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# SUSTAINABLE MEGACITIES: vulnerability, diversity, and livability

IPB INTERNATIONAL CONVENTION CENTER  
Bogor, 17 - 18 March 2015



Center for Regional System Analysis, Planning and Development  
Bogor Agricultural University

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JABODETABEK STUDY FORUM

### “SUSTAINABLE MEGACITIES: VULNERABILITY, DIVERSITY AND LIVABILITY”



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# Foreword

More than half of the world's population now lives in urban areas. Rapid urbanization in Asian developing countries over the past half century has been followed by excessive urban population concentration in very large urban agglomerations, so called as megacities. The UN defined megacity as a metropolitan area urban agglomeration complex with more than 10 million inhabitants. The number of megacities in the world has increased from 10 megacities in 1990 with 153 million of population or 7 percent urban population of the world to become 28 megacities in 2014 with 453 million populations or 12 percent urban population of the world. The United Nations expected that by 2050 about 66 percent of the world's population will live in cities (UN, 2014).

The rapid growth, high population density and high consumption rate of residents in megacities has led to a wide range of local and global socioeconomic and environmental impacts which requires attention from the global community. Therefore, it will significantly affect the future prosperity and sustainability of the world. The Greater Jakarta or Jabodetabek is experiencing continuous growth that seems to be an unstoppable phenomenon and at the same is facing various problems that may not have been experienced by other major cities in the world. The result of many studies showed that the carrying capacity of the environment, especially land and water in Java Island where Jabodetabek lies, is already overshot. However, given the relatively rapid growth of Mega Urban Jakarta, it is possible that Jakarta will grow to be the world's largest megacity.

Amid the global concern on the negative impacts of the continuing megacities' growth on global environment, the Center for Regional System Analysis Planning and Development (CRESTPENT/P4W), Bogor Agricultural University (IPB) has established Jabodetabek Study Forum since 2001. This Study Forum has conducted biennial international seminar on complex mega-urban issues on Asian megacities as well as urbanization and urban-rural linkages in Asian countries. The biennial conference has a tradition of organizing two types of paper presentations, namely scientific papers and community papers. This year's conference will also open a session for local government officials. This proceeding book covers papers from nearly all the presentations delivered during the conference.

We hope that this proceeding book will be able deliver the aims of the conference: to recognize multi-dimensional aspects, perspectives and knowledge on megacities; to communicate and facilitate experiences, policies, and studies related to challenges of continuing development of Jabodetabek and Asian Megacities, as well as solutions to address these challenges; and to bring up common understanding on the development of Jabodetabek and Asian Megacities.

Bogor, April 2015

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## Greenery and Blue Open Spaces Management in Water Sensitive Cities of Jabodetabek

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### ABSTRACT

Jakarta-Bogor-Depok-Tangerang-Bekasi (Jabodetabek), as a megacity has highly growth of citizen population. Urban density has been increased progressively. However, infrastructure development is left several steps behind. Therefore, environmental degradation, such as urban heat, water extreme and vulnerabilities are held not only in Jakarta, but also in its vicinity. It's proposed to establish two dams in Ciawi and Genteng with 36.106 m<sup>3</sup> and 25.106 m<sup>3</sup> water capacities to regulate water debit of Ciliwung and Cisadane rivers, respectively. Due to some ecologically and socio-economically constraints, dam construction has been delayed. This paper tells some lesson learned regarding greenery and blue open space management in water sensitive cities of Jabodetabek. Case study was conducted in the scale of Ciliwung Watershed as bioregional. Greenery and blue open space researches are concerned to the upper, the middle and the down streams of Ciliwung watershed management. According to the research results, it's well known that land use and land cover are increasingly changing in Ciliwung watershed during the latest 30 years. In order to reduce risk of flooding, some alternatives are recommended to manage greenery and blue open spaces better in the scale of riparian landscape of Ciliwung. The upper stream projected to develop urban agriculture zone, the middle stream for agro-biodiversity conservation zone, and the downstream for productive landscape zone of individual or community gardens, such as pekarangan, kebun campuran and talun. As substitution of big dams, it's planned to making a lot of ponds and water cascade as small water retention along the river, i.e. situ, embung, danau etc. Simple simulation could be calculated. Seventy percent of 117 km Ciliwung river length (c.a. 80 km) will be utilized for the project area. Each 1 km distance would be established two ponds in the right and the left side of public good riparian landscape. Average size of pond is 50m x 20m x 2m (2.103 m<sup>3</sup>). Therefore, total 160 ponds will regulate 32.10 m<sup>3</sup>. Those water retention ponds could be designed as landscape services for recreation parks, fishing, irrigation, biodiversity conservation, micro-climate amelioration depend on the needs of surrounding communities and governments policies. In the case of Ciliwung River, those greenery and blue open spaces must be managed by local government of Bogor District, Bogor City, Depok City, and Metropolitan Jakarta, respectively based on administrative region.

**Keywords:** *community gardens, embung, pekarangan, riparian landscape, situ, watershed*

### INTRODUCTION

One of the main environmental problems in Indonesia cities is water, whether quality or quantity. As a megacity, Jakarta-Bogor-Depok-Tangerang-Bekasi (Jabodetabek) has highly growth of citizen population. Jakarta, itself known as the Special Capital Region of Jakarta "Daerah Khusus Ibu Kota Jakarta" is one of the most populous urban accumulations in the world. Based on BPS data (December 2012) Jakarta population were 9,761,407. Urban density has been increased progressively. However, infrastructure development is left several steps behind. Urban carrying capacities have not estimated, yet. Therefore, environmental degradation, such as urban heat, water extreme and vulnerabilities are held not only in Jakarta, but also in its vicinity.

Jakarta, when it was known as Batavia in the colonial era, was built as a water front city in 1617. Based on the history, Jakarta had got flooding in 1621, 1654, 1873 and 1918. In the latest 3-4 decades, Jakarta was flooded in 1979, 1996, 1999, 2002, 2007, 2013, 2014, and 2015. It has been known that floods account for more losses than any other natural disaster in Jakarta both in terms of loss of lives and damage to property and crops. The trend in flood as natural disaster in the world from 1900 to 2008 shows the people affected and loss in USD and fatalities total (Fig. 1). Meanwhile, Asia accounts for >45 percent of water related disaster facilities and >90 percent of the affected population between 1989 and 2006 (Fig. 2). Asia populous megacities, included Jakarta, located at the bank of river and/or in a coast, are no exception in terms of being vulnerable to the impending flood-related disasters<sup>1</sup>.

