

# *Climate Change and Urban Poor: Water-related Behavior in Jakarta*

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**Abstract**—Jakarta is a growing urban centre that is facing two problems: climate change and urban poverty. City authority of Jakarta has yet to prepare comprehensive public policies to address the two challenges of the city that has over 9 million population. As a coastal city, Jakarta has a coastline up to 25 km long. The average elevation of land surface is 7 meters above sea level. Around 40 percent of land surface are below the sea level. There are thirteen rivers flowing rainwater from high land of West Java through the city running into Jakarta Bay. Therefore the threat of climate change is not only due to rising sea levels but also flooding and drought. It is estimated that around 1 million of the urban poor experiencing the vulnerability since most of them are illegally occupying the low land surrounding riversides. The extreme weather is now happen frequently both in urban and rural area. Since poor farmers and farm workers have no saving, some of them have trying to get the job in cities such as Jakarta. Their daily income is around USD 6 to USD 11. This article discusses how the urban poor act toward the impact of climate change. Since the urban poor have only subsistence income, they choose to live at the riversides in the all part of the city. They utilize the water resources for many purposes, utilize the short underground water table and also dump the waste into the river. This study discusses what the poor urban know and do regarding the water resources and its relationship with any evidence of climate change impact and vice versa. As an attempt to explore the possibility of linkages with climate change as an anthropogenic behaviour, this study tries to develop how the current water governance effectively address the problem.

**Keywords**— Climate Change; Adaptation, Urban Poor, Vulnerability, Water Governance

## I. INTRODUCTION

With the exceedingly rapid process of urbanization, the low-income squatter settlements are on the rise in developing countries. In 2012, more than 863 million urban residents in the developing world were living in slum conditions—up from 650 million people in 1990 and 760 million people in 2000 (MDGs and Beyond 2015 Fact Sheet). At present, more than 53 % of 253,2 million of Indonesia's population live in urban areas (BPS, 2013). Some of those are living in Jakarta, the biggest city and the capital city of Indonesia. Like most of the world's developing cities, Jakarta is a coastal city. Coastal cities face climatic problems which can be seen by the rising sea levels and storm surges. Extreme weather evokes unprecedented risks to the livelihoods of many people, property, and urban infrastructure. Coastal cities, with its ports, are most vulnerable to flooding both in the most developed and rapidly developing countries (OECD, 2013).

The Government of Jakarta faces two big problems: how to address the many problems related to the urban poverty and how to deal with the more frequent floods and droughts. Floods and droughts closely related to climate change. Some scientists suspect a link between the increases in the number of urban poor with the widespread impacts of climate change. In this regards, an

integrated and rigorous study should be developed and focuses on to study the behaviour of most vulnerable inhabitant in Jakarta. Meanwhile, no doubt that most of the urban poor, particularly in coastal cities inhabit the area around water resources. Though both floods and drought is related to water resources. So the question is whether the behaviour of the urban poor who inhabit the related area of water resources related to various risks arising by floods and drought? Furthermore, is it true the common belief that the urban poor is not victims, but rather some of the causes of flooding and drought. Or, indeed as anthropogenic climate change has a connectedness with the growing number of urban poor in developing countries?

As a coastal city, Jakarta has approximately 25 kilometres of coastline. With an average elevation of seven metres above sea level, 40 percent of the city areas are below the average elevation. There are 13 rivers that run water from high land at the outside of Jakarta region to the Jakarta bay. Fairly low of average land surface elevation can be associated with the number of rivers and the floodplains in Jakarta. The area surrounding the thirteen rivers are prone to flooding. Therefore river basins were prohibited to be inhabited since the colonial era.

