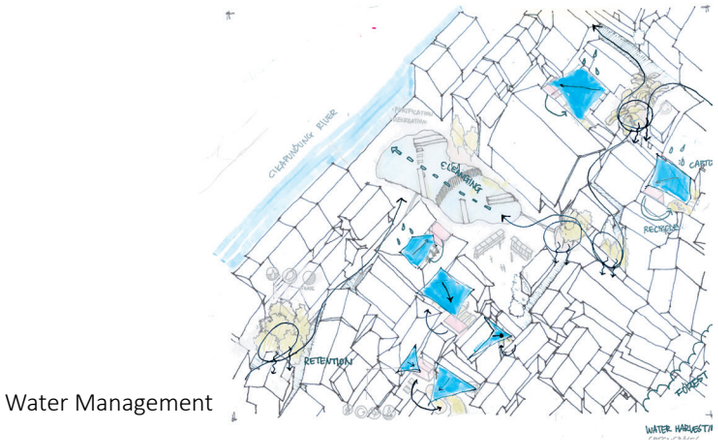


Relocate houses

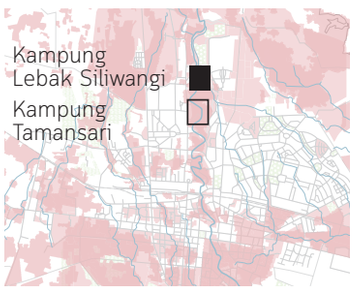


Make openspaces

Create Green patches



Water Management



[Fig. 6.1] Replication of project in kampung lebak siliwangi

6.1.2. UN SDGs Goal

When the project is reflected on the UN Sustainable Development Goals(SDGs), kitchen garden aims to get clean water and sanitation(6). Dry toilet module prevent soil and water pollution from human faces and use as an affordable and clean energy. At the same time, the module helps collecting rainwater for drinking(6) and generate electricity from solar panels(7).

Pit-forest creates water drainage system which improve liveability(3) and create better public hygiene(6). The space also offer vegetables using permaculture(2) and increase biodiversity(15).

Riverfront park purifies water(13,14) in a visible way for people to recognize the process and to be responsible(12). When the Cikapundung river cleans, people can use the river as a power source to generate electricity using turbine(7).

All these roles of implemented green patches create better atmosphere for good health and well-being(3) and sustainable communities. It can attain by people's participation in these spaces. In the end, it would reduced inequalities by allevating poverty. Moreover, it affects the environment and is a way of taking action for climate change(13).

[Fig. 6.2] UN Sustainable Development Goals

[Fig. 6.3]Programs in uncovered grounds in Kampung Tamansari

6.2 RESEARCH CONCLUSION

The project explores informal settlements in Bandung as a showcase to improve living quality for healthy future city. The Informal settlements are mainly located along the rivers and took over greenspaces and expanded until the edge of the river embankment. Lack of green spaces causes lack of ecosystem service in urbna Kampung(informal settlement) and degrades the community's living quality. Another cause is water-related infrastructure deficit in the community due to topographical characteristics.

The approach to the project is not only about creating new green spaces in the community but how to reconnect between people and nature in order to prevent open green space from new informal settlements. Therefore, Kampung Naga, which is an Indonian traditional kampung(village) located near Bandung, is studied to understsand the relationship in terms of water management. It was circular and people's daily life is directly connected to the water management system. By contrast, urban kampung's water system is highly linear and has nothing to do with daily life.

Based on the fact, Ecopolis theory is adopted as a theoretical background since people's participation is important. Process and strategy of design is imperative. Bottom-up project is considered in the context.

Bottom-up project attaches people's interest toward the nature and place while they create the space. It is a way of learning and understanding the ecosystem service with its benefit. This approach is possible due to Indonesian's unique social structure RT-RW system which gives possibility to organize by themselves even in informal settlements. Kampung Tamansari was selected as a specific site to be further developed.

Kampugn Tamansari is one of the densest urban kampung in Bandung; however, It was meant to be green corridor during Dutch colonial era. Currently there are compacted houses instead of green spaces. That is why small scale of intervention which called green patch in the project is suitable. Place making strategy using water management could create minimum empty spaces for green patches to start the project. Scattered green patches are physically seperated but functionally support each other and create a green and blue network as a decentralized system. Adapting to existing reality, structures and elements in green patch are made of local or recycled materials.

Green patches are divided into three greenspaces according to different enclosure atmosphere which connects to the owner of the spaces. It solves the problems which community faces such as lack of food security, water pollution, and poor drainage system.

The project could be realized by residents in the community as a main actor through collaboration with NGOs or other stakeholders. When it is procsed government could invest money to the bigger scale intervention. Moreover, goverments are convinced to invest money by the bottom-up project which already happened.

As a spatial design, this small intervention can be replicable in the similar environment. However, strong bond of community is important for the project to be created and sustained in a long term. When small intervention spreads all around the city along the river, it has great ripple effect in the end.

