Global Innovation Initiative

Urban Green Infrastructure:
An Interactive Web of Water, Space & Life

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Universitas Indonesia
University of Florida
Cardiff University

Editors:
Diane V. Wildsmith
Kemas R. Kurniawan
Andrea Frank
Christopher Silver
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Contributors	Participants of the International Joint Studio and Seminar (IJSS) Department of Architecture, Faculty of Engineering, Universitas Indonesia Cardiff University, United Kingdom University of Florida, United States 12- 21 January 2016
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Editors	Diane Valerie Wildsmith, Kemas Ridwan Kurniawan, Andrea Frank, Christopher Silver
Editorial Team	Diandra Pandu Saginatari, Tia Aprilitasari, Olla Varalintya Yochanan
Cover Design	Rezqi Adhika
Layout Design	Group 1: Cindi Ruth Maharani, Jeraldy Putra, Tia Aprilitasari Group 2: Amanda Larissa, Avi Sovia Group 3: Bella Septianti, Tri Damayanti
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TABLE OF CONTENTS

ABSTRACT

This book raises issues about the connections between water, space and life. The research and field surveys are derived from the January 2016 International Joint Studio and Seminar (IJSS) held in Jakarta and Depok between the Universitas Indonesia, University of Florida and Cardiff University at the Universitas Indonesia. Ths Joint Studio and Seminar questions how green infrastructure shapes the flow of water in harmony with nature and human activities, while grey infrastructure forms a mineralized web of reinforced concrete gutters, retaining walls and dams. On the other hand, the interactive web alludes to the linguistic connectivity between atmospheric, geologic and human cycles. While, the meshwork of human activity, in terms of architecture and space, strengthens the linkages between the natural and manmade environments. Life itself encompasses dynamic cultural attitudes, leading towards the wellspring of human activity and the reality of public policy to determine management of water and sustainable urban green infrastructure development.

The International Joint Studio and Seminar focuses on the issue of urban green infrastructure in three urban locations, namely Setu Babakan (a cultural community on the Setu Srengseng Sawah Lake in the southern part of Jakarta near Depok), upstream rivers to UI Campus lakes, (specifically the southern and eastern inlets that are impacted by traces of trash and settlements), and Setu Rawa Besar in Depok (which is impacted by commercial activity and development sprawl). The third case (Setu Rawa Besar) is related to topics that concern water, waste management and environmental public policy from the Depok City government.

The aim of this International Joint Studio and Seminar reflects three outputs. First, the sequence covers field research for identification of water, space and life issues in relation to urban green infrastructure in an interactive web of activities. Second, the joint design studio allows for cross-disciplinary interventions and key proposals for design guidelines to enhance architecture and green infrastructure objectives. Third, the seminar in the plenary session offers a workshop for dialogue, presentation of ideas and conclusions to further engage in-depth research to enhance urban sustainability and context-sensitive strategies. Students and educators from the three universities, as well as community representatives and government officials participated in the joint design studio and seminar.

This book and its subsequent activities form the basis for future research in relation to the Global Innovation Initiative Grant awarded to the University of Florida, Cardiff University and the University of Indonesia with the following research aim:

- Novel approaches of employing green infrastructure (GI) to enhance urban sustainability

Figure 1. Introduction to International Joint Studio and Seminar 2016, photo by Gibran, S. Ars., M.Sc

INTRODUCTION

University of Florida - Cardiff University - Universitas Indonesia
The International Joint Studio and Seminar
12-21 January 2016

Urban Green Infrastructure: An Interactive Web of Water, Space & Life

The Global Innovation Initiative awarded a grant to the University of Florida, Cardiff University and the Universitas Indonesia with the following research aim: Novel approaches of employing green infrastructure (GI) to enhance urban sustainability. The January 2016 International Joint Studio and Seminar in Jakarta and Depok at the Universitas Indonesia focused on the issue of urban green infrastructure in three urban locations, namely Setu Babakan, a cultural community on the Setu Srengseng Sawah Lake in the southern part of Jakarta near Depok. The second location, upstream rivers to UI Campus Lakes, specifically, the southern and eastern inlets that are impacted by traces of trash and sewage. The third urban location, Setu Rawa Besar in Depok, is impacted by commercial activity and development sprawl. This case study is related to topics that concern water, waste management and environmental public policy from the Depok City government. The aim of this Joint Studio and Seminar reflects three outputs. First, the sequence covers field research for identification of water, space and life issues in relation to urban green infrastructure in an interactive web of activities. Second, the joint design studio allows for cross-disciplinary interventions and key proposals for design guidelines to enhance architecture and green infrastructure objectives. Third, the colloquium offers a workshop space for dialogue, presentation of

ideas and conclusions in a plenary session to further engage in-depth research and debate to enhance urban sustainability and context-sensitive strategies. Students and educators from the University of Florida, Cardiff University and Universitas Indonesia, as well as community representatives and government officials will participate in the international joint design studio and seminar. The first day included an Orientation Tour to Kota Tua Jakarta in relation to water issues.

Manuel De Landa in **A Thousand Years of Nonlinear History** uses geological, biological and linguistic metaphors to describe the development of cities in the last millennium. In a geological sense, the crystallization of cities is derived from the materiality of buildings, walls and infrastructure, much like geologic strata. In terms of a biological analogy, the trabecular meshwork around the eye drains the aqueous humor into the anterior chamber and subsequently into the blood stream. The biological meshwork derives its sustenance from the flow of water in relation to the interlocking chains of the food web. Comparatively, alluvial river systems deposit soil along the riverbank and shape the channel morphology of flood plains and terraces. Green infrastructure shapes the flow of water in harmony with nature and human activities. Grey infrastructure forms a mineralized web of reinforced concrete gutters, retaining walls and dams. The interactive web alludes to the linguistic connectivity between atmospheric, geologic and human cycles. The meshwork of human activity in terms of architecture and space strengthens the linkages between the natural and manmade environments. Life itself encompasses the dynamic cultural attitudes towards the wellspring of human activity and the reality of public policy to determine management of water and sustainable urban green infrastructure development.

RESEARCH SITES

Setu Babakan, Upstream Rivers to UI Campus lakes, Depok City Government, Setu Rawa Besar

RESEARCH ISSUES

Urban Green Infrastructure, Water, Space, and Public Policy

SCHEDULE

The 10-day workshop is divided into three sites and involved one government agency for field surveys and research investigation.

