



# PROCEEDING

*The International Symposium of*



**"THE FUTURE CHALLENGE"**

AUGUST 10-11, 2009

IPB INTERNATIONAL CONVENTION CENTER, BOGOR, INDONESIA

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**Proceeding " The International Symposium of Green City"  
The Future Challenge**

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Sentul City

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## EDITORIAL

Proceeding of The International Symposium of Green City is concerned with conceptual, scientific, and design approaches toward urban sustainability. The papers were presented on The International Symposium of Green City, August 10-11<sup>th</sup> 2009, held by Dept of Landscape Architecture Department at IPB Bogor, Indonesia. It emphasizes ecological understanding and a multi-disciplinary approach to analysis, planning and design of urban area. The paper also attempts to draw attention to ecological processes interacting within urban areas, and between these areas and the surrounding natural systems with specific problems such as social and cultural approaches to urban landscape issues.

Proceeding consists of papers dealing with Green City, Eco-City and Sustainable City; Green Infrastructure and Green Architecture; and Urban Rural Linkage. The topics might include but are not limited to landscape ecology, landscape planning and landscape design. Landscape ecology examines how heterogeneous combinations of ecosystems are structured, how they function and how they change. Landscape planning examines the various ways humans structure their land use changes. Landscape design involves the physical strategies and forms by which land use change is actually directed. The papers is based on the premise that research linked to practice will ultimately improve the urban landscape.

We wish this proceeding to be a useful for increasing our understanding toward urban sustainability and we also sincerely thank for sponsors, steering committee, organizing committee and paper contributors.

Bogor, November 2009

**EDITOR**



**Opening Address**  
**International Symposium of Green City**  
**“The Future Challenge”**

Assalamu'alaikum Warahmatullahi Wabarakatuh

Good Morning, Ladies and Gentlements. First of all, please allow me on behalf of Bogor Agricultural University or IPB to welcome you all to IPB Campus. It is an honour for IPB to be a host of this very important event to discuss the future challenge of green city. I thank you very much, especially for the keynote speaker, the honorable Minister of Public Eork Republic of Indonesia visit to IPB campus to day. This visit is very important for IPB; because IPB has a long history in environment and agricultural studies related to publuc works. I thank you very much for invited speakers and participants from Indonesia and overseas to share their research progress related to green city in this symposium. This symposium is an initial meeting to develop understanding the context of problem sollution to address the future of green city. However, I am sure that this symposium will conclude very valuable results.

Dear Participants, Distinguished Guests,

Since December 2000, IPB has become an autonomous university. As a legal entity, IPB has been more independent in term of academic program, as well as resource management. IPB is the only state university in Indonesia that is focusing on tropical agriculture and bio-science as its core competence. Internationally, IPB is well recognized. IPB has been in a long standing cooperation with national as well as international institutions. IPB has nine faculties, one Postgraduate School, and one Vocational School. IPB has 36 departments and 16 research centers. Student body of IPB is around 25,000 students, 15,000 of which undergraduate students, 5,000 graduate students and the rest are vocational school students. IPB has 133 professors, IPB is capable of offering innovative programs including activities on green city research and development. There are some opportunities to develop research collaboration between IPB and national/overseas Universities, as well as other institutions, like Sentul City, Sampoerna Group on green city research and development.

Dear Participants, Distinguished Guests,

This symposium is aimed to be an exchange information event on research results related to green city and the implementation of green city concept in several housing area such as Sentul City. As we know that Sentul City introduce a new cluster with green building and green wall as a part of green infrastructure concept. The collaboration project between IPB and Sentul City was just signed by two parties on last month to show that IPB is very concerned to develop an integrated spatial plan for green city.



Dear Participants, Distinguished Guests,

Through this symposium we do hope that the green city concept could be widely adopted by the government and the housing developer to prevent and even to increase green space in urban area. I thank you very much for all the participants and wish you a very succesful symposium. Finally, I hope this symposium will be very fruitful and be a significant step in realizing green city concept. Thank you very much for your attention.

Wassalamualaikum Warahmatullahi Wabarakatuh

Bogor, August 10<sup>th</sup>, 2009

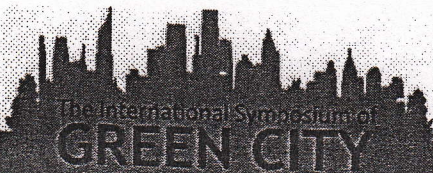
Rector,

**Prof. Dr. Ir. Herry Suhardiyanto, MSc.**

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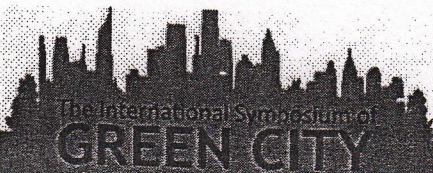
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## **Welcoming Speech**

### **Dean of Faculty of Agriculture**

Ladies and gentlemen,

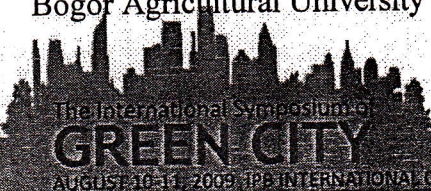
First of all we would like to express our gratefulness to Allah for all the blessings have received. It is our pleasure to welcome you all to this global awareness symposium. Will our city be chaos or controlled? We believe our city should be controlled. Our future city should be a green city, eco-city, and sustainable city. We invite our colleagues representing academicians, professionals, government and community members to give enhancement and to share their experiences on three sub themes of our discussion i.e. (1) green city, eco-city and sustainable city (2) green infrastructure and green architecture; and (3) urban-rural linkage. Therefore we would like to thank to Prof Yoritaka Tashiro from Chiba University; Diane Wildsmith, MSc Arch Visiting Assistant Professor of University of Indonesia, Prof Joerg Rekittke Director of MLA Program, National University of Singapore; Deni Ruchiyat from Ministry of Public Work; invited speakers and practitioners and developers who had pioneered local and community based sustainable development and management in the city.

Our landscape architecture competencies, originating from horticultural and environmental sciences that later will be developing into green and aesthetic spatial engineering competencies that will inspire our colleagues from Department of Landscape Architecture to develop concept of green city. We believe such competencies will be complementary and needed in our complex future.

