Attitudes towards Adaptive Governance of Social Ecological Systems Case study: Integrating Green Open Space Provision in Tangerang Municipality, Indonesia

Master Thesis

The thesis is submitted in partial fulfillment of the requirements for Double Degree Master Program at Institut Teknologi Bandung and Rijksuniversiteit Groningen

written by:
IIS MAISAR TAQIA
S2446162

Supervisors:
Yang Zhang (RuG)
Ir. Djoko Santoso Abi Suroso, Ph.D (ITB)

Environmental and Infrastructure Planning
Faculty of Spatial Sciences
Rijksuniversiteit Groningen
and
Department of Regional and City Planning
School of Architecture, Planning and Policy Development
Bandung Institute of Technology
2014

Attitudes towards Adaptive Governance of Social Ecological Systems
Case Study: Integrating Green Open Space Provision in Tangerang Municipality, Indonesia

Double Degree Master Program
Environmental and Infrastructure Planning
Faculty of Spatial Science
Rijksuniversiteit Groningen
and
Department of Regional and City Planning
School of Architecture, Planning and Policy Development
Bandung Institute of Technology

Approved
Supervisors

Date: August, 2014

Supervisor 1	**Supervisor 2**
Yang Zhang, MSc	**Ir. Djoko Santoso Abi Suroso, Ph.D**
(RuG)	**(ITB)**

Do not follow that of which you have no knowledge
for you shall be questioned for (the use) of your eyes, ears and minds – (QS Al-Israa; 36)

"One who treads a path in search of knowledge
has his path to Paradise made easy by God…" (Hadist Abu Daud)

ACKNOWLEDGMENT

I would like to give my gratitude to Allah SWT, The Almighty, the One that gives me guidance for the whole of my life and leads me to get in through any circumstance in finishing my master degree. This particular opportunity gave me a lot of enrichment for my knowledge and insight that may help me implementing what I have learned for my future development.

I also would like to thank to every person around me that has supported me to gain the great experience in my master program. Firstly, my great thank goes to Yang Zhang and Mr. Djoko Santoso Abi Suroso as my 1st and 2nd supervisors. Thank you for your relentless help to find the right direction in doing my research and to give efforts in putting all the pieces of my work together. I would like also to thank to all my lectures in PWK Institut Teknologi Bandung and Faculty of Spatial Science, University of Groningen, to motivate and inspire me to gain new thoughts and cognition in my study year. Sincere thankful is sent to Ibu Jeane and Pak Ito (ITB) and also Stiny Tiggelaar (RuG) who helped me doing the administration purposes in Bandung and Groningen. My great thank also for Bappenas and Nuffic Neso to assist me obtaining financial support so I could accomplish my study properly.

Thank you and my deepest sadness for Ibu (alm) for your love and prayer. I never imagined that I lose you when I was studying and we were separated in distance. Indeed, I do know that what I have reached happens due to your blessings. My sincere thankful also for the unwavering support I get from Ayah, Iyai Nie, Ajo Iyen, Papi, Mami, Atin Iyut and Osa. Being a part of Balau family strengthen my passion to pursue this special phase in my life.

It is a pleasure to thanks to all of my colleagues and acquaintances that make me enjoy my time for the last two years. Greatest thanks to DD-ITB 2012-2013 and EIP RuG 2013-2014 for passing the lively moment together. Thank you for Eurogenes, the Jokam families in the Netherlands who always guard and guidance my creed so I could keep it in the track. Thank you for PPIG and deGromiest for the time we spent in Groningen that make me feel I were in my home. I also deeply express my gratitude to my beloved friends who have shared and being shared every single moment of happiness, dejection, sadness, and yearning during we were together. You colored my days with such feelings.

The one and foremost, I give my deepest gratitude for my beloved husband, Iwan Sumarwan for all of the endless love, great motivation and understanding during my study. I dedicate all my works for our beautiful daughters, Kaisa Hauradhiya and Kanaya Zara Amily who always cheer my days with smile, laugh and love. Last but not least, my great thankful goes to you that have spent your valuable time reading this acknowledgment.

Groningen, August 2014

Iis Maisar Taqia

ABSTRACT

Challenge in managing GOS provision as an element of environmental preservation becomes a main issue in governing an urban area. This is due to rapid development in cities which leads into land use change and urban sprawl. Consequently, most cities have been experiencing problem of lack of green open space. As a point of fact that GOS is a public living room for the locality, the government has a responsibility to manage green open space area in order to make the city more sustainable. In managing provision of green open space, lots of approaches are used to deal with the existence of open spaces. One possible direction is by attempting the concept of social ecological systems which used integrated concept of humans in nature. In order to meet sufficient policies for protecting and providing green open space in Indonesia, there is a need to set up adaptive governance of SESs.

This study is conducted aiming to analyze and explore the government capacity in managing GOS provision in Tangerang municipality. The main questions revealed are related to the mechanism of GOS management done by the government in relation to SESs concept, the government capacity and the critical factors that might lead into the adaptive governance of SESs. Therefore, a case study taken based on a qualitative analysis by having open-ended questions and in-depth interview to key people involved in the interaction of GOS provision. Secondary data from various sources also supports the research process.

Research findings illustrate that the government capacity in managing GOS provision in Tangerang municipality is currently limited. This is due to the fact that the environmental preservation has not become prioritize for Tangerang municipality. Although the interaction between social and ecological has been well considered in the rules and regulation, the management process for gaining sufficient GOS provision is still far from sufficient. To embed the dimension of adaptive governance that seems to be neglected, there are some essential elements postulated which might become resolution towards a better performance. These elements are 1) building knowledge and understanding for experiential and experimental process, 2) creating networking among stakeholders to gain a better interaction, and 3) enhancing leadership capacity of the government in dealing with strategic policies in managing GOS provision. Overall, the concept of adaptive governance of SESs which is rarely been performed in urban area might give new insight when assessing the interaction between social and ecological in a city.

Keywords: Green open space, Social ecological systems, Adaptive governance, Tangerang municipality

ABBREVIATION

BAPPEDA
Badan Perencanaan Pembangunan Daerah/Regional Development Planning Board

BBWS
Balai Besar Wilayah Sungai/River Basin Management Board

BPLH
Badan Pengelolaan Lingkungan Hidup/ Environmental Management Board

BPN
Badan Pertanahan Nasional/National Land use bureau

DKP
Dinas Kebersihan dan Pertamanan/Landscape and Sanitary Agency

DPU
Dinas Pekerjaan Umum/Public Works Agency

DTK
Dinas Tata Kota/City design Agency

GOS
Green Open Space

IPB
Institut Pertanian Bogor/Bogor Agricultural University

NGO
Non-governmental Organization

SESs
Social-Ecological Systems

List of Contents

List of Table

List of Figure

CHAPTER I
INTRODUCTION

1.1. Background

Cities are defined as places where physical concentration of people and buildings exist, generating activities in economic, social and politics (Herbert & Thomas, 2013). As cities rapidly grow up, mostly they have been experiencing multitudes of problems, among of them are environmental as well as social-cultural issues. Regarding rapid development of land-use in cities, some serious problems emerge are connected to issues of urban sprawl, lifestyle, as well as ecology (Erickson, 2006). Focusing in environmental consideration, most big cities are facing lack of green space area nowadays. A lot of people repentance the lack of quality and quantity of green open space provision as the consequence of urban sprawl.

The term of green open space has various definitions, one of which has been introduced by Ebenezer Howard (1898) with the concept of garden city. He defined green open space in the cities as urban green space. He emphasized the importance functions of green space that people need in urban landscape. Green open space provides contacts between humans and nature, aesthetic necessity, recreation, and social interaction (Matsuoka & Kaplan, 2008). According to the Department of the Environment of London (2008), there are three main classifications of open spaces: economic regeneration, environmental and social cultural. There is a necessity to comply green space as it may trigger beneficial for the three factors aforementioned (London, 2008). The presence of green space may have impact both direct and indirect benefits. It reflects in economic terms as they may generate effect on properties values, investment, tourism and life quality (Costanza, 2008). In terms of indirect effect, green space provision has a great contribution into urban environment in accordance to ecosystem cycle (Bolund & Hunhammar, 1999).

As acknowledged the importance of green spaces, the Council of Europe (1986) portrays ‘urban green space’ as ‘a public living room for the locality’. It means that there is a task for the government to provide and manage the quality and quantity of green open space in their areas (Committee of Minister, 1986). Thus government has embraced the necessity to manage green open space area in order to make the city more sustainable. In managing provision of green open

space, lots of regulation approaches are used to deal with the existence of open spaces. In the realms of green space literature, the necessary to have a better provision and management of green open space has been well studied. Furthermore, Thompson (2002) revealed that there is a need to explore green open space demand in accordance to social and spatial implications. She argued that governments and politicians have to focus on protecting and enriching natural resources.

However, it is still a question that how can we try to achieve the growth of positive effects on humans being in economic and social, while at the same time we should decrease negative impacts of such growth on the environment? One possible path directed by ecologists and planners is the concept of combining a bio-geo-physical unit with association of social actors and institution; known as social-ecological systems (Glaeser, Bruckmeier, Glaser, & Krause, 2009).

Social-ecological system is an integrated system between society and its ecosystem with reciprocal feedback and interdependence (Alliance, 2007). It used integrated concept of humans in nature and to focus that the delineation between social and ecological systems is artificial and arbitrary. It means that the balance system between society and ecosystem becomes the main factor in creating integrated development. As for green open space provision, some conceptual models are only aimed to meet the human needs of green space and haven't taken the reciprocal impacts of the ecosystem into consideration. Therefore an effort that comprehends how both social and ecological components emerge as a main consideration of urban green space provision should be made.

There have been some endeavors in dealing with approaches to SESs management done by government in order to cope with efficiency, reliability, and optimality of ecosystem (Holling & Meffe, 1996). Yet a number of unsuccessful approaches and increasing vulnerability have emerged in the arena and eventually led to require more an adaptive governance management due to dealing with uncertainty and change (Dietz, Ostrom, & Stern, 2003). Thus, there should be a creation of adaptive governance in managing ecosystem deals with networks which connect individuals, organizations, agencies and institutions.

Mostly, green space in cities plays role as a counteraction of the impacts in urban expansion as well as intensification (Howard, 1965; Sister, Wolch, & Wilson, 2010). As urban development increased so rapidly with a high-density development, congruence and conflict

between the existence of green space and urban development becomes serious problem in the arena. Hence it is essential to perform research regarding physical aspects of urban green spaces; how people value the existence of green spaces, how the green spaces are managed, and whether the current and future policy of green space provision is effective (James et al., 2009). This thesis focuses more on the last aspect: green space policy and regulation within Indonesia context

In most big cities in Indonesia, green open space provision has gradually decreased as a consequence of urban sprawl. This decline resulted in decreasing of environment quality of the city which may cause flood occurrence, air pollution and limited social interaction of citizens in public areas. To tackle those problems, central government of Indonesia has issued regulation of providing 30 percent of open space in each municipality and regency. Although the local governments have imposed rules and regulation of green open space in the building permit terms, many regions still cannot meet the requirement of the regulation. Hence there should be a transformation of government management in dealing with such problem.

The effort to transform government role into an adaptive governance of social ecological systems is not new in natural resource management. Although there have been many studies about SESs, some regions still experience failure of such attempts. The unsuccessful trajectories occur as SESs was managed too late in transforming their governance systems into new SESs configurations (Olsson et al., 2006). Interestingly, there are still very seldom studies regarded to the management of urban green space by involving the social ecological systems concept. Furthermore, SESs concept in Indonesia is relatively new. Thus it is essential to deepen comprehension about transformability and determine appropriate key factors in SES configuration, particularly in green space provision.

Tangerang municipality as an urban area located in Jakarta Metropolitan Area (JMA) has been facing problem of lack of green open space for years, which is caused by rapidly urban sprawl in Jakarta and surroundings. In 2012, local government of Tangerang municipality has issued spatial planning document (RTRW 2012-2032) which consists of rule and regulation about land use utilization in the city for the next thirty years, including program indication of green open space provision. Regarding to the policy innovation, it is necessary to assess how local government impose SESs concept in the rule and regulation of green open space provision in Tangerang municipality.

1.2. Problem Statement

The concept of SESs may bring about an appropriate transformation in managing adaptive governance (Olsson et al., 2006). In order to meet sufficient policies for protecting and providing green open space in Indonesia, there is a need to set up adaptive management of governance. Local government ought to have adequate capabilities in guiding green space management. The higher degree of capabilities the government has, such as sufficient regulation and policies standard of managing open space, the better quality of open space management is obtained.

The local government as the main actors in governing process has a big influence in green open space provision. Nevertheless, the gap between regulation of green space provision and the reality is becoming obvious nowadays. Although regulation and policies in national level require 30 percent of green space endowment, there are many local governments in Indonesia which still cannot meet such obligations. The implementation of such case is still far from what is expected.

In social ecological systems, the capacity in adapting and creating changes become an essential factor (Berkes, Folke, & Colding, 2000). Further, Walker (2004) argues that in a high adaptability system, role of actors can determine reorganization of the system in response to changing condition. As a point of fact that SESs is a relatively new concept particularly in governance management for urban green space in Indonesia, it is essential to comprehend how adaptive governance is applied in terms of green open space provision. At this point, transformability of adaptive governance by using SESs concept becomes the main issue. Furthermore, SESs has not been well known as an adequate system in developing adaptive governance of social ecological systems notably in Indonesia. Thus it is necessary to assess the capabilities of local government, in case of Tangerang municipality, in delivering the mechanism of green open space provision using SESs concept.

1.3. Research Objective

The purpose of this research is to provide insights and lesson-learned about adaptive governance of social ecological systems in managing green open space provision for Tangerang municipality, Indonesia. The objectives of this research are as follows:

- To assess policy regulations about green open space provision done by local government of Tangerang municipality through using SESs concept

- To explore the attributes of government of Tangerang municipality in setting-out Social Ecological Systems approach in dealing with green space provision.