Figure 2. IJSS 2016 Team at Setu Babakan, photo by Avi Sovia

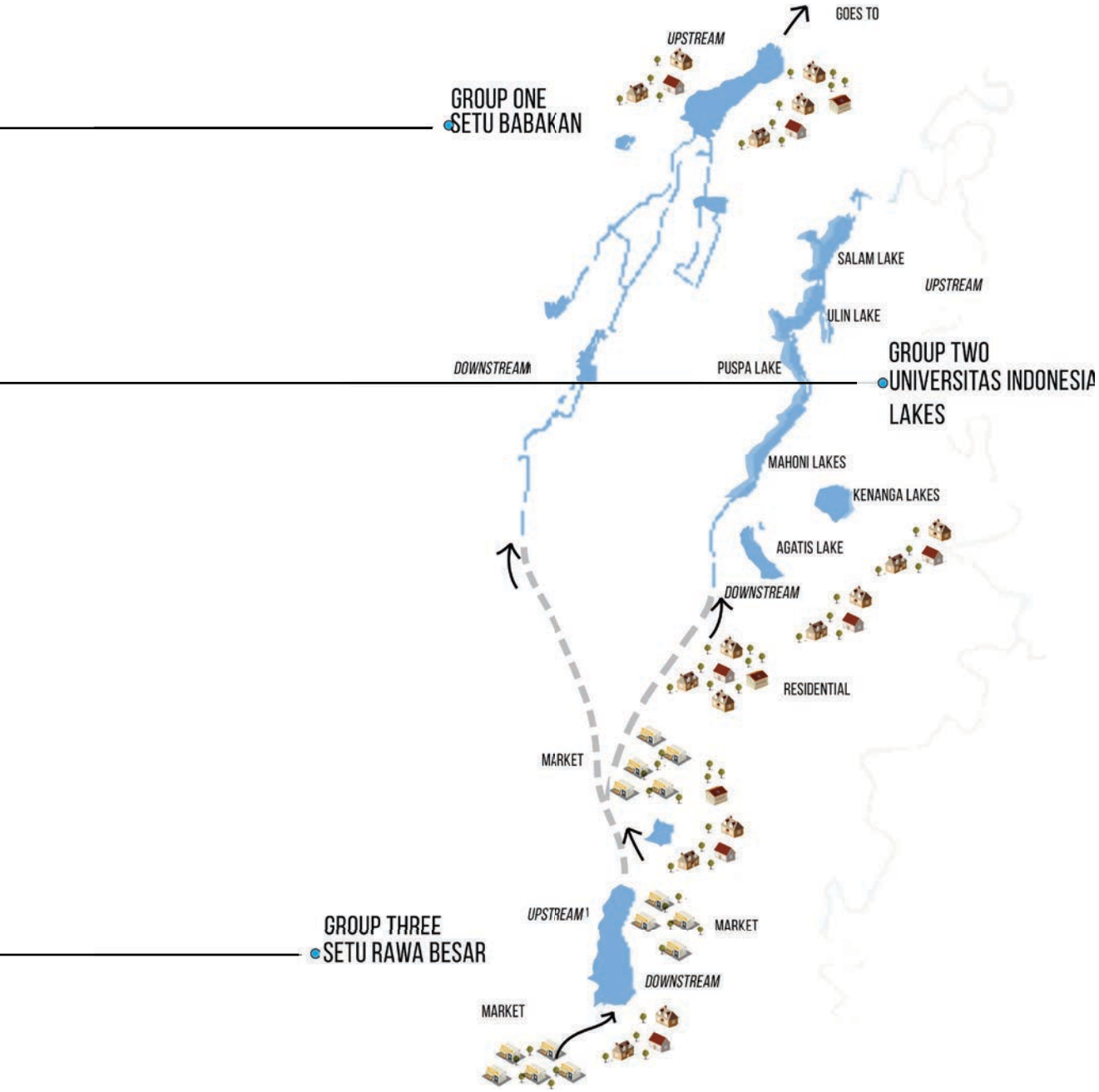

Figure 60. Relation between three lakes, illustrated by Tri Damayanti

Figure 2. Lake Setu Babakan, photo by Ajeng Nadia

ABOUT SETU BABAKAN

CHARACTERISTICS OF SETU BABAKAN

Setu Babakan or Lake Babakan is located in Srengseng Sawah, Jagakarsa sub-district, South Jakarta, Indonesia near Depok. Setu Babakan is an artificial lake with a total area of 32 ha. The water comes from the Ciliwung River and now it is used for many activities. Setu Babakan is also home for the Betawi people. The Betawi Cultural Village is used to preserve the cultural heritage of Jakarta. With a total area of 28 ha, Setu Babakan is owned by the government and the private sector with over 300 households. Setu Babakan is also known as one of Jakarta's tourism areas. In the 'Betawi Cultural Village, we can find and enjoy Betawi life with its nuances in the community, its natural beauty around the lake and in the urban forest, Betawi art performances, information and

Figure 3. a) fruits stand, photo by Zhongmin Deng; b) food vendor by Liliana Fonseca
c) Delman (horse carriage), photo by Zhongmin Deng; 4) seating area at lakeside , photo by Zhongmin Deng

documentation about the Betawi community, traditional dance, traditional music and martial arts classes, and also Betawi culinary dishes. The Betawi people hope that all activities can be understood as a form of protection and guidance in order to preserve and develop their livelihood in the arts and cultural traditions. Betawi cultural expression is in accordance with the needs of the present. Betawi culture is useful as a form of potential development in eco-cultural aspects related to the environment. Betawi culture responds to eco-social aspects by improving the welfare of the surrounding community as well as being one of the cultural tourist attractions in Jakarta.

ENVIRONMENTAL & CULTURAL CONCERNS

Figure 23. Waste, water and barrier, photo by Ajeng Nadia

From all the data analysis, our intent is to sum up the main issues in Setu Babakan. The key issues are related to the human relationships between culture and nature.

POOR AWARENESS OF THE INHABITANTS TOWARDS THE ENVIRONMENT

1.WATER AND POLLUTANTS

Water is one of the elements that can affect the quality of people's lives, so further observations on water are important to discover relevant patterns in society. Water inside the earth has a cycle of perpetual motion. In the context of Jakarta, the water cycle in the earth's surface occurs continuously. The water vapor in the air condenses to form clouds, which later on will contain particles of water and fall in the form of rain. The rainwater that falls to the earth's surface will be divided into ground water, which will be absorbed into the ground, and the runoff water that will flow over the surface of the ground. When the amount of water

