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FAKULTAS TEKNIK  
UNIVERSITAS ATMA JAYA YOGYAKARTA



**SCAN**  
SUSTAINABLE CULTURE  
ARCHITECTURE & NATURE

**KUMPULAN ABSTRAK  
SEMINAR NASIONAL  
SCAN #5: 2014**  
5 Juni 2014

***“Leave Nothing...  
Except Your Footprints and Love”***



Program Pascasarjana UAJY



Architecture and Planning Research Forum



Forum Wahana Teknik



IKATAN ARSITEK INDONESIA  
DAERAH ISTIMEWA YOGYAKARTA



GREEN  
BUILDING  
COUNCIL  
INDONESIA



Kumpulan Abstrak  
SEMINAR NASIONAL  
**SCAN** #5: 2014

***“Leave Nothing...  
Except Your Footprints and Love”***  
Building Waste and Sustainable Environment



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# Abstract

# SCAN #5: 2014

***“Leave Nothing...  
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Hak Publikasi pada Penerbit Universitas Atma Jaya Yogyakarta

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## KATA PENGANTAR

Tanpa terasa seminar SCAN (*Sustainable, Culture, Architecture and Nature*), telah memasuki tahun ke-5. Sebuah kebanggaan yang luar biasa bagi Program Studi Arsitektur Universitas Atma Jaya Yogyakarta, karena mampu menjaga kesinambungan program tersebut. Pada SCAN #5 kali ini, diangkat tema “*Leave Nothing... Except Your Footprints and Love*” atau diterjemahkan menjadi ‘*building waste and sustainable environment*’. Kita berkumpul untuk memfokuskan perhatian pada limbah bangunan dan membahasnya sesuai dengan latar belakang kita masing-masing, mulai dari sisi budaya, psikologi, rekayasa hingga ekonomi. Kita dapat belajar dari masa lalu dan menggagas masa depan demi keberlanjutan budaya, arsitektur dan lingkungan (*Sustainable Culture, Architecture and Nature*).

Buku kumpulan abstrak ini menyajikan kumpulan abstraksi dari dua makalah utama dan 27 tulisan ilmiah, yang dikelompokkan menjadi tiga sub tema, yaitu:

- § Konsep Visioner akan Pengendalian Limbah
- § Manajemen Limbah dalam Lingkungan Binaan
- § Dari Limbah Menjadi Arsitektur

Besar harapan kami pada pertemuan ilmiah ini dapat menghasilkan gagasan yang mengarah pada kondisi *zero waste*, agar tercipta lingkungan yang lebih baik dan layak bagi kehidupan anak cucu kita. Semoga pula gagasan dan pemikiran yang ada dapat berkontribusi pada kebijakan pembangunan atau paling tidak mempengaruhi gaya hidup keseharian kita..

Semoga Buku Kumpulan Abstrak SCAN #5, dapat memberikan gambaran secara utuh mengenai naskah-naskah akademik yang dipresentasikan dalam seminar dan disajikan secara lengkap dalam Buku Proceeding SCAN #5. Selamat membaca.

**TIM PENYUNTING**  
**Seminar Nasional SCAN #5 :2014**

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**TOWARDS A ZERO WASTE MANAGEMENT IN A BUILT ENVIRONMENT**

**A Case Study of Summarecon Serpong, Serpong, Tangerang**

Sinta Dewi

*By the late 1900s the key environmental problems comprised the greenhouse effect and global warming, the hole in the ozone layer, the acid rain and the destruction of tropical forests. Whilst the environmental problems continue to be significantly increased, the causes and solutions lie much more in people's attitudes, values and expectations. Most human activities in one way or another demand high provisions which make the environment is at risk because of human misuse of its natural resources and disturbance of its natural environmental systems. Many of the problems occurred from the interactions between people, resources and pollution namely: population increase, resource use, tropical deforestation, soil erosion, water resource, air pollution and water pollution.*

*As property developers are often condemned of damaging the environment, Summarecon Serpong has tried to twist the accusations. Since 2003 the company has decided to become a green company which has brought complex consequences of applying balanced concepts of 3P (people, planet, and profit), however in 2013 Summarecon Serpong was one among eight receivers of Indonesia Green Company Award 2013.*