I intend my address on how city as living and dynamic entity, should be developed in sustainable ways. As an analogy to a biological organism, a metabolic process in which material is consumed and transformed, complex growth and development occurs in a city. Therefore as generically outlined by Sarosa (2004) green city development and management is subject and in respect of (1) intergeneration orientation, (2) spatial dynamic (3) sosio-economic viability, (4) political and policy power and arena, (5) interspecies interaction, and (6) intermedium transformation. Moreover, benefits of such development and management for its inhabitants not only socio-economic and environmental benefits, but also cultural vibrancy in which the community inclusively participates. Starting by this symposium we invite you all to engage in efforts of "green" enhancement in respect to Lynch's (1980) fundamental criteria: (1) vitality of the infrastructure and function; (2) sense of place; (3) fit or sense of competence; (4) competence; (5) control; and (6) meta criteria (equality, justice) to create a better livable city.

Have a success symposium. Thank you.

**Prof. Dr. Ir. Didy Sopandie, M. Agr.**  
Dean of Faculty of Agriculture  
Bogor Agricultural University



## Welcoming Speech

### Head of Landscape Architecture Department

Distinguished Ladies and Gentlemen, all participants of Green City International Symposium,

The rapidly growing world population is exerting great pressure on the land, waters, and energy resources that are essential to productive tropical agriculture-rural communities and its bio-resources. By 2030, more than 60 percent of the world population will live in cities, up from almost half now and just a third in 1950. The growth poses huge problems ranging from clean water supplies to trash collection. Already, one of every three urban dwellers lives in a slum in the present time. Let us create green cities. Adding the United Nation goal of halving poverty by 2015 would not be met unless city planning was less haphazard.

Green city (*kota hijau*) is a term used for sustainable city or ecological city. Activists mark June 5, the date of the first environmental summit in Stockholm in 1972, as the UN World Environment Day. The 2005 theme is Greener planning for cities, many of them hit by air pollution, fouled rivers and poor sanitation. In San Fransisco, the main host of the 2005 event, mayors from more than 50 cities including Shanghai, Kabul, Buenos Aires, Sydney, Phnom Penh, Jakarta, Rome and Istanbul planned to sign up for a scheme setting new green standards for cities. Cities would be ranked from zero to four stars according to compliance with a set of 21 targets. And around the world, from Australia to Zimbabwe, activists staged rallies, cleaned up litter, organized poetry competitions or planted trees.

Green City is related to Urban Enviromental Management and ISO 14001 at the level of a City. The development and implementation of the EMS at the level of a city is a complex task involving a myriad range of tasks and actors. UNEP's International Environmental Technology Centre recommends three steps in extrapolating the ISO 14001 to the level of city:

- **Step 1 (Promotion of Eco-office):** Reduction of energy use; Reduction of water use; Reduction of solid wastes; Promotion of recycling; Green Procurement;
- **Step 2 (Promotion of Eco-Project):** Using e-friendly materials; Using e-friendly equipment; Accelerate use of recycled materials; Green public engineering works; Develop green technology; Promote greening
- **Step 3 (Green City Planning):** Set green guidelines for public works; Set green guidelines for housing; Enhance public transportation; Capacity building; Apply EMS to the whole city

Through the Green City International Symposium that is being conducted in IPB International Convention Center (IICC), Bogor, Indonesia on 10-11 August 2009, we wish all the stake-holders from academic institution, professionals, companies, government, and communities can sit together to have excursion in the second day in the objects of Sentul City, Puncak Highland, Taman Bunga Nusantara, and Kota Bunga.



After the symposium, you could enjoy Bogor City and its vicinity by yourself. We suggest to visit Bogor Botanical Garden, Ethno-botany Museum, Zoology Museum, culinary tour, etc.

Finally, welcome to Bogor and have a good and fruitful time attending this symposium.

**Prof. Dr. Ir. Hadi Susilo Arifin, MS**  
Head of Landscape Architecture Department  
Faculty of Agriculture-IPB



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## Welcoming Speech

### Chairperson of Organizing Committee

Assalamu'Alaikum Warahmatullahi Wabarakatuh

Good Morning, Ladies and Gentlemen.

First of all, welcome to distinguished guest Rector IPB, Keynote Speaker, Dean Faculty of Agriculture and other Faculties, Invited Speakers, Head of Department Landscape Architecture and other Departments, and all participants in this Symposium of Green City organized by Department Landscape Architecture, IPB. It is a great honor for me to explain a brief report about these two days symposium with the theme.

Dear Participants, Distinguished Guests,

As we all know the loss of urban green space became a trend of urban development in all over the world. However, global warming, high pollution, flooding, etc. have become hot issues recently in big cities, including in Indonesia. We need to give our energy to revitalize the existence of urban green space to reduce these problems. Urban green space strongly plays an important role to improve ecological sustainability of urban landscape, beside increase the aesthetics of the city.

The new Spatial Planning Act 26/2007 gives us a bright future for urban sustainability commitment. One of the important provisions of the Spatial Planning Law 26/2007 is the requirement of at least 30% of urban areas for open spaces. The open spaces can be public and private open spaces. More specifically, public open spaces account for at least 20% urban areas. In addition, this law stipulates that forest areas must be account for at least 30% of river stream areas. Such provisions were not included in the previous spatial planning law.

Dear Participants, Distinguished Guests,

With these all in mind, we selected "The Future Challenge of Greencity" to become a theme of this symposium. The symposium will be held on two days. On first day, we will learn deeply about greencity concept from honorable invited speakers, and experience learning from private sectors in the morning; and after lunch time we will share our research progress related to green city which is divided into 3 parallel sessions: Green city, Eco-city and Sustainable city; Green Infrastructure; and Green Architecture and Urban-Rural linkages. For these parallel sessions, we grateful all to 30 oral presenters and 9 poster presenters. It is great honor for us as an academic society to share our research experience through this Symposium.

On second day, we will hold a field excursion. We will visit Sentul City, the beautiful satellite city within Jabotabek area with excellent MURI awards of 2009 for their streetscape design, and Kota Bunga Nusantara, one of well designed flowers city in Puncak Area. Through this field excursion, we do hope that we could learn how to realize a greencity not only based on theory based but also from real practice.