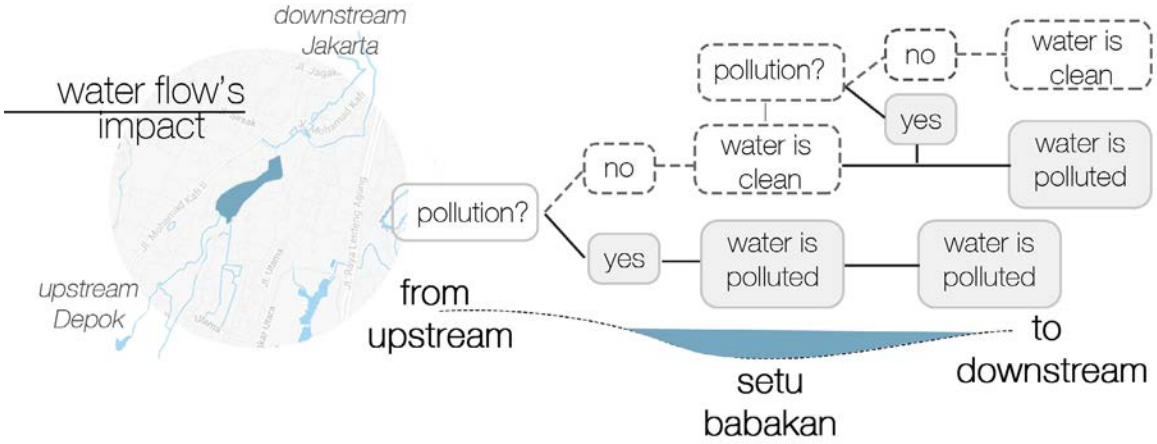

Figure 24. Water flow's impact, illustrated by Tia Aprilitasari

that flows over the ground is more than the amount of water that is absorbed into the ground, floods occur. According to Wibowo in Jakartapedia: The People's Encyclopedia, "Ironically, in the face of water scarcity, the potential of rainwater in Jakarta, which averaged 2.000 million m3/year is not optimal because only 26.6% are absorbed into the soil and the remaining 73.4% is wasted to the sea." (Wibowo, 1998)[1]. This occurs because the urban environment lacks water infiltration and water catchment areas.

Water follows gravity and flows from a higher position to a lower position. This may become either an advantage or a disadvantage that we need to keep an eye on.

Downstream, Jakarta gets its water supply from Bogor, so in terms of quantity, the water in Jakarta will continually increase. However, the quality of the incoming water should be a concern, because it will affect the water in Jakarta, and in this case, Setu Babakan.

Therefore, we took water samples to observe the level of clarity from five areas , which are:

A. Setu Babakan's inlet
B. Residential at upstream area
C. Southern part of the lake
D. ISTN's campus lake
E. Mangga Bolong outlet

Our initial assumption was that the upstream area will have a better level of clarity than the downstream because there are fewer water sources and less contamination. The more contaminants, such as pollutants, garbage, or organisms, the more complex the structure of water becomes. With that assumption, higher regions will have better water clarity. Thus, there will be a direct correlation between the locations and better water clarity.

However, according to our observations, the level of water clarity from lowest to the highest is A, B, C, D, E. This outcome shows that the level of water clarity is not always based on the position where the water is located.

What affects the level of water clarity is the ecosystem, the water channel (natural or artificial), the position of sampling, water sources and possible pollutants. In the ecosystem, there are organisms that can influence the level of water clarity (clear/ cloudy) and the tendency of different water colors, such as fish, algae, etc.

The form of waterways also affects the level of water clarity. In waterways with proper drainage systems and culverts with open drains, murky water level will decrease, with the exception of the likelihood of mixing water with mud and soil. Of course, when the drainage channel is formed from soil, the

1 Wibowo, (1998). "Assessment of Potential Watershed Using Geographic Information System." Bandung Basin Case Study, Master Thesis in ITB-Bandung. In Jakartapedia: the People's Encyclopedia. Badan Perpustakaan dan Arsip Daerah Provinsi DKI Jakarta. http://jakartapedia.bpadjakarta.net/index.php/Kondisi_Resapan_Air_Jakarta

INTERVENTION

SUSTAINABLE KAMPUNG

THE PROPOSED CONCEPT

What is a sustainable kampung?

Based on the current masterplan design, we feel the need to make sure that the plan is synchronized with what is hoped and expected for the future with what is going on in the present. From the issues that we have discovered, there needs to be a redesign of plan that enables:

1. A collaboration between the locals, visitors, sellers, inhabitants and administration officers through the proper distribution of public spaces that allows these actors to increase their encounters and communication.
2. A spread of awareness between the people and the surroundings that can revitalize the essence of the Betawi society
3. An increase of interest towards the Betawi culture for the visitors through a more inviting and attractive environment.

In order to reach the characteristics of such goals, we have created a concept with the theme:

"Sustainable Kampung"

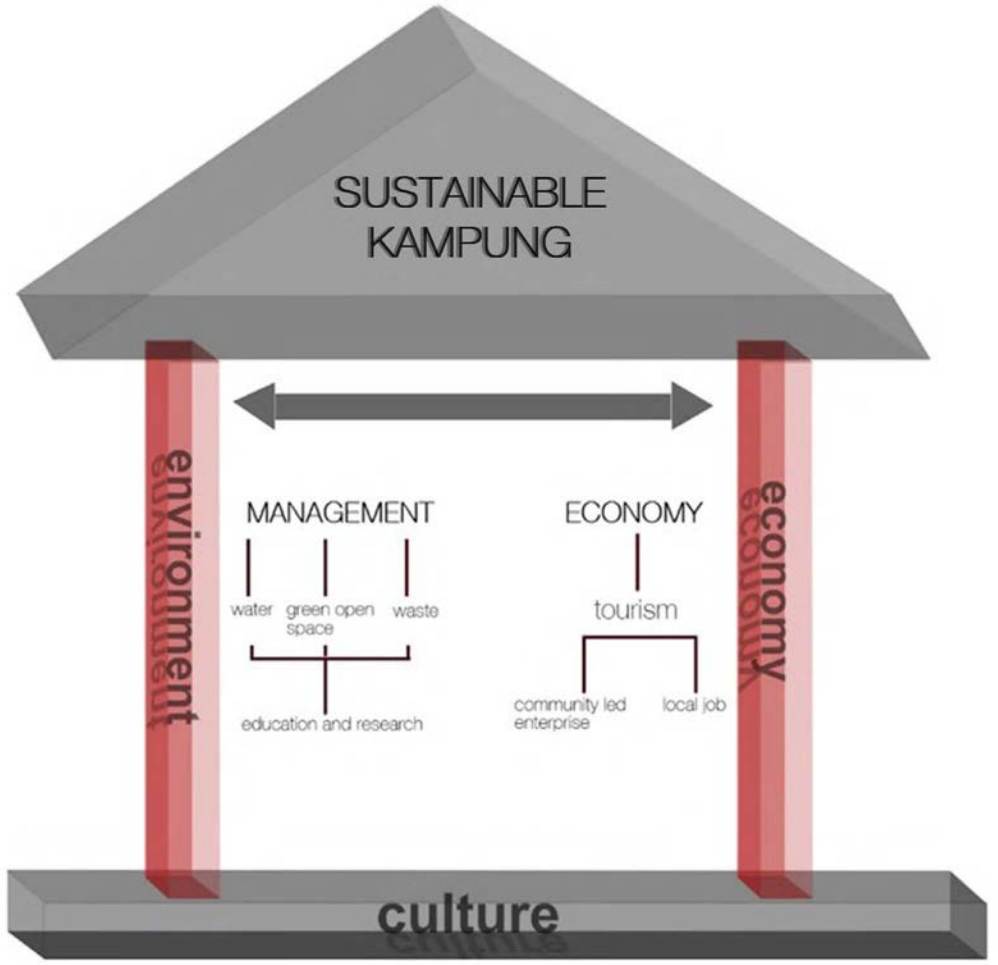

Figure 35. Concept of sustainable kampung for Setu Babakan, illustrated by Yalan Zhang

WHAT IS A SUSTAINABLE KAMPUNG?