However, lax governing tracing back nearly four decades have left squatters to freely occupy land area. Most of the floodplains has been turned to be illegal housing. An estimation said that 1 million people live illegally in the riversides and the floodplain. Squatters occupying the area surrounding the river basin are likely to have migrated from rural areas. They need jobs for living. They left their country side to get the opportunities in urban areas since currently they have facing of hardship in their agricultural activities. With the increases threat of extreme weather, farmers in many areas surrounding Jakarta has facing the impact of extreme weather. They have lost their income because the failures of harvesting. Many farmers and farm workers need alternative jobs to live. Not so many of them suspect the extreme weather relate to climatic change and the carbon gas emission.

Considering the vast array of these workers' geographical origins, informal employment in its diverse form are much different with formal employment. Informal workers are diverse in the sense that they cut across many sectors; from rubbish scavengers to fruit vendors. Moreover, these informal workers face unsafe and poor working conditions. Not unlikely do they end up living in an unoccupied or abandoned area of land and floodplains. Nowadays, illegal settlement are found along the thirteen riverbanks in Jakarta. Riverbanks are increasingly morphing into run-down slums, both dangerous and illegal. Most of the low-income families living at unhealthy conditions along the riverbank/riverbasin. They also have no legal or permission to stay there. Their income are very low, as about USD 5 to USD 9 per day.

The necessary measures to fulfill the people's need for drinking water is addressed as a public service obligation (PSO) under the Law of Public Service Provision No 25/2009. However, the riverbank falls under the category of a floodplain. Uses any property of floodplain are restricted or prohibited. Stemming from this fact, it goes without saying that any development of public service facilities in floodplain area is not permitted. Government efforts to provide clean water have taken many forms over the years, including the use of tanks truck to bring water supply. This step has been proven to be ineffective (Manurung, 2007). Piped water supplies has been established and developed since the colonial period in the 1920s, and then nationalized by the government in the 1960s. In 1998, clean water supplies were privatised and handed over to international corporations with a public-private partnership scheme. Nevertheless, even to this very day, stakeholders involved in bringing adequate water supplies to homes have yet to achieve their full intent.

Theoretically, climate change may intensify competition for water. Cities generally rely on their immediate surroundings for water. While the effect of climate change on the water resources of a particular city cannot be predicted at present, the competition for water can be expected to intensify in the areas that become dryer than they are now. Since current water management systems are designed for historical weather patterns, some adjustment will probably be required in most places (Hitz and Smith, 2004). As much as 50% of the urban population in Asia and Africa already lacks adequate provision of water and sanitary services (Ruth and Coelho, 2007). Drinking or recreational water can be contaminated by sewage backup, and microbial/chemical agents and biotoxins can be introduced into the water supply.

At the rate we are going, we can no longer trivialize the fact that climate change will only come to intensify the competition for water. Cities generally rely on their immediate surroundings for water. While the effect of climate change on the water resources of a particular city cannot be predicted at present, the competition for water can be expected to intensify in the areas that become dryer than they are now. The urban poor are dependent on water found in rivers, for various usages. Water obtained from the river are used for day-to-day activities—drinking, showering, laundry, even as a necessity in operating small businesses. Consequently, many of the urban poor utilize either groundwater or water obtained from rivers as a water supply for domestic use

(Manurung, 2007). This research, in essence, is an attempt to discuss the behavioural aspect of the urban poor inhabiting river basin, as well as how their attitudes and behaviours along with their vulnerability affects the impacts of climate change. Floodplains are not intended to accommodate inhabitants, the areas along the river are unfit for living settlements, thus the main focus of this article is to address the limitations of the urban poor who are faced with difficult policy-related choices by which is similarly difficult to conduct by the government. Moreover, with the increased risks that extreme weather poses, policy decision-making is even less on steady ground. The government is left to make do with the only remaining policies that are relatively standard in city planning. The government is left to make do with the only remaining policies that are relatively standard in city planning (Bicknell, 2009).