Dear Participants, Distinguished Guests,

Finally, we do hope that this symposium become a valuable time for our learning process to reach our dream: "Greencity". Many thanks to head of Landscape Architect Department, Steering Committee, and Organizing Committee, without you all, we could not hold a big event. Also highly appreciation for all studentd, with their big effort to spend the time and energy for symposium preparation.

On behalf of organizing committee, we kindly ask your apology for some any weaknesses during these two days event and symposium preparation.

I do hope that ALLAH SWT bless all of us

Thank You

Wassalamualaikum Warahmatullahi Wabarakatuh

**Dr. Ir. Alinda F.M Zain, MSi.**

**Chairperson of Organizing Committee**



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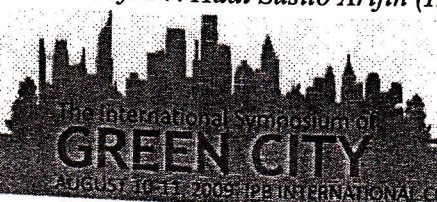
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# Landscape Planning Base on Bioregional Approach Case Study: Settlement Segment of CiLiwung River Bank in Bogor

Arin Ningsih Setiawan<sup>1</sup> and Qodarian Pramukanto<sup>2</sup>

<sup>1</sup>*Alumni of Department of Landscape Architecture, Faculty of Agriculture,  
Bogor Agricultural University*

<sup>2</sup>*Department of Landscape Architecture, Faculty of Agriculture,  
Bogor Agricultural University*

## ABSTRACT

Riparian area in middle stream of Ciliwung watershed at Baranangsiang and Babakan Pasar, Bogor are conservation area which have to preserved. The ideal land use of these areas is greenbelt but it has been occupied as built-up in areas. The settlements have caused environmental destruction and decrease health quality. The purpose of this study is to evaluate spatial structures at riparian areas on location and study the people's activity, in order to make a landscape plan based on bioregion with sustainable environment in ecological, social and economic aspects.

Analysis of spatial structure was conducted by comparing the characteristics of the existing conditions and standard criteria. If it is not appropriate with standard criteria, there will be some purpose for the solution, but if it is appropriate, then there will be some optimalization program. Based on the analytical process, it will be synthesized, and a conceptual plan, development plan and landscape plan will be produced. There are two type of zoning to be determined, i.e. conservation zone and non-conservation zone. Conservation zone occupies about 20.7 % of the area. The structure of conservation zone is a greenbelt which has to function as a buffer, wildlife habitat, filtering pollution, and producing nutrient for the river. The non conservation zone occupied an area about 79.3 % of the area. The uses in this area are for installation of public facilities, infrastructure and utilities. In addition the supporting facilities has been proposed, such as an evacuation area, installation of waste water treatment, biotoilet and green management.

**Keywords:** Bioregion, Landscape planning, Riparian

## 1. INTRODUCTION

River have important role in natural process and as source of water for human and other life forms. Ecologically, river bank is protected area should be conserved as riparian. Urban development hardly paid attention and neglected to the river system. The city had lost their river image and impression of natural resources river culture as well. Orientation development of the city changed from river-base to land-base. The rivers just as a complement not as a heart of urban living and urban scenery

CiLiwung as one of the big river which passing through Bogor city and streaming to Jakarta and always making flood in Jakarta at rainy session. Any environmental activities in the up stream will make response in down stream. The fact that some part the river bank of CiLiwung are used for housings, bridges, roads, paths, other urban facilities and utilities. The occupation on the river bank caused rivers are narrower and reducing some river functions. Environmental problems occur such as physical function (flood, landslide, erosion) ecological function (riparian wild life, water pollution from back water, solid waste), economic function (fishing, irrigation, water resource) and socially function (river life style). Those bad attitude and behavior make problem in term of spatial arrangement, environment and living.

With increasing environmental catastrophes on the urban river, it is necessary to actively undertake ecological sustainability in order for human and other life forms to survive. The most useful starting place to transform the enviromental problem in river of the city is to recognize the particular bioregion in which it is located.



A bioregion is defined as life-in- place that means following the necessities and pleasures of life as they are uniquely presented by particular site, and evolving ways to ensure long-term occupancy of that site. Bioregion refers both geographical terrain and a terrain of consciousness—to place and the ideas that have developed about how to live in that place (Berg and Dasmann, 1978). Moreover Berg (2003) said the bioregion is the unique natural characteristics that occur throughout a particular geographic area, such as climate, landforms, watersheds, soils, native plants and animals, and other features.

Since the study site considered as part of bioregion of CiLiung watershed, there are relationship and interdependency among other part within the (whole) watershed. Therefore, landscape planning based bioregion approach in the study site would be contribute to the other part, especially in the middle and downstream of CiLiung watershed.

The basic goals of a bioregional approach are as follows: a) restore and maintain natural systems, b) develop sustainable means for satisfying basic human needs such as food, water, energy, shelter, resource materials, waste handling, and cultural information, and c) create and support a broad range of activities which make it possible to fit better into the life-place.

### Objectives

1. To evaluate spatial structure and community activities of settlement segment on CiLiung river bank of Baranangsiang and Babakan Pasar sub district in Bogor city.
2. To prepare landcape plan on river bank base on bioregional approach

## 2. METHODOLOGY

The study was conducted in the segment of CiLiung river which is pass through the city of Bogor from March to August 2007. Study site located on the river bank involve Baranangsiang dan Kelurahan Babakan Pasar sub district, Bogor municipality (Figure 1)