Its purpose is to create a sustainable livelihood system in Setu Babakan. The Betawi culture should become the foundation or the roots that support economical and environmental aspects. The restoration of the Betawi lifestyle becomes the essence in order to create an environmental management system that can educate inhabitants and tourists. It should also facilitate research activities to increase environmental awareness. On the other hand, tourism can act as a trigger that can improve economic conditions for the locals.

LIST OF AIMS IN THREE MAIN ASPECTS

From the three aspects, we have created a list of goals that should be achieved

Socio-cultural

- Links cultural performance space with nature
- Engages community in cultural activity
- Creates recreational area for community
- Educates people in Betawi customs and nature conservation
- Regulates policy regarding Betawi architectural design style
- Uses a bottom-up approach in the decision making process by an advisory committee

Economy

- Enhances tourist facilities
- Increases local job opportunities by fomenting tourism
- Uses epicenters for cultural attraction

Environmental

- Creates wetland to improve water quality
- Improves water and sewage treatment plant
- Enhances waste disposal system
- Creates new green infrastructure development in the area

Figure 36. List of aims in three aspects of a sustainable kampung

Figure 61. Sustainable Kampung of Setu Babakan, illustrated by Tia Aprilitasari

PLENARY SEMINAR

THE FUTURE: A SUSTAINABLE KAMPUNG

SETU BABAKAN: BUILDING AN INNOVATIVE MODEL OF CULTURAL AND ECONOMIC SUSTAINABILITY

Moderator: Diane Wildsmith
Universitas Indonesia

Setu Babakan is attractive because of the Betawi culture. We believe that Setu Babakan can look forward to a sustainable future. Our findings reveal an innovative model of a sustainable kampung as well as making recommendations about the gaps in the masterplan applicable to the future. If we compare the green space and the size of the lake in 2005 to 2015, the lake size has increased. The 2005-2020 Master Plan is comprehensive with zoning around the lake.

The sustainable kampung model is based on the Betawi culture. If we think of a structure like a house where the roof is sustainability, the environment and the economy are the pillars and culture is the platform, then we have the relationship for a virtual circuit between management, the economy and sustainability. The management of water and green open space will transform Setu Babakan for educational and research opportunities. Even though the red zone in the master plan is fragmented, there is continuity in the overall master plan and it is just a matter of how to fill in the gaps.

GROUP TWO

UNIVERSITAS INDONESIA LAKES & SURROUNDINGS

RESILIENT FUTURE FOR UI LAKES AND SURROUNDINGS

ABOUT UI LAKES

REGAINING CONSCIOUSNESS

In addition to the beautiful and comfortable Forest City area at the University of Indonesia Depok, there are also lakes that serve as water catchment areas. There are six lakes in the UI Depok, among these are Lake Kenanga, Lake Agatis, Lake Mahoni, Lake Puspa, Lake Ulin and Lake Salam. Lake Kenanga was constructed in 1992 with an area of 28,000 m2. The lake is surrounded by several important buildings, such as the Rectorate, the Masjid UI, the Assembly Hall and the Library

The location of Lake Agatis between the Natural Sciences and the Jakarta State Polytechnic was built in 1995 with an area of 20,000 m2. Lake Mahoni is next to the South Campus and is bounded by the main southern ring road (East side of FIB & PSI, West FEB). Lake Mahoni (Mahogany) was built in 1996 with an area of 45,000 m2. Lake Puspa is situated between Lake Ulin and Lake Mahoni. Lake Puspa was built in 1995 with an area of 20,000 m2. The location of Lake Ulin is situated between Lake Puspa and Lake Salam and it was built in 1998 with an area of 72,000 m2. Lake Salam's location is parallel with a flow from south to north as part of the series in relation to Lake Ulin and Lake Puspa. Lake Salam was built in 1998 with a 42,000 m2 area. In addition to the six existing lakes, UI also has another lake, called a recharge pond, downstream. The UI's recharge pond, which was constructed in 2006, was initially expected to store inflow discharge from river, storm water, and runoff, to allow the water to infiltrate and percolate as ground water recharge. The construction was supported by the Ministry of Public Works. It was built with a long-term goal as a field model to overcome drought and flood disaster in Jakarta and the surroundings. (Hartono et al., 2010)

Historically, since 1983 the six lakes were constructed in stages and inaugurated in1987. At that time, the UI campus planning concept was "Green" to blend with nature.

The lake itself is a place to hold water based on a philosophy that is consistent with scientific principles, meaning that water is the source of life. Meanwhile, the spirit of science is to build life itself. According to SK Rektor UI (Prof. Dr. A. Boedisantoso R.), the UI Lakes function as a means of education, recreation and water catchment. Six of the lakes are adjacent to the city forest in the academic environment that makes up the UI Depok campus, which has a total area of 312 hectares. The existence of the urban forest and the lakes is expected to supply 825 million cubic meters of clean water for the surrounding residents as well as for the campus. In addition, the UI Lakes are also used as a nature conservation area and research laboratory. The water source in UI campus forest comes from the Cinakusen River, located on the outskirts of the urban forest The water management system includes a dam in order to manage the overflow from excessive rainwater into the lakes.

Due to pollution and sedimentation, the six lakes on the UI campus are in critical condition. In fact, these lakes are also part of the water catchment areas of Depok and Jakarta. The pollution caused by the large amount of housing waste and factory waste from the surrounding areas are not well managed, so that the pollution also flows into these lakes. The community around the UI campus often has a negative impact. Recreational activities, like fishing, have a positive feature, however, the disposal of solid and liquid waste directly into the river upstream eventually pollutes the lakes downstream.