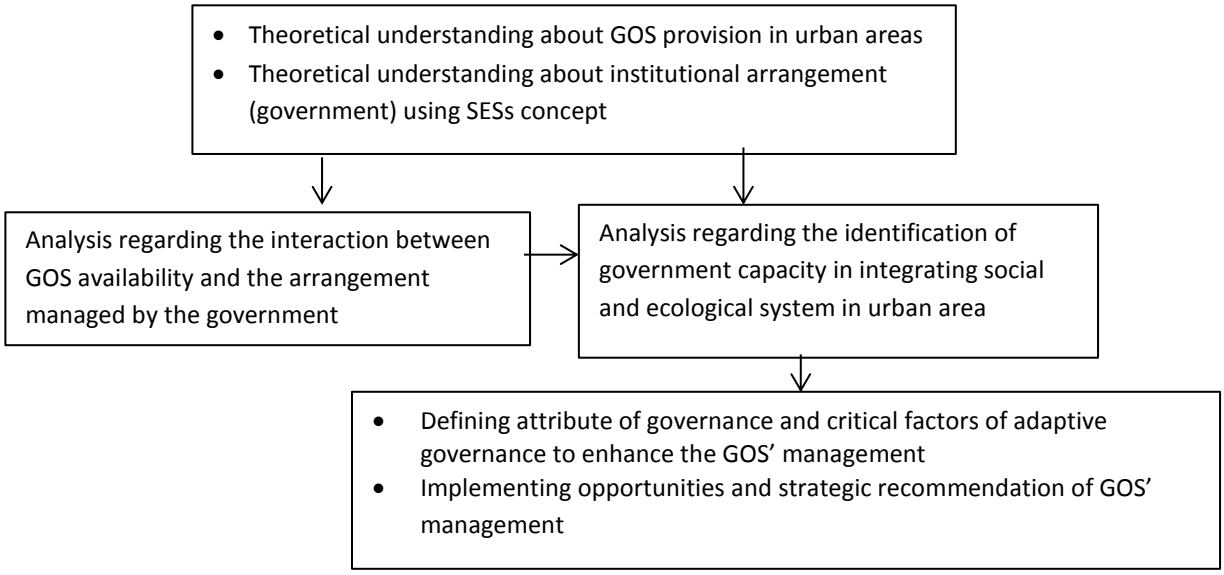
- To highlight insights on providing identification of critical factors to improve the transformation of government capacity into adaptive governance in managing green open space provision with social ecological systems approach.

1.4. Research Framework

The research framework of this thesis is shown in figure 1 below. I would like to take a qualitative research to reach a broad understanding in terms of government mechanism in managing GOS provision, focusing in the interaction of social and ecological approach. This research aims to gain an insight of GOS provision and the attributes of government in managing it. Though, this particular study is not a panacea for any other typical issues. Rather, as (Anderies, Janssen, & Ostrom, 2004) argued, there is no term as "cure all" for all problems relating to environment. Rather, this study might underpin the potential strategy to overcome the issue of urban environment and its derivative.

Firstly, the research framework starts by exploring the theoretical understanding about GOS provision in urban areas and the institutional arrangement embedded in the government system. Next step is dealing with the analysis between GOS provision and how the arrangement is constructed by the government. A capacity in involving the concept of social and ecological system also takes part in the analysis. Having gained such study, the result of analysis may bring about the attributes of governance and critical factors that might enhance the management of GOS. In the end, implementation of the opportunities and strategic recommendation of GOS management might be drawn for the final output.

Figure 1. Research framework



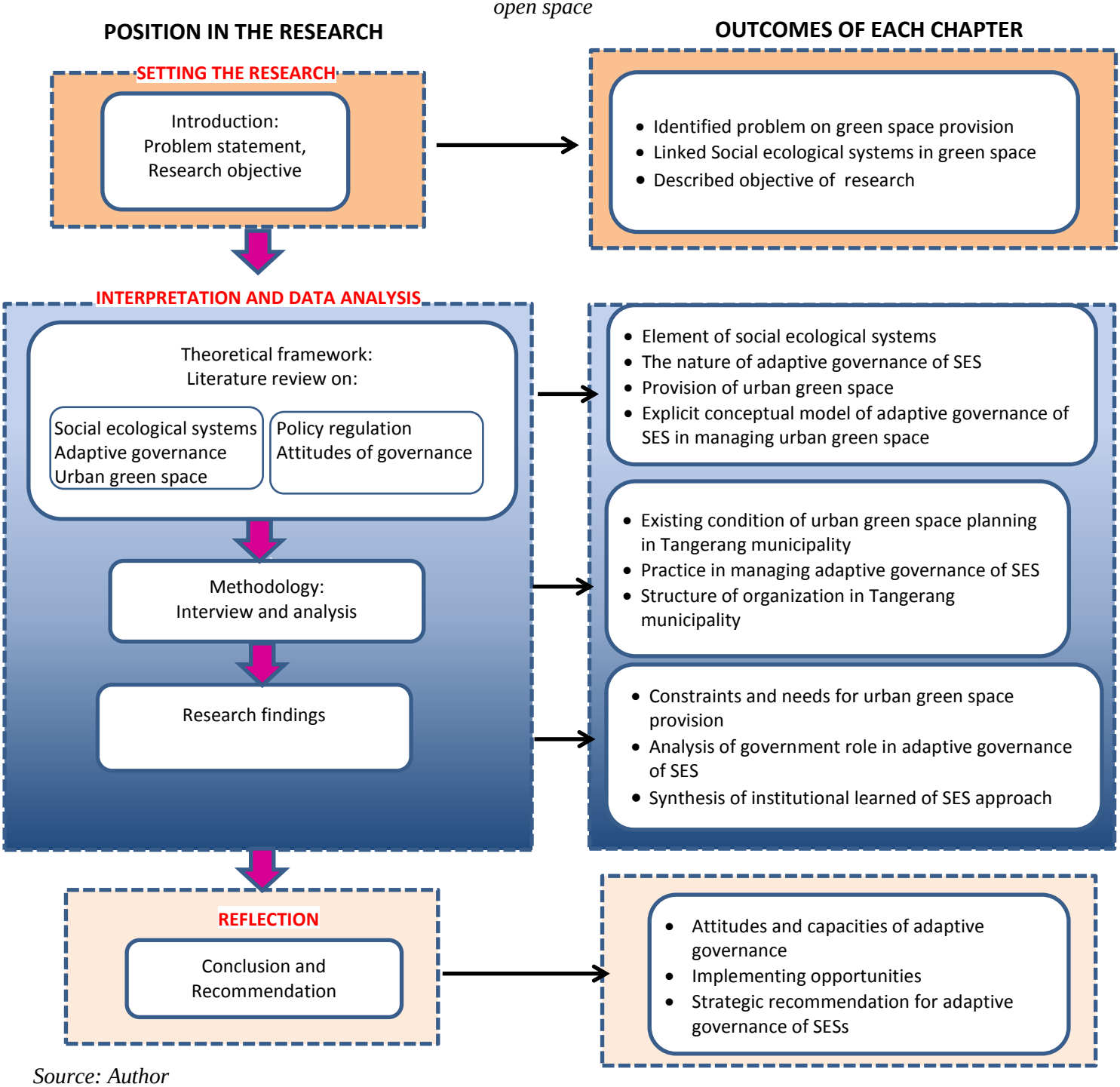
Source: author

Meanwhile, figure 2 shows the research methodology of the research. It describes each chapter's position and outcomes in order to achieve the research objective. Chapter 1 provides introduction which consists of background information, problem statement and research objectives. It is the initial stage of research setting since it formulates the research objective. Identified the problem on urban green space provision and its link with social ecological systems are outcomes for this chapter.

Chapter 2, 3 and 4 are the main parts of the research with interpretation and data analysis. In Chapter 2 the research framework of the thesis has been proposed based on literature review of different schools' thoughts in doing the relative research. Element of social ecological systems, the nature of adaptive governance of SES and urban green space provision are major issues that derived from supported literature. Policy regulation regarding urban green space provision in Tangerang municipality and the attitude of government also become centre of the study literature. Chapter 3 deals with methodology used in my research. As the research is in line with qualitative measurement, interview with some key people might generate data analysis. There will also be exploration of existing condition of urban green space in Tangerang municipality and practice of managing adaptive governance of SES. Chapter 4 will explore comprehensively the result finding gained from the interview and data collection in the fieldwork. It might generate finding regarding constraints and needs for urban green space provision, analysis of government role in adaptive governance of SES and synthesis of

institutional learned of SES approach. Chapter 5 presents conclusion and recommendation gained from the results. It will explain attitudes and capacities of adaptive governance of SES, see chance and opportunities in implementing appropriate model and strategic recommendation of adaptive governance.

Figure 2. Research methodology for the assessment of adaptive governance of SESs in managing green open space



Source: Author

1.5. Research Question

From the background mentioned above, some identification of research questions expose as follows:

- How does government of Tangerang municipality manage green open space provision? Is SESs concepts revealed?
- How to measure and improve the capacity of adaptive governance of SESs in the sense of green open space provision?
- What are the critical factors of adaptive governance in managing green space provision of Tangerang municipality?

CHAPTER II
LITERATURE REVIEW

2.1. The Emergence of Social-ecological Systems

In regards of human impact on the earth, Paul Crutzen, a 2000 Nobel Prize winning chemist argued that we have entered a new geological epoch called *Anthropocene (Crutzen, 2006).* When it comes into a more serious consideration, we realize that this new constellation has emerged by seeing a complex human-nature relation. In this situation, it is impossible to understand nature without society, and to comprehend society without nature (Becker, Jahn, & Stiess, 1999).

The idea of combining both systems emerges in the concept of social-ecological systems. In recent decades, the linkage between social sciences and natural sciences had limitations both in social and natural systems. Some ideas of revealing the importance of social sense are more intuitive than natural sense (Olsson, Folke, & Berkes, 2004). Many social/economic scientists ignore the presence of environment in the development. On the other side, mainstream ecology seems to exclude humans from the study of ecology. Although there were some exceptions showing that some scholars were working on bridging the social and environmental aspects, *the biosphere and humanity unity had been sacrificed to a dichotomy of nature and culture*. It started in the 1970s and 1980s with the rise of subfields that includes both social sciences and environmental consideration.

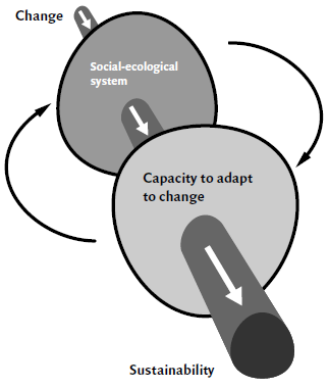
One of the initiator introducing the concept of social ecological system was Holling (1973). She employed social ecological system as a way to understand nonlinear dynamics. This approach might contribute to efforts towards sustainability, which is "*the use of environment and resources to meet the needs of the present without compromising the ability of future generations to meet their own needs"* (Folke, Hahn, Olsson, & Norberg, 2005). At this point, we consider sustainability as a process rather than an end product. It requires adaptive capacity for humans and societies to deal with change. Sustaining such capacity needs analysis of interrelation dynamics between ecological systems and social systems.

Social systems deal with the way to govern property rights and access to resources, as well as dynamic environment and ethics in human-nature relationship. Ecological systems refer to interaction of self-regulating communities and the environment which interact one another. In

emphasizing the concept of humans in nature, we use the term of social-ecological systems, which delineate both social and ecological systems in artificial and arbitrary situation.

As we consider changes and its impact are universal given, social ecological system acts as a function of its capacity to adapt to change and shape it (figure 3). Our challenge is to analyze the change and to respond it in a manner that lead to keeping future option, without compromising sustainability. The approach is focusing in social-ecological system change.

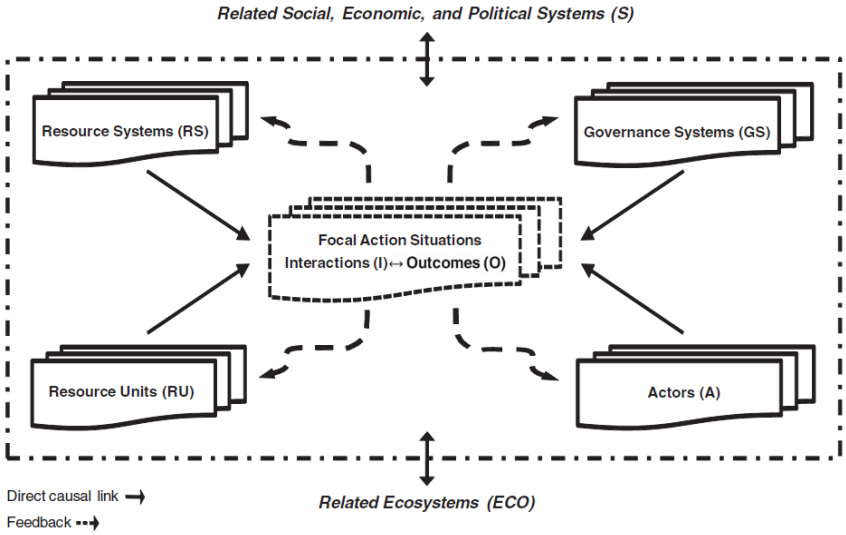
Figure 3. The focus on adaptive capacity for sustainability



Source: Ostrom, 2004

Reflecting several sources of SESs, the concept proposes the subset of social systems which interdependently connect humans interactions with biophysical a non-human biological unit (Anderies et al., 2004).

Figure 4. A multitier framework for analysing SESs

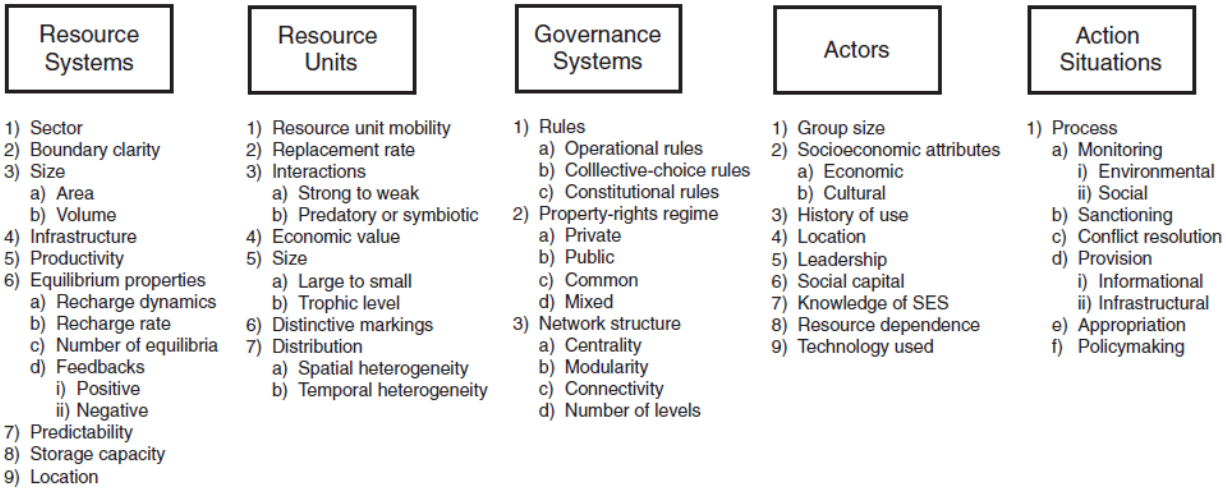


Source: Ostrom & Cox, 2004

I present a multilevel, nested framework for analyzing outcomes achieved in SESs from a model proposed by Ostrom & Cox (2007) in figure 4. It portrays the relationship among four levels of core subsystems of SESs that affect each other and link related ecosystems (ECO) as well as social, economic and political settings (S). Resource system is a designated infrastructure encompassing a specified territory (e.g. park, water systems). Resource units are natural environment such as trees, shrubs and plants, types of wildlife, and amount of water. Governance system deals with government and other organizations that manage infrastructure (i.e. park) and regulate specific rules regarding the use of the infrastructure. Actors/users are individual or groups who make use of the resources in diverse way for commerce, sport; space for peaceful coexistence and impersonal encounter.