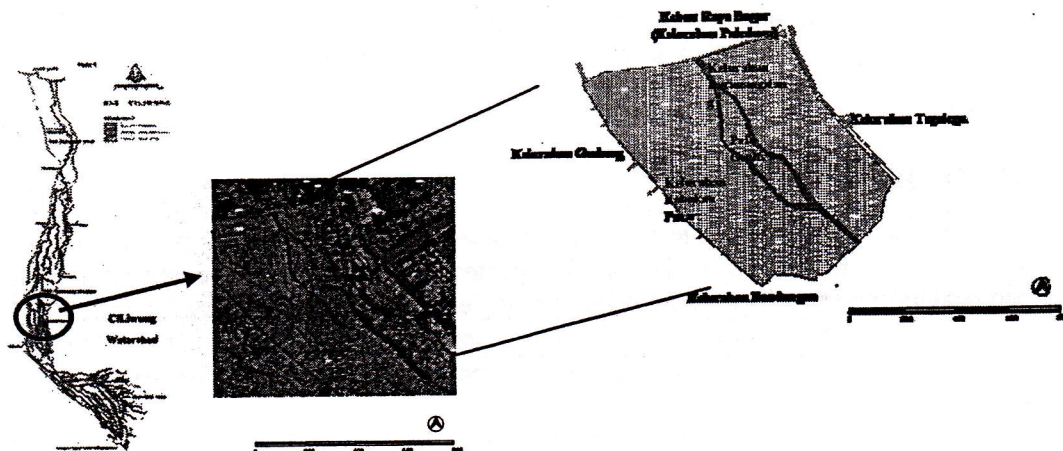


Figure 1. Study site

### Material and Equipments

Data and information used for the study consist of spatial data, such as administration map (2005), topographical map, street map and Ikonos imagery. Field survey was conducted for collecting information from selected respondent, ground check and verification. Some equipment were used such as PC computer, digital camera and GPS (Global Positioning System).

Mapping and Data analysis was conducted using Computer Aided Design (CAD) and Geographic Information System (GIS), and image editing and simulation using Adobe Photoshop and Bryce 5.

## Methods

Study was conducted in five steps as follow the framework of study (Figure 2). **First**, preparation of spatial data (such as base map and preliminary map), developing standard criteria and collecting related data from document, report etc. **Second**, field survey was conducted by observe the site, and interview the 35 of household as representation of each settlement category as sample respondent. Randomly, respondent was selected from sample frame of settlement types. The attribute data were collected was transfered into base map. Spatial data were produced, such as Existing Settlement Map, Infrastructure Map, Utilities Map and others. **Third**, the site was analyzed and characterized in term of biophysics, social and economy. Analysis will determined the site into planning capacity by matching the site characteristics and planning standard criteria. The planning capacity of settlement, infrastructures, utilities, and others were classified in order to be able to produce some map, such as River Map, Settlement Classification Map, Household Sample Map, Infrastructure Map, Utilities Map and others map. **Fourth**, base on analysis of the planning capacity of settlement, infrastructure, utilities and others, alternative to solved the problem were proposed for those which are over the planning capacity. For those which are less than the planning capacity will be proposed solution to optimalization. **Fifth**, base on synthesis, the planning development were proposed in form landscape plan.

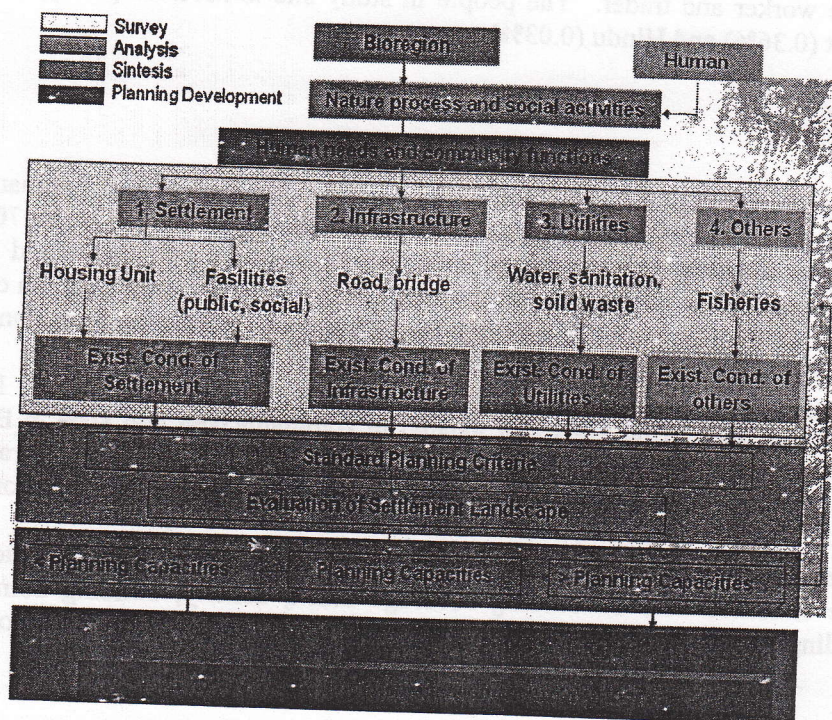


Figure 2. Framework of study

## 3. DATA AND ANALYSIS

### 3.1. General Condition

#### a. Biophysics

The study site, mostly located in elevation more than 200 m above sea level (a.s.l.). About 12%, 70% and 17% of the area in Baranangsiang sub district lay on 201-250 m, 251-300 m, and > 300 m a.s.l, respectively. While the area of Babakan Pasar sub district lay on 251-300 m a.s.l. Both Baranangsiang and Babakan Pasar sub district have area almost flat to steep slope.

The soil type of site is brown latosol, except the area in river bank of CiLiung which is coverage by grey aluvial. The average temperature is 27°C, with maximum 29°C and minimum 23°C. Rainfall depth in the study site is 4680 mm/year with 156 rainy day (Bapeda, 2005), during wet season the highest rainfall in February and June. While the wind velocity is 2 km/hour predominantly to the northeast.

The river of CiLiung passing through the site along 976 m. The average width of river is 12 m. There is a island-like in the middle of the study site, namely Pulo Geulis. In certain part of river channel is curve form and narrow. It was created by some landslide, sedimentation and settlement occupation on the river bank.

Some vegetation, such as Angsana (*Pterocarpus indicus*), Mahagony (*Swietenia mahagoni*), Bamboo (*Bambusa* sp), and others, mostly, covered the river bank. Those riparian vegetations are declining by occupation of unregistered settlement on the river bank.

## b. Social

Baranangsiang sub district (15.7 ha) has four neighborhood units with 792 inhabitants or has population density about 50.44 inhabitants per ha. While in Babakan Pasar sub district (37.8 ha) has 10 251 inhabitants or has population density about 271.19 inhabitants per ha. Population density of Babakan Pasar is five time higher than Baranangsiang sub district.

