‘An Interactive Web of Water, Space and Life’: A Paradox of Urban Dwelling in Setu Rawa Besar, Depok

K R Kurniawan\textsuperscript{1,2}, M N Fadhil\textsuperscript{1}, S Abdilah\textsuperscript{1}
\textsuperscript{1}4th Floor Department of Architecture Bldg, Faculty of Engineering, Universitas Indonesia Depok Campus, Depok, Jawa Barat, 16424
\textsuperscript{2}r_kemas@yahoo.co.uk

Abstract. This paper discusses an interactive web of water, space and life amidst the paradox of formal and informal urban dwelling in Setu (Lake) Rawa Besar in Depok, Indonesia. Its high-density population lives in a such critical environmental condition with the amount of garbage that has polluted the Setu. The meshwork of human activity in terms of architecture and space strengthens the linkages between the natural and manmade environments. This interactive web highlights the paradox of urbanization and modernization of the city amidst environmental and socio-cultural issues. This research was initially based on findings of the International Joint Studio and Workshop at Universitas Indonesia, in collaboration with University of Florida and Cardiff University in 2016 and 2017. The methods of the study are through qualitative analysis with the advanced methods of in-depth interviews, observation and site analysis, and socio-cultural mapping of the informal and formal community. In addition, this research also reviews the existing urban master plan that has not been fully implemented yet. This research identifies the ways in which municipal authorities can collaborate with the informal community to help manage the waste within the Setu, to propose further plans to create a ‘healthier’ settlement for the informal community.

1. Introduction
Depok is a medium-density city that is situated in the southern part of Jakarta and the northern part of Bogor. Depok plays an important role to function as a water reservoir/water buffer zone (with flows from Bogor to DKI Jakarta). In order to prevent flooding downstream, these water reservoir areas in Depok consist of many lakes, known locally as ‘Setu’. One of these lakes, namely Setu Rawa Besar became the main research topic for this paper.
Depok with its high-density population is now facing an environmental challenge in which the amount of waste (mostly from upstream outside the Setu) pollutes the water and reduces the size of the Setu. This condition creates some health and social problems. According to the local government, the condition of Setu is very poor. Since there is an informal settlement located around the Setu, the Setu’s size has been narrowed down to 15 Ha (from the original size of 25 Ha). Besides that, the Setu also has suffered due to the amount of waste disposal that comes from nearby settlements, local industries and markets around the Setu. [1]

On the other hand, Setu Rawa Besar is one of most contaminated lakes in Depok with a very dense population. Nonetheless, there are certain advantages and a relative degree of potential for development. For instance, its location is in the center of Depok, near the Office of Mayor of Depok (local government headquarters). It is flanked by three main roads and is located close to the center of transportation interchanges (trains, buses/minibus and ‘ojek’/rental motorbikes). With the lack of public space in Depok, therefore, Setu Rawa Besar has the potential to be developed as a new public space as well as one of strategic water reservoirs, which can also serve as an eco-tourist destination. There are several existing small workshops and industries, such as local craftsmen’s enterprises, food
preparation venues, freshwater fish cultivation and some other household scale industries that may increase the site’s economic value.

Setu Rawa Besar is considered to be the biggest Setu in Depok. It plays an important role within people’s everyday lives, especially to those who reside in the informal settlements around the Setu. In order to approach these issues and the problems relating to an interactive web of Water, Space and Life, we have conducted literature searches and made some direct observations on site. We also applied a method of being objective, third party observers, in the form of photographs and video recordings. We used a combination of research techniques, varying between qualitative and quantitative methods, in order to open the possibility of findings from different socio-cultural perspectives. The research process is monitored through in-depth interviews with formal and informal residents on their perceptions of the issues and their use of the Setu. Qualitative data collection is often used when trying to gain an understanding of other people.

From our observations and interviews, we found out about many problems that Setu Rawa Besar faces on a daily basis. We identified these problems as four main issues (water, waste, living space and regulations) that are inter-related with one another.

2. Research

The initial observation found several facts in Setu Rawa Besar. First, the water appears to be unclean; second, the densely-packed population is composed of formal and informal settlers; third, self-made homes are built from improper, salvaged materials; four, the informal community is located too close to the water’s edge; and five, the Setu has multiple uses- fishing, waste dumping, sewage disposal.