The framework above might be helpful to identify related variables for studying a single focal of SESs. In this case, I propose the concept to assess how government manages urban green space provision using SESs framework. With such framework, it is likely that we could figure out common set of relevant variables identified in theory and empirical research of adaptive governance of social ecological systems.

Figure 5. The unpacking of SESs framework into multi-tiered quality of attributes



Source: Ostrom & Cox, 2004

To be more specific, the unpacking of SES framework seen in figure 5 shows some multi-tiered quality of attributes (Ostrom & Cox, 2010). Some associated attributes are used in determining how entities of SESs occur and to what extend they influence the systems. In the

resource systems (RS), multiple levels used are resource sectors, boundary clarity, and the size of resource area, infrastructure and storage capacity. This decomposition is central to diagnose the element and its interaction which in the end will lead into impact and feedback occurs.

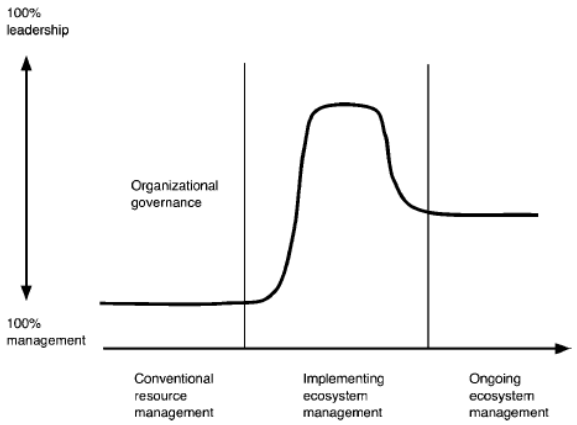
On the other hand, resource units (RU) have some elements as follows: resource unit mobility, interaction among resource, economic value, and spatial distribution. Governance systems have some variable related to focus of study: rules, property-right regime and network structure. The diagnosis and design principle will depend on mostly into the case study and its principle. Ostrom (1990) has embedded specific rules that could exist in each system based on its own design principle. Variables available in the actors/users element also deal with its study characteristic. Hence, there should be no overgeneralization to any issues or study discussed.

2.2. Adaptive Governance of Social Ecological Systems

The innovation of governance approach is important in order to resolve multi-scale environment-society (Dietz et al., 2003; Olsson et al., 2004). Although adaptive and management of ecosystems-based forms have emerged in the science role, the transformation of ecosystem principle into practice still remains a challenge. This is due to rapid change that navigates larger environmental consideration in social, economic and ecological aspect. Therefore, key agents try to develop strategies in facing uncertainty and complexity. An idea reveals in scientists trajectory is reflecting an adaptive governance of social-ecological systems.

Adaptive governance deals with capacity in coping with external drivers and rapid change of environment. Some literature on polycentric institution shows that flexibility in coping with rapid changes is enhanced by multilevel governance with some degree of autonomy (Low, Ostrom, Simon, & Wilson, 2003). Holling (1978) states the necessity of adaptive management that should be put forward as an appropriate approach in dealing with ecosystem complexity. Meanwhile, the requirement of organizational change as a component of managing ecosystem and leadership's role in initiating change within organization as seen in figure 6 (Danter, Griest, Mullins, & Norland, 2000). Leaders who are visionary establish new and vital significance, create new synthesis, and kiln new alliances between knowledge and action.

Figure 6. The role of leadership in transformation of organization toward ecosystem management and sustaining it



Source: Danter et al, 2000

In dealing with dimensions of adaptive capacity and its subcomponent, (Berkes et al., 2000) proposed some factors that interact across temporal and spatial scales and that is required to cope with nature dynamics in social ecological systems. Factors and its subcomponents needed are as follows:

1. Learning to live with change and uncertainty
   Consist of evoking disturbance, learning from crises, and expecting the unexpected
2. Nurturing diversity for reorganization and renewal
   Consist of nurturing ecological memory, sustaining social memory, and enhancing social-ecological memory
3. Combining different types of knowledge for learning
   Consist of combining experiential and experimental knowledge, expanding from knowledge of structure to knowledge of function, building process knowledge into institution, fostering complimentary of knowledge system
4. Creating opportunity for self-organization
   Consist of recognizing the interplay between diversity and disturbance, dealing with cross-scale dynamic, matching scales of ecosystems and governance, and accounting for external drivers.

In a point of fact, the concept of adaptive governance depends on institutional arrangements that are nested, quasiautonomous (Olsson et al., 2006). In delivering institutional mechanism from local to higher organizational levels, such institutions deal with coordination

between decentralized and centralized control. Adaptive governance relies on networks which link individuals, organizations, agencies, and institutions at multiple organizational levels (Olsson et al., 2006). Such governance form may create concept of transformability regimes.

According to research on adaptive governance of social-ecological system, it is indicated that the ecosystem management and landscapes is complex to apprehend and implement. Thus, planning and control by a central organization, such as a national government cannot be appropriate remedy in overcoming ecosystem and social problem. "*Adaptive co-management to self-organize, such as enabling legislation, flexible institutions, and recognition of bridging organization, are good candidates for governmental actions, which can be carefully tested and evaluated*". (Folke et al., 2005). Meanwhile Walker (2004) defined transformability as a capacity to create basic new system which include ecological, economic, or social that in the existing are still untenable. Transformability may introduce new concept of SESs, which eventually may change variables that define the initial system. In addition, transformations basically change processes and structures in SESs.

Based on natural resource management literature, the concept of transformation is not completely new. It has been used to reveal changes in the ecological which worsen state (Hamilton, Haedrich, & Duncan, 2004). The transformative change may also occur due to ecological crises, shifts in systems in social components, economic or political change (Danter et al., 2000).

There are four aspects in adaptive governance of complex social-ecological systems (Folke et al., 2005):

1) Shape knowledge and understanding of resource and ecosystem dynamics; detecting and responding to environmental feedback in a fashion that contributes to resilience require ecological knowledge and understanding of ecosystem processes. Management of complex adaptive systems may benefit from the combination of different knowledge systems. Social incentives for ecological knowledge generation need to be in place as well as the capacity to monitor and translate signals (feedback) from ecosystem dynamics into knowledge that can be used in the social system.
2) Feed ecological knowledge into adaptive management practices; monitoring and reevaluation is necessary due to enhance adaptive responses, acknowledging the inherent uncertainty in complex systems. It is increasingly proposed that knowledge generation of

ecosystem dynamics should be explicitly integrated with adaptive management practices rather than striving for optimization based on past records. This aspect emphasizes a learning environment that requires leadership and changes of social norms within management organizations.

3) The provision of flexible institutions and multilevel governance systems in order to combine multilevel linkage characteristic of co-management. In this case, whether centralization or decentralization may involve multiple and often polycentric institutional and organizational linkages among user groups or communities, government agencies, and nongovernmental organizations. This aspect emphasizes the role of multilevel social networks to generate and transfer knowledge and develop social capital as well as legal, political, and financial support to ecosystem management initiatives.
4) It is not sufficient for a multilevel governance system to be accustomed with the dynamics of the ecosystems under management. It is also necessary to develop capacity for dealing with changes in climate, disease outbreaks, hurricanes, global market demands, subsidies, and governmental policies. The challenge for the social-ecological system is to accept uncertainty, be prepared for change and surprise, and enhance the adaptive capacity to deal with disturbance.

Walker et al., (2006) defined the concept of associations between selected attributes of governance systems and the capacity to manage resilience, as can be seen in figure 7 below.

2.3. Green Open Space – a theoretical framework

Green open space is categorized as an integrated part of cities that provides various services for people and the wildlife. The idea of green space with garden city concept which was mainly as semi-natural areas, managed parks and gardens was advocated by Ebenezer Howard (Howard, 1965).

According to Gehl (1987), open space is defined as an arena that countenances any kind of activities occur upon the physical environment, including when someone goes to school or work, or just wait for a bus. The activities then will be dependent on the situation and quality of external environment. Thus the existence of physical environment has essential impact on the

physical activities done in an open area. Meanwhile, Walzer (1986) gave definition of public space with different categories both indoor and outdoor:

> *Public space is space where we share with strangers, people who aren't our relatives, friends or work associates.*
>
> *It is space for politics, religion, commerce, sport; space for peaceful coexistence and impersonal encounter.*
>
> *Its character expresses and also conditions our public life, civic culture, everyday discours. (Walzer, 1986).*

Open space provides many benefits and opportunities in urban areas. Some activities such as playing, walking, recreation might improve physical and mental health. The Council of Europe (1986) defines the term open space as 'a public living room for the locality'. The area has also functioned in educational role and social interaction. These benefits are increasingly accepted as social, economic and environmental endeavor. The existence of green space strengthens urban ecosystem function (Barbosa et al., 2007). It supports biodiversity system and provides ecosystem services in urban areas (Bolund & Hunhammar, 1999). In the case for public endeavor, green space generates social benefits as places for meeting and having interaction for diverse communities and neighborhood (Nuissl, Haase, Lanzendorf, & Wittmer, 2009).

In managing green space planning, some literature reveals the idea that there should be integration within wider city plans, planning for buildings and green areas simultaneously (Baycan-Levent, Vreeker, & Nijkamp, 2009; Werquin et al., 2005). Public and stakeholders have to be included from the start of the planning process (Gobster, 2001; Nuissl et al., 2009). Those terms fits well with the ideas outlined by urban ecologists; that the city is an integrated system with both natural and human dimensions (Grimm et al., 2008) and that management should be done in cooperation by a variety of stakeholders (Andersson 2007a). Furthermore, to achieve a learning-by-doing approach, a framework for monitoring planning and management should be in place (Carmona 2003).

Thompson (2002) identified three factors as central drivers for changing in green space provision of a city:

- The technological revolution, derives from the increasing of information technology and global to local networks which connect people

- The ecological threat, embedded with its implication regarding the importance of sustainable development
- The social transformation, which reflects the increasing of life expectancy and new style choices.

Those three factors may reveal individually or go side by side in urban development which will affect the existence of green space in an area. Due to those crucial factors, there is a need for government to deal with green space provision in their area.

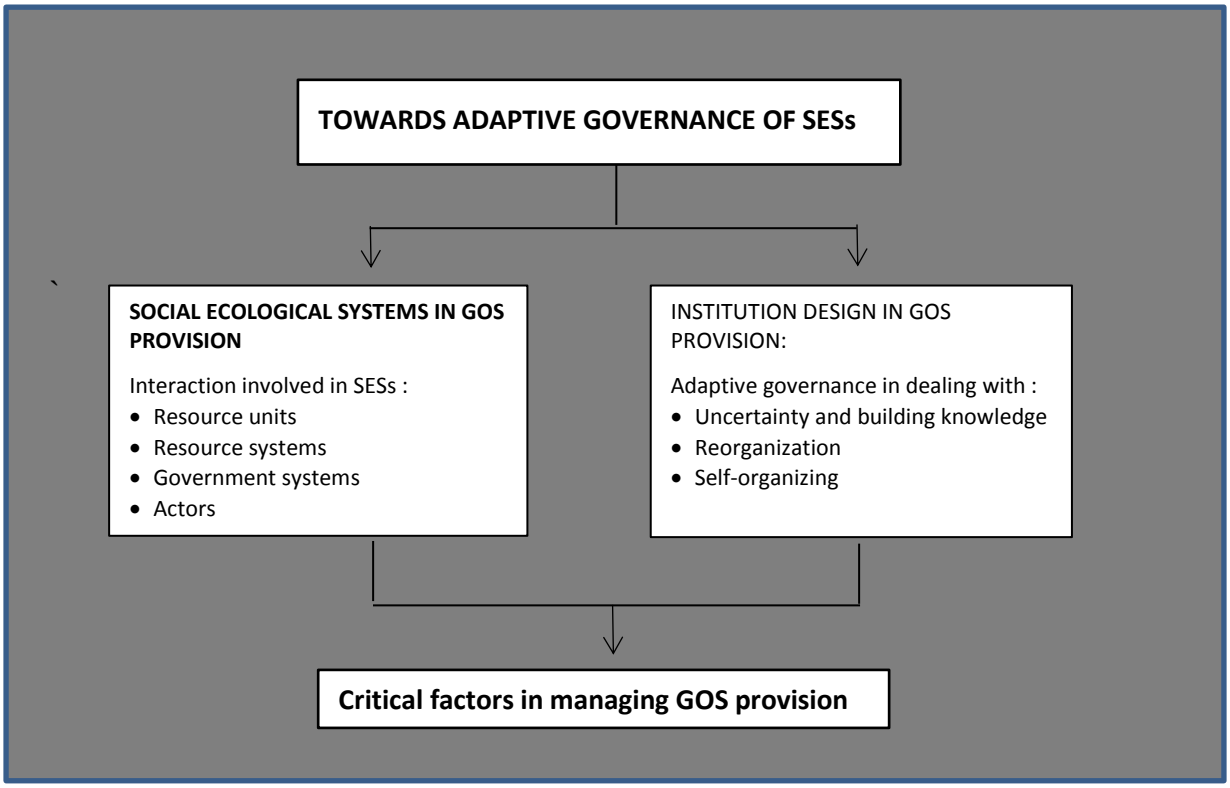
Apprehension about provision of green space to support environmental quality of urban areas has become driving paradigm for environmental professionals. The transformation of urban landscape profound urban consequences, led to a critical environmental resources (Meyer & BL Turner, 1994). Hence, there was a necessity to collect information about what is known and not known regarding the environment and then elaborate them into multidisciplinary research agenda. In addition, the concept of ecological understanding in mainstream planning is not considered new, which can be seen from Pattrick Geddes and Benton MacKaye' seminal regional planners in the beginning of 20th centuries (MacKaye, 1990). Yet a high-density development leads to the experience of lack of green space provision for most big cities in the world (Sister et al., 2010). It is essential to comprehend the provision of green open space in urban area due to enhancing the quality of environment and social interaction.