*This study is an attempt to review empirical facts i.e. environmental focused implementations done by Summarecon Serpong to enhance the environmental qualities. Started with strict estate regulations regarding the greenery, followed by choices of environmentally sound building materials, household waste management, building material waste management, wastewater management, and currently green building, and green lifestyle.*

**Keywords:** *environmental problems, people's attitudes-values-expectations, green company, environmentally friendly programme implementations*

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# TOWARDS A ZERO WASTE MANAGEMENT IN A BUILT ENVIRONMENT

## A Case Study of Summarecon Serpong, Serpong, Tangerang

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### ABSTRACT

*By the late 1900s the key environmental problems comprised the greenhouse effect and global warming, the hole in the ozone layer, the acid rain and the destruction of tropical forests. Whilst the environmental problems continue to be significantly increased, the causes and solutions lie much more in people's attitudes, values and expectations. Most human activities in one way or another demand high provisions which make the environment is at risk because of human misuse of its natural resources and disturbance of its natural environmental systems. Many of the problems occurred from the interactions between people, resources and pollution namely: population increase, resource use, tropical deforestation, soil erosion, water resource, air pollution and water pollution.*

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**Keywords:** *environmental problems, people's attitudes-values-expectations, green company, environmentally friendly programme implementations.*

## 1. INTRODUCTION

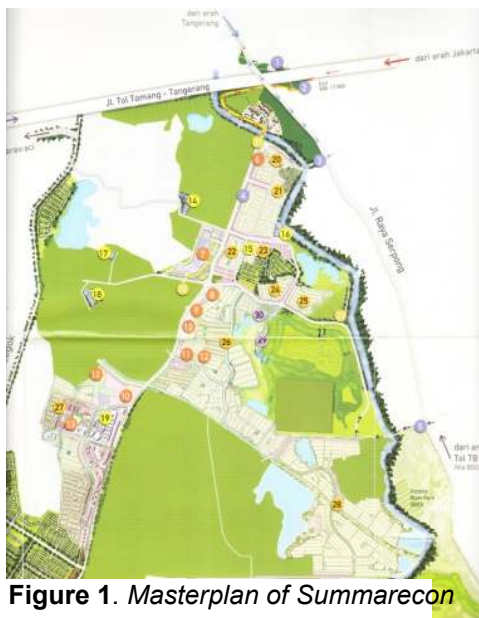
*'When hills are no longer covered with trees but buildings; ponds and swamps are no longer filled with water but crowded housing; land in the city center is thronged with concrete-steel-glass jungle; there is no doubt that human beings are heading to the depths of a destroyed environment' (Budihardjo, 1987:65 ).*

It is a convincing fact that land on earth will stay the same, whilst on the contrary, 70-80 per cent of the world's population live in the concentrated urban centres and demand new towns. *'To control the movement of people is to withdraw an important personal freedom, to restrict access in a most fundamental way' (Lynch, 1992:252).* As population increases, more people will migrate to the urban centres with great demand of housing and higher living standards and

thereby increasing the risks of environmental deterioration. Damaging the environment causes serious if not irreversible destruction to the planet's life support systems: the ecological process that shape climate, cleanse air and water, regulate water flow, recycle essential elements, create and generate soil, and keep the earth fit for life. *'Therefore the awareness and concern of good environmental management should become everyone's responsibility, especially those dealing with the plan and provision of large scale public housing. Each and every actor involved should be very careful in order to guarantee that fresh and clean air, healthy drinking water, fertile soil to be cultivated, land to live in, and beautiful scenery to be enjoyed are accessible to every inhabitant'* (Budihardjo, 1987:65).

Summarecon Serpong is the name of the property developer as well as its estate property. The estate property is located in Serpong, Tangerang with the total existing developed area of approximately 600 hectares divided into several categories, namely: residential, business and commercial, education, sport facility, access, and others. The residential area consists of 27 clusters with the average of 180 houses each.

