

Case Study Paper

Building Dignity: A participatory concept for climate change-impacts mitigation in informal settlements in North Jakarta

Rolf Schuett, Systemarchi; Poland

Abstract

Jakarta is today the centre of one of the largest and most populated human agglomerations in the world, and the economic and political centre of one of the largest economies. However, Jakarta is also considered a “mega city gone wrong”, because of its ongoing challenges. The city faces serious issues in pollution, social inequity, mobility and flooding, which in the next decades are doomed to cause critical consequences to the economic base of millions who depend on the city, not only in the Java region. The continuous growth of population and urban land in Jakarta is also condemned to hit the impacts of climate change first hand. Jakarta is a coastal mega city that already faces the effects of raising water levels, because it is subsiding at a rate of 15cm (avg) per year. This paper analyses the challenges and opportunities of each of these aspects in Jakarta, but it also discusses cultural aspects that may help to stimulate real participation of the population, provided that the legal and political framework applies a background of policies that comprehensive planning can deliver. One of these elements is the Malay concept of “gotong royong” or communal cooperation, which is very popular in rural Java (and has analogies world wide). It has been practiced in the kampungs or rural villages for generations, was eventually integrated, perhaps misused, in political agendas since the post colonial years of young Indonesia in the mid 20th century, yet lacking the expected success it achieves at lower scale. The paper also proposes an example of physical implementation in informal neighbourhoods in Pandemangan, North Jakarta, that the author developed some years ago.

Keywords

Comprehensive planning, participation, informality, climate change impacts

1. Jakarta, “a mega city gone wrong”

1.1. Introduction

The journalist and TV host Teymoor Nabili from Al Jazeera said once about ten years ago “Jakarta is a Mega city gone wrong”. And probably this still applies today. Jakarta was at that time a mega city that was trying to deal with severe issues, perhaps the most challenging were waste management (connected to flooding), traffic and insufficient housing. Jakarta also had difficulties to provide adequate drinking water and sanitation services.

Today Jakarta has more than ten million inhabitants, receives each day more than three million commuters who come to work from outside and by 2030 is predicted to become the world's biggest megacity. The challenges grow with the city. Even more, Jakarta is suffering subsidence at alarming rates of up to 25 cm/year (North Jakarta). The main reason behind this phenomenon is the extraction of water from the ground for domestic consumption.

The aim of this paper is to describe the current urban development problems of Jakarta, which in combination with its growing population, its urban sprawl and potential impacts of climate change reflect a situation that can be considered typical for mega cities in developing countries. The paper describes also the background of Jakarta's challenges, which can also be tracked to other regions in the world and can spread as well the same way.

Finally, the author refers to the Malay concept of Gotong Royong or communal cooperation and suggests this as a key to transform the situation of informal settlements in Jakarta in particular, in order to improve the living situation of their neighbours from the inside. A revitalization concept is proposed to this end in the last section of the paper.

2. Analysis

The urban situation of Jakarta will be described in this section under consideration of environmental, economic and socio-cultural aspects. Because the issues are not exclusively local but mostly a world-wide phenomenon, reflections are included to relate them to the global context.

2.1. Environmental challenges of Jakarta

Cities in the world consume 75% of the energy and produce 75% of the world's CO₂ emissions. Just as in any large metropolis, Jakarta faces important pollution issues, which are aggravated because of an ever-increasing motorized vehicle number at a rate of above 9% per year.

Solid waste has been as well mentioned in the media as a major issue. Each Jakartan produces in average 2,9l of garbage per day. A study of 2001 reported that scavengers (who collect recyclable waste) collect up to half of the city's waste. (The Jakarta Post 1, 2009)

One of the consequences of the insufficient solid waste management is that because a considerable amount of waste never reaches treatment plants, it contaminates the storm water collection system, the city water streams and eventually the ocean. Clogged storm water sewers contribute largely to local flooding, a problem which has increased in the last decades. Indonesia is the second largest feeder of plastics into the ocean after China. The activity of scavengers all over the city contributes also to aggravate the problem.

Bridges over rivers are now critical points because of garbage accumulation and the risk of flooding. The macro and micro drainage operate at 50-70% of their capacity due to garbage and silt clogging. The accumulation of garbage on roads affects the automatic railway crossing systems, which is also an eminent risk. (The Jakarta Post 2, 2009; Kurniasari, 2009)

An Article in the April 2019 edition of "Marine Pollution Bulletin" warns about the underestimated financial costs of ocean pollution.