In relation to the research questions, research objectives and theoretical background, I propose a conceptual model to analyze the adaptive governance of social ecological systems in managing urban green space (figure 7). In order to achieve adaptive governance of SESs in managing GOS provision, I identified core elements for the analysis in two aspects: interaction of social ecological systems and the institutional design in GOS provision. The first element, taken from SESs framework by Ostrom (2004), showed the interaction between links and entities of SESs elements; resource units, resource systems, government systems and actors/users. As the information is gained, I would analyze and relate it with link and entities of social ecological concept. In relating those elements, I would take the connection of each link and entities, and then determine the examples and the ideal condition of each element, and seeing problem of opportunity which might emerge.

The second element, institutional design, becomes the other element which focuses on adaptive governance. At this term, some variables analyzed are regarding aspect of uncertainty,

reorganization, building knowledge and self-organizing. By doing so, it is expected that we can figure out in detail the factors that support or hinder the management of GOS provision. Herewith, besides assessing policy documents related to GOS provision, I collected the information from the questionnaire distributed to the stakeholders and some interviews. Later on, the critical factors in managing GOS provision can be determined which in the end resulting the mechanism towards an adaptive governance of SESs.

Figure 7. Conceptual model in analyzing GOS provision in Tangerang municipality



Source: Author

CHAPTER 3
RESEARCH METHODOLOGY

To achieve the objective of my research, I took some stages as follows:

a. Underlying theoretical framework, literature review and institutional information as foundation of research

I did my research by exploring institutional learning in the case study and then link it with theoretical framework, literature review and in-depth interview with key people in charge in governing the urban green space provision. This research described qualitative analysis of the attitudes toward urban green space governance held by key people from Tangerang municipality.. Moreover, it focused on 'what' and 'how' question in relation to the performance of Tangerang municipality government dealing with adaptive governance of SESs. As the concept of SESs is relatively new in Indonesia, it is important to stress the focus on how government of Tangerang municipality may be transformed towards adaptive governance of social ecological systems.

b. Collecting Data and information on institutional learning

In order to pursue direction and lesson-learned about adaptive governance of social ecological systems in managing green open space provision, first step obtained was collecting requirement of data related to government capacity in managing green open space. Data about general information of Tangerang municipality (map, tables, graphic, report, etc) were needed to give broad understanding about case study taken in the research.

Data trends of Tangerang local government capacity in green open space provision were also essential factors to measure role of government from previous years until recently. By doing so, it would help to figure out government responsibility to cope with green open space provision. Regulation related to green space management may lead us comprehend whether government has had attempt to give statutory condition with rules and regulation. Another data was about governance changes, which are structure and processes in dealing with green space management. It is most likely that when structure of government system changed, the policy effect would be embedded with the change itself since each leaders of governance has different policy and approach in dealing with particular policy and regulation.

Data collection was obtained by getting primary and secondary data.

- Secondary Data

Secondary data were obtained from the internet source, embedded law and regulation as well as other related sources. In order to support further analysis, related documents to the case study were collected from Tangerang municipality agencies such as Bappeda (Development planning Board) and BPLH (Environmental Board), DKP (Sanitation and landscape agency), DTK (Urban Design Agency), media, articles and journals, other related sources as well.

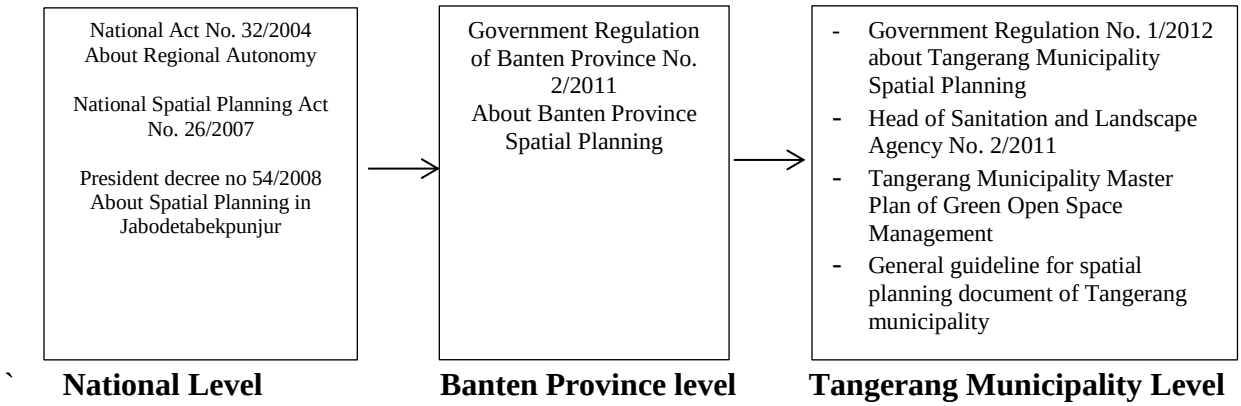
The methods of data collection and analysis were similar within objectives, which include qualitative and descriptive analysis. The output was in terms of condition of law and regulation, role of organization, support of organization in dealing with green space provision in adaptive governance of SESs.

In terms of conducting a research which deals with analyzing policy and regulation documents, data selection was essential due to having a good quality of upcoming result. The more comprehensive the secondary data were obtained, the more qualified and objective the result achieved. Hence, I took some principal steps for refining the research as follows:

- Identifying list of national, province and municipality laws and regulation regarding management of spatial planning development in Indonesia and specifically in Tangerang municipality.
- Selecting some relevant documents and guidelines about the provision of green open space and the mechanism of managing it in the level of municipality. This phase was essential to determine whether the research had been performed with some relevant documents and concept so that the result expected was reliable.

Related policies, regulation and guidelines used for the research as seen in figure 8 portray relevant documents in multilevel governance: national, province and local. It also shows the categorization/status for each policy document.

Figure 8. Policies and regulation related to green open space provision in Tangerang municipality



Source: Ministry of Public works (2007), Bappeda of Banten(2012) , DTK, DKP(2011)

- Primary Data

It was collected from a semi-structured in-depth interview with relevant stakeholders. There were eighteen questionnaire distributed into some stakeholders who directly or indirectly engaged in green open space management. Some of them have been interviewed more deeply to gain information and knowledge regarding governance structure and capacity. It was crucial to identified who were in charge, understood and involved intensively in the changing of green space provision. Furthermore, it was necessary to explore whether the stakeholders could relate the concept of social ecological systems, which was considerably a relatively new concept in Indonesia, with the necessity of green space provision in Tangerang municipality. This was to focus on how the existence system have coped, adapted and transformed due to facing green space problems. The methods to collect data were handing-in questionnaire to the key people and desk study/ study literature.

Table 1. Policies and regulation related to GOS provision in Tangerang municipality

Topic lists for interview
Explanation about governance structure and attribute of : - Main issues of green open space provision - Main task and function of each government agency - Conflict among multilevel government (Local government with national and province government) - Cooperation in managing green open space Links and entities of natural resources: - The availability of resources system, resource units and users - Expectation from public community regarding green open space Adaptive governance: - Perception about the importance of green open space and how stakeholders deal with the problems - Cooperation and coordination among different stakeholders in dealing with green open space provision - Role of stakeholders in managing green open space Critical factors of adaptive governance of social ecological systems: - Recommendation for better management of green space provision

Source: Author

Table 1 consists of list of key people and the main topics for in-depth questionnaire. Since the focus of my research was related to government capacity, the stakeholders were mostly from local government officer, such as Bappeda, BPLH, DKP and DTK. The interview also involved other stakeholders as the users of green open space: NGO, community and university.

Some main topics for the interview focused more specific to the role of local government. The first theme was the explanation about governance structure and its capacity. It would explore the historical story of the area; how was the condition in the past and how human intervention influence the ecology which subsequently affects the availability of urban green space. Main task and function of relevant local government agency were also assessed to measure whether the local government had embedded the needs of green open space. Further aspect of the interview was the conflict among multilevel governance and cooperation between them.

In terms of the interlink between government capacity and the concept of adaptive governance of SESs, the interview also dealt with links and entities of natural resources in the area. It measured the present availability of resource systems, resource units and users. On the

other hand, perspective and expectation from community and other parties was also been assessed.

c. Data Analysis

After collecting baseline data in primary and secondary data, descriptive analysis were used to elaborate the whole story of case study and endorse it with theoretical background to grasp knowledge gap. According to Brymann (2008), this kind of analysis stresses in the chronological stories from interviewees that have to be considered with the other connection (between events as well as its context).

For further identification, stakeholder analysis acts as latent actors in obtaining adaptive governance in case study of green open space provision. Stake holder analysis could determine stakeholders' interest and conflict that may occur in the future. Accordingly, qualitative analysis also played an importance role in this research. It is due to the fact that not all the underlying results of analysis reveals in detail (Brymann, 2008).

As a study case, Tangerang municipality has issued spatial planning document (RTRW 2012-2032) for regulating development planning process for the area. The spatial planning is derived from National spatial planning act No. 26/2007 and is in line with Banten province spatial planning document. The documents such as government regulations and government decrees as well as other guidelines act as baseline data for analyzing the mechanism of green space provision in the area. From the literature review and secondary data, I will elaborate indicators and variable of managing green open space that are related to concept of social ecological systems. A qualitative measurement is reached by doing in-depth interview with some key people.

The research result towards adaptive governance of SESs derived after getting the analysis of how mechanism of SESs reveals in green open space provision, the measurement of government capacity in adaptive governance of SESs, and the identification critical factors of SESs. In the end there will be a lesson learned and recommendation regarding how the government of Tangerang municipality may deal with adaptive governance of SESs, particularly in managing green open space provision.

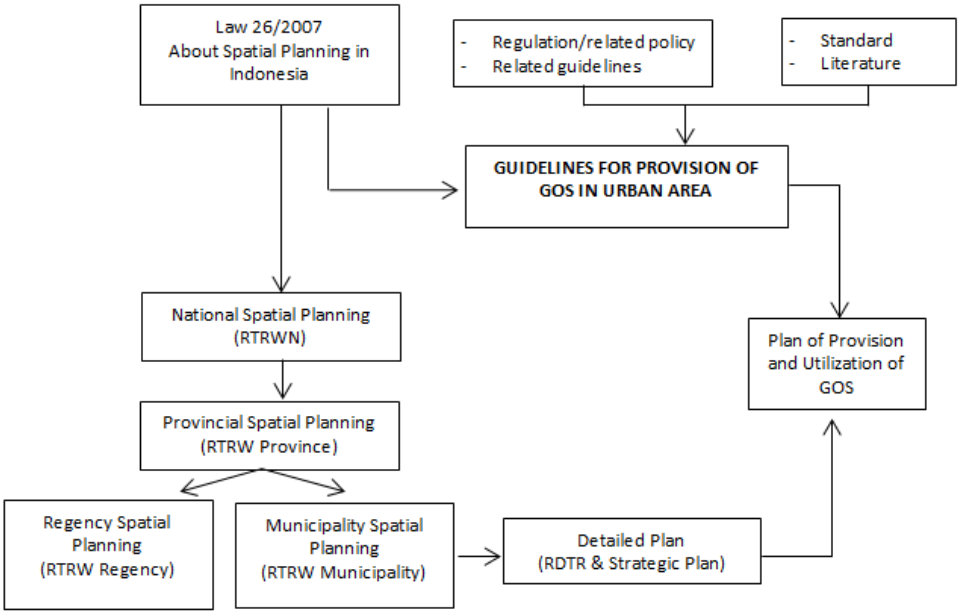
CHAPTER 4
GOS MANAGEMENT IN TANGERANG MUNICIPALITY: GOVERNMENT CAPACITY TOWARDS ADAPTIVE GOVERNANCE OF SESs

The city of Tangerang is an administrative municipality located near the capital city of Indonesia, Jakarta. As a buffering city of Jakarta, Tangerang municipality has become expanding as a city with various land use function such as industry, business and dwelling. The rapid development of the city has led the area become densely populated. With the number of almost two million inhabitants, the city has been experiencing urban sprawl which effects physical development in recent years.

In 1993, Tangerang municipality became a new autonomous region and separated from the old regency. As a new administrative region, it has authorities to plan and manage the city. On the other hand, this city has to provide goods and services for its society as well. To balance the authority and the obligation, an official document is needed to support this matter in order to manage city growth and its implications. One of planning product that is commonly known is spatial plan. It is a kind of guidance how city supposed to be.

According to the National Planning Act No. 26/2007, every municipality has to provide and utilize a minimum requirement of 30% green open space of the city. The proportion is 20 % provided by public and 10% by private. To this situation, Tangerang municipality has released a document of spatial planning document (RTRW 2012-2032) regarding land use utilization for the city. The provision for the utilization and the use of green space is set based on some guidelines available in the laws and regulation in Indonesia.

Figure 9. The conceptual framework for GOS provision in Indonesia

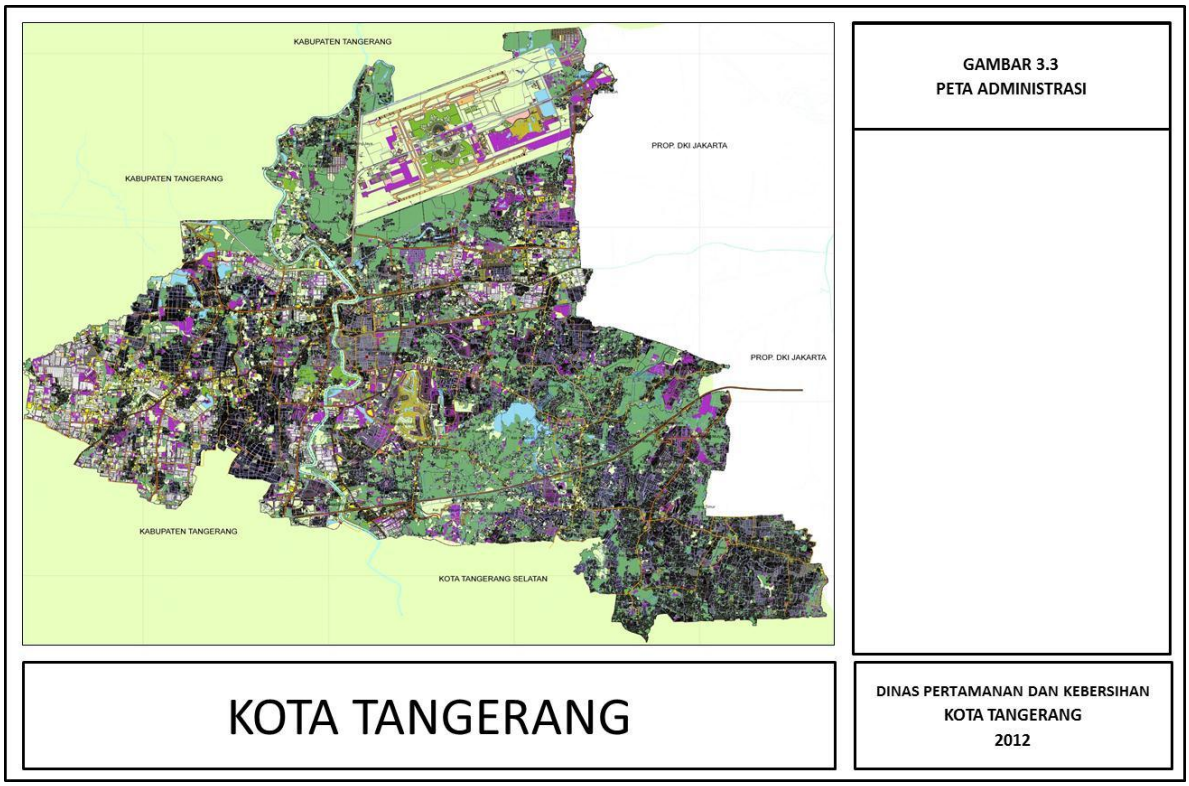


Source: Ministry of Public works, 2008

Figure 9 shows the mechanism for managing green open space for every region in Indonesia. The guideline for the provision of GOS in urban area gives detailed information regarding the responsibility of the local government. For instance, it explains the direction for GOS provision in settlement area, neighborhood and urban area. The vegetation type for different area (such as vegetation in the forest park, in the green belt, etc) is also stated clearly. Planning procedure and public participant also become main factors in the guidelines.

