SUSTAINABLE SETTLEMENT IN TERMS OF HYDROLOGY ASPECT

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Abstract

Growth and rapid population growth lead to changes in spatial patterns of a city where one goal is to meet housing needs. Fulfillment of the settlement began with the development of zoning in the suburbs. Land use change from green to open the settlement areas causes uncontrolled growth of city (urban sprawl). Development and population growth of cities has resulted in the addition of the burden of the city, so the city became crowded and uncomfortable inhabited. It is also exacerbated by the concept of unplanned urban development in a comprehensive and participatory. Along with the development of the city then the need for housing will increase anyway. As a result of this increasing need for residential housing complexes springing up so much. The emergence of complex settlements which are not controlled, not planned in a comprehensive and just pursue quantity without considering the quality it is highly susceptible to environmental damage. To control the problem the architect have a responsibility to achieve a sustainable settlement. Sustainable settlements which aim to control environmental damage or maintain natural resources to last longer or durable. There are various ways to consider who should be considered in a comprehensive manner to achieve sustainable settlements, some of which is a review of policy issues related to spatial issues, the permitting process and how to build, social, cultural, technological development facilities and others.
Researchers in this paper will discuss in detail issues concerning the loss of green open space associated with one of the functions of Green Open Space as an Catchment Area. Researchers took one of the settlements which are quite large as a case study. Spatial pattern changes before and after any Settlement analyzed with GIS systems. In addition research is also done by direct observation into the field and conduct interviews with relevant parties. From Research concluded that a change in land use from open areas into areas is obviously very disturbing wake catchment area. Improvement occurred run off and there are puddles of water puddles when it rains which if allowed to flood. Environmental damage is disruption of the water is very expensive in terms of its value, resulting in a settlement according to the master plan design with title must be weighed against the type of soil, building regulations, as well as consideration of social impacts

Keywords: City Development, Housing, Environmental Degradation

1. Introduction

Many residents who hold urbanization to the city due to the increased facilities in the city, less complete facilities in the area, the more difficult jobs, and technological developments. Development and growth of this population will increase the burden for the big city. Land carrying capacity has limits, if the carrying capacity of land already exceed the capacity of the population who may be accommodated then there imbalance (non-equilibrium) that ultimately lead to environmental damage.

Has been realized together that environmental issues become a central issue of the most inviting the world's attention, not only in developed countries, but in countries that are developing. Economic growth is expected to grow rapidly has been ruled out environmental balance, resulting in environmental damage Jakarta, which has a special attraction for many of the migrants who come from outside the area of course, assuming that Jakarta is an easy place to find a job. Besides, since it is a metropolitan city of Jakarta also has complete facilities compared to the circumstances / conditions that exist in each area are very much different, it is this that spurs people who come from villages or outside Jakarta organized urbanization such kind of situation the cause of the increasing demand for settlement.

With the mushrooming of many settlements on the outskirts of the city as a result of the development of the city then this would result in more severe environmental damage. On the one hand to meet the demand for housing for residents in the city of Jakarta because the land was no longer able to accommodate, but on the other side of comprehensive planning that is not ultimately generated a lot of problems of environmental degradation.From this issue the researchers wanted to study and formulate the problem of settlements mushrooming on the outskirts of Jakarta as a result of the development of urban areas. Planning settlements which are not considered in a comprehensive manner will result in environmental damage. Researchers will sharpen the issues of environmental damage that occurs due to the conversion of land from the green land into land woke up, and then how to provide solutions. Researchers take a sample of one of the settlements which are located in the western part of Jakarta which is the Area Housing "X"

2. Method

The method used is a combination of quantitative and qualitative methods. Qualitative methods carried out by conducting literature study, reviewing written sources such as documents, reports, legislation and other lain. Whatever quantitative methods used to count the number of green open space is lost due to construction of the settlement area, calculated by GIS (Geographic Information System). The data from field sources associated with the natural situation is also done by direct contact with the ground situation is through observation (observation), interviews, secondary data assessment (*RUTR* Territory), focus group discussions (focused group discussion). The analysis was done descriptively assisted with the existing field conditions.