6.3. REFLECTION

Aspect 1 & Aspect 3
the relationship between research and design.
Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.

My research aim was directly focus on how to improve living quality in a context of informal settlement as a landscape architecture by redefining the relationship between nature and people. Before starting the research in the site, I asked myself back that why we need nature in the city and near our neighbourhood. I got answered that we are part of the nature. Practically, ecosystem service can bring direct benefit to people.

After that, I tried to understand the landscape in context of the city and kampung (informal settlement) so that I could figure out why the site experienced radical changes that informal settlements occupied green spaces. I got a conclusion that these kampungs have similar condition, which is more efficient to choose one specific site and explore it. Even though I zoomed into my project site, which is Kampung Tamansari, the site is still extremely complex, so I conducted the research generally based on Ecopolis theory by Tjallingi(1995) using threefold strategies framework: flow, area and people. It drove me to study not only about unique landscape in Bandung but also about the social structure and people's daily life in the city.

Firstly I investigated the water flows in the Kampung Tamansari. It shows linear water flows without any treatment. And I found the cause through the lens of area. The research was brought the conclusion that landscape topography – kampung is on the lower ground level than centralized infrastructure facility – was the obstacle to connect kampungs to the existing centralized infrastructure such as sewage pipes and drainage system. The research guides me to think of how I can use this disadvantage as an advantage. Moreover, this outcome strengthens my argument that I need to solve the problem by creating landscape as infrastructure.

Finally Indonesian social structure was quite characteristic that they have their own autonomy which administration does not reach to their independent self-government system(RT and RW) even in the informal settlement. Also there are many grassroots support involve in many sector to improve their living environment. I considered these unique qualities and planned in the bottom-up approach and who will use the space. And when it comes to informal settlement, what kind of need the residents do want to meet, such as safe water source and food security.

During the design phase, studying Kampung Naga which was studied as an example of ecopolis helps me how to use the landscape value in the site. The cultural landscape provides ecosystem service and bond close connection between the nature and people in their daily lives.

The project dealt with sensitive subject which is informal settlement and focused on how landscape architecture can support the settlement's living condition. Based on the research on the context, I drew the conclusion that people's participation was the key point to sustain this green space and its system as a long-term solution and try to implement it into the design using ownership or visible benefit from the product which is produced in the space.

Aspect 2
the relationship between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS).

My graduation project is about the reestablishment of the relation to the nature. Failed relationship with nature provokes natural and ecological degradation due to human behaviours, which eventually boomerangs on the people. It is imperative to reconcile people and nature. The vicious circle is broken by constructing resilient urban metabolism on the existing landscape topography.

Studio Flowscape gives a basic frame to explore the project through landscape as a type of infrastructure and infrastructure as a type of infrastructure(Strang, 1996) In relation with this aspect, the project create new green and blue infrastructure to connect broken urban metabolism flows. Every flows are closely linked to green and blue infrastructure on the site.

On the other hand, flowscape suggests a point view of 'genius loci' which corresponds to Shared Heritage Lab. 'Shared heritage lab' explores how heritage could drive sustainable development to make a city and its landscape healthier and more resilient. Bandung is a case study for my batch. The garden city was a concept of Bandung city plan during Dutch colonial era. The Cikapundung river and its valley was main green corridor to brings nature from the North side of Bandung into the city. However, rapid social change due to urbanization transformed a green corridor to informal settlement, and Bandung lost biggest garden. But their unique social culture which was formed during the colonial era helps the informal settlement to survive ironically. The graduation project sheds new light on the garden city which is represented on the context of kampung(informal settlement).

Aspect 4

Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.

The tendency of growth of informal settlement are increasing globally. We need different perspective that informal settlement is an eyesore in the city and is physically isolated from the urban tissue. My project would like to explore and show that an informal settlement is not the object that we have to grant them the financial or development aid. The self-constructed city, or informal settlement, is not a separable element of larger city; rather it is intricately welded into it(Okyere, 2016). That is why the project aims to create decentralized system which does not physically connected to existing formal settlement but it can be dependent and the city can regard the people as a productive member of society.

This graduation project takes into account of restoration of relationship between nature and people especially in the context of dense informal settlements in a developing country. Replication could be adapted within Bandung city or other similar Javanese context. In addition, even you cannot adapt all the strategy, you can choose one of the element selectively. But still design's sustainability is nothing more than assumption that cannot guarantee completely.