Located on the upstream side of the UI Lakes, Lake Kenanga is actually a semi-artificial lake that was formerly a shallow marsh area, which was then excavated and molded to form the lake basin. Furthermore, pollution is also caused by the flow of water from the residential areas, from the slum areas, and also from the market, resulting in a variety of trash entering Lake Kenanga. Charged with reviewing the campus environment, its functions, and its sustainability, the UI Campus Environmental Development Agency (*Pembinaan Lingkungan Kampus*, PLK) operates regularly to manage and clean up garbage or trash from the lakes. In accordance with the Lake Management Plan,

Figure 2. Kenanga Lake's Emerald Water, Source (www.vsebayang.wordpress.com)

the UI PLK, along with the Depok residents, the Depok Institute for Community Empowerment (LPM), and the city government of Depok, continuously strive to preserve the lakes.

The UI Lakes are a favorite place for people from the Depok community and the surrounding areas, but not many of the people know about the burden that must be borne from sewage, trash and other pollutants entering the UI Lakes. Dr. Ir. Tarsoen Waryono, M.Si (Lecturer, Faculty of Mathematics & Science) mentions at least three sources of pollution: from the Depok market, the Bambon village, and the Beji Kukusan district. Annual data from the Department of Chemistry UI noted

Figure 4. Agatis Lake covered by plants, photo by Avi Sovia

the high levels of Potassium Permanganate (KMnO4). The compound is hazardous to water and the environment as it can be very toxic to the organisms in the water with a long-term impact on the environment. There are also oil-based compounds in the water that could threaten the survival of fish in the lake.

In contrast to the waste coming from Beji Kukusan, mostly the waste from the Depok market, is organic. When it rains, the market trash is washed into the waterways and into the UI Lakes. The sewage sludge is mixed with water and then the combination results in a precipitate in the form of sediment. Erwin Nurdin, Lecturer at the UI Department of Biological Sciences, describes the condition of some UI Lakes where the water is bluish-green, smelly, and possibly a source of disease. Bluish-green lake water is due to the blooming of algae, namely the abundance of algae that dominate organisms in the water. If there is a decay of algae, the oxygen content in the water goes down. Other aquatic organisms, including fish, will have difficulty in obtaining oxygen. In the face of the waste problem, the lake has the ability to conduct self-purification or independent cleaning that occurs naturally. However, when the incoming waste load is too heavy, the water is not capable of self-purification.

Figure 5. Walking Around Lake Kenanga, photo by Deassy

DATA

REVEALING THE LAKES

INHABITANTS IN ONE NEIGHBORHOOD (RT)

1. *2 Original/native residents (Betawi)*
2. *54 immigrants/newcomers residents (mostly Javanese, industrial workers, campus workers)*
3. *Upperstream creek and wetlands have potential value that could be used by the government and local people to improve their quality of life.*
4. *3-4 families integrate their houses together and made one neighborhood area. These informal inhabitants use the ponds directly for solid human waste disposal.*
5. *Usually, the formal and informal inhabitants do not interact with each other. The formal inhabitants do not care very much as long as the informal inhabitants do not disturb them. For some events,both formal and informal inhabitants contribute to neighborhood, as if they are in one area*
6. *Wetlands are owned by some members of the private sector as absentee landlords.*

Figure 9. Existing Conditions of the Southern UI Lakes Area, photo by Avi Sovia and Gandes Punjung, illustration by Gandes Punjung

While heavy rains occur during the rainy season, the water channel volume is wide enough and deep enough to contain the runoff water. (approximately 2 meters in depth). The water channel goes back to normal flow about 2-3 hours later. The water quality is firstly observed through its color. Recently, the water color has changed to a greyish tint, probably caused by solid and liquid waste deposited upstream, eventually clogging the water channel. Therefore, it is risky to use the water for drinking or cooking or washing purposes. Alternatively, people are digging wells and using pumps to obtain fresh water.

The housing surrounding the upstream channel is divided into formal and informal. Based on observations and site visits, the wastewater from the houses along the upsteam channel flows directly to the mainstream channel without any treatment. For the formal houses, the blackwater flows into houses' septic tanks, but for the informal ones the the blackwater flows directly into the mainstream channel. From both the formal and informal housing, the greywater flows directly into the mainstream channel. These problems led us to think about what treatments could improve the mainstream channel water quality, before entering into the UI Campus Lakes.

There is an empty piece of privately owned land beside the mainstream channel. According to an interview recorded with the neighborhood chief, the area was originally wetland used for planting rice fields. The remaining piece of land alongside the mainstream channel has the potential to be green open space, used as an absorption space for improving water quality. This kind of use will lead the community to take care of the site. After flowing through this site, the water quality that flows into the UI Campus will be improved.

Additionally, some kind of community action related to managing the blackwater and the greywater in the kampung and in the formal housing area would be advisable. Besides an educational approach, the addition of septic tanks and cess pools in the kampung and rerouting the greywater in the formal housing area could be considered to improve the infrastructure related to waste treatment and water quality. .

Based on the UI Master Plan 2008, there will be many changes in the next few years, especially in the nearby Lake Agatis. The existence of highway toll project will also significantly impact the UI Lakes and additional constraints inside the streams might appear.

Figure 10. Questionnaire Result about Waste Water, illustration by Gandes Punjung

Figure 11. Water Condition of the Agatis Lakes, photo by Avi Sovia, illustration by Gandes Punjung

Figure 24. Discussiing and Planning the Intervention, photo by Gandes Punjung

INTERVENTIONS

CURING WATER, CURING PEOPLE

Firstly, it is important to begin our solution framework from the patterns of activities inside the community itself. A reciprocal arrangement between the community and the environment leads to a visualization which could improve the lives of the inhabitants and the quality of water in the future. Design interventions derived from these patterns of living would be based on a holistic and social approach which consists of education and financial support and controlling the law and policy aspects. The aim of a social approach is to trigger and become the motivation of

Figure 25. Future Planning of the Waste System, illustration by Gandes Punjung

green infrastructure solutions that will be implemented sustainably later on.

Education, as one of the principal approaches, is necessary to create the overall public comprehension about environmental awareness, thus gaining the participation of people to collaborate together in maintaining their space independently in a sustainable way, especially in terms of the water quality aspects in relation to any physical intervention

This approach can be implemented in environmentally aware types of activities which are daily, weekly, monthly, quarterly, and annually on a regular basis. Events would be packaged in a somewhat interactive and fun way, including managing with laws, regulations, and goverment policies.

This would involve a top-down approach from the government to particular neighborhood chiefs. This kind of action could produce many new policies related to environmental issues. Fines are another way to regulate the environment. However, such an intervention may be ineffective, because of the lack of public awareness and control measures starting from society itself. Self-awareness can be raised with awards for creating a clean and healthy environment. Another control function is providing job opportunities for the informal settlers to manage the waste along the streams. In fact, the informal settlers may be engaged in activities to collect paper, bottles and trash. The trash may have some economic value, which potentially has a mutual benefit to individuals, thus encouraging support for environmental sustainability. These informal activities could also be connected to formal activities. Social approaches that are mentioned need integration of the communication systems between individuals, the government and other related agencies.