3. Results and Discussion

3.1. Settlement

The house is a basic human need after food and clothing. In addition to functioning as a protection against natural disturbances and any other creature, the home serves as a center for family education, nursery culture, preparing the young generation, the manifestation of identity, and so forth, in summary it can be said that the quality of human resources in the future will be strongly influenced by the quality of housing in which people occupied (Bulletin relatives of Housing and settlements, 2001, July). According to John F. Turner, the house has two terms, namely as a noun and a verb. As a noun house (housing) describes a commodity or product, while as a verb or a home is the process of human activity that occurs in such occupation. There are three functions in addition to the house are generally function (Turner 1976): As a family identity (quality), job-related, security.

Housing and settlements have a role and a very important function in human life. Housing is a living process, the presence of humans in creating living space in the natural environment and surrounding communities. Living is living together, and for that the house functions in life is to live together, to the house functions as a place in life is to live in an environment that has the facilities and infrastructure needed by man to promote himself (Yudohusodo, 1991).

Settlements (Arifin, 1988) is a physical order (spatial) which includes also the social, economic, especially the berkenaaan with human life and activity. Room setup includes either natural, or man-made (man made environment). (Chaerun, 1992). Understanding which states that residential housing is a group home that serves as a neighborhood / residential environment which is equipped with a working paper and environmental facilities (UU. No. 4, 1994, on Housing and Settlement)

3.2. The Concept of Sustainable

An environmentally sustainable settlements that are part of the city, the balance / ratio between land area and area of open land awakened.. Settlements that are part of the city is an open system. Components or subsystems forming the city was constantly interacting with each other and also interact with the components from other systems outside the city. Thus, the sustainability of a settlement is affected and affects other subsystems within and outside the city.

Like natural ecosystems, urban systems have the properties of diversity and interdependence. However, unlike the natural ecosystems that can always proceed without human intervention, the system the city can only proceed if there is human intervention. Processes in urban systems, as well as natural ecosystems, can only be understood in a holistic perspective. Some thinkers in the field of urban planning and design, as well as the artificial urban environment, argues that to achieve sustainable development process, it needs planning and design that is based on ecological and non-anthropocentric environmental ethics. Non-anthropocentric environmental ethics of human beings as living in the world community, as well as all

other living things, and have an equal footing with other living beings (Taylor, 1986). Since the second half of the 20th century, the development of non-anthropocentric environmental ethics as a result of environmental crises.

Process of sustainable development in urban settlements can be determined by evaluating the status of land area in the city, a process that occurs in society and between society and the environment. This evaluation can be done in several ways. One way is to do an evaluation based on criteria of sustainable urban development. Criteria for sustainable urban development based on ideas formulated three "Pro" above can be described as follows:

a. Pro Social Justice, justice means of access to natural resources and public services (water, soil, air, sanitation, social facilities, transport) respect for cultural diversity, gender equality.
b. Pro Economic Welfare, which means that economic growth is for the welfare of all members of society (not just the elite), can be achieved through innovative technology that minimum negative impact on the environment.
c. Sustainable Environment Pro, meaning non-anthropocentric environmental ethics (the view that humans are not superior and not to the oppression of other living beings and the environment) to guide people's lives so they are always seeking sustainability and ecological balance, conservation of vital natural resources (like water) and priority to increasing non-material quality of life.

3.3. Ecological Sustainability as the Settlement Sustainability Indicators

The city is an ecological unit of human work (ecosystem built). Urban ecosystems can be part of a Watershed (*DAS*), may also lie in some (DAS). As an ecosystem built, the activity of the city ecosystem is strongly influenced by several factors, including water resources. To ensure continuity of supply which are eligible for the needs of the urban population, then the concept of water supply should be a part of city management scenarios.

Watershed is a land area that is realized as a unity with the river and its tributaries, which serve to accommodate, store and transfer water from rainfall to the lake or the sea naturally, the limit on land is a topographical and boundary separators in sea until the water area is still affected by the activities of the mainland. Upon an understanding of the concept can be said that the DAS is a separate ecological unit with other units by a natural boundary where the watershed is a region where the process of hydrological cycle. As a target ecosystem, urban ecosystem activity is influenced by various factors, including water resources. It is understandable that the more population the more the city water supply is required. To ensure continuity of supply which are eligible, then the concept of water supply should be a part of city management scenarios.

