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CONTENT

THE CONCEPT OF *GREEN HOME* IN HOUSING AREAS (FUTURE OPPORTUNITY AND CHALLENGE)

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Abstract. The concept of green home is a part of green architecture having the objective of harmonizing the inhabitants and the environment.
In the context of real estate housing areas, various housing products having natural themes, such as, green city, green garden, city with natural insights, natural city, and so on, are offered to the customers frequently. Most of those housing areas have put their concerns on customers' needs especially those that have natural themes.
The problems are that, those housing areas are mainly aimed to customers with middle to high income.
The question is that, how about the customers with middle to low income; don't they have the same rights to live in the housing areas with natural themes?
Basically, green home concept may be implemented in the housing areas for customers with middle to low income especially those that are located in suburb areas where the availability of land area is still vast enough and inexpensive. Besides that, the structure and area of the houses are not always made in large size. Green home implementation is not always related to big-structured and spacious hoses.
Basically, green home concept is an environmentally friendly house harmonized with the tropical climate of Indonesian nature. Green home concept prioritizes land area optimization, optimizing natural energy utilization efficiently, utilizing environmentally friendly building materials, efficiency in water utilization by using independent wasted water recycling system, good land absorption system, and also the provision of sufficient green open space and vegetation.
The implementation of green home concept becomes an opportunity because it will create a convenient and cool micro climate and, at the same time, it becomes a challenge viewed from designing aspects to minimize the budget.

Keywords: green home, green architecture, opportunity and challenge

1. INTRODUCTION

In the middle of the hurly-burly of densely, crowded urban lives and outrageous traffic jam, today, urban people need houses with natural environment, which, hopefully, they may be the balance between the tiresome working activities in offices and relaxing activities at home. This condition is then captured by the developers as a chance to offer products of houses for dwelling places with various concepts named as the settlements with environmental insight.

Some newspapers issued in the capital city offer house products labeled as "Garden City Where Life Flourishes, It's All Here", "Greener Life in the Big City", "Turning a Dream into Reality (to Create a Green Living Atmosphere)", "Sparkle in the Peaceful Living Environment", "The City and Nature in Harmony", "Eco City Pasuna Epicentrum", and "Living Green in the Middle of the City" almost everyday (Roesmanto, 2008). What are offered by the developers are the answers of the market demand phenomenon, that people in the city, especially those who have medium to high incomes, need houses for dwelling places suitable to their desires. Even specifically, they mention the housing environment built with the concept of green home. However, what then becomes the problem is that the concept of green home is enjoyed only by the communities with middle to high incomes because, however it may be, the price of each house becomes very expensive because it should take the burden of facility fees provided by the developer.

On the other hand, especially in the tropical Indonesian region, it has technical criteria in relation to the development of houses for dwelling places. Generally, tropical climate is divided into wet and dry tropical climate. De Wall (in Sutrisno, 2008) divided tropical climate into 10 classifications based on the average daily temperature and temperature differences between day and night. In this grouping, what can be included into tropical climate are the regions having daily average air temperature of ≥ 28°C. Jakarta and Semarang City are included in this category because they have the daily average air temperature of ≥ 28°C, meanwhile, cool cities like Bandung and Malang are not included in the tropical classification made by De Wall because they have lower daily average air temperature. The cities having tropical climate experience a particular problem, which is heating caused by sun radiation. The heat radiated by the sun to the earth surface depends on the projecting angle and condition of clouds filtering that radiation. The radiation will reach the maximum amount if the projecting angle is 90°. The implication of sun radiation to the earth surface will be different depends on the characteristics of surface that absorb and reflect that radiation. Hard surfaces tend to absorb more heat. Surfaces with light colors tend to reflect more heat and dark colors tend to absorb more of it. Besides that, the soil surface covered by concrete and asphalt in tropical cities will cause 'heat urban island'. The air temperature of that area will be higher than the surrounding rural areas because the sun radiation absorbed and released to the air by the hard materials such as concrete and asphalt is greater that plants.

Based on the above problem, therefore, the question is that, how the concept of green home can be enjoyed by people with middle to low incomes, however, by maintaining the principles of tropical climate occurring in Indonesia.