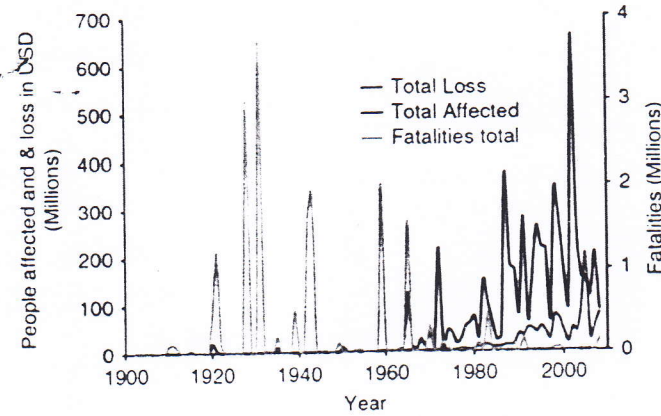


Figure 1. Global Natural Disaster Trend in Flood from 1900 to 2008.

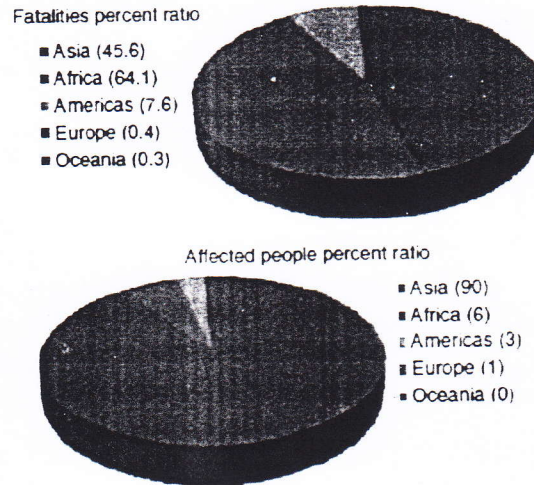


Figure 2. The ration of water-related fatalities and people affected from 1980 to 2006<sup>1</sup>.

Research of "Green and Blue Water Availability Analysis on Sustainable Landscape Management in Ciliwung Watershed" was started under budgeted by BOPTN (2013-2014). Micro scale research in some flooded area in Jakarta has been studied by research collaboration between IPB and ETH Singapore in the scheme of "Future Cities Laboratory". Dissemination and social engineering has been implemented through the join research between IPB and Monash University Australia. The theme is "Water Sensitive Cities" under managed by the Australia and Indonesia Centre (AIC) and Directorate General Higher Education (DGHE). Therefore, this paper shows the latest 3 years research of greenery and blue open spaces management in Jabodetabek. The objectives of this paper are: 1. To show the land cover/land uses changing from the upper-the middle-the downstream in Ciliwung watershed; 2. To show how the

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## METHODOLOGY

Intensive observation was conducted in the bioregional unit of Ciliwung watershed from the upper stream, the middle stream, and the downstream (Fig. 3). The upper stream has landscape characteristics as a hilly and mountainous area; poverty, low of land property right; agricultural farmlands and big plantation estates, mineral water resources; and forest & greenery open space. The landscape character of middle stream is: flat till undulating area, high density of population; settlements & new settlements; industrial areas & pollution; abandon lands; agricultural farmlands; land use changing. The characteristics of the downstream are: flat area, high density of population; dense settlements; water/industrial pollution; lack of greenery open space; and dominated by trading and services area.