Tangerang municipality has been trying to follow the instruction regarding GOS provision and utilization in their area. The effort is explained in the following section.

Figure 10. Map of Tangerang municipality



Source: DKP, 2012

4.1 GOS Provision in Tangerang Municipality

In Tangerang municipality, the provision of green open space in urban areas has two purposes: main function and additional function. As a main function, urban green space is essential for ecological endeavor, such as for assuring the air circulation system, producing oxygen, absorbing rainwater, providing wildlife habitat and etcetera. Meanwhile, as an additional function, urban green space is needed for social and cultural purpose such as for recreation, for socialize, for media to communicate and so on. Besides, urban green space also has added value in terms of economic and aesthetic function. As a natural resource, green space is also beneficial in producing some sale products such as plants, fruits, and vegetables. In the aesthetic function, the availability of green space may add the value of livability, city landscape and beauty of nature.

Due to its importance, urban green space becomes a critical factor for a city which is developing. In particular when there is a lot of physical development in the area, it is more likely

that urban green space will regularly decrease which in the end will result in lack of green space availability. This is what has been happening in lot of big cities in Indonesia, including Tangerang municipality. Although National laws and regulation has released a minimum standard of 30% green space provision in every municipality and district, in fact only few of the cities have met the standard.

According to the document of master plan of urban green space in Tangerang municipality, the amount of green open space provision in 2011 was 9 % for public (Urban design Agency, 2011). It still needs far more percentage to reach the minimum amount of 20 % green open space provision as stated in the document of spatial planning.

4.1.1 Condition of GOS in Tangerang Municipality

As collected from secondary data, the existence of green open space for public is as follows:

a. Forest Park

Forest park functions as a component of green open space. According to the guidance of green open space provision, forest park consists of expanse land with dense trees in city areas and is legitimized by the authorized officials in Tangerang. In this area, forest park is used as a counterweight of the city. In details, types of forest park and its size is portrayed in table 2 below.

Table 2. Forest park in Tangerang municipality

NO	Name of forest park	Size (Ha)	Sub district
1	Hutan Kota Cikokol	0,96	Tangerang
2	Taman Angsana Cikokol	0,42	Tangerang
3	Hutan Kota Daan Mogot	0,30	Tangerang
4	Bantaran Kali Cisadane Jl. GJA	0,28	Karawaci
5	Bantaran Kali Mookervart	1,92	Tangerang
Total		**3,88**	

Source: DKP, 2011

Figure 11. View of city forest in Tangerang

Source: DTK, 2012

b. City Park

According to the guidance of green open space published by Landscape and sanitary agency (DKP), a city park is an open space which functions for recreation, education, sport center, and others. City parks in Tangerang is 4,43 Ha (Table 3). At this moment, DKP as the leading sector agency in managing GOS has been trying to maintain and improve the existence of city parks in particular areas, mostly in the city center such as Tangerang sub-district. Other sub-district are already had some parks, yet the number as well as the quality is not as good as those located in the city center.

Table 3. List of city parks in Tangerang municipality

NO	City park	Size (Ha)	Sub district
1	Cisadane river park (Taman Pujalidane)	0,62	Tangerang
2	TMP Taruna park(Taman Hoek Lio Baru)	0,08	Tangerang
3	Adipura Park	0,03	Tangerang
4	Plaza Jl. Satria Sudirman	0,11	Tangerang
5	M.Yamin green belt	1,26	Tangerang
6	Nyi Mas Melati park	0,88	Karawaci
7	Pasar Pisang Karawaci park	0,50	Karawaci
8	Metadon park	0,15	Cipondoh
9	Pasar Pisang Cibodas park	0,25	Cibodas
Total		**4,43**	

Source: DKP, 2011

c. Lakes/situ

The number of lakes as well as its wide has been decrease in Tangerang. Out of the total wide 263.5 ha, nowadays there is only about 189.06 ha left (table 4). It proved that the problem

of land use management is still neglected. Although there is already rule and regulation about performance of lakes, it is hard to apply the law enforcement.

Table 4. Condition of lakes in Tangerang municipality

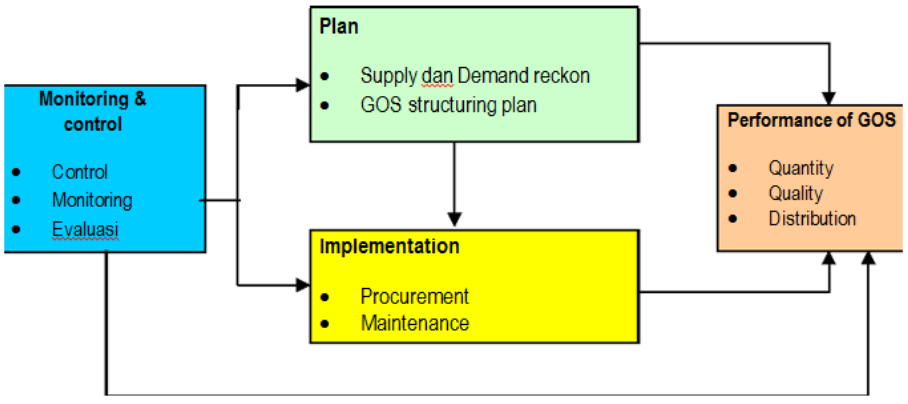
No	LAKE	Village	River basin	Wide	
				Initially (Ha)	Currently (2008) Ha
1	Situ Besar	Cikokol	Cisadane	6,80	7,88
2	Situ Bojong	Kunciran	Angke	6,00	4,91
3	Situ Bulakan	Priuk/Jatiuwung	Cirarab	30,00	33,57
4	Situ Cangkring	Priuk	Cisadane	6,00	9,10
5	Situ Cipondoh	Cipondoh	Cisadane	142,00	133,20
6	Situ Kompeni	Rawa Bokor	Kamal	70,00	0,4
7	Situ Kunciran	Kunciran	Angke	3,00	-
8	Situ Plawad	Plawad	Cisadane	6,50	-
	TOTAL			263.5	189,06

Source: DTK, 2012

4.1.2. Management of GOS in Tangerang Municipality

In order to accomplish sufficient green open space area, government of Tangerang municipality has an obligation to manage and provide appropriate GOS. The responsibility consists of steps such as plan, perform, implementation, and monitoring and controlling. At this moment, some agencies involve in the management are BPLH, Bappeda, DKP, DTK and DPU.

Figure 12. Management of GOS in Tangerang municipality



`

Source: DKP, 2011

Based on secondary data gained, there is already a consideration to bring about both the social and ecological benefits in the management of GOS. In social analysis, the utilization of GOS provision aims to provide room for social interaction, such as utilizing lakes and marsh as fishing area, river banks as places for recreation and playground, city parks and forest parks as sport centers and other outdoor activities. On the other hand, ecological analysis portrays that government of Tangerang has an effort to enhance the quality and quantity of environment by determining type of vegetation for ecological concern as well as for rainfall runoff.

However, the management of green space provision at this moment is only limited to keep the existing area, not to improve the availability into the minimum requirement. It is still very much difficult to fulfill the necessity of 30 % green space area because of complex and dynamic problems that occur in the city. Currently, there is only 11,04% and 1,56% green space area in Tangerang provided by public and private respectively (table 5).

Table 5. Condition of GOS existing in Tangerang municipality in 2012

No	Sub district	Area (Ha)	GOS Public area per sub-district (Ha)	% of width area (Ha)	GOS Private area per sub-district (Ha)	% of width area (Ha)
1	Ciledug	876,9	87,9	10,03%	0,07	0,01%
2	Larangan	937,9	80,8	8,62%	0,19	0,02%
3	Karang Tengah	1.047,4	101,69	9,71%	0,42	0,04%
4	Cipondoh	1.791,0	175,63	9,81%	1,16	0,06%
5	Pinang	2.159,0	219,12	10,15%	0,002	0,00%
6	Tangerang	1.578,5	170,59	10,81%	136,57	8,65%
7	Karawaci	1.347,5	132,42	9,83%	0,74	0,06%
8	Cibodas	961,1	91,84	9,56%	1,11	0,12%
9	Jatiuwung	1.440,6	143,40	9,95%	1,15	0,08%
10	Periuk	954,3	114,60	12,01%	0,54	0,06%
11	Neglasari	1.607,7	146,77	9,13%	1,92	0,12%
12	Batuceper	1.158,3	1,26	0,11%	0,12	0,01%
13	Benda	998,9	395,62	39,61%	118,83	11,90%
Total		**16.859,1**	**1.861,67**	**11,04%**	**262,85**	**1,56%**

Source: DTK, 2013

As been mentioned in the literature review, there are four main entities used in analyzing SESs framework for GOS provision in Tangerang municipality as seen in table 6. The variables of SESs concept are resource units (RU), resource systems (RS), governance systems (GS) and actors (A). On the other hand, links between those elements also become core points to analyze to determine to what extend the concept of social ecological systems has/has not embedded in

the mechanism of GOS provision. The result finding and analysis are performed in a more detailed description as follows.

Table 6. Multilevel variables of SESs concept

***RESOURCE SYSTEM* (RS)**	***GOVERNANCE SYSTEM* (GS)**
Sector (eg: water, park, forest) Boundary clarity Size of resource area Infrastructure Storage capacity	Rules: operational, constitutional, collective-choice rules Property-rights regime Network structure
***RESOURCE UNITS* (RU)**	***USERS* (U)**
Resource unit mobility Interaction among resource Economic value Spatial distribution	Group size Socioeconomic attribute History of use Location Social capital Knowledge of SESs

Source: Ostrom & Cox, 2007

4.2. Entities of SESs in the system of GOS provision

In doing the research, I distributed eighteen open-ended questions for interviewees from different backgrounds: government employees, communities and academicians. For each association, I interviewed three people each. However, since I did the interview mostly by sending questionnaires by email, I could not receive responses from some interviewees. There were eleven respondents who gave feedback for my questions. Meanwhile, I also did direct communication by phone to some government employees to go further into in-depth interviews. There are five key people from Bappeda and DTK who had in-depth interviews. As been mentioned above, the questions were regarding the mechanism of GOS management in Tangerang and its relation to the entities of social ecological systems. To be more specific, the result finding is discussed in the following subchapters.

a. Resource System

The result gained from the open-ended questions and in-depth interview can be seen in table 7 below. Each stakeholder gave their opinion and perspectives which are likely directed to some various insights. In terms of resource systems, the fact of lakes shrinkages in Tangerang

from nine into six lakes conveys the deterioration of green open space. Land use changes in river banks also resulted to the decrease of quality and quantity of ground water. It is also interesting to note that government of Tangerang focus more the provision of green open space in Tangerang sub district and airport area. The other twelve sub districts still have very limited concern for GOS provision.

"GOS in Tangerang municipality quantitatively and qualitatively is still far from enough. It is only about 9,6% which consists of vacant land owned by central governments, airport, developers. It means government of Tangerang has no right to utilize the area. In the future there might be changes in land use function. It is also worth to point out that the management of GOS is unequal and only concentrated in the city centre (Tangerang sub district) and the airport area" (A1)

Table 7. Knowledge of social ecological framework among stakeholders

Stake Holders	RESOURCE SYSTEMS	RESOURCE UNITS	GOVERNANCE SYSTEMS	USERS/ACTORS
BAPPEDA	Has not reveal implied knowledge about interlink between social, ecological and social-ecological systems	People are not quite aware of the importance of GOS, more focus on economic factor	Un-integrated coordination among agencies in Tangerang municipality Developers have met the minimum requirement of GOS provision	Rapid development of infrastructure decreases GOS availability
BPLH	Land acquisition becomes the main barrier in reaching GOS shares of 30%	Users' participation slightly improved, yet has not been applied effectively	Interaction and coordination among agencies should be enhanced	Rapid development of the city causing a more complex problem of GOS provision
DTK	It is hard to reach sufficient GOS due to budgeting problem and land acquisition	Limited participation from users. Focus more in infrastructure development	Need continued coordination between stakeholders Developers has met the minimum standard of regulation (for providing public facilities including GOS area), yet has not concerned to give specific green space area for public	Limited access of GOS for public due to an un-prioritization of GOS management

Stake Holders	RESOURCE SYSTEMS	RESOURCE UNITS	GOVERNANCE SYSTEMS	USERS/ACTORS
DKP	Difficult to reach sufficient amount of GOS due to limited funding and preserving the area	Misused land function of GOS into semi-permanent dwelling/kiosk by the poor and street vendor	Government deals with GOS management by enhancing supported programs and projects. Some developers have innovation in building the area with green concept	
Communities	In-sufficient GOS area due to un-optimized spatial pattern and less maintenance of existing green space	Lack of approach from government to society leads to limited information regarding GOS issues	Private sectors prioritize profit oriented rather than concern the necessity of GOS provision	People have not involved appropriately in the interaction for GOS provision
University	It is essential to fulfill the obligation of GOS, yet in fact the availability of GOS becomes more decreasing	Economic of scale is the main factor triggering the main problems in GOS provision	Government should make detailed land inventory, distinguish the allotment between public GOS and private GOS. Also enhance partnership program with private sectors, apply incentive and disincentive system	

Source: author

It is hard to fulfill the requirement of 30% GOS due to the fact that Tangerang has been a dense city for decades. Prior to its strategic location, the city is becoming more densely populated. Urban sprawl also causes misused of land availability. A lot of immigrants come to the city trying to improve their plight. As a consequence, they occupy every part of vacant land such as river banks. They also infest the location besides the lake and use it as trading area by building temporarily kiosk for their local business.

b. Resource Units

In terms of resource units, some findings portray that urbanization becomes the main factor of dynamic interaction in social and ecological system. In the variable of social, urbanization and

migration continually raise due to economic growth and employment opportunities. As a result, there is a high demand of housing and settlements because of population growth. The industrial area and commercial buildings such as offices and shopping centers have been scattered as well. Given the situation, variable of ecology such as the increased of residential and industrial area have also given direct impact into the decline of green open space availability.