According to the paper, which reports on a metadata analysis of 1100 international datasets, each tone of plastic that reaches the ocean will cause an economic damage of worldwide up to 2,2 billion €/year, translated from a 5% estimated reduction of the potential yield of exploiting marine resources. (Köppe, 2019)

Plastics in the oceans contribute to a heavier pollution with bacteria and algae, which added to the negative effect of bisphenol A (BPA) in fish reproduction, means that this compromises the availability of fish as food resource, which is the diet base of 1,5 billion people on earth. (Beaumont, 2019)

Industrial economies are reacting accordingly. The recently adopted ban 560-35 on single-use plastic items (including plates, cutlery, straws and cotton buds sticks) by the EU Parliament has been a crucial step forward in Europe. The EU Commission assumes that the new regulation will have a cost on the bloc's economy, but eventually will reduce 22 billion € in environmental damages until 2030. (Köppe, 2019)

60 % of Jakarta's waste is domestic household waste, which is collected with no previous separation by the residents. Even more, a study at Atma Jaya Catholic University in Jakarta in 1999 concluded that more than 70% of Jakarta's waste is organic. Both conditions open the possibility to introduce in Jakarta the use of sorting out recyclable waste at home, which can be used as a resource, and to collect organic waste, which can be processed in biodigestors to produce biogas and natural fertilizers. Biogas can be collected as energy resource. Even though its production is controversial, because it is a greenhouse gas, the high amount of organic waste that Jakarta generates justifies this alternative.

Certainly, no matter how well we deal with organic waste, it makes more sense to avoid it to happen than to deal with it afterwards. The "Zero Waste Scotland", for example, is a public initiative that aims to cut carbon emissions by informing and encouraging the society to live more responsively so that Scotland becomes "greener, wealthier and fairer". In 2019 Zero Waste Scotland launched a Food Waste Reduction Action Plan aimed at encouraging citizens to improve the way food is consumed in order to avoid unnecessary food waste. Because that waste rots once it is discarded and it produces the greenhouse gas methane. According to Zero Waste Scotland, food waste is therefore a bigger cause of climate change than plastics. Nevertheless, Jakarta is still far away from introducing policies that effectively would reduce organic waste the way it is being done in Scotland. (NN, bbc.com, 2019)

Bagasse, Paddy (rice husk) and other agricultural sub-products from the region of West Java can be also used as biomass to produce heat and energy with biodigestors, together with organic waste of the city (Benget, 2009). Thinkable would be a network of small units in the neighbourhoods or larger central plants with high technology and efficiency.

There is already a project for generating power with waste in the landfill of Bantar Gebang, a plant could generate 26MW. The waste collection site is the largest in SE Asia and is the main landfill for Jakarta's solid garbage. About 100 000 people live around the place, which is also the base of income of most of them. The first waste-to-energy incinerator started to operate 2019 and generates just under 1 MW. (Purningsih, 2019)

Jakarta has also serious challenges concerning drinking water and sanitation. Only 3% of Jakarta's wastewater is treated. E.coli bacteria are reported to have been found repeatedly in all of the 13 rivers of Jakarta. Because of this risk, private investors build treatment plants

for their housing developments, contributing to the growth of their market value. (Besalicto, 2019)

The drinking water situation in Jakarta affects also about one fourth of the world population. According to a UNO report, 2 billion people have insufficient or no access to safe water. The situation is especially critical in sub-Saharan African countries. (Breda, 2019)

In Fact, in the world four billion people currently have at least once a month no access to drinking water. This figure applies especially to the rural population in countries with insufficient water services in general.

Yet the water situation has improved considerably in most regions. North America and Europe have reached a coverage of 99%, South America 96%, but the sub-Sahara 58% and Oceania 52%. Paradoxically, only 1% of that delivered water is actually drinking water, the rest is used for industry and agriculture.

The problem of basic access to safe water in the world is doomed to get worse. The growing global population and the improving access to water in developing countries imply a growing demand of water, which is in average 1% higher each year since the 1980s.

Stefan Uhlenbrook, water expert at United Nations warns that climate change is another factor that will change water access: dry zones are getting drier and wet zones are getting wetter, which means that the distribution of water sources in the world is not improving.

Unfairly, in many developing countries, in underdeveloped suburbs locals have to pay more for water than the average population in areas with regular service, even though the water quality they get is insufficient.