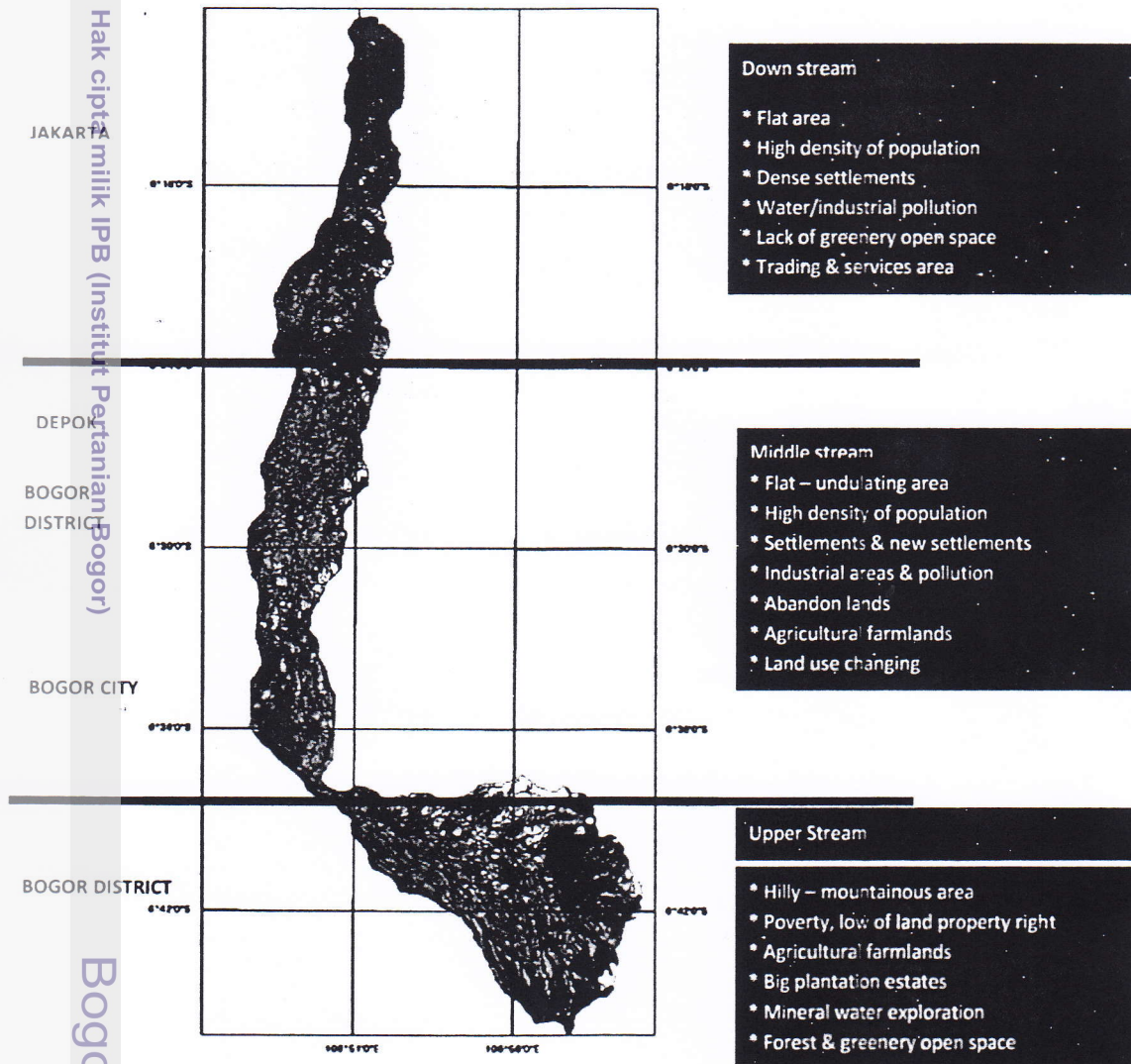


Figure 3. The Characteristics of Ciliwung Watershed

Source: Environmental Analysis & Spatial Modeling Laboratory, Faculty of Forestry-IPB

The study has been conducted in Jabodetabek Region since 2013. The deep observation was held in Ciliwung watershed from the upper stream to the downstream<sup>2</sup>. The length of Ciliwung River is around 117 km, which cover the area c.a. 386 km<sup>2</sup>. Three sample sites in the upper stream are: Desa Pandansari, Desa Tugu Utara, and Desa Cilember (Bogor District). There are 9 samples in the Middle stream are: Kelurahan Katulampa, Kelurahan Sempur, Kelurahan Kedunghalang (Bogor City), Kelurahan Karadenan, Kelurahan Waringin Jaya, Kelurahan Sukahati (Bogor District), Kelurahan Tirtajaya, Kelurahan Depok, and

Kelurahan Pondok Cina (Depok City). The downstream study sites are located in Metropolitan Jakarta, i.e. Kelurahan Lenteng Agung; Kelurahan Kampung Melayu; and Kelurahan Tanjung Priok (Fig.4).

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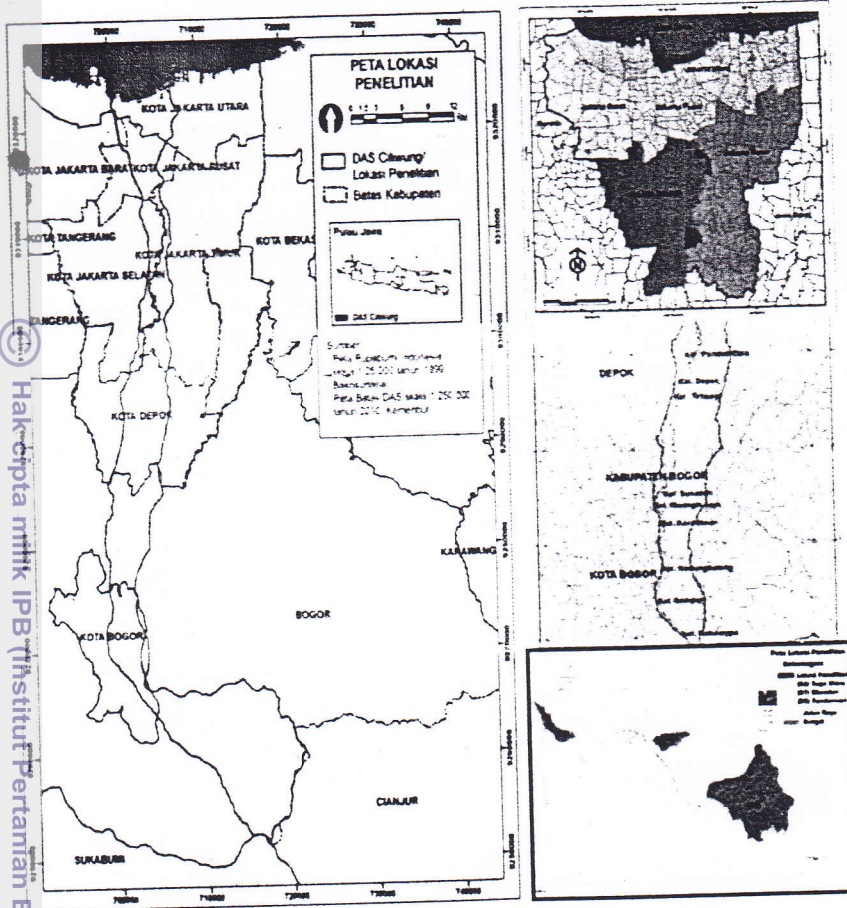


Figure 4. Study area in Ciliwung Watershed

The macro scale research of green and blue land cover/open spaces changing was conducted in the level of bioregional of Ciliwung watershed from 1978, 1995, and 2010. It was detected using remote sensing methods with the supervised classification. To know the changes in land cover, it's used Landsat MSS in 1978, Landsat TM 1995 and Landsat ETM + 2010<sup>3</sup>. Survey method was held in order to collect bio-physic-social-economic data in the micro scale of "kelurahan" unit. Focus Group Discussion with all stakeholders was conducted to decide dissemination program media (leaflet, poster/standing banner, and pocket book). Those media will be used for social engineering to change the mind-set of communities, who are living close to the riparian landscape.

## RESULT AND DISCUSSION

### Green and Blue Open Spaces Management

Greenery open spaces and blue open spaces are very important for landscape services, especially for water resources management. They are also functioned as biodiversity conservation, microclimate amelioration, Carbon sequestration, and landscape beautification. The form of greenery open space can be as *pekarangan* or home garden, agriculture landscape, orchard, mixed garden, plantation, Community Park, City Park, and urban forest. Vegetation as land cover can absorb and keep water in the soil. A process of evapotranspiration, which produce water in the air, is called "green water". Blue open spaces could be found as water bodies (lotic and lentic) of river, canal, *situ*, *embung*, lake, dam, pond and wet land forms, such as marsh and swamp area. Some runoff waters are flowed to the lower place. When

The water penetrated to the soil, then percolated to the aquifer layer. Both of surface water and spring which is exposed as water bodies then it's called as "blue water" (Fig. 5).