Figure 26. Diagram Presentation, photo by Avi Sovia

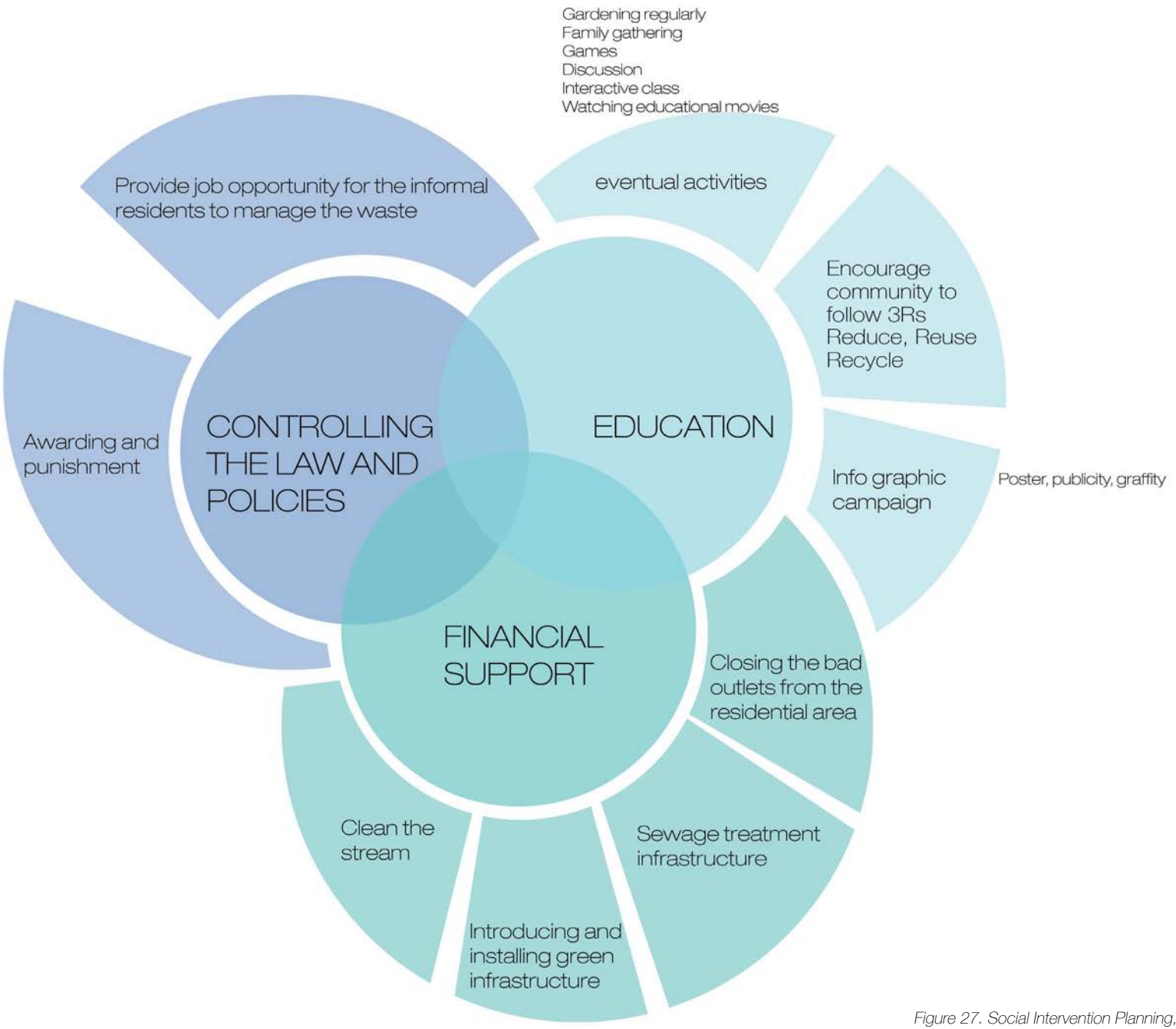

Figure 27. Social Intervention Planning, illustration by Gandes Punjung

GROUP TWO

SETU RAWA BESAR

PEOPLE-SETU RELATIONSHIPS

Figure 1. Setu Rawa Besar, photo by Bella Septianti

ABOUT SETU RAWA BESAR

COEXISTING WITH SETU RAWA BESAR

Depok City is situated in the southern part of South Jakarta and the northern part of Bogor. Regarding the area's climate and topographical factors, Depok serves as a water storage area/water buffer zone that flows from Bogor to DKI Jakarta in order to prevent flooding downstream. Therefore, the area provides several lakes and setu(s) (a setu is similar to a lake, mainly its function is to catch and store rainwater). It is one of the examples that will be discussed in this chapter.

Based on some interviews with local authorities of Depok City, the condition of this setu is poor. Since there is an illegal slum located around the Setu, the setu's size has been narrowed down to 15 Ha (from the original size of 25 Ha). Besides narrowing, the setu also suffered due to the amount of waste disposal from nearby settlements, local industries, and markets around the Setu. This Situation has led to the Setu being polluted.

INTERVIEWS

LOCAL PEOPLE NEAR SETU RAWA BESAR

Our group formulated a questionnaire that represents the response and information we needed for our research. We realized that in this International Joint Studio and Seminar, there will be different perceptions about culture, language, and the way to find information. Therefore, we arranged the questionnaire to meet with the local cultural context. The surveys and observations were conducted on Monday, January 18th, 2016 from 02:00-05:30 pm. We divided the teams into 5 zones to gather comprehensive interviews and documentation. A total of 34 surveys were collected. The survey was recorded using Fulcrum applications via mobile devices. Our main objective is in "forming behavior to live side by side with setu" but also we wanted to find the correlation between the government intervention (plans) and the community behavior in Setu Rawa Besar. Therefore, hopefully we will be able to generate a sustainable design that is appropriate with the local context. To obtain these goals, we made some approaches using community-based development techniques where the policy implemented by the government should be able to educate and provide benefits to the community. Policies can encourage the positive responses of the public to interact directly with the Setu and also to adopt a concern about conservation and sustainability of the Setu.