## **II. RESEARCH METHOD**

This study utilizes data from reports of studies and public policies as primary sources for literature review. To better understand the context of the problem, researchers conducted continuous in-depth interviews (via fax, e-mail, and phone call) with several speakers, including the head of Kelurahan office. Kelurahan is the smallest administrative unit responsible for providing most government services. Jakarta comprises 265 unites. For this research, a kelurahan was to be made an object of observation. Kelurahan Gambir is located in Central Jakarta and it is where a series of in-depth research on the subject of informal sector workers took place. The area of Kelurahan Gambir are 258,28 acres. This particular area was chosen for its prime location, being the site of the presidential and vice presidential palace along with a scatter of prominent government offices, foreign embassies as well as the business district. Due to the strategic location of government offices and business compounds, the majority of residents in this prominent district works in the formal sector. A total of 1,376 people (42,51%) works in various governmental divisions. In the very same area, there is also a military residential complex. A total of 229 people (7,07%) are retired government employees. In terms of age, approximately 46,37% of the population were aged 0 to 29 years. Residents over the age of 29 to 65 years of age comprised 52,55% of the population, while around 6,18% of the population were aged 65 years and above.

The Ciliwung River runs its course through Kelurahan Gambir. According to database, the total population of Kelurahan Gambir reaches 3,996 people. The riverbanks of Ciliwung River are unfit to accommodate families yet as many as 140 households are currently occupying the area. Around 90 households fall under the category of urban poor because they are recipient to government aid in the form of rice. From 140 households occupying illegal land area, around 40% of them are government employee. The rest of the population are involved in informal sector jobs.

## **III. RESULTS AND DISCUSSION**

Climate change plays a key role in flooding and prolonged drought. An entire city may become paralyzed in the event of a flooding. Each year, it is not uncommon for severe flooding to cause casualties and destruction. On the other hand, droughts are known to last for extended periods of time, and persist long enough to cause a deficiency in the water supply. During droughts, the water table (upper level of an underground surface) of groundwater falls further below the surface. This is due to the drastic change in the climate. With the increasingly high rate of urbanization, agricultural workers have faced crop failures in the the last decade. Prolonged droughts and irregular rainfall causes inevitable damage to crops. The numbers of the poor living in urban areas has increased significantly, although it is prudent to acknowledge the various definition of 'poor'. Official government agencies proposed using a single standard of daily calorie intake to define the category of people who were not in poverty. Therefore The Central Bureau of Statistics identify the number of urban poor inhabiting Jakarta 362.000 persons. However, if residential eligibility is measured from the state of sanitation facilities and clean water sources then the number of the urban poor living in Jakarta will be 3 million people of the 9,7 million population. Meanwhile, from the legality aspect of occupancy, according to city planning analyst Nirwono Yoga, around 5 million people in Jakarta inhabit riverbanks, the bank-side reservoirs, the green belt, floodplains, railwaysides and underbridges.

If the dual or dichotomous nature of jobs were to be used, it is estimated that approximately 2 million people in Jakarta work in the informal sector. Employment in the informal sector spans many categories, ranging from domestic workers (live-in servants), street food vendors, mini bus drivers along with their conductors, temporary workers, the independent drivers, motorcycle taxi driver (ojek) and so forth. Inhabitants working for the informal sector occupy river basins. Their income fluctuates. According to a series of interviews, informal workers earn from USD 6 to USD 11 per day. Public service in the forms of piped water services or roads and streets are not accessible in illegal housing compounds. Nevertheless, electricity provided by

the state are provided even in said areas due to safety reasons. Under the circumstances, people depend on groundwater and bottled water to meet their need of water. Suppose the government attempts to provide water to meet their needs, the quality and adequacy of clean water supply is not sufficient. Although water service has been privatized and converted in the form of public-private partnership since 1998, the scope of services is still too low (Manurung, 2007).