Based on the research conducted by the local and international students and the academic team during the joint workshops in 2016 and 2017, the research team found three interactive networks on site. These are: Water and Waste, Water and Living Space, and Regulations and Living Space.

2.1. Water and Waste

‘Over the last three decades, Indonesia has enjoyed substantial achievements in poverty reduction, human development and improvements in service delivery. However, enormous challenges remain. Improving access to safe water and sanitation is a key priority, due to the severe consequences of poor sanitation infrastructure on public health, the economy, and the environment. Of the four most important causes of under-5 mortality in Indonesia, two—diarrhea and typhoid—are fecal-borne illnesses directly linked to inadequate water supply, sanitation and hygiene issues. Difficult access to improved water supply also means that poor households, particularly women and children, spend too much time fetching water.’[5]

In the Setu Rawa Besar neighbourhood, the settlements that are located in the eastern part of the lake have a decent waste and disposal system. They have to pay for the trash management regularly and very few of them combust the trash. In addition, all of those formal settlement have their own septic tank as the results of a planned residential area.

However, unlikely that eastern part, the northern and western part of the lake are fulfilled with informal settlements. The settlers live there inexpensively as the consequence of their occupation in small service sectors, such as becak drivers, carpenters, laborers, and small retail vendors. As the results of their status as informal settler and exacerbated with the unplanned residential area, those informal residents have no access to a fixed or formal system to manage their waste and disposal.
Figure 3. Blue, Green, and Grey Water Diagram. 
Illustrated by Fachry Ardani

The diagram above illustrate the interactive connection between water and waste in the Setu Rawa Besar. Blue water represents the clear water for daily consumption. The conditions of lake water that is not reliable and worsened by the polluted private well have forced the settler to buy the water for consumption purpose from the local seller. It is distributed directly from mobile cart seller to formal and informal settlements. They also do the rain water harvesting which is marked with green water in the diagram. The recycled or reused rain water is collected in the buckets at the houses. The residents use it for bathing, watering the plants, and washing the dishes. The last category is grey water which is waste water. This end of the cycle of water usage between Setu’s residents are directly transferred to the lake. This water is one of the main pollutant in the Setu Rawa Besar because of the absence of water purification and process before disposes into the lake. Home industries and market in the lake surroundings are also at the bottom of the lake’s pollutions.

2.2. Water and Living Space
Some residents come from a Perumnas neighborhood (formal houses provided by the national housing board) have lived by the lake since 1970s. They are from various professions, such civil servants, teachers, and entrepreneurs.

‘Water is a living thing.’ [4] Based on interviews in 2017 with residents from the formal settlement near the Setu, they said that in the 1980’s people could still see the lake view clearly through the Perumnas housing. This observation shows that more than 30 years later, the Setu has been degraded with additional dwellings along the lake.

The paradox is that with its strategic location in the center of Depok and behind Mayor of Depok Office which should have potential as the main living space of Depok, the Setu seems to be the backyard of Depok, where waste is thrown into the lake.

Moreover, the people from formal settlement also have built many “rental houses” and are renting them out to settlers, outsiders and newcomers. With this business, they earn about Rp. 200,000-300,000 per month. Some of the neighbours in the formal area also “own” and claim part of the informal land, and they are also renting it out.

It is a paradox when it comes to people’s dwellings and livelihoods. Although some residents from the formal settlements gain financial benefit (from renting the claimed land) to informal residents. Yet, other formal residents would prefer the informal residents to be evicted.
They would like to see the lake cleaned up. Informal dwellers are blamed as the main cause of the unhealthy conditions around the Setu. This situation has created some tensions between the communities. Formal and informal residents say:

“We get our drinking and washing water from a 10-meter deep well,” (Formal). We only rent the house for working nearby,” (Informal).

2.3. Regulations and Living Space

The dwellers from informal settlement acknowledge that they throw trash and waste (both solid and liquid) directly into the lake. Residents’ grey and black water does flow into the lake. Everyday they collect the trash from the lake, and from their homes. Then the trash is burnt in the settlements’ backyard. They burn trash rather than collect it because it costs Rp. 20,000 for trash collection, and that is too expensive for them. Sometimes they do ‘kerja bakti’ or ‘gotong royong’. But it is more a community initiative rather than a government intervention.