Majority of Baranangsiang sub district are trader or services business, but the Babakan Pasar people are worker and trader. The people in study site is Moslem (96%), Christian (3.6%), Buddhist (0.36%) and Hindu (0.03%)

## c. Settlement

### Housing Units

The study site coverage an area about 53.6 ha. It is consist of area in Baranangsiang sub district about 15.7 ha (29.37%) and in Babakan Pasar sub district about 37.8 ha (70.63%). The coverage area of study site consist of 86.67% occupied by settlement and remain 13.33% by green open space. Since geometry of the CiLiung have varies in depth of river, than base on the PERMEN PU NO: 63/1993 the setback of river is no less than 30 m. Mostly, the settlement was occupied within the river setback.

By analyzing the spatial data and delineation Ikonos imagery, there are 1692 of building unit. About 20% of building unit located in Baranangsiang and 80% in Babakan Pasar sub district. There are some characteristics of building, such as type, coverage, and density. Those characteristics express economic level, social background and environmental influences.

There are three type of building unit, namely Type 1, Type 2 and Type 3. Those type of building are classified base on buiding coverage index, density, building domination, amount of buiding per ha, buiding area, building pattern and width of neighbour road (Table 1.).

Table 1. Criteria of Building Classification

Criteria	Type 1	Type 2	Type 3
Floor-based Coefficient	64,4 %	90,71 %	79,52 %
Buiding Density	high	very high	High
Building Dominance	house	house	House and store (rukho)
Amount of Building per ha	30	85	30
Building area	600 m <sup>2</sup>	70 m <sup>2</sup>	70 -400 m <sup>2</sup>
Building Pattern	reguler (linier)	irreguler	reguler (linier)
Width of neighbour road	4-5 m	1.5 m	4-5 m

Sources: Field survey analysis

Randomly, in amount of 35 household as sample representation from each type building class was selected. There were six household units were selected for building type 1 with building area between 600 – 800 sq.m (average 750 sq.m), 24 household units for building type 2 with building area between 8 to 800 sq.m (average 150 sq.m), and five household units for buiding type 3 with building area of house and store between 600 to 800 (average 105 sq.m).

Base on inventory and analysis of those samples, the building area of type 1 > type 3 > type 2, building floor area type 1 > type 3 > type 2, the average need of space type 1 > type 3 > type 2. Moreover settlement type 1 and type 3 have similar space needed per person and comply as standard criteria. While the settlement type 2 have varies of space needed per person. These varieties are caused by different of building area, building floor area and amount of person in household. In settlement type 2, there are some household comply to standard and some others were not comply to standard yet (Figure 3).

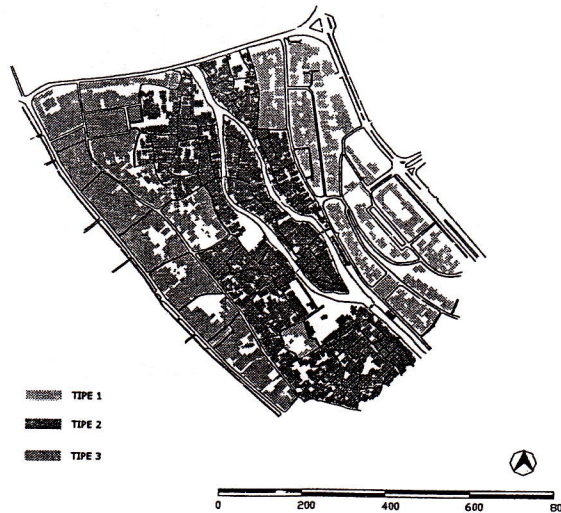


Figure 3. Map of Settlement Classification

### Facilities

There are some facilities within study site, such as education, health, worship, economic facilities (Table 2.). Those facilities are comply to the minimum standard, but the area coverage to those facilities within the study site not fully shows the distribution of the uniform.

Table 2. Public Facilities in Study Site

No	Facilities	Note
1	Education	Pre-School, Primary School, Secondary School, Tertiary School
2	Health	Dru store, integrated heath service, community health center
3	Worship	Mosque, Chruch, Buddhist's Temple
4	Bussiness	Store, Ruko, petty trader
5	Open space	Park, sport field

Source: Field Survey

### Infrastructures

There are infrastructures avaiable to accomodate transportation, such as road and bridge within study site. The study site was surrounded by artery road of Jalan Pajajaran, Jalan Otto Iskandardinata as collector road, and neighbourhood road. Other collector road are Jalan Roda, Jalan Bangka, Jalan Belitung, Jalan Sambu and Jalan Taman Riau. The

quality of road, in term of paving and drainage system of Jalan Pajajaran, Bangka, Belitung, and Sambu area good (Figure 4).

There are five bridges connecting Baranangsiang and Babakan Pasar sub district. Four of those bridges connect each part of study site through the island-like area of Pulo Geulis. The construction of bridge are made by concrete and steel and have average length 10 m and width 3 m.



Figure 4. Map of Infrastructure

### Utilities

According to the previous research, the water quality of river was C, that mean cannot used as drinking water, but possible for fisheries. About 92.8% household in Baranangsiang sub district and about 84.75% Babakan Pasar sub district are supplied drinking water from PDAM (authority responsible for drinking water supply). The PDAM have been supplied drinking water to the settlement type 1, 2 and 3. Base on interview, there were 92% respondents used PDAM, 6% used river and 2% used drill well for shower. About 79.5% of household used PDAM, 14.7% used river, and 5.8% used drill well for washing the cloth. There are seven drill well used and distribute in settlement type 2.

There are 5.9 % household within the study site have no toilet and using river as toilet. About 94.1% household have they own toilet. Those who have toilet, there are 50% have septic tank, and the remain 50% have no septic system, it mean the black water are throw to the river. Among those who have no septic system are the household who live in the island-like of Pulo Geulis (Figure 5).

Regarding to the solid waste system, there are three system, i.e. a. Solid waste container and collecting by the Environmental Service Agency (27%), b. Adjacent solid waste transfer station (TPS) and incinerator ( 56,8%), and c. Throw it to the river ( 16,2%).