2. CHARACTERISTICS OF GREEN HOME

The concept of green home is closely related to the local wisdom of Indonesian architecture. So far, actually, Indonesian people have had the traditional house model suitable to tropical climate, for example, it has wide windows and Venetian blinds, and also it has conical roof so that it does not require air conditioner and lighting lamps in daytimes. Meanwhile, from its material aspects, a house for dwelling place should use bamboo. Besides it is easily available because it can be harvested within two years, bamboo also grows easily in many places. The bamboo wall of a house also functions as a good ventilation. Besides that, because it is elastic and light, a bamboo house is relatively able to withstand the shock of earthquake.

According to Yeang (1987), the regional local architecture seeks its basic of design by taking the "spirit of the places", which is the architecture that is contextual and able to respond to local conditions where the building is built. In a more specific way, the regional architecture seeks the significance of architecture in the relation of building configuration, aesthetic, also technical and material organizations to place and time. In searching for the "spirit of the places", regional architecture will search for the relationship between design continuity and structure and the past time included in the cultural traditions and traditional architectural heritages as the "spirit of the places" in the local vernacular where the building is built.

Basically, the green home concept is an environmentally friendly house harmonized with the nature of the humid tropical climate of Indonesia. The green home concept prioritizes area optimization, efficient energy utilization, environmentally friendly building material utilization, water usage efficiency and waste water recycling into clean water, good water penetration system, and availability of green open spaces.

a. Land Optimization

Optimization of area usage, which is in accordance with the green home concept, is worth considered behind the more limited housing areas in cities. To achieve the goal of area optimization, the principle that should be held firmly is not to maximize the building built on the existing land plot, because, if all area is covered by the building, therefore, it does not leave any green areas and open spaces. Presenting green gardens in limited housing areas may be in form of roof gardens, hanging pots, and also "breathing wall".

Many people have different comprehensions concerning area optimization. Some have an assumption of the amount of building area should be less than the area of its open space. The ratio may be 50-70% : 50-30%; which means, the building area is 30% and the area of open space is 70%, or the maximum ratio is in balance, which is, the building area is 50% and the area of its open space is 50%. This situation is, hopefully, able to realize the ideal and healthy dwelling consistently.

Area limitation encourages the optimization of every inch of the area and the function of each room. There is no wasted or empty room, the position of open green areas is developed optimally in the front yard, side yard, back yard and also front and center/side balcony terraces. A garden is a part of making a house green having the objective of improving urban environment quality, cooling the air around the house, having natural scenery and playground, thus, it is not just green.

Figure 1.
Land Usage Optimization by Prioritizing the Unused Area for Water Penetration
Source: www.inhabitat.com in Wahyudi, 2008

The phenomenon of exhausting the area of land plot for the building of house has come to be abandoned because it is very inefficient and ineffective, also unsafe, especially if there is a case of fire. Green home optimizes housing areas as the urban green spaces very much. A house with the green home concept is the reinterpretation of socio-cultural of community culture to the nature and life of its dwelling place.

b. Efficient Energy Utilization

Architectural design is a medium giving direct impacts on the area utilization. Design concept that may minimize the usage of electrical energy, for example, may be categorized as the sustainable concept in energy, which may be integrated with the concept of utilizing sunlight maximally for lighting, natural air circulation, water heating for domestic needs, and so on. Therefore, building orientation must be taken into consideration in relation to the utilization of energy efficiently. Building orientation is always related to the *thermal* comfort and energy utilization of the building. The East-West building orientation; it means that the largest sides of the building faces East and West. This causes an effect that both sides receive sun radiation in the morning and afternoon that it relatively has the potency of heating the rooms inside it and causing *thermal* discomfort. The building inhabitants may be disturbed and they need various building accessories such as sun protector and artificial air conditioner so that they may use the rooms well. It is different to the building orientating to North and South; the building does not receive sun radiation

as much as East and West sides, thus, the rooms facing North and South are more comfortable to be used and they do not need any large sun protector or artificial air conditioner.