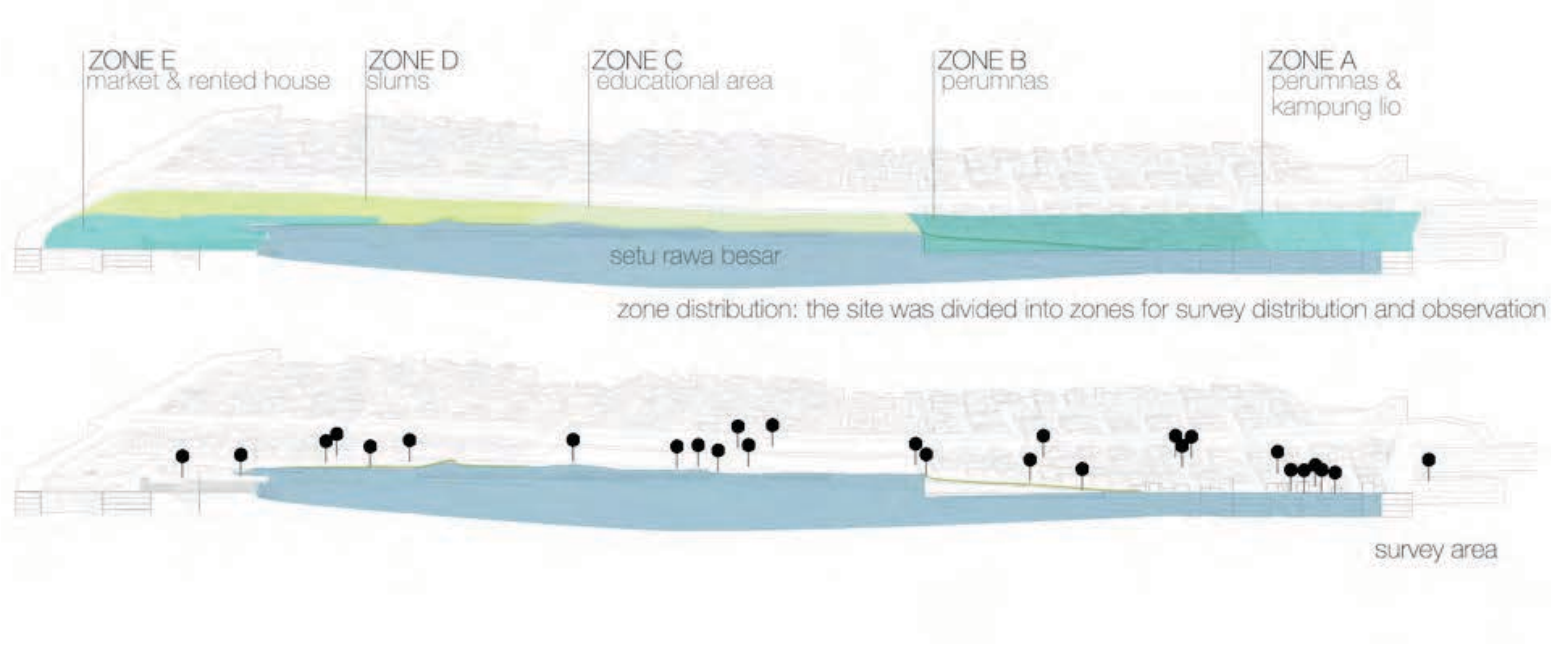

Figure 4. Group 3 decided to distribute the area into several zones:
a) The divisions of site were used to mark the boundaries for group survey and observation
b) The pins indicate the location for data acquisition during survey.
illustrated by Nisrina Muthi Meidiani

DATA

LOCAL PEOPLE'S PERCEPTION

We collected the data from the site and transformed the information into diagrams and charts. The data was derived based on the respondent's backgrounds, activities in the Setu, and satisfaction/expectation from the neighborhood around the Setu.

Figure 5. a) Acquiring data from local residents in Zone C; b) Foreign interviewers interacted with a small group of local children; c) and d) Residents in Zone D gave their aspiration to Group 3 interviewer, photos by Linjun Xie, Haoran Zhang

Figure 6. a) Local people went fishing on the setu; b) Observing the setu c) and d) Local children, photos by: stiqamah

DIAGRAMS

Figure 7. Illustrated by: Afif Muhammad F.

ZONING

We divided the area by colors to see land use differences in the Setu Rawa Besar neighborhood. Yellow indicates formal housing, while the brown indicates the informal ones. The green parts are open space, and purple indicates public area.

Figure 8. Illustrated by: Nisrina Muthi Meidiani

FLOODS

The floods occurred in the northern part due to the lower topography compared to the southern area. There was also a lack of retaining walls that could prevent the water from overflowing in the area.

WASTE

The waste diagram indicates where the most contaminated area occurs in the southern area; this part is where the slums are located. In the meanwhile, in the northern part, trash can be found in the sluice where the garbage got caught and stuck there.

Figure 9. Illustrated by: Nisrina Muthi Meidiani

GATHERING PLACE

The gathering space is differentiated by various activities held in the place. The diagram depicts the main activity, which is fishing, as shown by the purple dots.

Figure 10. Illustrated by: Afifah Karimah

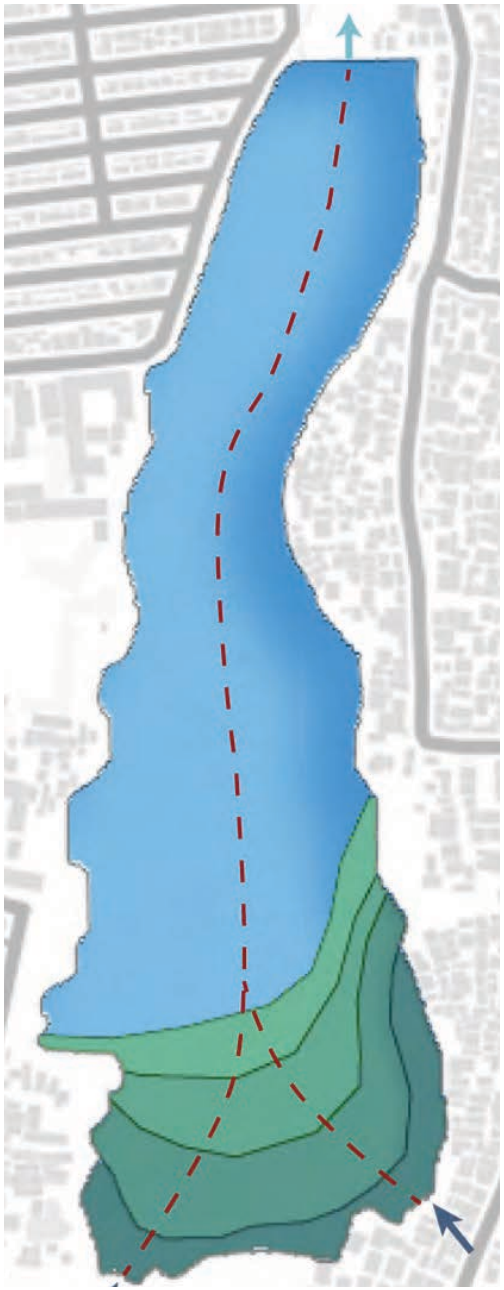

Figure 15. The wetland flow as the intervention, illustrated by: Weiyi Cui and Qingtao Li

INTERVENTION

INTEGRATING MANAGEMENT: WATER, WASTE AND LIVING

Our group proposes three integrated approaches to respond to the issues while we base our considerations on the positive characteristics of Setu Rawa Besar. First, we would like to reuse the grey water produced by the neighborhood. Secondly, we would manage the solid waste. Lastly, we would relocate the slums into a vertical-living estate. Since we decided to focus on three problems, we tried to simplify them by grouping them together based on two issues: environmental and social. The water treatment and the waste management are used to respond to the environmental problems, while the relocation issue is used to respond to the social problems..