Beginning from 2003 Summarecon Serpong has started to take account of the green concept in its property comprehensive planning and implementations. After more than a decade, it has proved that the aspect of being more and more environmentally sustainable has resulted in the company receiving many national and international awards. In addition the trend by house buyers to purchase environmentally friendly housing has been increasing for the company.



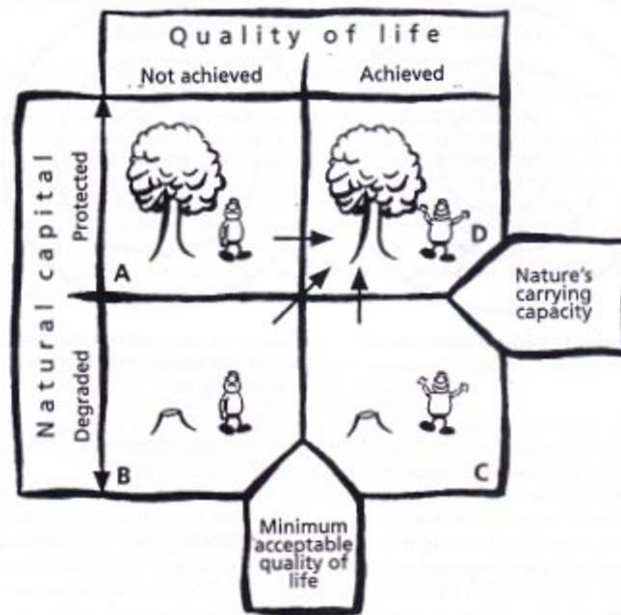
**Figure 1.** Masterplan of Summarecon Serpong

## 2. LITERATURE REVIEW

### 2.1. Developing Sustainability

Primary objective of sustainability is to achieve satisfying lives for all while staying within the bounds of nature. If either of these elements is not achieved then the efforts to reach sustainability are considered as failures. Interaction between the elements of nature and quality of life is described in four different communities as shown in Figure 1 below. Classifications of communities are made based on their positions with respect to sustainability.

In Figure 1, Zone A represents a situation where nature is protected but even the most basic quality-of-life objectives are not met. Zone B represents a situation where both the environment is being degraded and quality of life is low. Zone C represent a situation where people enjoy a satisfying quality of life, but where the environment is not being adequately protected. Zone D is where both the key goals of sustainability are satisfied. A high quality of life is achieved without degrading the environment at either the global or local level. 'Developing sustainability' is then considered as any move away from Zones A, B, or C towards Zone D. Communities or societies in Zone D can be deemed 'sustainable communities'. Once a community is in Zone D, sustainable development, in terms of continuing to raise quality-of-life standards while protecting the natural capital from overuse and abuse, becomes a reality (Chambers, Simmons and Wackernagel, 2000:8).



**Figure 2.** *Achieving quality of life within the means of nature; mapping out the process of achieving sustainability*

## 2.2. Sustainable New Towns

What are cities, how do they work? Cities and towns are a complex mesh of people, lifestyles, machines, buildings, politics, power. However they can be simply defined as systems that import raw materials (input) to fuel a “metabolism” that exports goods (output) and refuse material (waste). Studies show that the actual useful product is usually very small (often less than 1%) as compared to the input, whilst the waste is approximately 70%. In many cases the vast amount of waste is typically put directly back into the biosphere, leaving it to be absorbed and processed. Following this philosophy, the earth can be viewed as a series of reservoirs (for resource) and sinks (for waste), both having finite capacity. There are two basic ways to view a city’s metabolism. Either as a linear process, (input gives output plus waste) or as a cyclical process that produces feedback loops and recycles wastes. The key difference between these two viewpoints is that the linear system will eventually reach full capacity, whereas the circular system is sustainable.

The system can be identified by the following characteristics – Linear: water use high and is polluted; sewage is discarded, toxic fumes pollute; building materials and ‘wastes’; trees felled without replacement. Circular: low water consumption, treated and recycled; wastes reused for fertilizer, heating and energy; fossil fuel used efficiently, building materials recycled and used discarded; trees replanted. (Battle and McCarthy, 2001:88)

## 3. METHODOLOGY

The study emphasizes on environmentally friendly actions towards a zero waste management done by Summarecon Serpong which have been conducted especially in the residential area. Some literatures were reviewed to give a base for further data analysis. The data was derived directly from the empirical facts on the field and interviews both with the decision makers and field officers.