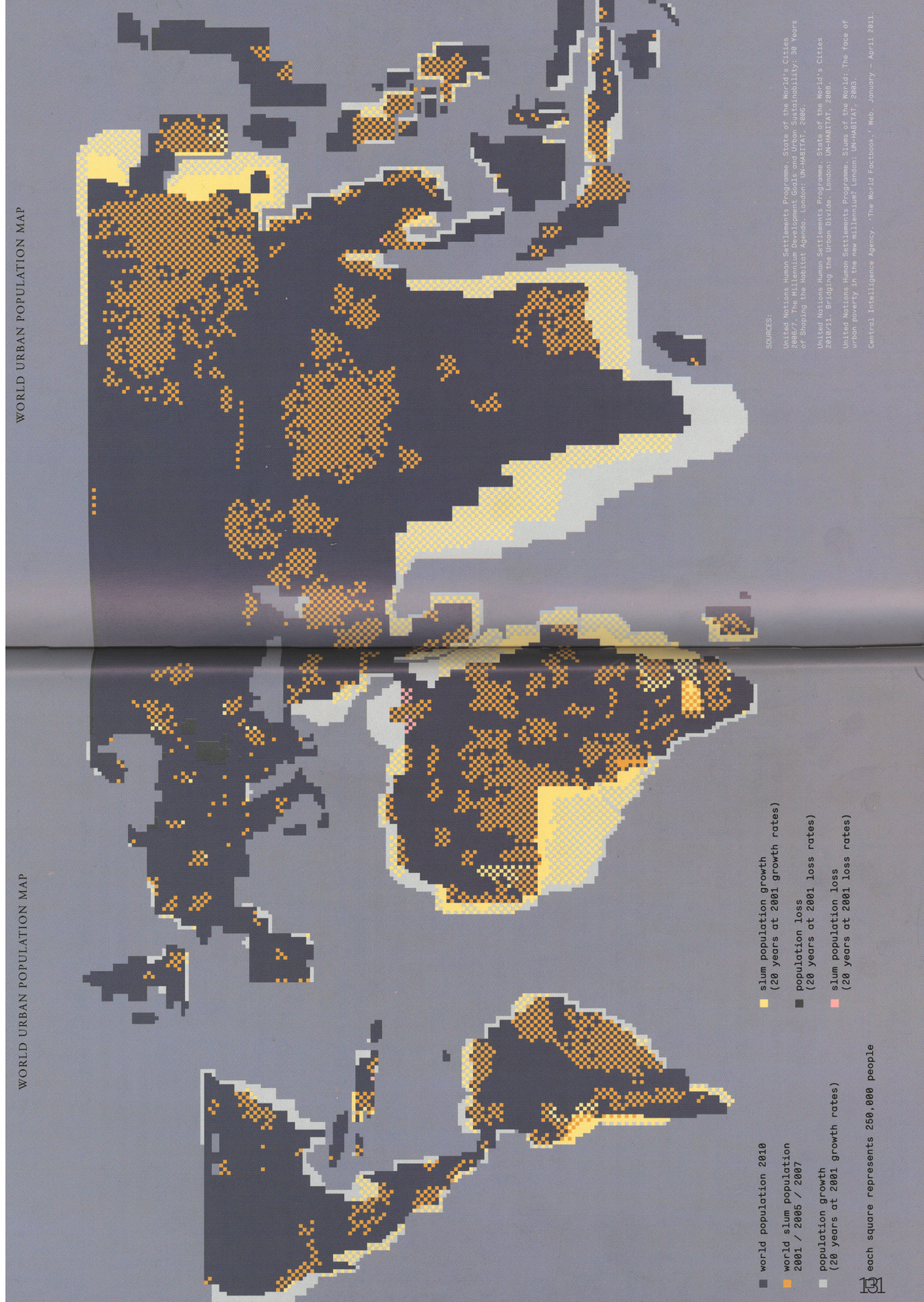
Aspect 5

Discuss the ethical issues and dilemmas you may have encountered in (i) doing the research, (ii, if applicable) elaborating the design and (iii) potential applications of the results in practice.

I focused on two ethical issues in Bandung generally about maldistribution of nature and the lack of safe food and water which decide quality of life. Bandung remains garden city plan during colonial era. It makes another landscape segregation which north-east Bandung is most greenery space including parks and the rest of city can barely find nature. Another one is between formal and informal settlement. Moreover, people who lives in informal settlements cannot afford to buy groceries and clean water. Many people are suffered from a water-related disease. To deal with both issues, I tried to make a hybrid landscape which can offer green space to promote productivity of land as well as public amenity.

To make a new type of space for design removing houses in dense kampung(informal settlement) was inevitable. It conflicts to ethical issues on freedom of residence even though people took it illegally. I made priority and minimize the distance to move – within the community – and the number of houses of relocation. Priority is to remove house which blocks stormwater flow to be against floods and the house next to the river embankment. Both are closely related to their safety.

At the same time, I did not include the improvement of quality of houses in this project because I make a conclusion that it is too premature to apply it. Indonesian government tries to improve kampung nationally. They invest big money to build vertical garden. As a process, they have considered the freedom of residence and have plan about temporary relocation. However, residents are not fully satisfied because of the cost of housing maintenance. The cost of current housing maintenance is almost zero. But you need to pay for the fee if you live in proposed new vertical kampung. It is a big burden for the people who even cannot afford their food. So this graduation project could be a phase before adapting vertical houses to establish economic foundation.



[Fig. 6.4] Informal Settlement World Map
source: Christian Werthmann et al. (2011)

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