Egan's theory of orientation (1991) stated that the good orientation to anticipate heat condition of a building is stretching from East to West or vice-versa. Besides that, according to Frick (2006), building orientation is positioned between sun and wind paths as the compromise between the building position, orientated from East to West, and positioned perpendicular to the wind direction. Building orientation may also be used to create "sunlight pocket", which is the condition where the sunlight is at the lowest radiation intensity according to the cycle of sunrise and sunset and the small projecting angle. Therefore, the area receiving light will be larger and its radiation intensity will be lower. Sunlight pocket occurs at the time after sunrise until about 11:00 and at 16:00 to sunset.

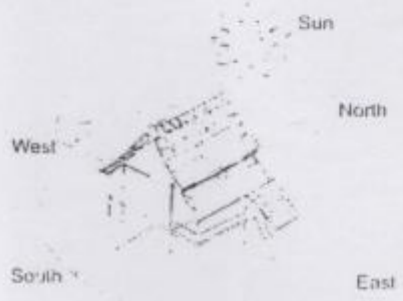

Figure 2.
Building Orientation Suited to Sun Movement
Source: Modification from Frick, 1998

Natural lighting in daytime with an optimum opening will reduce electrical energy used for lighting and artificial air circulation. On the whole, this method may reduce energy needs up to 40%.

c. Environmentally Friendly Building Material Utilization

The use of building materials suitable to this ecological concept of the green home may be taken by: [i] utilizing natural materials coming from the renewable sources, [ii] utilizing materials coming from non-renewable resources but they are able to last long, [iii] utilizing local materials, and [iv] utilizing material technology.

The principle of sustaining environmental system sustainability may be achieved by building the buildings using the natural materials coming from the renewable sources. However, they should be controlled in their utilization because the needs of these building materials cannot be counterbalanced by the availability of natural materials quickly. The utilization of materials coming from the non-renewable sources will obviously have undesirable impacts on the environment. However, those materials may be utilized by sorting the materials having long durability; thus, they are possible to be utilized in a long term so it will minimize wasting natural resources.

The concept of room flexibility in a building allows the building to be used for various activities. This will leave efficiency value of a building. The material technology of a building may help to reduce discomfort conditions, for example, the utilization of glass technology to reduce heat in the rooms, material preservation technology to produce long lasting materials, raw material for the wall that allows natural air exchange.

In general, green home design may use wooden material; however, due to the availability of wood that becomes rarer, therefore, as another alternative, it may use bamboo. The utilization of bamboo material, besides it is affordable, it is also easily found because it has the harvesting period of twice in a year and it may grow easily. Besides it is used as the main structure, bamboo may also be used as the raw material of wall construction and at the same time, it also functions as good ventilation. Besides that, because it is elastic and light, a bamboo house is able to withstand the shock of an earthquake.

Figure 3. Example of Bamboo Material used for Wall and Building Structure
Source: www.mastergardenproducts.com, accessed on October 8, 2008

In the regional scale, it requires a brave effort to convert the asphalt of parking area into *grass block*, shade the parking area with trees, and make all level roofs as *roof gardens*. In addition, the buildings are also designed in the principle of energy saving. Building skin is light-colored, element of sun protector and shading that reduce building heat to reduce air conditioner load.

d. Water Usage Efficiency

It can be achieved by utilizing rain water and dirty waste water coming fro household waste in innovative measures to store and process rain water f domestic needs by filtering it. To anticipate the clean water crisis, the matters th should be taken into account are how to develop the system of reducing wat usage (reduce), reuse the water for various needs at once (reuse), recycle th waste of clean water (recycle), and recharge the ground water (recharge). Som architects have begun to develop the waste of clean water processing system - th recycles daily wasted water (washing hands, plates, vehicles, cleansing) or th waste (coming from bathroom) that may be reuse to wash vehicles, flush toilet and water plants - and also create penetrating well (1 x 1 x 2 meters) and holes c bio-pores (10 centimeters x 1 meter) as needed (Kompas, May 29, 2008).

In fact, it occurs very often that domestic wasted water in capital cities of Indonesi is not processed further and it is thrown into receiving water bodies such as river or lakes. This has caused environmental damages and public health degradatior Constructed wetlands is a potential alternative technology of wasted wat processing that may be applied in Indonesia, in which, there are so many natura wetlands found in Indonesia but they are rarely used. Constructed wetlands st receives less attention and it is rarely used as the system of domestic wasted wat processing. The target of this planning is creating the processing facility of domesti wasted water coming from housing, hotels, and restaurants activities by usin constructed wetlands as the alternative of secondary processing. The wasted wat from bathrooms and outlets of septic tanks is directed into a pool containing grave and sand with the vegetation of water plant of bulrush (http://digilib.itb.ac.id/ accessed on October 8, 2008).