## **4. RESULTS**

### **4.1. Go Green**

Since 2003 Summarecon Serpong has started to prepare and to design environmentally sound estate management concepts and regulations. To achieve the company's vision of creating a better living and a better future, certain estate regulations have been strictly implemented, commenced from the efforts to protect the vegetation in the existing built clusters. Inhabitants were not allowed to cut the tree nor change the ground cover into concrete surface. Allocated space for garden should not be changed into parking space. Breaking these regulations caused administrative sanctions and the doer had to replant the tree.

At the beginning it was hard to implement the regulations, but as the people's environmental understanding was improving, a growing sense of cooperation between the people and the property management was developed. A green community was established and later on people were even actively involved in monitoring the greenery. *'The main strength to change the individual behaviour is through a participation process'* (Rustiadi, Saefulhakim, and Panuju, 2011:365).

As for the new clusters, various fruit plants were given to the inhabitants-to-be. It was hoped that by planting his or her favourite fruit, it would create a sense of belonging since the fruit could be harvested in the future. Taking care of all plants such as watering the plants, replacing the dead plants, mowing the grass, collecting the compost became the responsibility of the estate management.

As the plants were growing, the inhabitants' values towards the benefit of the plants existence were growing as well. The vegetation provided aesthetics visual values, fruits in each season, and climate control. Leafy trees could reduce the solar heat and made the temperature 2°-4°C lower (Mediastika, 2013:233). Besides those benefits the greenery increased the oxygen supply and absorbed the carbon dioxide of the area. Certain types of trees (e.g. Trembesi, Kiara Payung and Tanjung) were chosen for these aims.

At the beginning 375 trees were planted in Alexandrite residential cluster, which produced approximately 450 kg oxygen per day. In the fifth year, the number of the trees had become more than 930 trees. With the total inhabitants of 900 persons and the need of oxygen per person per day is about 0.5 kilogram, there was abundant supply of oxygen in the cluster. Besides that, one adult Trembesi (*Albizia saman*, *Samanea saman*) is able to absorb 76.7 kilograms of carbon dioxide per day (Dahlan, 2004 in Mediastika 2013:248). Up to now Parkland, the public park in the area has 800 Trembesi tree, whilst the residential clusters have more than 8000 trees which made the carbon dioxide absorption is more than 250,000 tonnes per year.

### **4.2. Environmentally Friendly Building Material**

The use of environmentally friendly housing materials has been conducted since 2008 by reducing the use of timber and replacing it to new materials such as aluminum for door and window frames; and light steel truss for roof construction. Wooden formwork was replaced by iron or steel formwork. The concept of saving the environment implied also to choices of mortar cement and paint. The decision of replacing the wooden formwork has given a significant impact. For every single house, its wooden formworks were made of two twelve meter height of three year old trees. As Summarecon Serpong builds approximately 1,000 houses per year, the replacement of wooden formwork would save at least 2,000 trees per year or 10,000 trees in five years. This saving was calculated only from the changing of formwork material.

When the replacement of wooden door and window frame as well as the wooden roof truss were added to the above calculation, more and more trees would be saved. As a description, approximately 2,27m<sup>3</sup> wood is needed to make the wooden roof truss for 1 single house, while the door and window frame need approximately 1,11m<sup>3</sup> wood. Substitution for these two parts of building have saved 3,380m<sup>3</sup> wood per year. This is the equivalent number of 1,977 fifteen year timber with the height of 19 meters and 39 centimeters in diameter. The price for making one wooden form-work was Rp.390,000.00 whilst the same formwork made of iron cost Rp.1,700,000.00. The wooden formwork could be used twice which means Rp.195,000.00 for every use, whilst the iron formwork could be used 24 times which means Rp.70,000.00 per use.