3.4. Water availability for Ecological Sustainability Indicators

Water needs for everyday life including clean water (potable water) and drinking water (drinking water). Clean water is indispensable in the household activities, ie for bathing, washing, and sanitation while for economic activities including industry events and other activities. Basically water sources include :

a. Rain water, which usually before falling to the earth's surface will experience the pollution that does not qualify as a drinking water
b. Surface waters, rivers, lakes, there, dams, marshes that can not be directly taken as it may be contaminated
c. Groundwater, which consists of shallow ground water and ground water within. Shallow water wells deemed not eligible to drink, because it may contain pathogenic bacteria from septic tank

Settlement is an ecosystem that is incomplete. Because this ecosystem in the process of decomposition can not take place perfectly, then the government should provide clean water and drinking water for the community. Procurement of clean water is generally done by treat water drawn from surface sources, such as rivers or reservoirs used as water reservoir. Moreover, it can also with how to process springs or deep wells. Processing cost to clean water springs will be much cheaper because of the higher purity levels than surface water, but the springs are not always near the city. Therefore the main choices of natural supply of water for urban dwellers is the construction of water treatment plants that use river water / reservoir. The concept of water resources of a settlement basically follow the basic principles of hydrology. This concept is the basic concept of the global water balance, but it applies also to the regional scale.

3.5. Green Open Space

Understanding Green Open Space : Space in the city or the wider region, both in the area / region or in the form of elongated or pathways where its use is more open, without filling the building with green plants.

Benefits of green space in terms of ecological, social and economic is as follows:

a. Regulator of the water and ground water supplier
b. Micro climate regulator, through a process of evaporation
c. Reduce air pollution, noise
d. Recreation and tourism, sports venues
e. Aesthetics of the city.

With growing population increases demand for land as well, with advances in technology lead to accelerated clearing new land (Suriadi et al, 1998). Areas that used to be retaining water catchment areas and turned into residential areas, that are relatively impermeable. These changes led to the hydrological balance of the runoff turned into a new equilibrium

3.6. Case Studies and Analysis

Picture 1 : Area Development towards the East and Greater Jakarta Landing West (Source Instruction No. 13 of 1976)

In accordance with case studies drawn is one of the major areas of existing settlements in Greater Jakarta, is mentioned with the settlement "X". Settlement is expected to help control the burden of Jakarta which is increasingly growing. To set all the necessary policies or regulations of a comprehensive, integrated, and cross-sector in the greater Jakarta area, so that complex problems can be avoided Jakarta sustained or controlled.

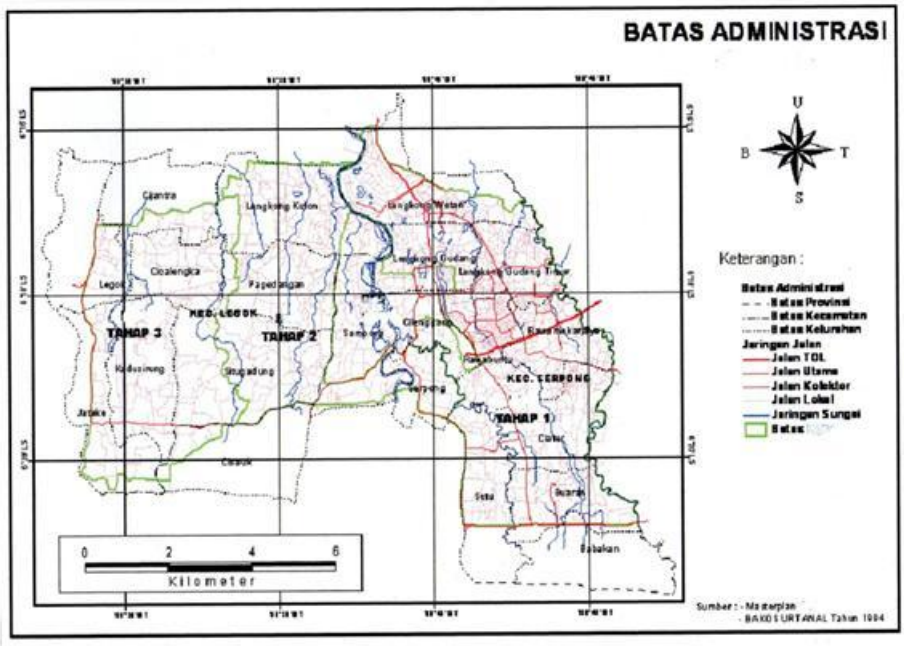
Direction and development in the greater Jakarta area in greater detail Tangerang regency is divided into several zones as follows:

a. Zone 1 (development of the coast)
b. Zone 2 (the development of technical irrigation)
c. Zone 3 (urban and industrial development)
d. Zone 4 (limited urban development and agriculture).