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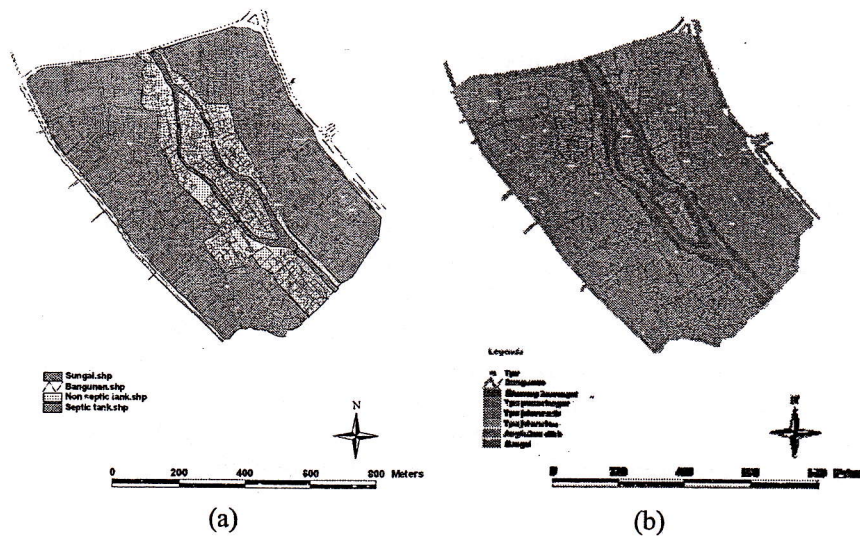


Figure 5. Map of Utilities: a. Septic system; b. Solid waste

### Others Activities

The river also used for other economic activities, such as aquaculture with “karamba system”. Some people rising fresh water fish, i.e. consumable fish (such as tilapia, catfish) and ornamental fish (such as “koi”). The excess of “karamba system” are in create water pollution from the residual of fish feed and blocking the stream flow.

### 4. SYNTHESIS

In order to be able to create the sustainable urban environment by applying bioregion concept, it was conducted evaluation to the existing condition of settlement landscape aspect, i.e. settlement, infrastructure, utilities and others base on planning capacity. Evaluation was classified the landscape into two bioregion categories, i.e. “good” and “bad”. Categorization was base on two criteria, i.e. comply with standard and availability of, for example, facilities. The “good” category would be considered if the exisiting conditon is comply to the standard criteria or the standard facilities are available, in other world it is less than or same with the planning capacity. And “bad” category would be considered, if there are not comply to the standard criteria or no standard facilties are available, in other world it is more than the planning capacity.

Base on evaluation of planning capacity to the settlement landscape, there are propose alternative to control the problem for those which are over the planning capacity. For those which are less than or same with the planning capacity its will be proposed solution to optimization.

Table 3. Characteization of Evaluation on Planning Capacity

Evaluation	"Good" Categories		"Bad" Categories	
	Standard	Available	Not Standard	Not Available
Settlement	√		√	
Fascilities	√		√	
Infrastructures	√		√	
Sanitation system (Utilities)		√		√
Solid Waste	√		√	

Source: Field survey analysis

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## Settlement

Concerning to the environmental function river bank area is unsuitable for settlement. The settlement which are occupy those river setback, less than 30m from the river, as mentioned in PERMEN PU No.63/1993, would be considered as "bad" category. On the other side, the settlement which are lay outside those setback, would be considered as "good" category (Figure 6).

The area which have density of 30 building units per ha, would be considered as "good" category. The "bad" category would be considered to the area which has density more than planning capacity, i.e. 85 building units per ha.

Moreover "good" and "bad" categories would be considered base on floor-based coefficient (KDB) as mention in Keputusan Menteri PU No.640/Kpts/1997 and Penmendagri No.59 tahun 1988, i.e. maximum KDB between 75 – 80%. So, the area within study site with have KDB 64.4% and 79.52% would be considered as "good" category, and the area with 90.71% would be considered as "bad" category (Figure 6).

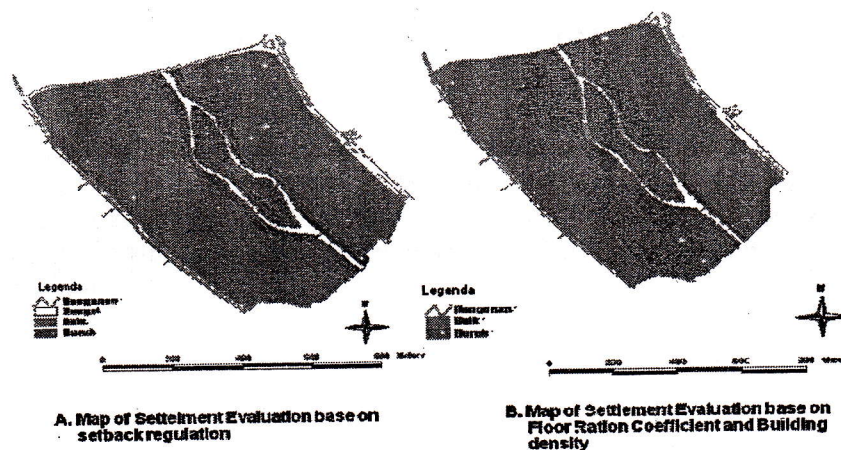


Figure 6. Map of Settlement Evaluation Base on a. Setback and b. Floor Ratio Coefficient

## Facilities

There were education facilities in the study site that (available and) comply to the standard (in term of location and area unit) would be considered as "good" category. On the other side the education facilities which are not standard would be considered as "bad" category (in term of location close to the river and the area smaller than standard) and will be proposed to be improved.

The health and worship facilities, within study site were available and comply to the standard would be considered as "good" category.

## Infrastructures

The road with good paving and drainage system, would be considered as "good" category. In the other hand road with bad paving and bad drainage system, would be considered as "bad" category. Some bridge with good quality, would be considered as "good" category, and some bridge with the wood as material construction and bad quality, would be "bad" category.