When the number of the total timber is calculated based on oxygen production, it shows that Summarecon Serpong has avoided the loss of 6,9 million kilograms of oxygen caused by timber clearing. This is the equivalent amount of oxygen required for 18,729 people per day.

#### **4.3. A New Look at Waste**

Since 2005 every single house has been equipped with the trash bins for organic and inorganic waste. In 2009 a comprehensive waste depot was built as a facility to accumulate all the waste produced by all of the residential clusters, schools, hospital, restaurants, shops and offices in the area. The site allocated for the depot is 1 hectare. The depot processes the waste into different products, e.g. biomass and compost. Mixed waste is classified using a sorting machine. Plastic waste is pressed, packed and sold. Organic waste is dried and precipitated for 2-3 weeks and processed into organic compost. The organic compost is sold to the inhabitants and to the estate management as fertilizer for the landscape. The production of the organic compost shows an increasing trend. In 2009 only 1,803 sacks were produced, in 2009-2012, 14,263 sacks or 285,3 tonnes of compost were produced. This means that the depot has added economical value of Rp.427,890,000.00.

Plastic bottles and paper were classified separately and donated to the Tzu Chi Buddhist Foundation which is located next to the depot. The income generated is then donated to the surrounding charity actions. Many inhabitants are involved in this activity voluntarily.

Building material waste is also transferred to the depot and processed into landfill. This activity produces 40m<sup>3</sup> soil filling per day. This is the equivalent amount of landfill needed for more than 14,000m<sup>3</sup> per year. The cost for building this comprehensive depot and its facilities was 20 billion Rupiahs.

#### **4.4. Developing Sustainable Water**

The water management is divided into 3 classifications, i.e. clean water, rainwater and wastewater. Clean water supply for all purposes is provided by the company. Every house depends on the property management for its clean water access, and making a personal well is strictly prohibited. Instead of providing clean water wells, the property management makes rainwater absorption wells and biophores in every garden and in the public parks to catch rainwater. Currently, the absorption capacity is approximately 10,000m<sup>3</sup>. The runoff in the residential cluster is drained to the wastewater treatment, whilst the runoff from outside of the residential clusters is channeled to the retention ponds.

The main source for clean water is the water from Cisadane river which flows through the retention pond in the area. The 50 hectare width retention pond functions as an augmentation for the unstable river flows, to increase the amount of water that needs to be stabilized and abstracted for supply purposes and decrease the flood risk. At this point it can be said that the nature capital (Cisadane river) is protected rather than degraded, and the estate is living more

on nature's interest rather than living off nature's capital (Chambers, Simmons and Wackernagel, 2000:12). A water treatment plan (WTP) was built to process the water from the retention pond. The water treatment plan was equipped with two ground tanks. The capacity of each ground tank is 1,000m<sup>3</sup>. Whilst the processing tanks have the capability of producing 360m<sup>3</sup> of clean water/hour.

The household wastewater treatment technology has been implemented in the residential areas since 2009. A wastewater treatment depot has been built in each new residential cluster. Currently ten clusters have been able to process 70% of their grey water into clean water in their own clusters. The grey water coming from the houses in every cluster is channeled to the wastewater treatment and is processed into clean water. Each depot processes approximately 5,000m<sup>3</sup> of grey water per month. The processed water is utilized for watering the garden and landscape in the cluster.

As a relatively new built cluster, the wastewater treatment in Newton Cluster produces 4,900m<sup>3</sup> of clean water. The total area of both public and private garden is 6,827m<sup>2</sup>. The need of water for watering all vegetation in this cluster is only 1,912m<sup>3</sup> per month. The surplus of water is distributed and utilized for watering other clusters' vegetation. For the time being 10 clusters have already equipped with a wastewater treatment depot each. The water produced from these ten wastewater treatment depots is enough to fulfill the need of water for all of the residential clusters. The possibility of becoming self sufficient in water management is very promising since the company is planning to build the same depots for the existing clusters.