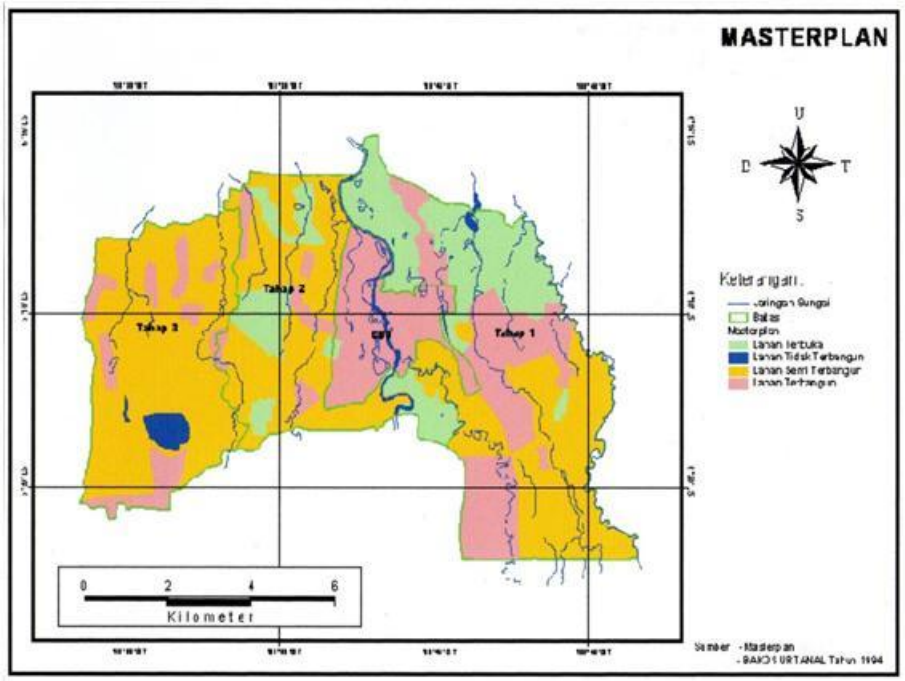
Based on the overlay of the development direction of the greater Jakarta area towards the west and east with the master plan area of settlement "X" as a case study lies in zone 3 and zone 4, and towards the increasingly crowded city.

Land Settlement "X" used to be a former rubber plantation land and rice fields. The area has a land area of 6.000 hectares, construction began January 16, 1989 is a new and modern city. Today that has been built is an area of 1300 ha, with a population of 180.000. For the next stage will be built covering an area of 4.700 hectares of land consisting of 150,000 units a house with a population of 800.000, and plans to be completed in 2019.

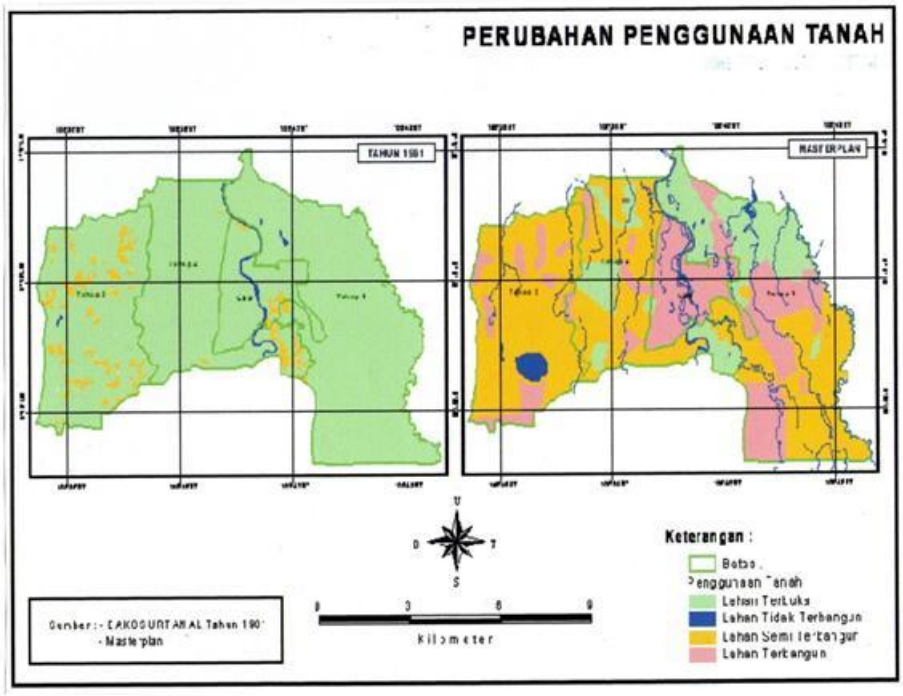
From the Land Use overlay before and after any Settlement is the presence of these then:



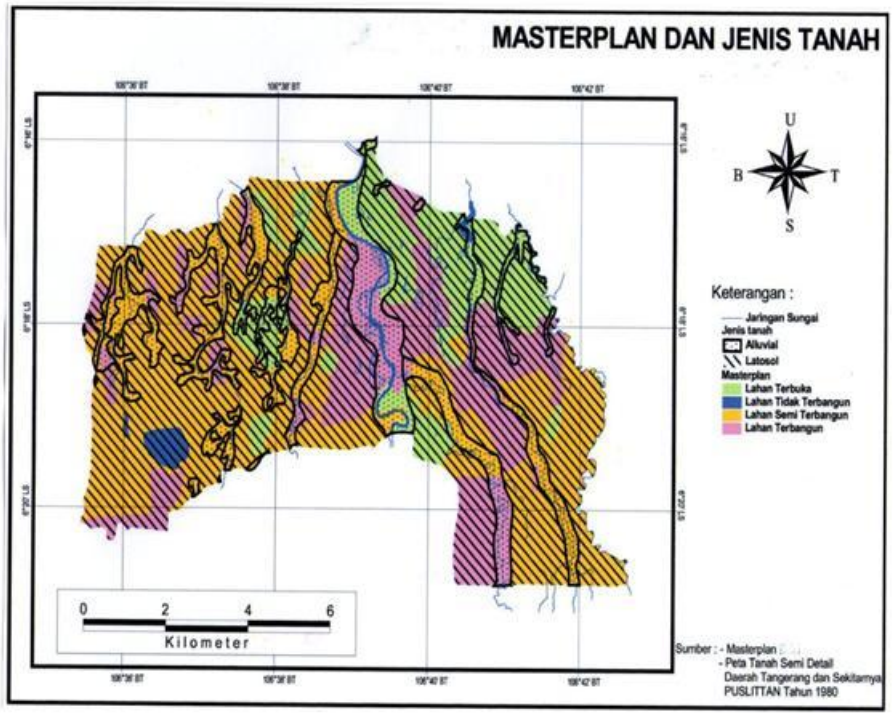
Picture 2 : Administrative Boundaries of Settlement "X"
(The total area of 6000 hectares, consists of rubber plantations, rice fields, the original settlement population)



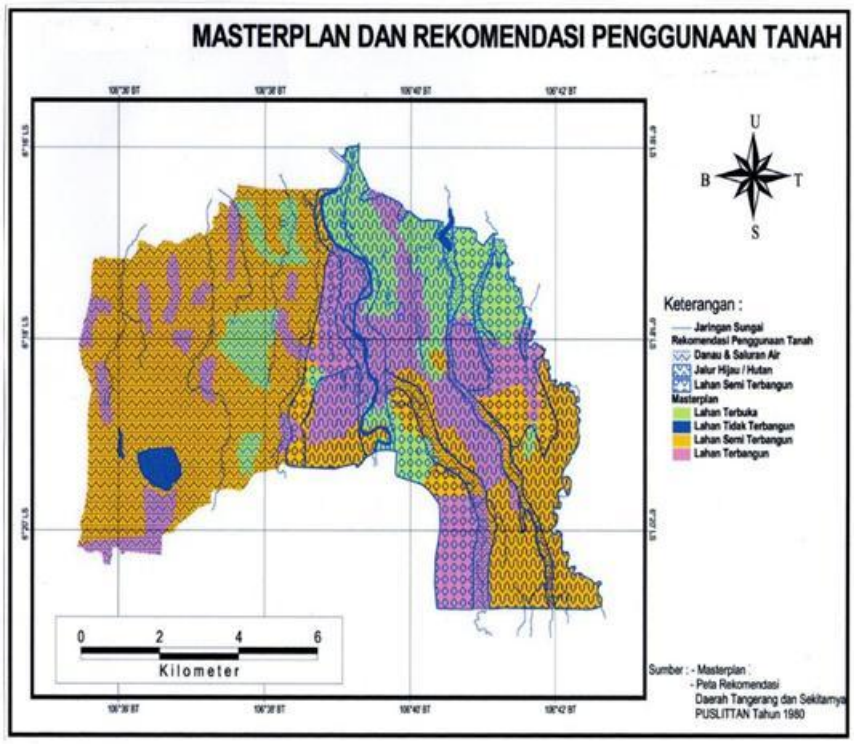
Picture 3 : Master Plan Land Use Settlement "X"
(hectare of the Open Land, Land Built, Built Semi Land, Land Not Built)