Uhlenbrook explains that politicians often build less wastewater treatment plants because they don't deliver a visible impact, thus politically these are not as effective as dams or public toilets. Meanwhile in these cities 80% of the wastewater is released back to nature without treatment, which is the origin to even more issues. In sub-Saharan countries like Central African Republic, Chad, South Sudan and Eritrea more than one hundred people out of hundred thousand died in 2017 for consuming contaminated water, actually a totally avoidable situation. In other words, solving the clean drinking water issue is not a knowledge issue but an administrative fail. The situation in Jakarta is even more controversial given the fact that the service is provided by two private companies that operate under concessions of 25 years. (Breda, 2019)

2.2. Economic Issues

Jakarta generates about one fifth of Indonesia's GDP and its GRP per capita is predicted to be the biggest in South Asia by 2030 and a top twenty world wide by 2028. Jakarta's economy is driven by services and manufacturing, including automobile, chemistry and electronics. The city hosts the headquarters of the largest Indonesian corporations dealing with oil, energy, cosmetics, food, trade, insurance and financial services. Its economic growth averaged between five and six percent in the last years, which induces the ground and property prices to rise, and also the general cost of living.

Despite of Jakarta being a magnet for capital and property investment, the unsolved mobility issues, together with the already mentioned subsidence rate, are prompting the government to consider radical measures.

The recently re-elected president Joko Widodo recognized after winning the elections in April 2019 that there is a need to move the capital. Moving Jakarta has been studied for more than sixty years, since Indonesia's independence from The Netherlands. Researchers calculate that a large part of the city may disappear until 2050 under water. Already most of the city's surface is below the sea level. (BBC Mundo, 2019)

Planners are considering three possibilities. The first one is to establish a special government district in Jakarta. The second one is to move the government into new infrastructure to be built in a suburb of Jakarta and the third one is to completely move the government to a new location. Indonesia's territories in the Island of Borneo have been mentioned, more precisely Palangka Raya in Kalimantan, which is on the south of the island.

The environmental impact for Kalimantan would be huge though, since the island's forests are considered not only by the local population as "the lungs of the world".

There is also a political interest to decentralize the administration of the country, and the new location in the centre of the archipelago would serve this purpose, especially because it does not stick to the main island Java.

On the other hand, the traffic issue is also yet to be solved. Among the factors that contribute negatively to the heavily congested roads is the fact that about 70% of the 3,6 Million daily commuters into the city use an own vehicle to travel and only 27% use public transportation, which also does not serve all commuter trips.

Jakarta has probably the worse car traffic in the world. The minister for national development planning has stated that only in Jakarta, traffic jams cost the country 6800 M USD each year. Other sources talk about 7400 M USD (BBC Mundo, 2019). Alternative solutions for mass public transit have been installed amid considerable investments. The most prominent is probably the Bus Rapid Transit BRT TransJakarta, which is considered today as the largest in the world (210 km). In its first years of operation back in 2004, TransJakarta contributed successfully to reduce traffic congestion. However, due to operational and design faults, the system has not had the expected overall impact. Tracks are too often invaded by other vehicles, the assigned Busses consume more fuel than originally estimated, which raises the subsidized costs, and the number of users does not increase due to the unreliability of the system.

Due to Jakarta's dependency on traffic and the growth rate of motorized vehicles in its streets, the role of mobility will become more meaningful in the medium term, to a point that the cost of traffic congestion to the local economy may compromise the viability of many economic sectors. In the eyes of the author, it makes little sense to try solving the traffic issue in Jakarta repeating the same approach. The answer may be much more radical. And the situation has been understood in many large economies worldwide, but transformation processes tend to be more difficult to implement in developing economies (or Newly Industrialized Countries, as in the case of Indonesia).

Cars have transformed our civilization, but they also have pushed cities to sprawl and continue to affect our health and safety. They contribute to 70% of the carbon emissions in the transport sector and pollute the air we breath. 1,25 million people die each year in car accidents and the particulate matter that increases to critical levels with heavy vehicle traffic is considered by the WHO as a group 1 carcinogen. The air pollution with micro particles

PM_{2,5} contributed to 4,1 million deaths from diverse heart and respiratory diseases in 2016. (HEI, 2017)

Prof. Richard Kingston and Ransford A Acheampong from the Spatial Policy Analysis Lab at Manchester University recommend three ways in which cities can achieve less car dependency, so that pedestrians, cyclists and public transport recover public space that once was taken by cars.