To know the economical profit of recycling the wastewater in Newton cluster, a comparison is made between taking the water needed from WTP and the wastewater treatment depot. The electricity expenses spent for the wastewater treatment depot in Newton Cluster is Rp.4,512,146.00 per month. Whilst taking the water from WTP costs Rp.16,248,600,00 per month. This means that Newton cluster could save the amount of Rp.11,736,454.00 per month. As an additional information, the cost for one wastewater treatment machine is approximately 3 billion rupiahs.

#### **4.4. Creating Green Lifestyles**

Taking a good care of the environment is a matter of education and is a matter of responsibility. Human beings shape the environment and vice versa, the environment is shaping the human beings. *'Being placed in a beautiful and clean room, a person will think twice or even more before doing certain things such as lighting a cigarette, or spitting, or throwing something which might pollute or degrade the environment. Therefore a good environment will educate people to do good things'* (Dwidjoseputro, 1990:55).

Starting from its own office, Summarecon Serpong has required all the staff to reuse the paper, and to turn off the computer during lunch time. Restaurants were asked not to use Styrofoam and to use the washable chopsticks. As the fuel for the Summarecon Serpong Mall generator, the property management preferred to use gas because its evaporation could be utilized for operating the absorption chiller.

The principles of saving the environment by reducing, reusing, and recycling have been implemented in every possible aspects. To reduce the energy consumption, the layout of the houses in the residential clusters was dominantly North-South oriented, and the cross ventilation system was applied in every house. Together with the existence of vegetation, it was hoped that the use of electricity for air conditioners could be reduced. For energy efficiency, all of the public buildings, public facilities and new residential clusters used the LED lamp and solar cell system.

To reduce the use of private cars, the property management has encouraged the use of busses and bicycles. Fifteen shuttle busses were provided as the number of people traveling with bus was increasing significantly. In 2010 only 99,999 people used the shuttle busses, whilst in 2012 the number had increased into 168,828 people. More bike lanes were made to accommodate the growing enthusiasm for cycling. Fun Bike activities were often organized and a plant seed was given to every participant. Since 2012 a bicycle was given to every new house buyer.

The current concept of green and low energy building is applied in Pahoia Kindergarten, Scientia Business Park, and Surya Research and Education Center. Pahoia Kindergarten was built in 2013, while Scientia Business Park is in the construction phase.

Pahoia Kindergarten maximizes the green outdoor space, the green roof, the cross ventilation, roof fans, and the surrounding big trees for its natural ventilation. The oxygen supply from the 300 trees is 360 kilograms per day. This is an equivalent amount of oxygen required for 720-900 children and adults per day. The classrooms do not use any air conditioner, nevertheless the room temperature was 3°-6° lower than outside. The design of the building could save 8,1 million Rupiahs per month or 11,571 KWH per month. This is an equivalent amount of 2,314 liters of petroleum per month. Recently, Pahoia Kindergarten has received 2 international awards i.e. Best Asia Pacific-Public Service Development 2014 and FIABCI (International Real Estate Federation) prix d'Excellences 2014.

One step forward concerning the waste management has been done by young children in Pahoia Kindergarten. They have learned to dispose of their waste according to certain classifications, i.e. organic, cans, plastics and bottles, and paper. Certainly they will not have any difficulty to do such things and disseminate this responsibility at their own home

## **5. CONCLUSION**

### **Living in a Sustainable World is a Valid Option**

Taking real actions to create a better and healthier environment are costly, at least at the beginning of the processes. However, saving the environment should not be judged by monetary worth alone. *'People would do better all to become paupers and live on a beautiful and healthy planet than to be millionaires living on a dying one'* (Seymour and Girardet, 1989:8). How human beings use the environment today which will largely determine what sort of environment they leave for the next generations.

The property management of Summarecon Serpong has been aware of the deterioration of the planet and has been determined to change things for the better and to encourage other cost-conscious people to follow the path. The realizations to create an environmentally friendly property estate and to increase people's awareness have been based on the comprehensive planning and have taken willingness, sustained efforts, patience, and money. After more than 10 years, it seems that the property management has been successful in its ways of sustaining the environment. However, the efforts done by Summarecon Serpong were only the preliminary steps towards developing a more vibrant environmentally friendly place to live in for the people and for other parts of the ecosystem.

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