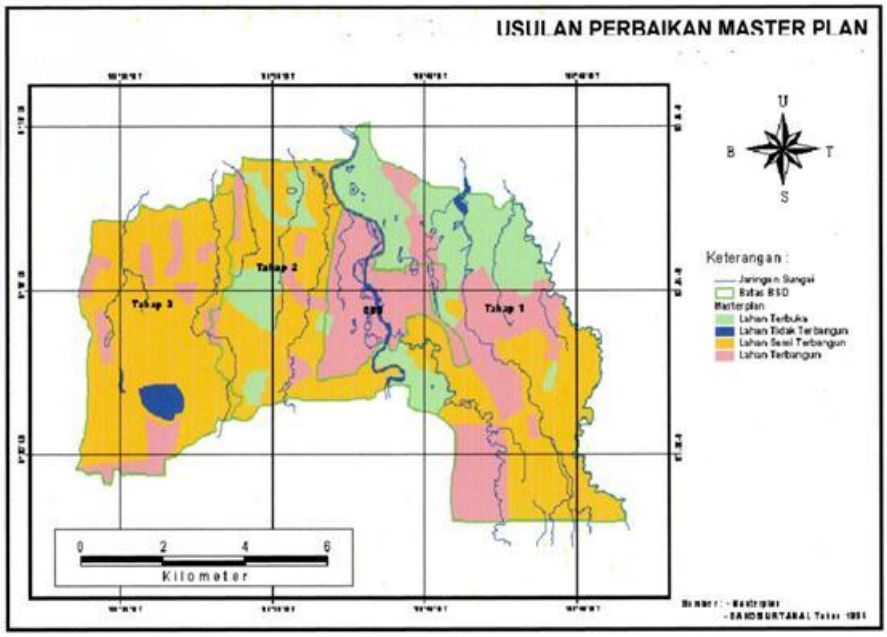
Picture 4 : Changes in Land Use (Left: before it is built settlement, Right: after a constructed Settlement)



Picture 5 : Overlay between the master plan of Settlement "X" with a map based on the Types of Land ease of water seep



Picture 6 : Settlement with the overlay between the Master plan Land Use Recommendations according to function



Picture 7 : Improvements Proposed Settlement Master plan "X" with a broad consideration of the percentage of the Open Land, Land Built, Built Semi Land, Land Not Built and Soil Types)

4. Conclusions and Suggestion

From the above discussion can be concluded that the construction of settlements according to the above case study has led to the impact in terms of :

a. Social : The original township land lost is 860.000 m^2
b. Environment : Green Open Space that has been missing is an area of 44.415.720 m^2 of forest, rice field area of 12.500.149 m^2 of the total land area of 60 million m2, Run off Increased water for 63.6 million m^3 / year and reduce the amount of water permeated by 44.1 million m^3 / year
c. Economy : Improved Run off water and decrease the water seep water that is lost when *Rp.* 318 billion every year.

While the suggestion of researchers associated with the development of technology to replace the main function dalan Water Regulatory Procedures are as follows:

a. Master Plan should be reviewed to BSD land use planning with consideration on Soil Type Map and Map Recommendations from the *Bakosurtanal, and RUTRK RUTRW* Serpong Tangerang regency.
b. It needs to make regulations making water infiltration should be made on each building, because the regulations had been valid only in Jakarta.
c. Rain water soak into the ground (Artificial Recharge Injection by run off pumping water into the
d. Groundwater aquifer layer with to injection) with a special construction so that the Artificial Recharge Injection here have multiple functions: as flood control, water supply, filter sediment and helps to control seawater intrusion.
e. Creating a pond / flood control as well as for water conservation and energy saving can be for the water tank in the dry season, on the other hand can be used for hydroelectric power (Power of Water), so the reservoir could have a function here: as the Controlling the flood in the rainy season, clean water reserves on the season dry, Power Plants (*PLN*)

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