



Water, water everywhere but too much or too little

- Francesco Farne

Image source: www.straitstimes.com, sinking Jakarta could face major flooding by 2020; retrieved on 03 January 2020 Edited by the author **Tapasya Mukkamala** MSc. Landscape Architecture Department of Urbanism TU Delft This thesis is produced under the guidance of

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In 2015, The world economic forum ranked water as the highest risk for the global society.

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Location



Scale: NTS

Introduction



Why does Jakarta flood?



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Why does Jakarta flood?



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Effects of Urbanisation

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Water Infrastructure to mitigate floods



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Water Infrastructure to mitigate floods



Reservoirs/dams

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Kampungs and Floods

40% of the population *live in Kampungs*

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Kampungs, floods and Evictions







Sources: Images on ight 1. www.jakartapost.com, retrieved on 12 january 2020 2. www.jakarta post, retrieved on 12 january 2020 3. by Autro-Images on right 4. Posthouwer, J. (2014). Informality and Floods in Jakarta. Amsterdam: Jarien Posthouwer, J.

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Kampungs- urban fabric of Jakarta



Post independence- 1945 to present

After Eviction (River naturalisation scheme)- 2015

kampong /kamˈpɒŋ,ˈkampɒŋ/

Noun:

Traditional villages, especially of indigenous people, and also been used to refer to urban slum areas and enclosed developments within towns and cities.

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Kampungs: Socio-spatial character



Kampungs, as a self-initiated urban settlement, are characterised by informality, irregularity, and their flexibility and resilience

Kampungs are spaces that mediate practices of communing which exceed the capitalist social relations

> Source: Irawaty, D. T. (2018). Jakarta's Kampungs:Their History and contested future. Los Angeles: University of California.

> > Image : Taken and edited by Aurthor

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self-initiated



Flood defence



Public seating Infront of river

flexibility



mediate practices of communing



Space for informal vendors



Cottage industries



New green initiatives with NGO collaborations



Maintaining river ecology



Streets as place for interaction



Shop house

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Relation between kampungs and river



No daily chores



Reduced Mobility



Primary needs



Recreation

Image Source : 1. www.alarmy.com, edited by author 2. www.cityseeker.com, edited by author 3. www.insleindonesia.org, edited by author 4. www.jakartapost.com, edited by author

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Problem statement

The constant dependency on linear approaches of flood management and inequity in the planning policies leaves the kampungs and river network vulnerable to the imbalance in the natural- built systems

Research objective

[Re]activating the flood vulnerable kampung communities along the Ciliwung river through "Adaptable landscape and water management strategies and design" to improve living conditions, social life and water resilience How to *integrate* blue-green infrastructure into the existing gray infrastructure for better and efficient water and landscape management within city?

Landscape as Infrastructure



As an Operational tool that Integrates with or as an alternative for the exiting water management infrastructure

> Source: Nijhuis, S., & Jauslin, D. (2015). Urban Landscape Infrastructures: Designing operative landscape structures for Built environment. In S. Nijhuis, D. Jauslin, & F. Van der Hoeven, Flowscapes: Designing infrastructure as Landscape (pp. 14-34). Delft: TU Delft.

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As a *Backbone* to formulate the landscape infrastructure tools to answer...

Source: .Tjallingii, S. (1995). ECOPOLIS- Strategies for ecologically sound urban development. Wageningen : Backhuys Publishers .



What are the ways to integrate the river dynamics into existing urban fabric?



The Ciliwung river

Source: .Tjallingii, S. (1995). ECOPOLIS- Strategies for ecologically sound urban development. Wageningen : Backhuys Publishers .

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How to tackle socio-spatial conditions of the river and the kampungs in day to day life and in flood scenarios?



The Kampungs

Source: Tjallingii, S. (1995). ECOPOLIS- Strategies for ecologically sound urban. development. Wageningen : Backhuys Publishers .

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The Community

Source: Tjallingii, S. (1995). ECOPOLIS- Strategies for ecologically sound urban. development. Wageningen : Backhuys Publishers .







Flow and site



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High concrete embankment with paved roads



Infrastructure along the waterbodies



Low concrete embankment with green path and footpath



High concrete edge with a alley



Natural edge with no buffer space



Natural edge with buffer space

River edge typology



High concrete edge with no buffer space



Sprawl along the water edges



Low lying kampung with concrete dike - road

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Building typology





Multi-level compact

housing

Shop houses

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Open space typology



Vacant tertiary pockets of land

building cluster

Wide traffic intersections



Large empty land parcels



Ecologically degraded land near the coast

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Conclusion maps



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Kampungs as Mediating waterscapes





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Bio-eng. Edge- green bridge Water retention under street



Terrace-bund for water storage and public space Adaptive strategies: River edge





Concrete edge- bioswalewater retention tanks



De-centralised purification tanks and waste trappers



street and public space

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constructed wetland

Room of river-

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Adaptive strategies: Buildings











Mosque: Storm water retention zones

Single house : Water purification- storm water storage zones Multi-level house: Storm water discharge



Adaptive strategies: open spaces















Tertiary plots as multiuse spaces for water storage and community scale gardening

Larger purification nodes for community level waste water purification Traffic intersections and streets as water storage and drainage channels



Large open spaces used as production zones and public parks



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Pilot kampung locations



--- weak sea wall -- New industrial port -Fishing industries --- High end residential Pluit pump station Waste dump site Impoverished edge sediment and waste accumulation Degraded mud flats High end residential on the evicted site of kampung Lunar Batnag Congested Kampung Muara Baru Waste trapping mesh Site 1: Muara Baru