In order to reuse the greywater, a natural filtration system will be located at the riverbanks on the southern area, and plants (e.g. bamboo, cattails, calamus) will be planted to help the chemical filtration process. Layered ground levels, such as terraces, is one of the natural filtration methods, which acts as a retaining wall to stop the water volume overflowing in the rainy season.

In addition to the filtration system, a solid waste management system is added to the proposal. We propose to relocate the slums into vertical housing and to try to normalize the area by stopping the residents from generating and discarding waste in an ad hoc manner. With the slums gone, part of

the area can be used as one of the waste dispatching points and for urban farming with a composting facility.

This program is proposed so that any waste can be recycled and reformed into another product so that people who reside there can also benefit. The area is designed to be playful, like a waterfront. On a sunny day, people would not lose their main gathering space.

To make sure that the system works on a long term basis, there are some regulations to be applied to the lake area. The proposed policy guidelines are: water treatment, solid waste management and living space.

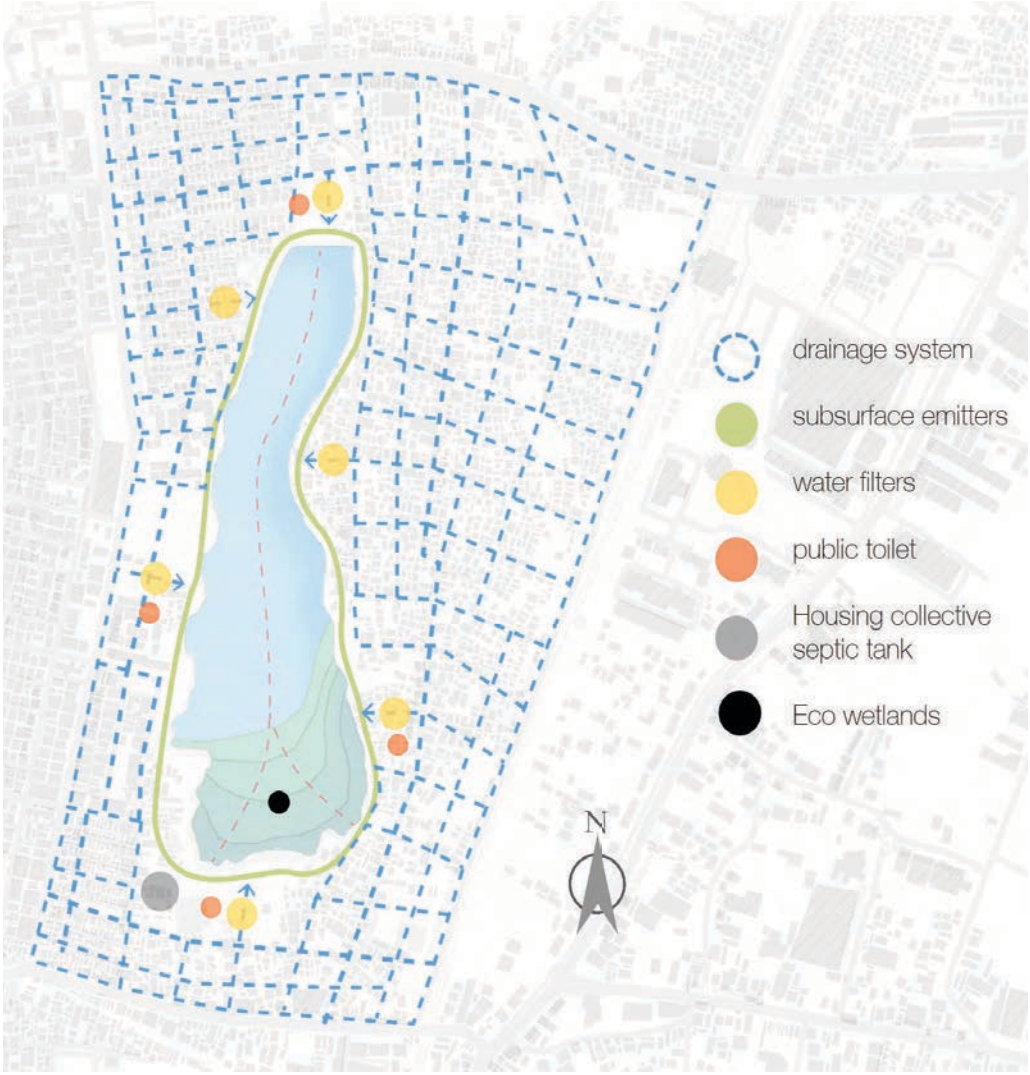

Figure 16. Mapping the ideas for intervention on water treatment, illustrated by Farah Nabilla Putri

WATER TREATMENT

An artificial wetland should be established in inlet areas around Setu Rawa Besar. Recently, water that comes from inlets is primarily contaminated wastewater from commercial activities upstream. Therefore, the wetlands will serve as a mechanism for filtering wastewater disposal. Wetlands should contain some elements, such as wetland plants and grasses, for instance alang-alang and bamboo, which could be beneficial in filtering water contaminants, such as metals, sediments, toxic chemicals, excess nutrients, etc, in the water.

Wetland plants should be planted in a manner that controls shoreline erosion and additionally, increases the aesthetic value for the setu's visitors.

In order to provide effective water filtration, the setu's depth should be transformed into different levels and heights. By planting different plants on each level, varying intensities of filtration will be provided for different contaminants. The transformed elevation will also serve as protection against flooding.

The diversion of incoming water through an artificial wetland to the setu will improve overall water quality. However, the treatment does not merely need to be applied on the setu, but there also needs to be a development in the drainage system in the neighborhood.

PHOTOGRAPHS

OPENING REMARKS

Photograph by: Gibran, S.Ars, M.Arch

WALKING TOURS

Fatahillah Square, Museum Bahari, Kampung Luar Batang, Sunda Kelapa

Photograph by: Avi Sovia

SITE VISITS





Photograph by: Avi Sovia

LECTURES

Photograph by: Tania C.

STUDIO WORK

Photograph by: Nisrina Muthi

PLENARY SEMINAR AND EXHIBITION

Photograph by: Cindy Ruth

CLOSING EVENT: DINNER AT GUBUG MAKAN MANG ENGKING, DEPOK

Photograph by: Cindy Ruth

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