## Utilities

The area within study site which have septic system, would be considered as "good" category, and vis versa. Moreover the area with the solid waste management, such as have solid waste container and collecting system and solid waste transfer station (TPS) and

incinerator, would be considered as "good" category. But the area which have no solid waste management system and throw it to the river, would be considered as "bad" category (Figure 7).

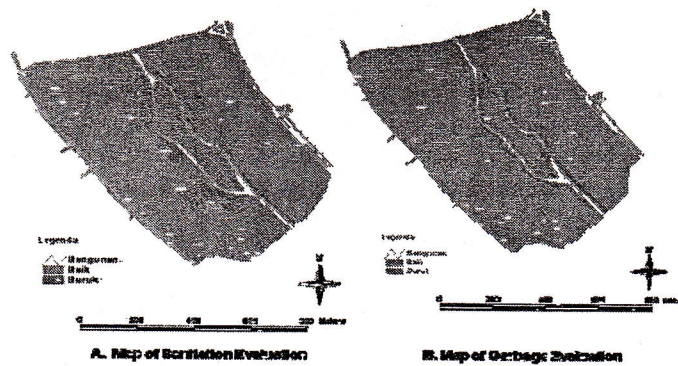


Figure 7. Map of Utilities Evaluation: a. Satination; b. Solid Waste

## LANDSCAPE PLANNING

### General Concept

Since the study site considered as part of bioregion of CiLiwung watershed, there are relationship and interdependency among other part within the watershed. Therefore, landscape planning based bioregion approach in the study site would be contribute to the other part, especially in the middle and downstream of CiLiwung watershed.

Moreover by applying the bioregional approach it will be restore and maintain natural systems and develop sustainable means for satisfying basic human needs such water, energy, shelter, resource materials, and waste handling,

### Zonation

Base on analysis of functions, activities, facilities and space (Figure 8), there are two zone, i.e. conservation zone and and non conservatino zone. Conservation zone cover an area about 20.7% and non conservation zone about 79.3% (Figure 9). Both zone will accomodate ecological and social economy of the community in sustainable away.

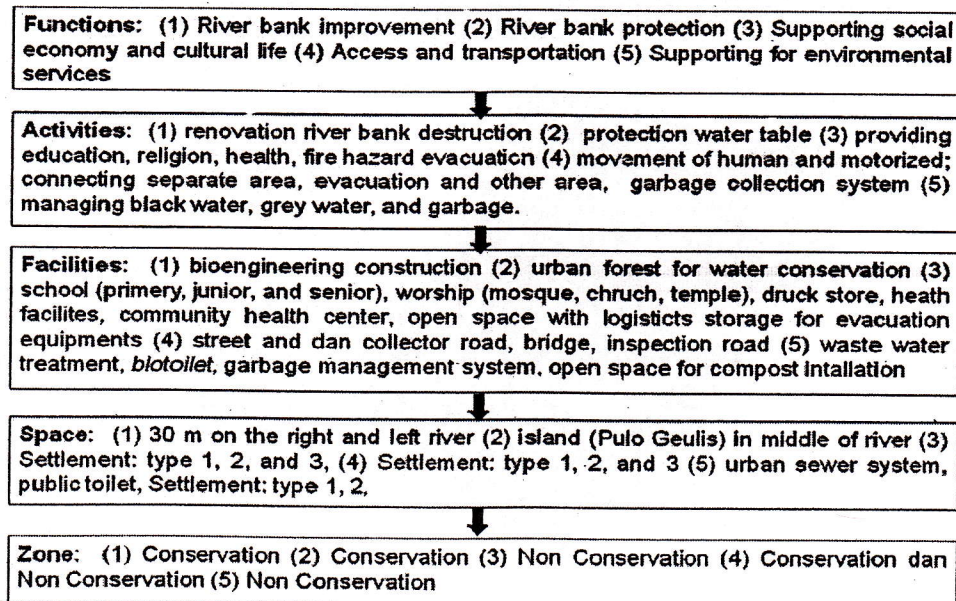


Figure 8. Developing of Zonation



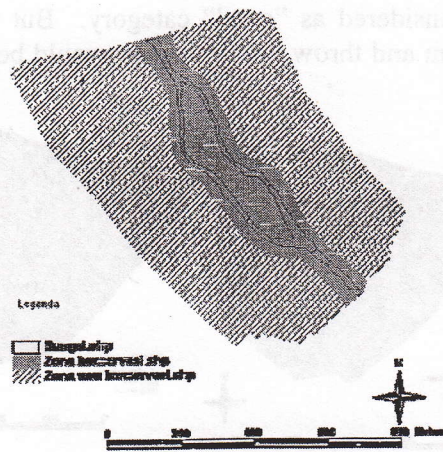


Figure 9. Map of Zonation.

### Development Concept

Base on categorization and planning capacity evaluation there are proposed some alternative to control and solve the problem for "bad" category and optimization for "good" category as (Table 4). Those propose alternative will be implemented in appropriate space within landscape plan of settlement segment of CiLiung river bank (Figure 10).

Table 4. Propose Alternative

Evaluation	Alternative
Settlement	Greenbelt concept a. Bioengineering construction b. Soil and water conservation
Facilities	a. Relocation facilities from setback area of river b. Provide evacuation point
Infrastructures	a. Improving physical qualities b. Limited access to the vulnerable and conservation area c. Konstrukt inspection and emergency road
Sanitation system	a. Konstrukt Waste water Treatment b. Konstrukt Biotoilet
Solid waste	a. Provide solid waste managemen