Comparative study





Delayed discharge due to sediment and waste trapping and stress on existing discharge routes



Disconnected and ecological degraded landscapes





Pressure on infrastructure like pumps and dikes from heavy water discharge from inland. Weakened sea walls due to sea currents and water rise



Conflict between spatial qualities of Kampungs, port and High-end ا units





No large open spaces, only empty plots or tertiary spaces within buildings

Comparative study: Layer analysis



No natural drainage towards the river and impervious spaces





compact spatial qualities of Kampungs with no vibrant public space



poor drainage along the infrastructure lines

Site 2: Bukit Duri

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Spatial qualities

















Site 1: Muara Baru





Site 2: Bukit Duri

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Comparative study: Strategies proposed

Site 2: Bukit Duri

Restructuring of layers



Site 1: Muara Baru

Site 2: Bukit Duri

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Restructuring of layers



New Landscapes and ecology

- The reservoir acts as a passive water retention 1. systems to enhance fresh water ecosystem
- Fishpond and farming to revive the traditional-2. cultural landscape
- Revive mangrove estuary as a flood defense-З. ecological structure.

New Landscapes and ecology

- *The community open spaces as water squares* 1. and production zones.
- The revived river ecology 2.



Restructuring of layers





Site 1: Muara Baru

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Site 2: Bukit Duri

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0<u>500 m</u>1 km

Restructuring of layers

Infrastructure: as dikes



Infrastructure: as stormwater drainage network



Site 1: Muara Baru

Site 2: Bukit Duri

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The re-activated kampungs



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Water and waste flows: Muara Baru



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The "New" Muara Baru



The "New" Muara Baru



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The mangrove estuary





Process of landscape development



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Water and waste flows: Bukit Duri





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Water and waste flows: Proposed



Bukit Duri: As a storage basin



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Process of river edge development



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At the community scale



The Community space

The river/canal edges

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How to combine bottom-up design methods with top-down strategies to improve water resilience that enables **behavioral change** towards river and its ecosystems?

Participatory city









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Participation-Proposed



Participation framework

STAKEHOLDERS	POSITION With in the project	INVOLVEMENT Across scales	CONTRIBUTION To the project	RETURN ON INVESTMENT From the project
Indonesian ministry Flood and Water Management Urban Planning and Development	Provider/ Benefactor	L L L M M M S S	Long term policies and master- planning	Economic, Socio- Political Benefits
Municipality Kota(District) Kecamatan (Sub District) Kelurahan (Village)	Provider/ Benefactor	M M M s s s s xs xs	Driver for community participation and monitor development	Community trust
Community RW and RT	Provider/ Benefactor	s s s xs xs xs	Proactive participation and Self-led initiatives	Improved living conditions and financial opportunities
NGO's Urban Poor Consortium Rujak, Ciliwung Merdeka and others	Provider	M S S S XS XS XS	Driver for community participation, education monitor development and promote bottom-up strategies	Community trust Proof of concepts and Future opportunities
Private Parties Universities, Water Management, Urban planning/design firms	Provider	L M M M S S	Master-planning, strategies and technical support	Proof of concepts and Future opportunities

**This conclusion is specific with the stakeholders involved in the decision making and implementation of the proposals

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Implementation framework



Stakeholder involvement

	Highly involved	Indonesian Ministries Flood and Water Management Urban Planning and Development Fisheries and Industries	Municipality Kota(District) Kecamatan (Sub District) Kelurahan (village)	NGO's Urban Poor Consortium Rujak, Ciliwung Merdeka and others	Private Parties Universities, Water Management, Urban planning/design firms	Kampungs RW and RT
Flood- Resilient	Dike construction					
	Mangrove management					
	River/Stream edge treatment					
	Discharge Canals					
	Fish pond and farms					
	Constructed wetlands					
	Storage ponds					
	Storm water tanks					
	Green streets					
Circular waste water management	DEWAT systems					
	Hydrophilic ponds					
	Septic tanks or Bio digestors					
	Green Bridges					
	Open drains					
	Drainage pipelines					
	•					
Self sufficient and collaborative	Education					
	Design decisions					
	Construction					
	Maintenance					
	Future Proofing					
	Collaboration and Innovation					



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Synthesis









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Synthesis



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Conclusion

KAMPUNGS AS MEDIATING

WATERSCAPES Research objective:

[Re]activating the flood vulnerable

kampung communities along the Ciliwung river through

"Adaptable landscape and water

management strategies and

design" to improve living conditions,

social life and flood resilience.







SITE 2 : Bukit Duri

Sustainable development goals



Potentials and Future scope

- Makes the River and Kampungs as the guiding systems on which the strategy is designed
- It is built based on the existing strengths of the relationships between the built and natural system .
- Scalable and Replicable across different cities
- The strategy could be used for any neighbourhood other than kampungs
- Encourages a collaborative management over hierarchical management.

- Detailed stakeholder framework and involvement in the development of plan
- Financial feasibility of the project should taken into consideration.
- Further technical validation in terms of flow capacities and storage areas.
- Further development of the adaptive strategies. Design guidelines and construction methods



Takeaway

One needs to re-think infrastructure in terms of resilience and not just build it.

Every modification made to a single entity will have an impact on the entire network of complex systems. Hence, it needs to always be considered as a whole.

Every site (in this case *Kampungs*) are *different*. Geographically, spatially, culturally, economically. One solution cannot solve every problem. Therefore, design and strategies need to be *flexible*.

Informality should not be treated as a problem, but as a part of a solution

Terima Kasih!