Greenery open space, *ruang terbuka hijau* (RTH) in Indonesia has regulated in spatial planning and management (*Rencana Tata Ruang Wilayah and Rencana Tata Ruang Kota/Kabupaten*) through the Law No. 26/2007 regarding Spatial Planning<sup>4</sup>. However, policy/decision makers have not been interested yet to regulate blue open spaces, *ruang terbuka biru* (RTB) strictly. Both of RTB and RTH have some roles as landscape services, such as: 1. water basin reservoir; 2. habitat of bio-diversity conservation; 3. carbon sequestration and micro-climate amelioration; 4. medium for production of agriculture and fishery; and 5. Medium for serving the amenities, landscape beautification for tourism. Therefore, analysis of green & blue open spaces changes is very important in study area. Focus Group Discussion (FGD) with stakeholders were held to have some input to formulate social engineering. The last but not least, dissemination program to be designed for implementation of sustainable RTH and RTB.

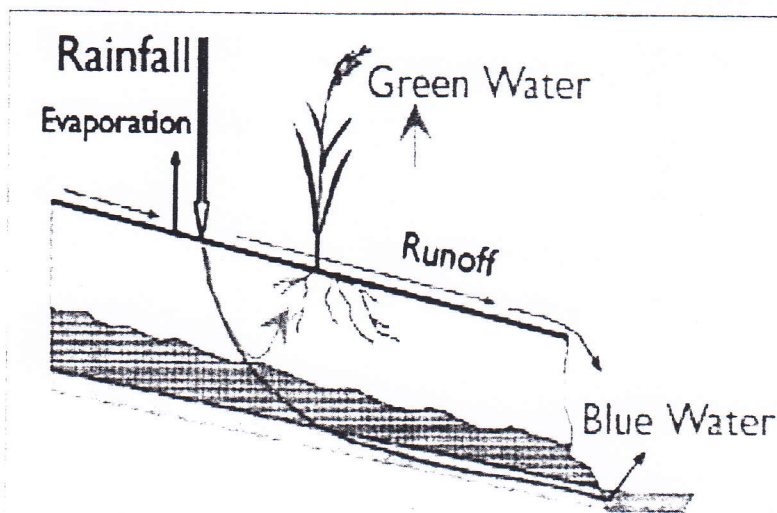


Figure 5. Green water and blue water concept

### Changing Pattern of RTB and RTH

Land cover changing, especially, the RTB landscape in Ciliwung watershed from 1978, 1995, and 2010 was detected by using remote sensing methods with the supervised classification. To identify the changes in land cover, it's used Landsat MSS in 1978, Landsat TM 1995 and Landsat ETM + 2010<sup>3</sup>. Spatial analysis result showed significant changes when RTB area in 1978-1995 was decreased approximately 27.62 ha (0.07%) and 1995 to 2010 declined approximately 66.01 ha (0.17%). The change directions are dominated by changes RTB into settlements of a new town with an area of 114.79 ha (16.96%). Furthermore, greenery open space (RTH) was changed in Ciliwung watershed from 1978, 1995 to 2010 significantly<sup>3, 4</sup> (Fig. 6).

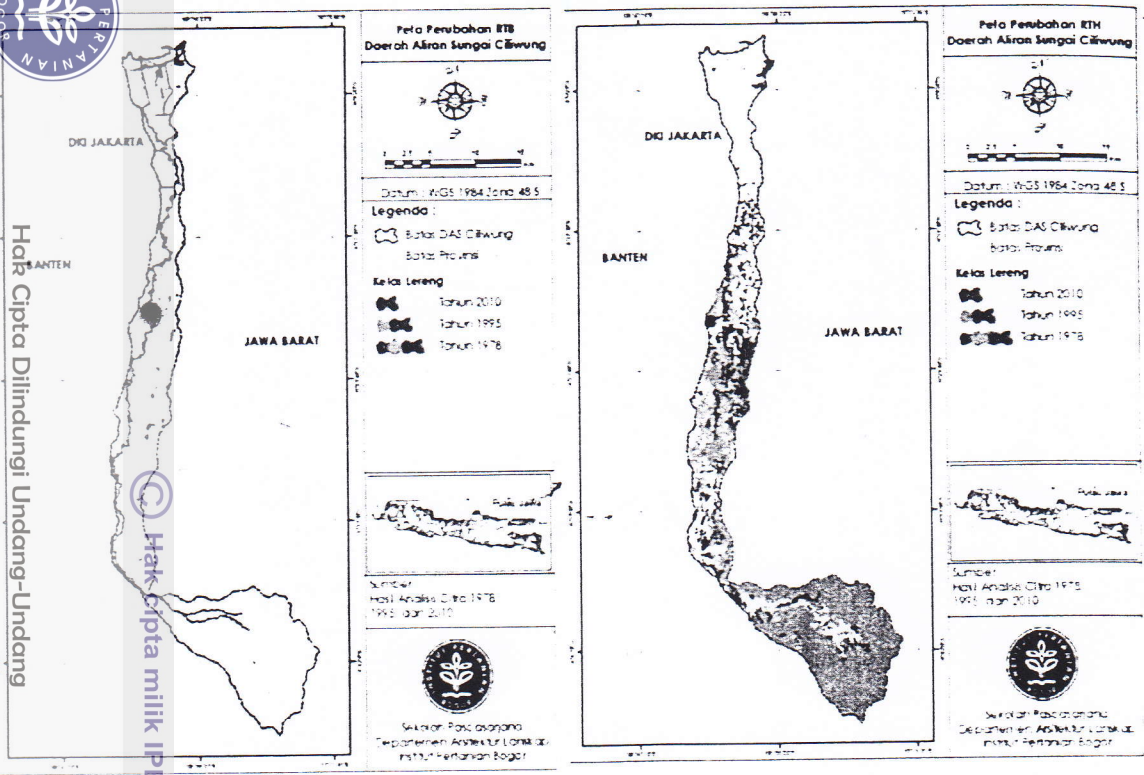


Figure 6. Blue and Green Water Land Cover Changing in Ciliwung Watershed in the period of 1978, 1995, and 2010<sup>3,4</sup>