They recommend, among other measures, to introduce car-free zones. Examples are Copenhagen, Brussels, Ghent, Madrid, where cars are either not allowed into the city centre or banned if they don't belong to residents. London charges congestion reducing fees. In all cases, socializing campaigns need to be previously organized to gain public understanding and public transport has to be made available to cover the mobility needs. (Kingston et. al. 2019)

Another recommendation relates to public transportation, which has to be reliable, flexible and cost effective. A reflection of its success is the decreasing use of private cars in many European cities, the US and Australia. Millennials are considered today a generation that generally avoids owning a car.

We as planners and urban designers have obviously a main responsibility when it comes to recover the excessive public space that was sacrificed for car transit. But planners need to make sure that solutions are inclusive, housing is affordable and close distances motivate citizens to cycle or walk to their work or the locations they visit on their daily life. The key is to provide again the human scale and human speed that was usual before the automobile revolution and to make sure people understand the benefits, support the changes and adapt their habits.

2.3. Social Issues

The consequences of poverty, high migration, river pollution and subsidence are visible through the existence of numerous slums in Jakarta, most of them located in vulnerable areas. These spaces have been usually occupied by migrants, who set up their homes with their own hands. Tambora is one example. One of the densest slums in the world, where in just under 4,5 square km about 250 000 dwellers live. Even though the government has programmes to relocate slum residents to social housing blocks, most of them refuse to live, because they have no documents, and without identification they are ineligible to take part in the programmes. Besides, they are not willing to leave a place they have lived in their whole life. (Wargadiredja, 2016)

Slums and informal housing areas in vulnerable sites in general lack the basic elements for living with dignity. With no sanitation, scarce open space, critical levels of pollution and despite of living in extreme density, dwellers feel abandoned to their fate. The Jakarta government uses different methods to evict residents and make space for profitable developments. There is no programme that foresees revitalization and inclusiveness, with few exceptions.

Muara Baru is one of the scarcely any examples, where revitalization was chosen instead of bulldozing. But not because it is too valuable to destroy, but because it is located in perhaps the most vulnerable area of North Jakarta, just behind Jakarta Bay, separated from the sea water by a cracking sea wall, which is also sinking.

However, the project goes beyond the recovery of a neighbourhood, the old traditional fishers villages around Muara Baru are the gate to a future so-called Giant Sea Wall, a 40 billion USD new waterfront built on reclaimed land called National Capital Integrated Coastal Development (NCICD), which comprises in total seventeen islets. The project has received important political support, but is socially and environmentally very controversial. Once completed, it would separate the Jakarta Bay from the ocean and convert it into a lagoon. The idea behind it is to pump the water out of the lagoon to lower the water level, so that the rivers from Jakarta can recover their natural flow and flooding in North Jakarta become less likely. Local experts however warn that instead of restoring the natural flow of the rivers, the lagoon could end up becoming a septic pond with polluted water and debris coming from Jakarta. (Sherwell, 2016)

Certainly, Jakarta, especially its coastal area, has reached a point of no return, and something urgently needs to be done to avoid a massive loss of homes and urban fabric with catastrophic outcome. First groups of hundreds of residents in the area have been forced to leave from 2016 on.

In Jakarta poverty and scavenging are obviously two interrelated conditions. However it seems that they are the product of a missing political vision to incorporate alternatives that effectively fight poverty, create opportunities and let as many Indonesians as possible take part in the ongoing economic growth.

Malaysia, Thailand, Philippines and Indonesia have been portrayed by the media in mid 2019 after they rejected containers of recyclable waste from overseas because they were contaminated with diverse other chemical and bio-hazards. Importing recyclable solid waste represents an opportunity to obtain cheap raw materials for manufacturing, but the health and environmental cost is high, and some countries, China ahead of them, have understood that the derived environmental degradation is not worth the effort. Recycling is a booming business in Indonesia, and scavengers don't seem to care about the side effects of their activity, they are happy to have an income. (Whiting, 2019)

Jakarta and other Indonesian cities struggle to tackle the domestic solid and organic waste problems and need to improve its waste management plan to industrial scale. Regrettably, the primitive way solid waste is processed in Indonesia, with the involvement of low income, untrained rural population is neither healthy for the workers nor compatible with the environment. Due to Indonesia's important industry sector, it is certainly feasible to implement a solid waste recycling programme based on the Circular Economy, which allocates for instance household recyclable garbage in the local industry as raw material. Even though it happens today, the applied methods do not comply with minimum international health and safety standards. A change starts with introducing a different approach of packaging material, change of materials for more sustainable alternatives, inducing pre sorting at home, community involvement and public support initiatives.