"Seeing from economic value, green open space will not give a significant benefit. Meanwhile, if there is a switched function from vacant area into commercial building, the regional income will increase. However, government should pay more attention into the availability of GOS. There should be a breakthrough in setting land acquisition for GOS. (A3)

Likewise, some other respondents also gave similar opinion. Instead of concerning the necessity of environment preservation, mostly stakeholders consider more into the availability of infrastructure. This is the case since located in a strategic area, Tangerang municipality has becoming favorite city to live in. Along with a rapid growth of population, it is for sure that physical construction may lead into degradation of resource units

"There is still insufficient GOS provision (lack of resource units) due tosome factors:

- *Imbalance city design*
- *The proliferation of dwelling and settlements*
- *Lack of GOS maintenance causes changes in land use function*
- *Lack of information regarding the necessity of GOS" (C1)*

Besides admitted that land use in Tangerang is more preferable for building public facilities, a government employee from DTK (city design agency) has more opinion from a different perspective. She added that the problem in managing resource units such as land availability for GOS in Tangerang is also due to geographical condition. Since Tangerang demography is flat area, it is difficult to provide GOS into what is required.

"It is hard to fulfill the obligation of 30 % GOS in Tangerang because of the requirement of technical criteria for GOS. Due to flat area, it is hard to get land slope >15%. So there should be a particular criteria for reaching sufficient GOS provision. On the other hand, land acquisition for GOS is not common yet. The priority of land use is more preferable for public facilities (school, medical center, government building). Besides, it is hard to realize land acquisition because of difficult mechanism and debate in land price. Also there is still poor coordination regarding GOS target achievement" (A4)

c. Governance Systems

In relation to the environmental consideration, every agency in the government system has its own task and responsibility for GOS management. In the very first step of planning process, each agency gives proposals for the development to Bappeda as the coordinator in arranging action plan. As an overview, DTK has a responsibility to do land acquisition for

establishing GOS area which is done after DKP hand in a particular proposal to expand GOS area. In collaboration with BPLH as the coordinator in environmental management, the other relevant agencies discuss which proposal will be the most prioritize to be implemented, which one should come first and which one should be postponed. Due to constraint of time and budget, not all proposals could be accepted in the current development process.

The mechanism of proposing work plans is certainly applied for all agencies which responsible not only in the physical or environmental development, but also in the administrative and routine activities. Later on, after reaching an agreement of regional budget for revenue and expenditure, local government as the executive board request for the approval from the legislative council. Prior to this situation, the initial plan of the development might be changed due to some further consideration from the council.

As the most authority party in the region, the government of Tangerang municipality has tried to manage GOS provision properly. Some elements in all levels of institutional design principle are already embedded in the rules and regulation. The spatial planning document of Tangerang municipality 2012-2032 stated clearly how constitutional rules and collective-choice rules about the management of GOS. The property-rights regime also exists in the institutional design. It portrays some clear rules in the mechanism of land use changes, starts from the highest level of government, BPN (National land use board) who releases land ownership status into lower level of government who issues building permits.

However, there is still a lot of barrier in implementing the rules and regulation for GOS provision. The national government only issued the minimum service standard of 30% GOS without giving a more specific guidance for doing it practically. An un-integrated coordination between agencies also reveals which lead into a difficult implementation. As the leading sector of GOS provision, DKP has the tasks and functions to manage it. However, what has been done by the agency is still limited merely to maintain public facilities such as roads median, river banks, pedestrians, and street parks. There is no effort to expand the green space area more than the current condition.

DKP itself argues that the agency cannot go further to have more GOS due to the fact that the authority to have land acquisition is DTK. On the other hand, DTK disputes that the main issues of providing land is the limited availability of land and limited budget. Bappeda as the

coordinator claims that policies regarding program and budgeting from the executive and legislative chambers are not in favor of the GOS presence.

"The main problems of green space provision in Tangerang are as follows: limited vacant land, expensive land prices, limited budget for land acquisition, a weak coordination to reach target of green space area, prioritize in building infrastructure for public and commercial" (A1,A4,A5)

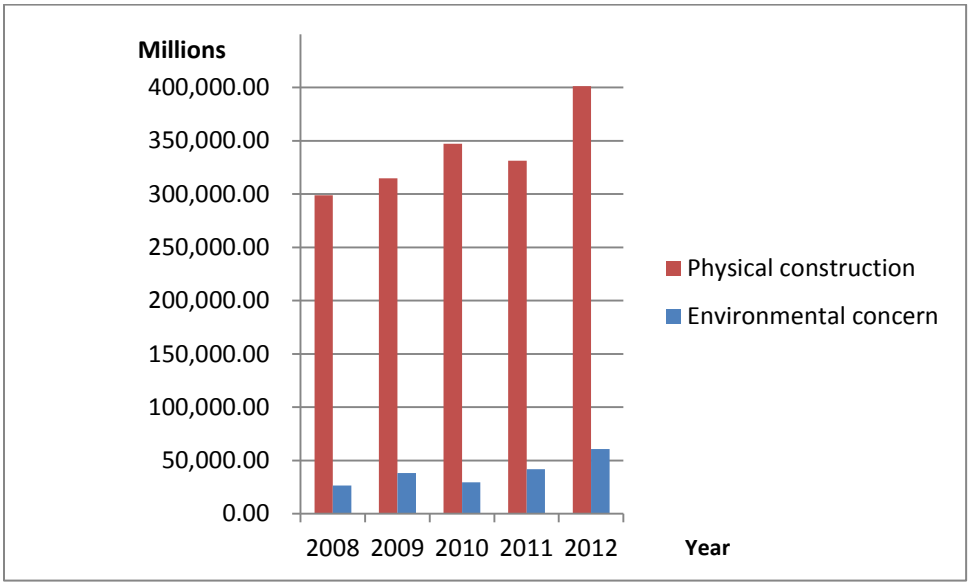
To be more specific, the allocation for environment affairs and physical construction in Tangerang municipality can be seen from table 8 and figure 13 below. The budget allocated for the environmental programs were much less than the allocation for physical construction. In 2008, there was Rp. 26.347.401.848 allocation for the environmental concern. Meanwhile, physical construction was allocated Rp. 298.971.377.988. From the time series data, during 2008 to 2012 the budget ranged from 8 % to 15 %. In a more detailed data gained from the interview with some key people, it was found that of the overall budget for the environmental concern, the allocation for GOS provision is even far fewer.

Table 8. The budget allocation for environmental concern and physical construction in Tangerang municipality 2008-2012

Development focus	Affairs	2008	2009	2010	2011	2012
Environment concern	Environment	26.347.401.848,00	38.158.363.150,00	29.434.296.649,00	41.942.728.502,00	60.825.166.305,96
Physical construction	Public works	96.562.900.351,00	116.626.384.494,00	60.628.321.628,00	134.907.105.945,00	164.035.319.846,50
	Settlements	18.483.526.019,00	9.169.023.433,00	8.512.944.750,00	22.676.685.761,00	21.874.580.405,00
	Office building	49.848.819.326,00		2.307.284.700,00	48.988.965.092,00	48.988.965.092,00
	Transportation	15.333.854.400,00	14.088.261.208,00	50.213.115.031,00	24.927.286.254,00	50.213.115.031,00
	Education (Infrastructure development	116.508.671.686,00	150.266.829.397,53	215.139.526757,00	69.210.658.369,00	85.549.066.346,00
	Health	2.233.606.206,00	24.563.189.950,00	10.444.830.150,00	30.554.594.500,00	30.554.594.500,00
Environment concern		26.347.401.848,00	38.158.363.150,00	29.434.296.649,00	41.942.728.502,00	60.825.166.305,96
Physical construction		298.971.377.988,00	314.713.688.482,53	347.246.023.016,00	331.265.295.921,02	401.215.641.220,50
Percentage of environmental concern		9 %	12 %	8 %	13 %	15 %

Source: analysis (author, adopted from Bappeda, 2009-2013)

Figure 13. Budgeting allocation for environmental concern and physical construction 2008-2012



Source: Author

Gaining the data and information about budget and allocation for the development in Tangerang municipality, it does portray that the local government is still giving focus more to the development of public facilities and infrastructure. Due to limited budget, although some agencies have already proposed programs and projects concerning the environmental preservation, the decision makers decided to execute proposals for physical construction. This is reasonable since Indonesia as a developing country is still seeking for a pro-growth development instead of other un-physical development. Nevertheless, in the future some respondents expect to see a development process which also takes into account environmental consideration as one of the main focus in the development. There should be a balance attention for both elements in order to reach a more sustainable development for the region.

d. Actors/users

The actors involved in experiencing green space management are determined by group sizes, attributes of socioeconomic, history of use, social capital and knowledge of SESs. As a densely populated area, there are about two million inhabitants who actually need to experience green space in Tangerang. The existing condition of 11 percent green space is still far from the eligible condition. Yet, it is more likely that socioeconomic activities drive the residents' un-

awareness attitudes for the needs of GOS. Since Tangerang has been developing into a compact city for decades, a lot of development has been spreading here and there. It causes only small vacant land left, the rest are built-up area for commercial building and other socioeconomic activities. Thus, some government employees argue that it is difficult to fulfill 30% requirement in the city. They tend to recommend regencies that are more possible to reach such amount.

"From the requirement of 20% and 10% GOS by public and private respectively, almost all big cities in Indonesia only reach total of below 10 %. Meanwhile regencies are more possible to reach the number. It is due to the fact that mostly cities already consist of built-up areas, so it is much difficult to meet the prerequisite".(A5,A7)

Regarding the knowledge of SESs, none of the interviewees are familiar with such term. What is more likely is that, although they realize that social and ecological system as two in-separable elements in dynamic human-nature relation, they have not got the insight of how the two parts should be interacted.

Seeing some discourses and policies embedded in GOS management, government of Tangerang seems to have an appropriate consideration in managing GOS. However, in the future such discourses are still facing uncertainty. This as governance system and attributes of governance might change. Further, at this moment the government has not been able to respond social and ecological problems. Given the concept of SESs, adaptive governance might be developed to face the challenges. In the next sub chapter I would discuss the insight towards adaptive governance for managing GOS provision.

4.3 Towards Adaptive Governance of SESs in the Management of GOS Provision

The discourse towards adaptive governance deals with requirement to cope with nature dynamics in social ecological systems (Grimm et al., 2008). As it deals with capacity in coping with external drivers and rapid change of the environment, assessing the adaptive governance focuses on the capacities of government which later on leads into critical factors for transforming the government system. This section explores how both elements evolve the challenge in the management of GOS provision done by the government of Tangerang municipality. According to (Berkes et al., 2000), in dealing with dimensions of adaptive capacity and its subcomponent, there are some aspects which can be assessed.

a. Learning to live with change and uncertainty

This dimension involves the necessity to induce learning for change and facing uncertainty. Having the finding of how concept of social ecological systems reveal in the management of GOS, I bring about the linkage of social systems and ecological systems as can be seen in table 9. Humans' interventions in the interaction with nature cause a lot of negative impacts. Urbanization and migration occurred due to economic growth and employment opportunities resulting in a high demand of housing and settlements. Furthermore, policy regulation issued by government, such as settlement expansion led the city becomes much more densely populated.

Table 9. Interaction between social systems and ecological systemss

NO.	INTERACTION	IMPACTS	FEEDBACK
1.	**Urbanization and migration raise** due to economic growth and employment opportunities	• Raised in demand of housing and settlements because of population growth Policy regarding settlement expansion enhanced infrastructure development	Land acquisition from arable land/ open space into residential area.
2.	**Industrialization development**	• Employment opportunities • Increased in regional income led to rapid growth of industrialization area • Increased in trade and service sector => more and more infrastructure development	Infrastructure development occurs because of some amenities such as the existence of resources, accessibility in building permit, business opportunity, et cetera.
3.	- **Land use change => conversion from protection area and agriculture land into built up land** - **Status of vacant land that owned by other parties**	• Decreased of air quality and water quality which cause pollution • Decreased of catchment area, rainfall infiltration which cause flood • Some vacant land cannot be used	Difficult to reach the share of GOS requirement

Source: author

The government of Tangerang municipality seems not so much concern about the uncertainty that might occur in the future. Due to enhancing economic of growth, the government is in favor of a lot of physical development rather than natural preservation. From

the result findings and analysis done in the previous section, I constructed the linkages between social system and ecological systems in Tangerang municipality.

What is important to take into account in the future, regardless the physical construction, is that the government should have a breakthrough in improving environment condition. There will be more infrastructure development indeed, yet the consideration of reinventing environmental elements become the major factor to think about. Thus, in arranging any spatial planning, the government should pay much more attention into the availability of green space. The scheme of incentive and disincentive might become an appropriate method as some interviewees suggested:

"In dealing with the problem of GOS provision, I would suggest the local government to have some consideration as follows:

1. *Increase partnership program between the government and private sectors to enhance the land area for GOS, or expand the quality of existing GOS*
2. *Apply incentive system for private sectors, by simplifying building permit if they provide or increase the quantity and quality of GOS area*
3. *The government should try to have inventory of idle land including river banks and enhance them as GOS area*
4. *The government should integrate the requirement of land acquisition or apply minimum requirement of planting trees in the building permit document especially for business areas." (U1)*

"This is true that rapid development will automatically increase building area while at the same time will decrease catchment area. Besides, lack of monitoring phase may cause GOS such as river banks and lake buffers are occupied to the other functions.
I suggest the government to enhance the management, control and law enforcement for the utilization of urban space."(A4)

Using SESs concept, capacity in combining different types of knowledge for learning is essential. What is meant with the framework is that there should be an effort to combine knowledge gained from the experience and experimental, knowledge from the institution, and knowledge systems which can be a complimentary for such combination (Folke, et al, 2003). To be more specific, the government hand in hand with communities and private sectors and other stakeholders has to share knowledge in building social ecological network for managing GOS.