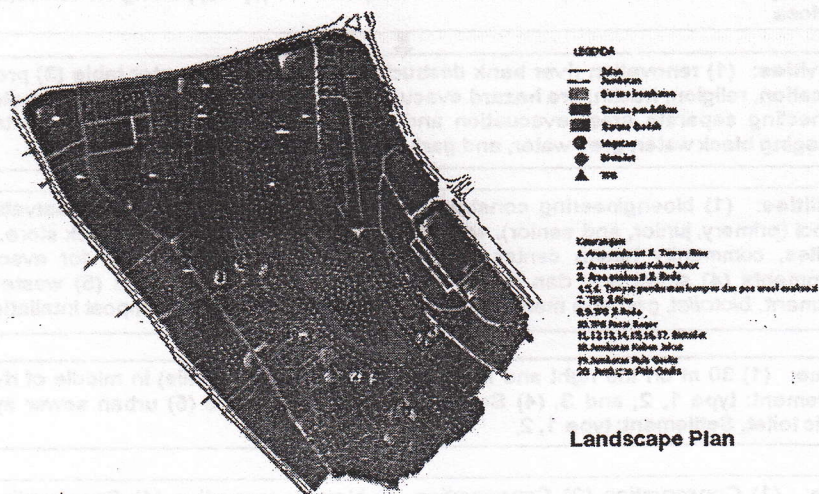


Figure 10. Landscape Plan of Settlement Segment of CiLiung River Bank

## Conservation Zone

The greenbelt will be developed about 30 m from the river. The width of greenbelt had been defining base on: Binford and Buchenau (1993, in Pribadi, 1999) and PERMEN PU No.63/1993, who recommended the buffer area minimum 30 meter in both side of river (Figure 11).

Alocated for greenbelt is about 20.7 %. The previous settlement area in both side of river will be utilized as conservation area. Bioengineering technique will be applied to improve the area. The small island-like of Pulo Geulis will be will utilized as green space and the settlement will be relocated to the out site the study area.

The green space will be planted by multilayer system, consist of tree, shrub, and ground cover. Plan selection to this area base on the following criteria, i.e. improve soil and water quality, improve hydrological function, protect soil erosion, and enrich biodiversity.

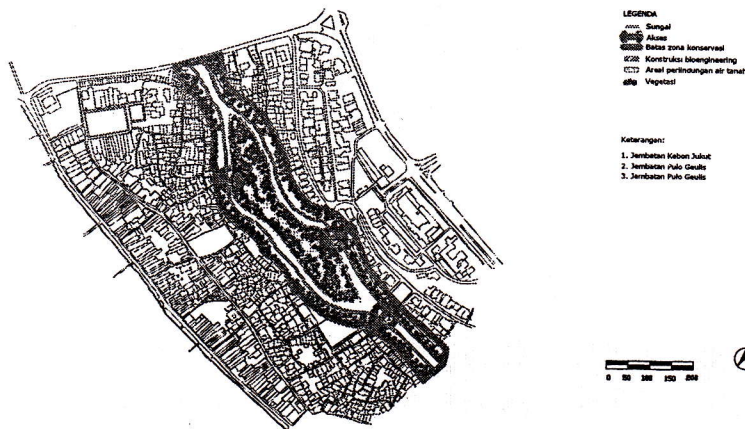


Figure 11. Conservation Zone

### Bioengineering Construction Plan

Bioengineering technique will be applied to improve both river side. By planting the vegetation and construct the gabion will improve the river bank stabilization and protect from erosion and land slide. Some species will be used, such as *Gigantochloa apus*, *Denrocalamus asper*, and *Vetiveria zizanioides*.

### Soil and Water Conservation Plan

The main function of the island-like of Pulo Geulis will be used retention of river flow. Moreover, by reducing the river flow it will stabilized the river bank and avoid lateral incission, erosion, bank colapse, land slide and other natural hazard. In order to be able to so, the island should be conserved. As conservation area, it has to be stabilized and reinforced. Some conservation program are need to be implemented, such as revegetate with the follwoing criteria: local species, multiple layer (continuous cover), low transpiration rate, has deep root.

## Non Conservation Zone

### Facilities Plan

Some facilities will be relocated from conservation zone and built in non conservation zone. There are evacuation area will be built for emergency space for fire safety, especially within highest density building house and narrow access road. Those facilities will be built as green open space.

### Infrastructures Plan

Since Pulo Geulis will be developed as protected area, any access to it will be reduced. There are only two bridge will be operate to connect both side of river and pass through the island. On the other hand access to evacuation facilities will be built and connect to main

road. Some inspection and service road will be built for maintain the river and solid waste management.

### Utilities Plan

There are some utilities will be built, such as Centralized Waste Water Treatment, biotoilet and participatory solid waste handling management with the 5R (Reduce, Reuse, Recycle, Reform dan Replanting).

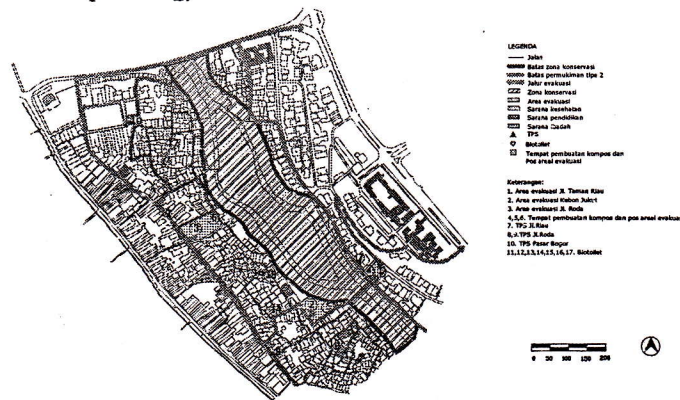


Figure 12. Non Conservation Zone

## 5. REMARKS

1. There are varies settlement characteristics in study site, in term of type, coverage area, density etc. Those different characteristics express different back ground, level of economic prosperity, socio culture and environmental factors.
2. There three type of settlement class, i.e. type 1, type 2 and type 3. Since, most of settlements type 2 were occupied on the river bank, their need to be improved and controlled.
3. The facilities available in study site are comply to the standard. Even, there are some facilities not fully shows the distribution of the uniform.
4. By applying the bioregional approach it will be restore, maintain natural systems and develop sustainable means for satisfying basic human needs such settlement, facilities (worship, heath, education), infrastructures (road, bridge) and utilities (water, sanitation, solid waste).
5. Since the study site considered as part of bioregion of CiLiwung watershed, therefore, landscape plan based bioregion approach in the study site will contribute to other part, especially in the middle and downstream of CiLiwung watershed
6. Base on developing concept of landscape planning, there are two zone will be developed in study site, i.e. Conservation Zone and Non-Conservation Zone, with the area about 20.7% and 79.3%, respectively. Those two zone will accommodate ecological, social and economic need in sustainable way.

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