3. A regeneration proposal for vulnerable settlements in Pandemangang and Sunter Agung districts

Following the analysis of some of the most important challenges in urban Jakarta, the author wants to summarize the findings into a set of ideas as a conceptual regeneration proposal.

The main motivation for the design concept was to look for a way to turn informal neighbourhoods in vulnerable areas into green water absorbers and carbon collectors and combine the process with the *Kampung Gotong Royong* concept. That means, keeping the residents on the site instead of relocating them out of soil they call home perhaps since generations. As well it was a motivation to propose a way to maximize the green areas inside these extremely dense neighbourhoods.

The site that was chosen belongs to the districts of Pandemangang and Sunter Agung, which belong to North Jakarta. The site of the proposal was chosen as a symbolic location, and is not a concrete redevelopment proposal, but an idea of how the author considers that revitalization of Jakarta's slums could work out. Some of these areas have been already considered by private investors for new redevelopment, some of them with luxury character, towers and shopping malls.

The concept incorporates a mix of residential, commercial, services, education, communal infrastructure and green space. All functions are surrounded by a network of paths, corridors and access that maintain a healthy degree of permeability. Most of the site has been covered by at least two layers. The lower one comprises roads and corridors, flooding areas, ground water collection, playgrounds and sports facilities, with the existing water streams below. They also contain the green areas with vegetation and some allotments as urban farming with a biodigester plant. The middle layer, which is essentially a flooding proof elevated layer, contains the residential infrastructure, some services, education, and some communal infrastructure and the network of access bridges. The rest of the built infrastructure, such as services, communal buildings and some commercial buildings are located in areas with lower vulnerability.

The scheme design foresees to respect and conserve representative buildings (key points) in the existing neighbourhood, such as mosques, public buildings and other elements that have some kind of communal value. All other buildings, mostly for housing use, would replace the existing ones, making sure they have a longer life span and provide satisfactory living conditions.

The proposal also incorporates the participation of residents in the design and construction of their houses. Training should be provided to all disciplines involved, from craftsman to carpenter, gardener, etc. This would be a way for beneficiaries to contribute to cover the costs for their homes with their work and also learn new skills that would provide them chances in the labour market.

In the urban scale, a honey comb pattern was chosen to reduce the surface of paved roads and increase the size of blocks without increasing walking distances. Despite of the large areas covered by private ground, an extensive network of walking and cycling paths can be incorporated in the scheme, as well as green corridors and representative sites, where the existing and added key points are located.

On the micro scale, houses are preferably grouped around semi private courtyards, which have the aim to maintain the social dynamics that would arise during construction time, as a way to represent the *kampung* spirit of *Gotong Royong*, communal cooperation, in the big city.



Figure 1 The honey comb web is an interpretation of gotong royong in the urban landscape: mutual cooperation to raise the life quality

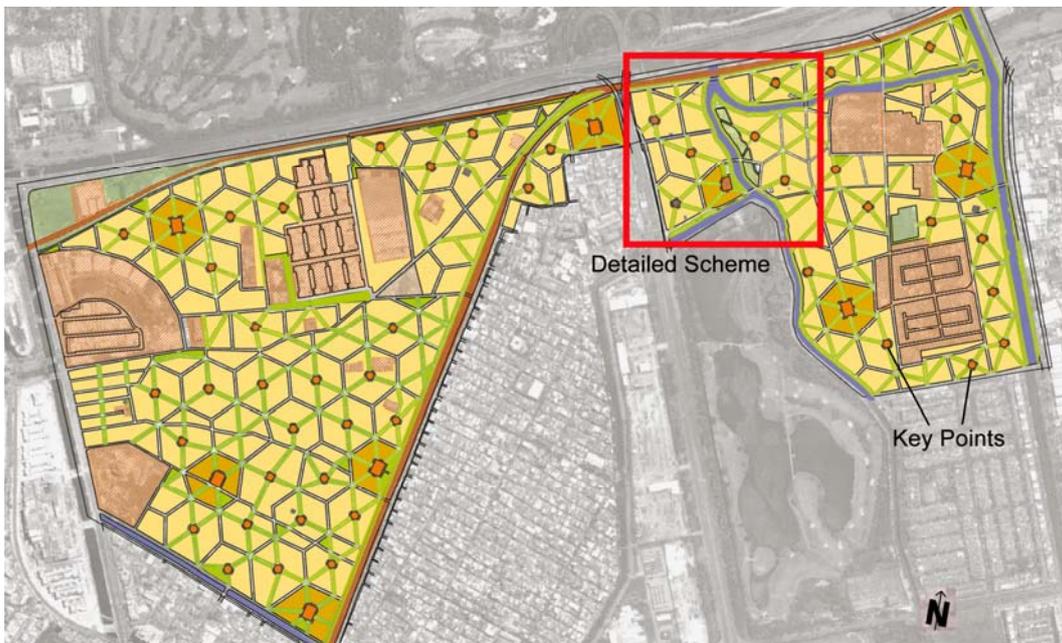


Figure 2 The concept applied in the Pandemangan (left) and Sunter Agung (right) districts.