Although some policies and regulations have already considered such element, the law enforcement is still very limited. So far, each stakeholder is focusing in their particular interest and ignoring the necessity to collaborate each other. The scheme of incentive and disincentive, for instance, has already included in the policy documents. Yet, the implementation has not

revealed in the arena. "*Private sectors have not given positive impact in GOS provision. They prefer to get profit oriented per se." (A6).* Likewise, citizens also have not given prioritize in the necessity of keeping GOS area in their surroundings. *"It is difficult to maintain GOS because there are a lot of slump settlements occupied the area."(A7)*

Meanwhile, as been mentioned above, the government at this moment has not been able to implement rules and regulations appropriately. Although some policies clearly regulate the mechanism of every single development, there is very limited, if cannot been said not at all, strict action by the government if somebody breaks the rules. It seems that in the planning process, the government has performed quite well. Nevertheless, they cannot keep the performance well in the implementation, monitoring and controlling phase.

b. Nurturing diversity for reorganization and renewal

To develop the government system into a better performance, there are various types of reorganization and renewal can be imposed. Ideally, the transformation of government system may lead into a better situation which involves polycentric and multilayered government. The role of government in managing the city depends on how the institution performs such part. Since Indonesia's planning system is decentralization, the government duties are in line with polycentric and multilayered institutions (horizontal and vertical links). In the case of government system in Indonesia, the management of green open space provision must be fit with all national regulations.

As an organization with multiple opportunities, local government of Tangerang municipality has tried and developed appropriate systems and management of social and ecological contexts. For instance, coordination embraced among agencies in local government, with other governments in the same level and also with higher level of government (central governments). However, there are still some difficulties in gaining sufficient cross level interaction among lower level and higher level of government. In the central government level, some rule and regulations is hard implemented due to technical difficulties.

"Central government has issued regulation regarding 30% green open space provision. Local governments have the obligation to fulfill it. Yet in practice, it is hard to reach the number. It is due to the gap occurs between national rules and local government rules" (A6)

Government employees complained that it is hard to interpret the instruction from central government into a more practical implementation. Although the rules aim to improve the fit

between knowledge, action, and socio-ecological contexts, societies cannot respond more adaptively at appropriate levels.

The local government has had an attempt to achieve sufficient management of GOS by the performance of plan, implementation, monitoring and control. Based on the document of master plan of GOS of Tangerang municipality, the scheme of GOS management can be seen in table 10.

Table 10. Scheme of actors in charge in GOS management of Tangerang municipality

GOS type	COORDINATOR	PLANNING PHASE	DESIGNING PHASE	CONSTRUCTIONG PHASE	MAINTAINING PHASE	MONITORING
Lake buffer	BPLH DPU	BPLH DPU	BPLH DPU	BPLH DPU	BPLH DPU	BPLH DPU
River banks	BPLH DPU	BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)
Sempadan Mata Air	BPLH DPU	DPLH BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)	BPLH DPU BBWS (National agency)
Forest parks	DKP	DKP DTK BPLH	DKP BPLH	DKP DTK Private sectors	DKP DTK Private sectors	DKP BPLH
City parks	DKP	DKP DTK BPLH	DKP BPLH	DKP DTK Private sectors	DKP DTK Private sectors	BPLH
Neigborhood parks	DKP	DKP DTK BPLH	DKP BPLH	DKP DTK Private sectors	DKP DTK Sub-district level Private sectors	DKP DTK Sub-district level Citizens
Road border	DKP DPU	DKP DPU	DKP	DKP DTK Private sectors	DKP DTK	DKP DTK
Sport fields	DKP	DKP DTK	DKP DTK	DKP DTK Private sectors	DKP DTK Sub district level Administrator	DKP DKP DTK Sub district level Administrator Citizens
Public cemetery	DKP	DKP DTK	DKP DTK	DKP Administrator	DKP Administrator	DKP Administrator

Source: DTK, 2013

The table showed that each type of GOS has its particular actors in charge. Lake buffer, for instance, is coordinated by BPLH as the board which sought the environmental condition

around the lakes and DPU as the technical agency. The other phases also held by both agencies since they are the most in charge parties for the management of the lakes and its buffers. Meanwhile, riverbanks which the management is also coordinated by the two agencies, has different actors in the rest phases. BBWS as a national agency also plays an important role in the management of GOS. This is because based on national regulation, rivers are owned by state, thus the management must be controlled by state as well. Such scheme also applies in the other GOS element. Further, private sectors and citizens also play their role in maintaining and monitoring phase.

c. Creating opportunity for self-organization

To create an opportunity for self-organizing, the government ought to have innovation that deals with cross-scale dynamic, for example by matching scales between ecosystems, communities and governance. Self-organization such as public participatory scheme plays an important role in enhancing the opportunity for innovation. Yet, result findings from communities' perspective show that there is very limited involvement and participation due to the fact that there is seldom information dissemination for public regarding the requirement of GOS.

"As far as I know, GOS provision only comes from public initiative. There is no advocate or encouragement from government for public to enhance GOS provision. (C1)
"The level of participation in the green open space provision by public is relatively low. It can be seen from the existing of GOS that is still far below the requirement of 10% area." (A3)

An interesting finding regarding the government capacities reveals from one distinguish case of land use allocation in a particular area in Cipondoh sub district. Based on the Spatial Planning document of Tangerang municipality 2012-2032, there is one area in Cipondoh that is allocated as the green open space allotment. It means that the area cannot be built. On the other hand, the area is already owned by some communities and private developers, causing that practically they should allow government to have land acquisition. Unfortunately, the government of Tangerang municipality cannot afford to have land acquisition in the near time because of budgeting issues. Due to this situation, the citizens bring such matter in to the law. From the situation above, it is clearly seen that the management of governance system in Tangerang is still reactive instead of proactive. The situation proves that the government of Tangerang has not reached the scheme of self-organization.

The in-depth interview held with some stakeholders portrays that green open space provision is still far from sufficient. The data gained from report of government stated that out of 30 percent of green open space area, Tangerang municipality has only been able to provide the amount of 11,4 percent public and 1,56 percent private.

"GOS provision in Tangerang is merely green belt along the road and only a few parks in the city and dwelling areas. Hence, GOS provision cannot effectively benefit for communities. Meanwhile, a sufficient GOS should give highly social benefits. Meanwhile, participation and deliberation from communities is still far from sufficient. (A1)

Regarding the opportunity for having self-organization, the government has not performed well. The initiative for integrating sufficient mechanism is merely based on command from the government as the leading sector. Meanwhile there is still problem in defining the responsibility for GOS management. A key person from Bappeda argued that GOS management is still far from sufficient. There is still a lot of ambiguity in defining the term of GOS,

"So far GOS management in Tangerang is still partial, has not comprehensive yet. In concrete, the management of GOS is only in the maintenance level. It has not reached the development level yet"(A2)

Having analyzed the government capacity in managing GOS provision, there should be a mechanism of institutional design done by government of Tangerang municipality. Key factors used for the analysis are about knowledge, networking and leadership. In the existing situation, there are diversities among different stakeholders in determining particular knowledge and translate rules and regulation into actions. Each stakeholder tends to define the knowledge for the management aspect with their own understanding, which is different one another.

Table 11. The critical factors in designing institution towards adaptive governance

	CRITICAL FACTORS FOR ADAPTIVE GOVERNANCE		
	Building knowledge	**Networking**	**Leadership**
Existing condition of govern ment performance	The diversities perception among different stakeholders hampers the sharing of new innovations. Efforts to develop knowledge based on ecosystem approach (e.g. by seeking a fit GOS provision with 30% shares of area) have not met the requirement.	Networks among stakeholders (government agencies, NGOs, municipality, landowners) in vertical links and horizontal links is appropriate in the rules and regulation, yet it is poorly developed	Leadership for collective action and ecosystem management has not revealed. Rather, the institutional design is carried fragmented, each stakeholder has its own implementation to pursue their specific interests.
Contribution	Knowledge in the pro-	There is already scheme of	Strategic policies reveals

	CRITICAL FACTORS FOR ADAPTIVE GOVERNANCE		
	Building knowledge	**Networking**	**Leadership**
factors for adaptive governance	growth and ecosystem approach emerges in the institutional design (such as laws, policies and regulation for environmental preservation do exist)	actors involved in each element of GOS management (as seen in table 9). It might lead into a more clear network system.	
Hindering factors for adaptive governance	- Hard to transfer knowledge into institution understanding - Reactive approach reveals instead of proactive approach	Cross level interaction among agencies has not been performed appropriately	No clear guidance in implementing rules and policies (who to do what). Thus, there should be a bridging institution to encompass task and function for managing GOS

Source: author

As seen from table 11 above, the diversities perception among different stakeholders hampers the sharing of new innovations. Efforts to develop knowledge based on ecosystem approach (e.g. by seeking a fit GOS provision with 30% shares of area) have not met the requirement. In one side, knowledge in the pro-growth and ecosystem approach emerges in the institutional design (such as laws, policies and regulation for environmental preservation do exist). It takes part as the contribution factor in enabling the effort towards adaptive governance. However, hindering factors such as difficulties in knowledge transfer into institution understanding and reactive approach hamper the process towards adaptive governance.

Network system is already in the form of sufficient context, as can be seen from the legal aspect embedded in the rule and regulation. However, the implementation is poorly developed. Cross level interaction among agencies has not been performed appropriately. Therefore, there should be efforts to navigate the institution into such attitudes. Likewise, leadership also has an important role to succeed the government role gaining the critical factors for the adaptive governance.

CHAPTER 5
CONCLUSION

5.1 Concluding remarks: Navigating the attitudes towards adaptive governance of SESs

During the study from relevant literatures, diverse topics on the SESs, environmental preservation for GOS management, and government system emerge as the path to navigate the attitudes towards the adaptive governance of SESs. This research is conducted aiming to measure the green open space management in Tangerang municipality and see whether the concept of social ecological system has or has not revealed in the institutional design. Having the analysis result, I figure out that government of Tangerang municipality has performed quite a sufficient management of GOS. It can be seen from the rules and regulation embedded which shows the efforts to taking into account both social systems and ecological systems implicitly. Still, social consideration and ecological consideration come up with an un-integrated interaction between both aspects. This is to say, although framework of SESs reveals, the arrangement of each element is still detached. This is due to the fact that concept of SESs is relatively new in Indonesia.

In terms of enhancing adaptive governance of social ecological systems, government of Tangerang municipality is still far from reaching such effort. The links and entities occur are still in reactive rather than proactive effort. Not only does the government solely who responsible for the management of green open space but also many other stakeholders. The main problem that usually occurs in the management process is an unclear role and responsibility of the organizations. The limited of law enforcement also plays a big role in leading the governance performance has not reached a sufficient management of GOS provision.

The planning process can be categorized quite well performed. It is seen from the legal aspects such as rules and regulation which already put social and ecological elements into consideration. Yet, the implementation, controlling and monitoring phase are still lack of performance.

The main problems of GOS provision in Tangerang municipality are as follows:

- The provision on green space area compare to socioeconomic activities has not become prioritize for Tangerang. At this moment Tangerang is still doing much more

infrastructure development such as housing and settlement as well as commercial buildings. Although there are already some programs and projects to enhance GOS provision, the number is still far from enough to fulfill the necessity of green space availability.

- There is an un-integrated coordination and synchronization between agencies in dealing with green space provision. While the leading sector (DKP) has responsibility to provide and maintain green space, the authority of land acquisition is held by the other agency (DTK). DTK is hard to execute any programs because of the constraint of land availability and budgeting issue. On the other hand, Bappeda as a coordinator cannot have any assertive decision because the political will does not enable them to do so. The other agencies such as BPLH and DPU also experience difficulties in performing their tasks and functions to enable the proper management of GOS.

Having assessed the condition of government system in managing GOS provision in Tangerang municipality, there should be an improvement for a better performance in the future. The research findings show that government capacity in managing GOS provision is currently limited. This is due to the fact that the environmental preservation has not become prioritize for Tangerang municipality. To embed the dimension of adaptive governance that seems to be neglected, there are some essential elements postulated which might become resolution towards a better performance. These elements are 1) building knowledge and understanding for experiential and experimental process, 2) Creating networking among stakeholders to gain a better interaction, and 3) Enhancing leadership capacity of the government in dealing with strategic policies in managing GOS provision.

5.2. Contribution and Recommendation

5.2.1 Contribution to the academic debate

The outcome of this study may bring about the contribution to the academic dispute by offering new insight to the institutional design of GOS provision for environmental preservation. This research has exposed limitation and challenges occur in current government system in managing GOS provision by attempting the approach of social ecological systems. The critical

factors may improve the integration between elements of SESs and might lead into a more successful implementation of adaptive governance of SESs.

Seeing the aspects of SESs involved such as the necessity to build knowledge, create network and enhance leadership, we should bear in mind that this study also contributes to the theory by bridging the mismatches between literature and the implementation phase. The case study has revealed the importance to integrate and manage each element of SESs in order to gain an adaptive governance system. What is also interesting to note that the idea to impose social ecological concept in managing environmental preservation in an urban area has rarely been subject to research in the previous time.

To create the adaptive governance of SESs, there should be efforts to explore new system for governance and developing strategies for a better government system. Varying from higher level of government in national level to lower levels such as local organizations and individuals, the coordination and collaboration among them occur aiming to gain appropriate configuration of the institutional design. Hence, building knowledge, imposing networking, and performing leadership become main elements in generating the system. In terms of attributes of governance of SESs, GOS provision of Tangerang municipality that initially should connect individuals, organizations, agencies, and institutions seems have not met the proper implementation.

a. Building knowledge and creating network

In combining different types of knowledge for learning, there is still limitation regarding experiential and experimental knowledge done by the government as the policy maker and other stakeholders. In other words, the government of Tangerang municipality still faces difficulties in transferring knowledge into institutional understanding. Likewise, other stakeholders such as the community also have not well-informed about the concept and mechanism of GOS management in the region.

The diversity in defining knowledge among stakeholders therefore hampers the sharing of new innovations. Efforts to develop knowledge based on ecosystem approach (e.g. by seeking a fit GOS provision with 30% shares of area) have not met the requirement. Although there has been an attempt to enhance knowledge application in the laws, policies and regulation, it is still hard to transfer knowledge into institution understanding.