The main problem that the government faces for living space is land authority [2]. People in the informal settlement keep to built illegal settlements as government lack of resources to control the area. It is a phenomena of the existence of informal actors that are socially very influential to produce unplanned urban squattres.

Another problem is government capability to do law enforcement for private business which caused environmental problems on the area. There are market and tofu factory that are located outside the Setu which are identified as the main sources of waste in the Setu. It is a paradox that both factories are still in full operation, and the factory owners are seemingly unaware about ecological problems created by their activities.

3. Findings

3.1. Zoning Diagram

The diagram below was the result of zoning conducted by the Research Team to determine the allotment and function of the space contained around Setu Rawa Besar. The human activities and movements generally occur around Setu, especially in the parts of the informal settlement.
This situation results are then followed by the location of a high accumulation of waste that occurs in Setu, where the location of waste accumulation is adjacent to the residents’ activities. Beside that, the waste sedimentation is also in the flow close to the Setu’s upstream source. The waste is actually from outside Setu. The residents dammed the inlet so the trash would not enter the Setu water catchment area. The waste comes from markets upstream that are close to Setu.

On the lower ground on the northern side of Setu, the Research Team found several places of waste accumulation, which resulted in flooding. The floods are not only caused by lower geographical conditions of Lio Village, but also by the waste sedimentation on the edge of Setu, which clogs the drainage ways. On the other hand, in the formal settlement there are only minimal activities that are directly related to the Setu. This is due to their daily occupations that occur far away and not related to the Setu itself. Any local activities occur on the weekend.

3.2. Mapping the Activity Diagram

The myriad types of activities that occur in the area near Setu Rawa Besar can be grouped into 3 major interactive webs, namely ‘Space - Water,’ ‘Space - Live,’ and ‘Water – Live’. These three basic elements represent the ‘Quality of Life’ diagram of the interactive web of activities in Setu Rawa Besar.
These diagram shown that the activities of the informal settlements that are in-direct contact with
the Setu. Water is the basic element to support the activities (washing, fishing, cultivating fish, showering, etc) which have important role in daily life of people in informal settlements of Situ Rawa Besar. These activities creates ‘living aspect of water’ [4]. However, for the provision of clean water, micro-economic and dietary activities in the informal settlements do not have direct contact with the water in Setu. The blue water (clean water) was bought from mobile cart seller. This connection has been shown in Figure 3 about grey, green, and blue water diagram.

3.3. Diagramming the Quality of Life

This identification process then concludes that three basic spheres form of the interactive web into
an integrated connectivity between water, space and ‘life’ (Live) in Setu Rawa Besar to produce the
‘Quality of Life’. The objectives need to be an overall concept that solves problems more holistically. In this case, the government can create regulations that not only play an important role to improve the quality of water and the environment, but also in the form of education to improve human resources in Setu Rawa Besar. Government can adopt recycling and waste management education programs from other places that have success stories, for instance in Australia [6].
4. Conclusions

This research raise our awareness that the Setu is not safe in terms of its health and environmental conditions. The research found the paradox of urban dwelling that is represented through the ambiguity implicit in interactive web of ‘water, space and people’ in Setu Rawa Besar. The residents from the formal settlement maintain benefits from the residents of the informal settlements, but also they blamed people from informal settlements as the cause of the Setu’s degradation.

It is the fact that, formal and informal settlers respectively need each other in terms of doing their business. On the other hand, the lake should be restored and cleaned. Therefore, the International Joint Studio and Workshop produced four recommendations in dealing with this interactive web. During the interim period, it is suggested that the Depok City government engage with the local community with rehabilitation projects, communicate the issues with local NGO and seek possible funding from enterprises or private individuals. In the short term, it is suggested to work through education programs that involve NGOs and schools. Additionally, another program would be to apply floating treatment wetlands. In the long term, it is suggested that the government build community sanitation and community projects to remove waste from the water. Other initiatives include applying green infrastructure, relocating the informal settlers to safer place nearby in order to enlarge the size of Setu, and developing Setu Rawa Besar as a new public space offers potential for an eco-tourism concept for the City of Depok. This research also found that unoccupied land has the potential to be developed as a green area for water catchment, beautification and ecological revitalization.

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