The traditional communal cooperation can be applied to set up a cooperative-type of neighbours business sector, which includes retail, repairing services, recycling, urban farming, craftwork, child care, elderly care, gardening, etc.

The honey comb pattern also reduces the attractiveness for transit traffic, which is compatible with the neighbourhood character. It is assumed that residents will rather not own a car, but smaller sized mopeds or motorbikes.

The streets that surround the blocks and the green corridors that cut across them should be wide enough to allow the transit of emergency services and also to incorporate vegetation, seating and pedestrian movement.

4. Discussion and Conclusions

Indonesia recovered well from the Asian crisis in the early 2000s, and since 2005 has been experiencing a positive economic growth. However, the gap between rich and poor has also expanded (Diela, 2016).

The author considers that the best way to fight poverty in urban Jakarta is to combine urban revitalization with the improving of the living conditions of the most vulnerable poor population, especially women and children, without moving them out of the city, but instead increasing their chances to benefit from the economic growth.

The simple fact that people increase their earnings and secure their jobs in times of improving economy will also increase the pressure in the market to provide housing opportunities, which pushes planning authorities to increase among other things the built density. And the current trend for sustainable neighbourhoods is to mix uses with living, which reduces distances, increases concentrations of public space and green, and invites residents to share a community-based, often multi cultural townscape.

Inclusive urban revitalisation is not compatible with exclusive high end, west oriented gated developments. Indonesia has a rich, geographically, historically and culturally diverse background that must be incorporated in the way their urban development is guided, for it to maintain a strong and rich local identity.

Communities in many industrial nations have started to realize the monetary and social cost of urban sprawl for the cities and the crises that it causes when it comes to provide new affordable housing. One of the most discussed consequences has been racial and economic segregation due to the separation of exclusive residential zones (and services) from the rest of the city and the drop of conditions for low income families or ethnic minorities. (Badger et. al. 2019)

This shows that planners today finally understand that increasing the built density reduces overall car traffic emissions, prevents urban sprawl, increases the use of public transport and makes cities economically more viable.

The recently broadcasted images of Indonesia receiving (and rejecting) containers of recyclable waste as an import good for their cheap labour to sort and reuse have been shocking. They demonstrate how irrational human consume has turned in developed nations. The worse thing is, the more educated we are, the more we are aware of the impact

of our consumption. But the wealthier we are, the more we potentially contribute to it. Our actions in our micro world play also a role in the global context.

We can influence 72% of greenhouse emissions at home. In fact, 10% of the richest global population cause the most climate pollution and we as qualified planners probably belong to this group or are very close. Certain is that the poor cause very little pollution. The renowned British newspaper The Guardian interviewed several scientists living in the UK and asked them how they contribute to reduce their personal carbon footprint. Their answers were rather predictable. Most have basically given up flying, they own no car or have substantially reduced driving, some eat only vegetarian food and in general they consume much less than the average British population. Concerning consumption, the article mentions C40, a network of the world's largest cities, in which they discuss strategies to reduce climate impact. One of the focuses of research is the impact of consumption. A C40's proposal to address climate change is to introduce a four day working week, which would reduce the speed of the "ever-expanding economies" and thus reduce our capacity to consume and have more time for a balanced life. (Masoliver, 2019)

The 'standard occupancy rate' that the architects among us planners use to measure success of a built investment can be applied to consumer goods. How many times a year does a consumer use their collection of tennis racquets? How often do they use their second, third, fourth winter coat? A 'standard rate occupancy' applied to consumer goods would probably indicate that most things we possess have been just a wasted investment, and an unnecessary impact to environment.

The author of this paper hopes that eventually accurate information about the environmental impact of the goods we buy will become as important as the cost itself, and that this information will be displayed on a price tag in an internationally recognizable, standardized way.