According to BOWSCC, **Bogor District** has 95 situ as blue open spaces/RTB<sup>5</sup> (Table 1). There are 8 watersheds, i.e. watersheds of Cimanceuri, Cidurian, Cisadane, Angke, Ciliwung, Pesanggrahan, Cikarang and Cikeas-Cileungsi-Bekasi. **Bogor City** is streamed by two big rivers, i.e. Ciliwung and Cisadane Rivers. It has 6 situ. **Depok City** as a buffer of Jakarta, has 21 situ. Some rivers flow through **Depok** are Ciliwung, Kali Krukut, Kali Grogol-Krukut, Kali Angke, Kali Cipinang, Kali Cipinang-Sunter, Kali Sunter, and Kali Cikeas-Cileungsi-Bekasi rivers. **Tangerang District** consists of 38 situ and has rivers of Cisadane River, Kali Cidurian, Kali Pesanggrahan, Kali Cimanceuri, Kali Ciarab, Kali Angke, and Kali Cileuleus. There is **Tangerang City** also as buffer of Jakarta. It has 8 situ, which is flowed by Cisadane River and the stream, i.e. Kali Angke, Kali Ciarab, and Kali Kamal. **Bekasi District** has 14 situ and Kali Cilemahabang, Kali Cisadang-Bekasi, dan Kali Cikarang rivers. **Bekasi City** has 4 situ, and it's passed by a river of Kali Cikeas-Cileungsi-Bekasi. Finally, Capital City, **Jakarta** as the biggest city in Indonesia has 16 situ, which is flowed by Ciliwung River and it streams<sup>6</sup>.

Table 1. The changing of size of "Situ" Landscape Condition in Jakarta, Bogor, Depok, Tangerang and Bekasi (Jabodetabek)

Region	Number of Situ	Previously (ha)	Present (ha)
<b>Bogor District</b>			
Parung Panjang	11	42.00	30.00
Jasinga	8	18.05	18.05
Cigudeg	2	3.50	3.50
Nanggung	3	4.50	4.50
Leuwiliang	1	2.50	2.50
Ciampea	1	2.50	2.50
Ciomas Darmaga	5	9.50	8.50
Rumpin	11	29.50	29.00
Parung	9	65.75	65.75
Bojong Gede	7	52.42	42.88
Semplak	8	49.57	49.55

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ecosystems. The data were analyzed by classification of horizontal and vertical diversity of plant, Shannon Index and Important Value Index. Based on the result, *pekarangan* and forest garden in the top part of the middle stream of Ciliwung River had the highest score for diversity (4,45 and 3,9). But, the mixed garden had the highest score in the middle part (3,68). Good species that must be kept and planted on riparian based on important value index are *Zea mays*, *Ceiba pentandra* and *Ficus elastica*<sup>8</sup>. Those ecosystems are suitable for agro-biodiversity conservation development (Fig. 7).