On the other hand, network system among stakeholders also experience difficulties. There is a very limited interaction between citizens and government for GOS regulation. Although some laws and rules about participation do exist, in practice there is rarely citizens' as well as other parties involve. As a result, there is still a real challenge in spanning the role of local actors, communities and other organizational systems. Thus I argue that there should be a bridging institution acts as an element to encompass the task and function of each stakeholder by having communication, transforming information and sharing knowledge to pursue relevant policy and regulation.

Referring to the theory about windows of opportunity to enhance the adaptive governance of SESs, the provision of flexible institutions and multilevel governance systems emerge. In this case, centralization or decentralization may involve multiple and often polycentric institutional and organizational linkages among user groups or communities, government agencies, and nongovernmental organizations. This aspect emphasizes that the role of multilevel social networks may generate and transfer knowledge into the implementation. When the networks are tied together, a result which shows increasing knowledge for decision making might succeed. However, knowledge and network themselves are not sufficient enough in overcoming problems of institutional design. There should be a form of leadership which might enable the government system become more adaptive.

b. Leadership

Transforming the government system towards adaptive governance requires leadership as a key function. Similar to building knowledge and creating network in GOS management, leadership for collective action and ecosystem management done by the government has not revealed sufficiently. Rather, the institutional design is carried in fragmented. Each stakeholder has its own perception in the implementation to pursue their specific interests.

The limited capacity in dealing with issues of GOS provision consequently hinders the process for integrating ideas and finding solution. Initially, strategic policies regarding GOS provision reveals in the planning documents. It consists of government regulation regarding the strategic of public and private GOS provision. What makes it difficult to implement is the vagueness in connecting stakeholders, giving direction to find opportunities and supporting for transition phase. Therefore, it is necessary to impetus the idea to feed ecological knowledge into

adaptive management practices; monitoring and reevaluation. By doing so, it is increasingly proposed that knowledge generation of ecosystem dynamics should be explicitly integrated with adaptive management practices rather than striving for optimization based on past records. This aspect emphasizes a learning environment that requires leadership and changes of social norms within management organizations.

5.2.2 Recommendation

Some research findings and analysis of the performance of GOS provision in Tangerang municipality portray that the government does play an important role in determining the presence of adaptive governance. Unfortunately, the government has not been able to perform an integrated management and coordination with other stakeholders. Although the planning phase is sufficient, as seen from the rules and regulation embedded, there are still some hindered factors faced in the implementation, monitoring and controlling phase. The obstacles then create some conflicts and gaps among stakeholders of GOS provision.

Seeing from the perspective of SESs, I would propose practical recommendation for enhancing the management of GOS provision in Tangerang municipality as seen in table 12 below.

Table 12. Recommendation towards adaptive governance of SESs

ELEMENTS	KEY ISSUES	STRATEGIES
Rules, policies and regulations	• There is a gap between national, regional and local spatial planning. Mostly, higher regulations are too macro so that it is hard to define them into a more practical policies (ex: land allotment for GOS is stated by regionally rather than by territory/zoning) • Law enforcement of rules and regulation has not been applied appropriately.	• Developing a more clear scheme / mechanism of land allotment for GOS • Strengthening law and regulation by scheme of incentive & disincentive
Stakeholders' involvement	• No clear distribution of authority (who to do what) creates conflicts among agencies • Ineffective participation from communities and private sectors • Lack of dissemination of GOS	• Strengthening the division of authority by establishing a specific organization which focus on the preservation of GOS • Spreading information, for instance by fact sheets, websites, public meetings, etc.
Target of development	• Economic priority rather than environment consideration leads into	• Creating breakthrough in combining infrastructure

ELEMENTS	KEY ISSUES	STRATEGIES
	rapid development => causing lack of land availability	development and the need of environment preservation
Data and information	• Lack of data resources, capability and willingness (particularly from the government)	• Enhancing capacity building

Source: author

First element should be considered is regarding the rules, policies and regulation. The main issues occur is the gap between national, regional and local spatial planning. Mostly, higher regulations are too macro so that it is hard to define them into a more practical policies. For instance, the land allotment for GOS is stated by regionally, not by territory/zoning. When it comes into the work field, it is hard to define the specific spot for a particular purpose because there is less detailed direction. As a result, there is a lot of land misused in the arena. Prior to this, there should be an effort to develop a more clear scheme / mechanism of land allotment for GOS. Law enforcement and regulation which has not been applied appropriately should be also strengthened, for instance by the scheme of incentive and disincentive.

The other element should be considered is about the stakeholders' involvement. Currently, there is no clear distribution of authority (who to do what) which often leads to conflict among agencies. Hence, there should be an effort to strengthening the division of authority by establishing a specific organization which focuses on the preservation of GOS. Furthermore, to bring up an effective participation from communities and private sectors, the local government should spread information and dissemination by any means, such as fact sheets, websites, public meetings, et cetera.

In terms of the development target, the local government of Tangerang municipality is still facing the dilemma between economic priority and environmental consideration. In favor to the first element, the region is experiencing a very rapid development which causes lack of land availability. Consequently, it is difficult to fulfill the sufficient GOS provision. A strategic of creating a breakthrough in combining both infrastructure development and the need to keep the environmental conservation should be put in the government agenda.

The last element of consideration is about sufficient data and information. Currently, there is limitation of data resources, capability and willingness (particularly from the government). Hence, there should be an effort to enhance capacity building of the government

and other stakeholders to achieve a more comprehensive understanding in the management of environmental preservation particularly for GOS provision.

5.3. Reflection and potential for further research

Having done the research comprehensively, I intend to provide the notion on how to manage GOS provision with the concept of adaptive governance of SESs. Regarding to the objective, this research aims to give insight and trajectory on facing issues and obstacles through the mechanism of combining concept of social system and ecological system. This is to say, local government as the decision maker in spatial planning has a very critical role in determining whether they could perform an adaptive behavior, and if not, what factors should be considered in order to reach such performance. However, there is still a lot of limitation faced in this research, particularly in terms of gaining reliable data and information. Primary data is also decisive in determining the quality of the analysis. Due to the fact that the collection of data and information was gained in distance, there is a possibility that the result is subject to bias and less comprehensive.

There is a connection throughout the overall study which was considered in line with the theoretical framework. The link and entities of social ecological system may bring about an appropriate attitude to the case study of GOS provision. The elements of SESs might be a plausible approach to cover the shift in the institutional design and take part as an initial framework when assessing the capacity of government in managing environmental preservation. By doing so, it is more likely that the management of GOS might become more adaptive. Another important point gained from the study is that in managing GOS, the government as the leading role should be able to deal with uncertainty in the future. Furthermore, the government also has the chance to do learning process in every activity and decision making they have.

What makes the study unique is that the concept of SESs are usually applied in the case study of nature and environment, rarely there has been performed in assessing interaction between social and ecological in the city. At this point, I figure out that giving the insight of adaptive governance of SESs in the case of urban environment is also possible to be explored. Though, I realized that there should be adjustment in many aspects embedded in the concept of social ecological systems which is not relevant to be assessed in urban area.

This study might not become aspiration that is comprehensive. Rather, I do realize that during my research process there are some aspects which I could not explore more detail due to the limitation of my study. Therefore I recommend further research in relation to the government capacity in transforming into the adaptive governance or other focus of studies.

Last but not least, I do realize that perhaps this research only take a very small part in the academic realm. Yet, I believe that we could seek lesson learned from the study.

References

Alliance, R. (2007). Assessing and managing resilience in social-ecological systems: A practitioners workbook. *Retrieved June, 1*, 2007.

Anderies, J. M., Janssen, M. A., & Ostrom, E. (2004). A framework to analyze the robustness of social-ecological systems from an institutional perspective. *Ecology and Society, 9*(1), 18.

Barbosa, O., Tratalos, J. A., Armsworth, P. R., Davies, R. G., Fuller, R. A., Johnson, P., & Gaston, K. J. (2007). Who benefits from access to green space? A case study from Sheffield, UK. *Landscape and Urban Planning, 83*(2), 187-195.

Baycan-Levent, T., Vreeker, R., & Nijkamp, P. (2009). A multi-criteria evaluation of green spaces in European cities. *European urban and regional studies, 16*(2), 193-213.

Becker, E., Jahn, T., & Stiess, I. (1999). Exploring uncommon ground: sustainability and the social sciences. *Sustainability and the Social Sciences. A cross-disciplinary approach integrating environmental considerations into theoretical reorientation, London (Zed Books)*, 1-22.

Berkes, F., Folke, C., & Colding, J. (2000). *Linking social and ecological systems: management practices and social mechanisms for building resilience*: Cambridge University Press.

Bolund, P., & Hunhammar, S. (1999). Ecosystem services in urban areas. *Ecological economics, 29*(2), 293-301.

Committee of Minister, C. o. E. (1986). Recommendation of the committee of ministers to member states on urban open space. *The 399th meeting of the Ministers' Deputies, Council of Europe*.

Costanza, R. (2008). Ecosystem services: multiple classification systems are needed. *Biological conservation, 141*(2), 350-352.

Crutzen, P. J. (2006). *The "anthropocene"*: Springer.

Danter, K. J., Griest, D. L., Mullins, G. W., & Norland, E. (2000). Organizational change as a component of ecosystem management. *Society & Natural Resources, 13*(6), 537-547.

Dietz, T., Ostrom, E., & Stern, P. C. (2003). The struggle to govern the commons. *Science, 302*(5652), 1907-1912.

Erickson, D. (2006). *MetroGreen: connecting open space in North American cities*: Island Press.

Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources, 30*, 441-473. doi: 10.1146/annurev.energy.30.050504.144511

Glaeser, B., Bruckmeier, K., Glaser, M., & Krause, G. (2009). Social-ecological Systems analysis in coastal and marine areas: A path toward integration of interdisciplinary knowledge. *Current Trends in Human Ecology, 1*, 183-203.

Gobster, P. H. (2001). Visions of nature: conflict and compatibility in urban park restoration. *Landscape and Urban Planning, 56*(1), 35-51.

Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M. (2008). Global change and the ecology of cities. *Science, 319*(5864), 756-760.

Hamilton, L. C., Haedrich, R. L., & Duncan, C. M. (2004). Above and below the water: Social/ecological transformation in northwest Newfoundland. *Population and Environment, 25*(6), 195-215.

Herbert, D., & Thomas, C. (2013). *Cities in space: city as place*: Routledge.

Holling, C. S., & Meffe, G. K. (1996). Command and control and the pathology of natural resource management. *Conservation biology, 10*(2), 328-337.

Howard, E. (1965). *Garden cities of to-morrow* (Vol. 23): Mit Press.

James, P., Tzoulas, K., Adams, M., Barber, A., Box, J., Breuste, J., . . . Greening, K. (2009). Towards an integrated understanding of green space in the European built environment. *Urban Forestry & Urban Greening, 8*(2), 65-75.

London, D. o. t. E. o. (2008). The city of London open space strategy (pp. 80).

Low, B., Ostrom, E., Simon, C., & Wilson, J. (2003). Redundancy and diversity: do they influence optimal management. *Navigating social-ecological systems: Building resilience for complexity and change*, 83-114.

MacKaye, B. (1990). *The new exploration: A philosophy of regional planning*: University of Illinois Press.

Matsuoka, R. H., & Kaplan, R. (2008). People needs in the urban landscape: Analysis of< i> Landscape And Urban Planning</i> contributions. *Landscape and Urban Planning, 84*(1), 7-19.

Meyer, W. B., & BL Turner, I. (1994). *Changes in land use and land cover: a global perspective* (Vol. 4): Cambridge University Press.

Nuissl, H., Haase, D., Lanzendorf, M., & Wittmer, H. (2009). Environmental impact assessment of urban land use transitions—A context-sensitive approach. *Land Use Policy, 26*(2), 414-424.

Olsson, P., Folke, C., & Berkes, F. (2004). Adaptive Comanagement for Building Resilience in Social–Ecological Systems. *Environmental Management, 34*(1), 75-90. doi: 10.1007/s00267-003-0101-7

Olsson, P., Gunderson, L. H., Carpenter, S. R., Ryan, P., Lebel, L., Folke, C., & Holling, C. S. (2006). Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society, 11*(1), 18.

Ostrom, E., & Cox, M. (2010). Moving beyond panaceas: a multi-tiered diagnostic approach for social-ecological analysis. *Environmental Conservation, 37*(04), 451-463.

Sister, C., Wolch, J., & Wilson, J. (2010). Got green? Addressing environmental justice in park provision. *GeoJournal, 75*(3), 229-248.

Walzer, M. (1986). Public Space-Pleasures and Costs of Urbanity. *Dissent, 33*(4), 470-475.

Werquin, A. C., Duhem, B., Lindholm, G., Oppermann, B., Pauleit, S., Tjallingii, S., & Attwell, K. (2005). *Green structure and urban planning: final report*: COST Office.

Law and Regulations

Law No. 26/2007 about National Spatial Planning

Law No. 32/2004 about Regional Government

Spatial Planning No. 1/2012 about Tangerang municipality spatial planning

President Decree No. 54/2008 about spatial planning document of Jabodetabekpunjur

Regulation from The Minister of Public Works No. 14/PRT/M/2010 about the minimum service standard for public works and spatial planning aspect

Regulation from Minister of Internal Affairs No. 1/2007 about management of green open space in cities

Regulation from Minister of Public Works No. 05/PRT/M/2008 about the Guidelines for Provision and Utilization of green open space in city area

Regulation Head of Sanitation and Landscape Agency No. 2/2011 about master plan of green open space provision in Tangerang Municipality

Report of performance measurement of Tangerang municipality year 2008, Bappeda

Report of performance measurement of Tangerang municipality year 2009, Bappeda

Report of performance measurement of Tangerang municipality year 2010, Bappeda

Report of performance measurement of Tangerang municipality year 2011, Bappeda

Report of performance measurement of Tangerang municipality year 2012, Bappeda

Appendix 1. Key stakeholders interviewed in the case of GOS provision in Tangerang municipality

CODE	ORGANIZATION	ROLE
A1	Bappeda	Head of Division of Infrastructure and utilities planning (second level of decision making authority in Bappeda-policy level)
A2	Bappeda	Head of Sub division of Infrastructure planning (third level of decision making authority in Bappeda-policy level)
A3	Bappeda	Head of Sub division of Utilities planning (third level of decision making authority in Bappeda-policy level)
A4	DTK	Head of Planning Division
A5	DTK	Head of Spatial Planning Division
A6	DKP	Head of Spatial Planning Division, having knowledge about past and current spatial planning conditions
A7	DKP	Staff of Planning Division.
A8	BPLH	Head of sub division of monitoring of environmental quality, having knowledge about past and current planning conditions and the regulations
C1	Community in Tangerang municipality	
C2	Community in Tangerang municipality	
U1	Institut Pertanian Bogor (IPB)	Director of Cooperation of university, expert on landscape planning