The state of water provision in the world was mentioned earlier. It is recognized as a human right, but we do not necessarily appreciate how valuable it is. Just to put water availability in context: Water is actually an abundant resource in the world. It obviously is. However, almost all of it is salty. Freshwater (which is not automatically drinking water) is less abundant (2,8 % of all the water on earth). Yet drinking water (potable water) is rather rare. Only 0,003% of the total available water in the world is fresh and unpolluted. To understand the rareness of naturally occurring drinking water, in the earth crust (down to 100km depth) gold is only 600 times less abundant, silver is 428 times less abundant, and uranium is only 12 times less abundant than naturally occurring drinking water.

And we cannot forget that the available 'drinking water' is actually not drunk, two thirds of it is used by the manufacturing industry. Every good we consume has an embedded water footprint. According to figures published by FAO, every cup of coffee we drink needed about 140 l of water along its production chain. One kg of beef accounts for 15 415 l of water, one apple costs 70 l, and if we buy it as apple juice, a cup costs 190 l until it reaches the consumer. (Fao.org, 2019)

Nuts are not meat, but they cost also a lot of water: cashews, pistachios, walnuts or hazelnuts need about 15000 l of water per kg to produce. That is, each single pistachio costs 2,6 l of water. The state of California (USA) produces 80% of the almonds that are consumed in the country, and it uses 10% of its rather scarce water resources to grow them. A T-shirt needs 2 720 l, a pair of jeans almost 10 000 l water to manufacture (Guertin, 2017). Even our

electricity may have an imbedded water footprint. Greenpeace has calculated that coal fired power plants need as much water as one billion people consume. That means, even by reducing our electricity consumption, we also save water. (Greenpeace, 2016)

Jakarta is considered by the author as a fascinating case study to analyze the most fundamental challenges of today's planning. Poverty, pollution, traffic, city reinvention, vulnerability... whatever key arises, Jakarta embeds it. In this sense, Jakarta is probably a black box for urban sustainability analysis, a living research book, perhaps a mandatory examination for each future planner or a perfect billboard of examples for each senior planner.

In that sense, it is very fortunate, timely and suitable to congregate this year in Jakarta to discuss urban planning "beyond the metropolis". This experience hopefully will leave a shocking impact in the minds of all participants, one that will inspire the work and shape the influence we as planners exert wherever we work.

5. References

- Badger, Emely et. al. "Cities start to Question an American Ideal: A House with a Yard on Every Lot" in The New York Times Online (18 June 2019) <<https://www.nytimes.com/interactive/2019/06/18/upshot/cities-across-america-question-single-family-zoning.html>> [retrieved on 3 July 2019]
- BBC Mundo "Yakarta: el preocupante motivo por el que el gobierno de Indonesia quiere trasladar la capital del país" in BBC Mundo online (29.04.2019) <<https://www.bbc.com/mundo/noticias-internacional-48097530>> [retrieved on 29 April 2019]
- Beaumont, Nicola J., et al. "Global ecological, social and economic impacts of marine plastic." *Marine pollution bulletin* 142 (2019): 189-195.
- Benget, Besalicto "Economic crisis helps boost growth in Indonesia's organic fertilizer sector" in The Jakarta Post Online (03 Feb 2009) <<https://www.thejakartapost.com/news/2009/03/02/economic-crisis-helps-boost-growth-indonesia039s-organic-fertilizer-sector.html>> [retrieved on 3 July 2019]
- Breda, Adrian "Trinkwasser: Zwei Milliarden Menschen haben keinen Zugang" in Der Spiegel Online Edition (18 June 2019) <<https://m.spiegel.de/politik/ausland/trinkwasser-zwei-milliarden-menschen-haben-keinen-zugang-a-1271147.html>> [retrieved on 3 July 2019]
- Diel, Tabita "Indonesia's Richest One Percent Controls Nearly Half of Nation's Wealth: Report" in Jakarta Globe Digital News portal (1 Dec 2016) <<https://jakartaglobe.id/context/indonesias-richest-one-percent-controls-nearly-half-nations-wealth-report>> [retrieved on 3 July 2019]
- Fao.org "How much water is needed to produce...?" in Fao.org Food and Agriculture Organization of the United Nations Online <<http://www.fao.org/resources/infographics/infographics-details/en/c/218877/>> [retrieved on 3 July 2019]