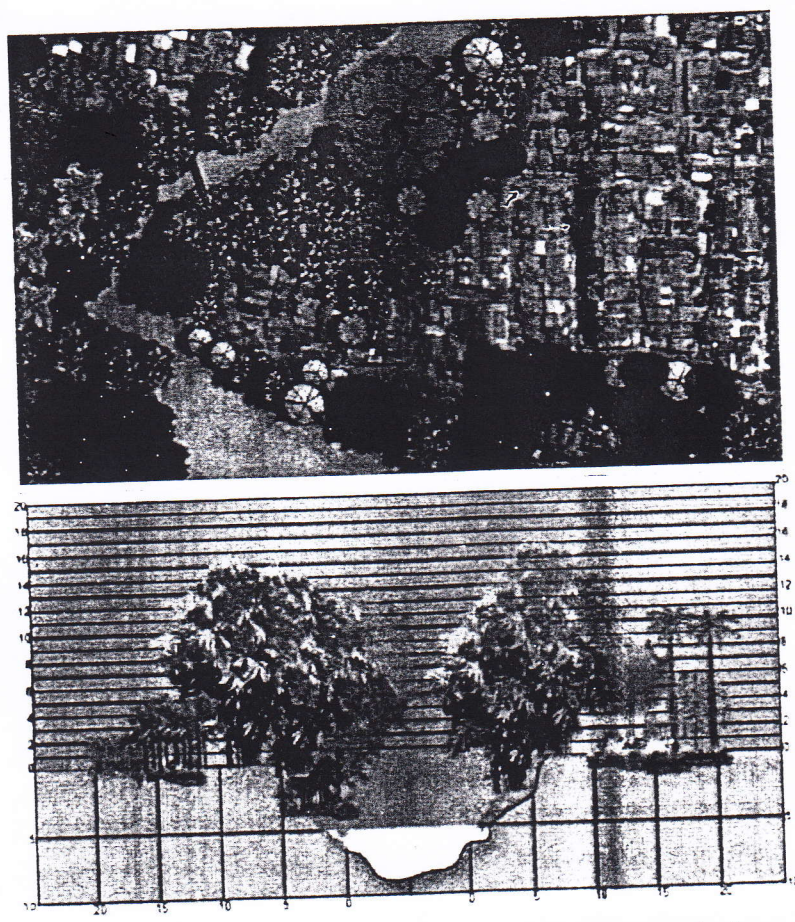


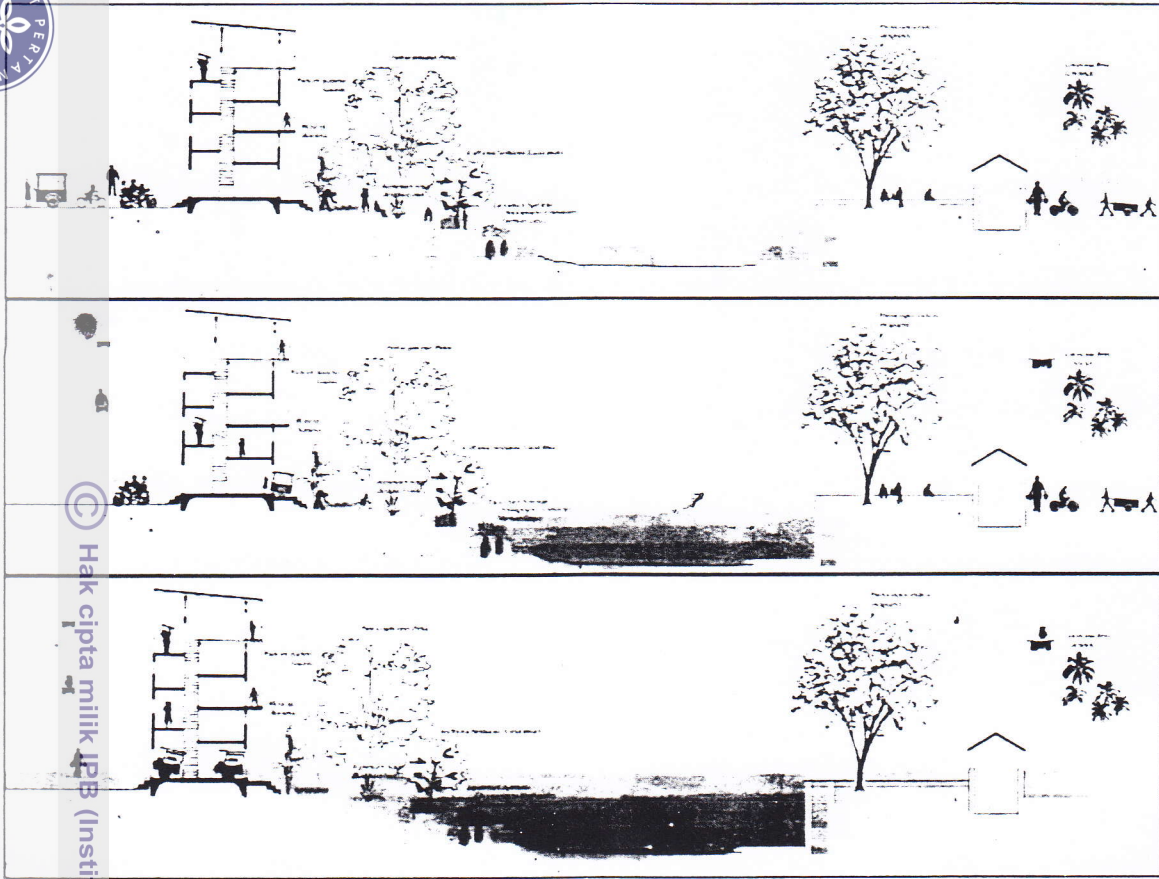
Figure 7. The riparian landscape of Kelurahan Karadenan, a part of the middle stream of Ciliwung River ecosystem<sup>8</sup>.

The downstream study sites are Kelurahan Lenteng Agung; Kelurahan Kampung Melayu; and Kelurahan Tanjung Priok. They are located in the alluvial flood of Metropolitan Jakarta. Therefore, landscape management for green and blue open spaces are addressed to become productive landscape as community gardens, e.g. *pekarangan*/public *pekarangan* (home gardens/apartment gardens), *kebun campuran* (mixed gardens), and *kebun talun* (forest gardens) is depended of the community needs and government policy and decision<sup>9</sup>. As the rules, riparian landscape should be free from the built up and constructed building. Paradigm of river front landscape must be implemented through re-movement of slum landed house to multi-storey housing (Fig. 8). Replacement of green open spaces as community gardens in the riparian is very necessary<sup>10</sup>.

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**Figure 8.** Anticipative landscape model in alluvial flood riparian landscape: normal water surface (top), the 3<sup>rd</sup> early warning (mid), and it's getting flood (bottom) condition<sup>10</sup>.

Riparian landscape in the city river must be thought carefully. Retaining technical implementation for avoiding erosion and sedimentation could be designed (Fig. 9). There are three designs with value of Scenic Beauty Estimation<sup>11</sup>: 1). Natural vegetation: to protect natural river bank (SBE value: 47.96); 2) Bio-retaining wall: Alternative to develop urban river bank which has erosion hazard SBE Value: 27.07); and 3). Fully retaining wall: to implement in the steepness slope and fragile soil type/to avoid landslide (SBE Value: -2,65).



**Figure 9.** Three alternatives design of the steepness of riparian landscape: natural vegetation (left), bio-retaining wall (center), and concrete retaining wall<sup>11</sup>.

Illustrator: Noviandi, 2014

### Riverside Water Cascade Model

Watershed management concerns to avoid flooding in the rain season and escape the drought in the dry season<sup>2</sup>. Water as a source of life to be kept and managed maximum in sustainable concept. Riverside water cascade model is the alternative water management, which could be implemented to substitute the development of big dams in Ciawi and Genteng. This model is simpler, cheaper, and proportional in distribution of responsibility by local government due to the establishment of riverside cascade along the

riparian landscape. By the rule, the riparian is belonging to public own or government land. By simulation (Fig. 10 and Fig 11), it is assumed that only 70 percent of 117 km Ciliwung river length can be used for construction of riverside cascade. C.a. 82 km is suitable. Riverside water cascade will be built in each km of both sides in the left and right. 164 water ponds will be confirmed, which the size of 50 m length, 25 m width and 5 m depth. One pond has 6,250 m<sup>3</sup> water volumes. Therefore, the total water can be preserved around 1,025 million m<sup>3</sup> or 1,025 billion liters. As a productive landscape, riverside water cascade provides water for irrigation, fishery, habitat of wildlife biodiversity conservation, micro-climate amelioration, and recreation object for the communities<sup>2, 12</sup>.

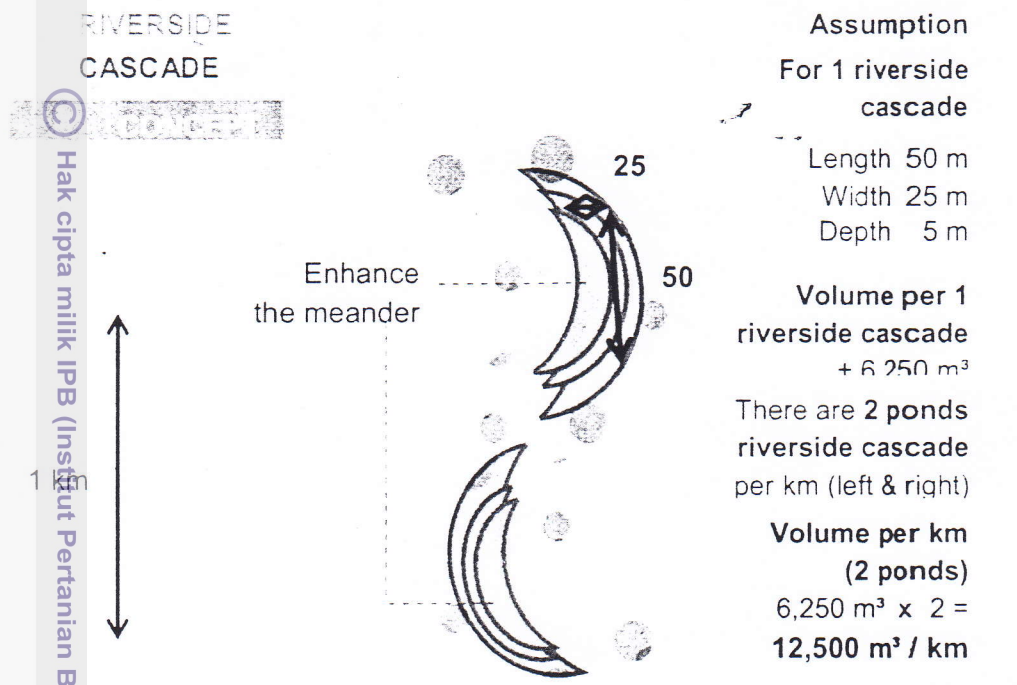


Figure 10. River water cascade model for blue open space landscape management<sup>13</sup>  
Illustrator: Noviandi, 2014