To meet the need on water the urban poor combine groundwater mining with utilizing the river water. They use river water for washing clothes, showering, and other sanitary facilities. The urban poor choose to live in the riverbanks and surrounding area because it proves to give easier access to obtain river water for free. To meet the needs of drinking water, they buy bottled water that can be purchased and refilled by paying as little as USD 0,7 per water gallons (20 litres). Groundwater, which is below the surface, along with water obtained above the surface are relatively cheap, easy-to-access source of water supply. Inhabitants of informal settlements on the outskirts of the area of the river is essentially utilizing groundwater not too far from the ground. An electric water pump is needed to obtain the water.

The low price water pump is about USD 35 per unit. The pump can suck groundwater from 5 to 10 meters deep below the land surface. One of the impacts of climate change is the alarming rise of plagues. Outbreaks of diseases such as cholera and typhus are easily spread in any illegal river side settlement. The illegal settlement, due to their low income, adding to that the collective use of unhygienic sanitary facilities that inevitably causes disease transmission. Many continue to dispose human of waste into the river, both groundwater and surface water are then prone to be polluted with other contaminants. Squatters in the area are actually being threatened by the construction of high-rise buildings in Jakarta. With the increasing development of tall buildings; the more construction work done, the more it disturbs the water table. The water table gradually shifts and falls, making it difficult to obtain groundwater. Squatters are then in danger of water deficiency.

Due to the low supply of piped water, building owners opt to drill groundwater, and in this case the government give their consent/permission but require owners to pay taxes. The water reservoir in the water table depletes and low-powered water pump is unable to obtain significant amount of water, therefore inhabitants become increasingly dependent on surface water sources and from buying water from suppliers. In a dissimilar fashion, Kelurahan Gambir is witness to building a high-powered water extraction. With the held of grant funding in from society, high-powered drilling, as well as water distribution, was built and possible to supply water to a number of homes in the area. The owners of buildings surrounding the illegal settlements use deep pump water to get the underground water they want with their own internal drilling installations. Most of the office buildings and hotels in Jakarta drill water after obtaining licence and also paying obligatory taxes (Manurung, 2007).

In the next few years the urban poor occupying riverbanks will not be able to obtain the water they need. In the long-run, the water table continues to deplete, causing groundwater drilling to become expensive. However, the most negative outcome from this situation is competition among people in the event of drilling water for their own needs. This may turn into a serious conflict, whether among inhabitants of urban slum or between inhabitants versus building owners. The unfortunate situation faced by the urban poor in developing countries has been studied by a number of researchers. According to (Hill, 2003), quoting (Ruth, Coelho (2007), said that as much as 50% of the urban population in Asia and Africa already lacks adequate provision of water and sanitary services. With respect to the behaviour of the poor communities that inhabit the river basin, the government is faced with difficult choices, forcing them to take immediate action in relocating inhabitants from the riverbanks. This effort will be the comprehensive public policy that can address the city's adaptation to climate change, especially since it would potentially suppress incidents resulting in deaths due to flooding and infectious diseases. It could be the way to ensure the wellbeing of the people of Jakarta and surrounded cities.

#### IV. CONCLUSION

Continued substantial population and economic growth have resulted in a rapid increase in urban areas and changes in land use. Jakarta's rapid growth and urbanization have increased large-scale infrastructure problems that are recognized by the Jakarta government, which are also experienced regularly by the community. In fact, Jakarta is very vulnerable to the impacts of climate change. This can be seen from the behavior of Jakarta's poor, who are productive and integral members of the city's economy and are also the most vulnerable to risks due to flooding. Although the Government of Jakarta has taken various actions to respond to climate change, much remains to be done to mainstream climate change across all sectors in the long term. Some basic principles can guide the way forward in responding to climate change, disaster risk, and poverty in urban areas. First, climate change adaptation should not be an additional challenge to existing policies and planning priorities. Still, an opportunity for the

government of Jakarta and its key partners to implement future focuses and priorities. Policies and investments need to be made based on better information, including quantitative data and an understanding of community-level action and adaptive capacities. Second, better collaboration with neighboring provincial governments, as well as with local communities as active participants and partners, is essential for future success.

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