- Greenpeace Africa “World’s coal power plants consume enough freshwater to sustain 1 billion people” in Greenpeace Press Release (22 March 2016) <<https://www.greenpeace.org/africa/en/press/2036/worlds-coal-power-plants-consume-enough-freshwater-to-sustain-1-billion-people-greenpeace/>> [retrieved on 3 July 2019]
- Guertin, Laura “How much water cost nuts to grow” in PAESTA: Pennsylvania Earth Science Teachers Association (6 Aug 2017) <<https://www.paesta.psu.edu/podcast/how-much-water-does-it-really-take-grow-almonds-paesta-podcast-series-episode-43>> [retrieved on 3 July 2019]
- HEI, IHME. "State of global air 2017: a special report on global exposure to air pollution and its disease burden. 2017." (2017).
- Kingston, Richard et. al. “Climate change: we can reclaim cities from the car without inconveniencing people” INDY/LIFE in The Independent Online Edition (8 June 2019) <<https://www.independent.co.uk/life-style/design/climate-change-we-can-reclaim-cities-from-the-car-without-inconveniencing-people-a8941556.html>> [retrieved on 3 July 2019]
- Köppe, Julia “Plastik in Ozeanen kostet Weltwirtschaft bis zu 2,2 Milliarden Euro pro Jahr” in Der Spiegel Online Edition (04 Apr 2019) <<https://www.spiegel.de/wissenschaft/natur/plastik-in-ozeanen-kostet-weltwirtschaft-pro-jahr-2-2-milliarden-euro-a-1261316.html>> [retrieved on 3 July 2019]
- Kurniasari, Triwik “Sanitary agency races against time to rid rivers of garbage” in The Jakarta Post Online (19 Jan 2009) <<https://www.thejakartapost.com/news/2009/01/19/sanitary-agency-races-against-time-rid-rivers-garbage.html>> [retrieved on 10 March 2009]
- Masoliver, Daniel “No flights, a four-day week and living off-grid: what climate scientists do at home to save the planet” in The Guardian Newspaper Online Edition (29 June 2019) <<https://www.theguardian.com/science/2019/jun/29/no-flights-four-day-week-climate-scientists-home-save-planet>> [retrieved on 3 July 2019]
- NN, bbc.com “Food waste worse for climate than plastic” in BBC online (13 May 2019) <<https://www.bbc.com/news/uk-scotland-48257019>> [retrieved on 13 May 2019]
- NN, The Jakarta Post 1 “Garbage piles up in city rivers, streets” In The Jakarta Post Online (24 Feb 2009) <<http://www.thejakartapost.com/news/2009/02/24/garbage-piles-city-riversstreets.html>> [retrieved on 10 March 2009]
- NN, The Jakarta Post 2 “Most of Jakarta train crossings unattended” In The Jakarta Post Online (06 Mar 2009) <<http://www.thejakartapost.com/news/2009/03/06/most-jakarta-train-crossingsunattended.html>> [retrieved on 10 March 2009]
- Purningsih, Dewi “Bantar Gebang Waste-To-Energy Plant is Ready to Operate” in Greeners News Service Jakarta (26 March 2019) <<https://www.greeners.co/english/bantar-gebang-waste-to-energy-plant-is-ready-to-operate/>> [retrieved on 3 July 2019]
- Sherwell, Philip “\$40bn to save Jakarta: the story of the Great Garuda” in The Guardian Newspaper Online Edition (22 Nov 2016)

<<https://www.theguardian.com/cities/2016/nov/22/jakarta-great-garuda-seawall-sinking>> [retrieved on 3 July 2019]

Wargadiredja, Aiza Tivany “In This, One of the World’s Most Densely Packed Slums, the Sun Never Rises” in VICE Media LLC Asia (31 October 2016) <https://www.vice.com/en_asia/article/yvj53v/in-this-one-of-the-worlds-most-densely-packed-slums-the-sun-never-rises> [retrieved on 3 July 2019]

Whiting, Kate “Indonesia has a plan to deal with its plastic waste problem” in The World Economic Forum (WEF), Cologny-Geneva, Switzerland (13 March 2019) <<https://www.weforum.org/agenda/2019/03/indonesia-has-a-plan-to-deal-with-its-plastic-waste-problem/>> [retrieved on 3 July 2019]

Winarti, Agnes “Clean canals could reduce flooding by 40%: Expert” In The Jakarta Post Online (02 Feb 2009) <<https://www.thejakartapost.com/news/2009/02/02/clean-canals-could-reduce-flooding-40-expert.html>> [retrieved on 3 July 2019]

Wood, Johnny “Your morning cup of coffee contains 140 litres of water” in The World Economic Forum (WEF), Cologny-Geneva, Switzerland (22 March 2019) <<https://www.weforum.org/agenda/2019/03/hidden-water-in-your-cup-of-coffee/>> [retrieved on 3 July 2019]