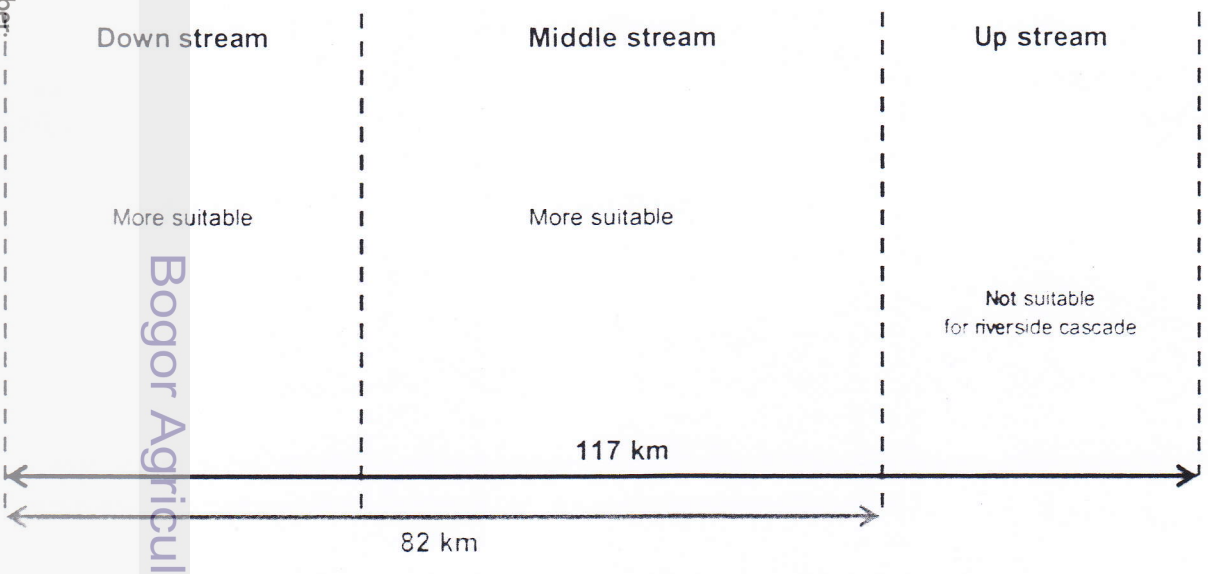


Figure 11. The effective landscape for riverside water cascade in Ciliwung riparian<sup>13</sup>  
Illustrator: Noviandi, 2014

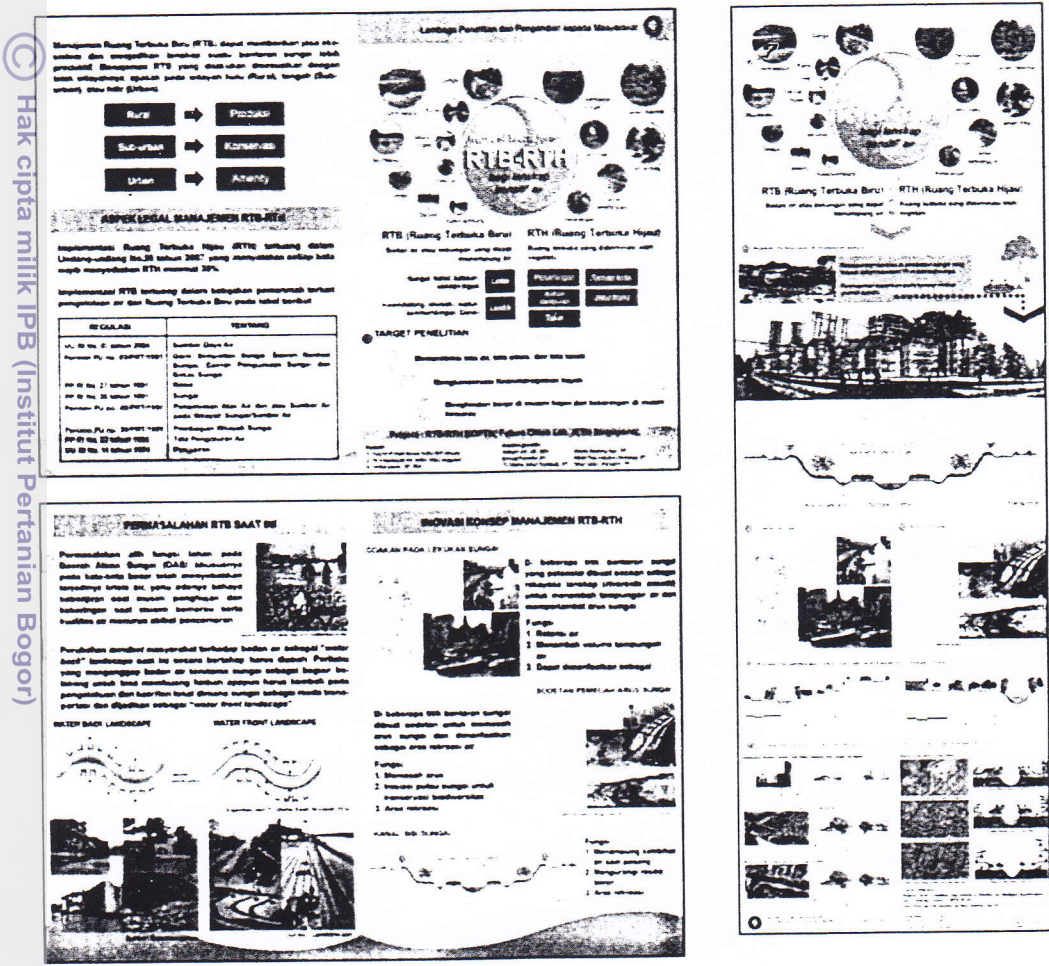
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This part, composed as the results of the study, aims to share the concepts of river front landscape or *situ* front landscape over the media of leaflet, poster and booklet. Involvement of the community would be held through Focus Group Discussion (FGD). The FGD has been and will be conducted many times in three study areas in the upper, the middle and the downstream of Ciliwung riparian in order to elaborate what people want and what the regulation should be. The objective of dissemination and social engineering also to interfere the public mindset, from "water back concept" to "water front concept". In the end, there will be a commitment and statement from all stakeholders to clear the Ciliwung riparian from any occupation of settlement and other built up area. The planning to develop "riverside water cascade", if approved by all stakeholders will reduce the possibility flood disaster in Jakarta City, and at the same time evenly distributing the responsibility of management to all government at any level.

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Leaflet

Standing Banner

Figure 12. Social engineering materials for extension services: leaflet and standing banner would distributed to the communities who are living in the riparian and its vicinity<sup>2</sup>.

CONCLUSION

Based on the characteristics of the riparian landscape along Ciliwung River, the proposed landscape management types are: urban agriculture in the upper stream, agro-biodiversity conservation in the middle stream, and community gardens in the downstream. The regulation that the riparian landscape should be public green open space should be strongly implemented. To slow down the river flow and to utilized more effectively and efficiently the water resources, the model of water cascade, canalization, and small check dam are suggested to be developed intermittently along the river, where the landscape is suitable. The result of this study, particularly the threats and the danger of improper land uses and



management in riparian landscape, and the recommendation of landscape management and alternatives models to manage blue open space, were simply explained in communication media such as leaflet, poster and video. These media will be utilized as community guidance for social engineering. This effort should be supported by local government to convince the people welfare.

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## ACKNOWLEDGEMENT

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## REFERENCES

- [1] Adikari Y, Osti R, Noro T: Flood-related disaster vulnerability: an impending crisis of megacities in Asia. *J of Flood Risk Management* 2010, 3:185-91.
- [2] Arifin HS, Kaswanto, Arifin NHS: *Manajemen Lanskap Riparian Sungai Ciliwung Berbasis Pemberdayaan Masyarakat dalam Mengatasi Banjir di Wilayah Hilir*(Management of Riparian Landscape of Ciliwung River Based on Community Empowerment to Overcome Flood Disaster in the Downstream). Seminar Hasil-hasil Penelitian PPM IPB Desember 1-3, 2014. Hotel Pajajaran Suites Resort & Convention, Bogor Nirwana Residence, Bogor (in Bahasa Indonesia), 2014.
- [3] Arkham HS, Arifin HS, Kaswanto: Management of Blue Open Space Landscape in Ciliwung Watershed. Graduate School Seminar of Landscape Architecture Department, Bogor Agricultural University (in Bahasa Indonesia). Bogor, 2014.
- [4] Arifin HS: Revitalisasi Ruang Terbuka Biru (RTB) sebagai Upaya Manajemen Lanskap pada Skala Bio-Regional. *J Risalah Kebudakan Pertanian dan Lingkungan* 2014, 1:172-80.
- [5] [BBWSCC]. *Inventarisasi Badan Air Jabodetabek* (Inventory of Water Catchment in Jabodetabek): Balai Besar Wilayah Sungai Ciliwung Cisadane, Departemen Pekerjaan Umum. Jakarta (in Bahasa Indonesia), 2011.
- [6] Noviandi TUZ: Inventory of Blue Open Space in Jabodetabek. Bogor: Laporan Topik Khusus Manajemen Lanskap Riparian - Task 1. Graduate School of Bogor Agricultural University (IPB) Bogor. 21p (*Unpublished*). 2015.
- [7] Siswanto NG, Arifin HS: Green and Blue Open Spaces Management for Potential Revitalization and Development Urban Agriculture in the Upper Stream of Ciliwung River. Undergraduate Seminar of Landscape Architecture Department, Faculty of Agriculture, Bogor Agricultural University (in Bahasa Indonesia), 2014. p. 10.
- [8] Sari MA, Arifin HS: The Dynamic of Plant Structure in Riparian Landscape of the Middle Stream of Ciliwung River. Undergraduate Seminar of Landscape Architecture Department, Faculty of Agriculture, Bogor Agricultural University (in Bahasa Indonesia), 2014. p. 10.
- [9] Saputra AP, Arifin HS: Riparian Landscape Management for Community Garden in the Downstream of Ciliwung River. Undergraduate Seminar of Landscape Architecture Department, Faculty of Agriculture, Bogor Agricultural University (in Bahasa Indonesia), 2014. p. 10.
- [10] Qing W, Ying F, Risinda N, Susetyo B, Ziegler M, Olas K: Facing the River. Singapore: The Future Cities Laboratory Workshop in Jakarta and Singapore, 2013.
- [11] Noviandi TUZ, Mansyur A, Nurwanda A, Danniswari D, Franjaya EE, P FDI, Mulya MR, H NJ, Najmi N, Rejoni R, Wakyudi: Kajian Strategi Pengelolaan Ruang Terbuka Biru (RTB) Kota Bogor (Analysis Strategy of Blue Open Space Management in Bogor City). Workshop Pengelolaan Kota Bogor, Mata Kuliah Pengelolan Lanskap Berkelanjutan (ARLS21) Semester Genap TA 2013/2014. Bogor (in Bahasa Indonesia), 2014.
- [12] Arifin HS: Manajemen Ruang Terbuka Biru (RTB) untuk Pengendali Banjir. *Majalah Indonesia Housing*, 2014. pp. 42-5.
- [13] Arifin HS: Green and Blue Open Spaces Management in Water Sensitive City of Jakarta. International Workshop of Infrastructure Cluster, the Australia Indonesia Centre in Melbourne, 2015.



# SUSTAINABLE MEGACITIES: vulnerability, diversity, and livability

The 5th International Conference of Jabodetabek Study Forum with the theme "Sustainable Megacities: Vulnerability, Diversity and Livability" was held in Bogor, Indonesia, during 16-18 March 2015. This event was attended by academicians, researchers, governments, practitioners, NGO's and communities, both Indonesian and foreign participants.

The plenary lectures were delivered by four keynote speakers which include the Minister of Agrarian and Spatial Planning, Deputy Governor of Jakarta Province, Head of Megacities and Global Environment Project RIHN Japan and Scientific Director of Future Cities Laboratory Singapore ETH Centre. This conference was attended by 92 presenters and 150 participants.

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