Figure 4.
Constructed Wetlands Wasted Water Processing System
Source: http://digilib.itb.ac.id/, accessed on October 8, 2008

e. Good Water Penetration System

In order to realize green home, it requires the green open environment that is abl to absorb rain water overflow well, so that, it will not cause flood and at the sam time, it conserves the availability of ground water. The ground water penetratin system is applied by utilizing two methods; the first method is by using bio-pore system and the second method is by using conventional penetrating well.

Bio-pores penetrating system are in form of cylindrical holes created vertically int the ground with the diameter of 10-30 cm and the depth of about 100 cm, or in th case of the ground with a shallow ground water level, it does not exceed the dept of ground water level. The holes are filled with organic rubbish to trigger th forming of bio-pores. Bio-pores are pores in form of holes (small tunnels) created b the activities of ground animals or roots. The principle of this technology is to avoi rain water flowing to the lower regions and let it to be absorbed into the groun through those penetrating holes.

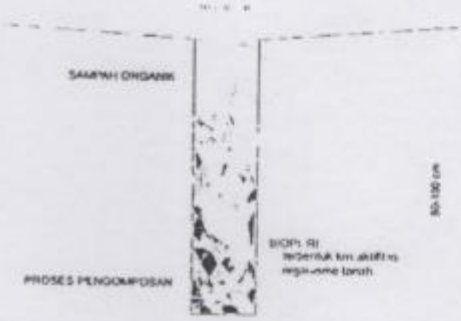

Figure 5
Ground Penetrating System by Using Bio-Pores
Source: id.wikipedia.org/wiki/Biopori, accessed on October 8, 2008

The second penetrating system is in form of a well, which it is then mentioned as water penetrating well (WPW). The construction of water penetrating well is an alternative of choice in overcoming flood and the subsidence of ground water level at the housing areas, with the considerations of: [i] the construction of WPW does not cost much, [ii] it does not require a large space, and [iii] WPW construction is simple.

Water penetrating well is a technical invention of water conservation in form of a structure constructed in such a way, thus, it looks like a dug well with certain depth

functioning as the place to store rain water coming from the roof and penetrating it into the ground. The benefits acquired by creating the water penetrating well, among them are: [i] it reduces surface flow and prevents stagnant water, thus, it reduces the possibility of flood and erosion, [ii] it maintains the level of ground water level and increases ground water supply, [iii] it reduces or prevents sea water intrusion for the areas that are close to coastal regions, [iv] it prevents land subsidence as a result of ground water over-consuming, and [v] it reduces the concentration of ground water pollution (http://architectaria.com/sistem-drainase-sumur-resapan-part-ii.html, accessed on October 8, 2008).

f. Availability of Green Open Spaces

In order to realize green home, the component of the green open spaces has an important and strategic function. The study of green open spaces and their functions has been conducted quite frequently. The obtained results are, gardens have the roles of the socio-cultural developing facility such as community education, as the safety valve and urban culture enrichment, as the places where the plants grow that give comfort to people using streets, safety areas for pedestrians, and also as the utility places and supporting facilities of people's activities. Besides functioning as educative and social facilities, the vegetation of green open spaces also gives aesthetic functions, filter of gas and dust, carbon trapper, micro-climate controller, and conservation of genetic resources in an ex-situ nature, having the "intangible" values for urban people themselves.

According to Hakim and Utomo (2003), systematically, green open spaces are basically the parts of unused housing areas, having the function of supporting comfort, welfare, improvement of environmental quality, and natural preservation. In the context of utilization, the meaning of green open spaces has a vast scope more than just making green with plants, thus, it also covers the meaning in form of open space utilization for public activities. Green open spaces may be classified both in their layout and functions. Based on their layout, the urban green open space may be in form of city parks, sporting places, and environmental parks.

In relation to the functions of green open spaces, based on SNI 03-1733-2004 concerning the Order of Urban Housing Environment Planning, it requires the following conditions (in Indrawati and Nurhasan, 2008):

a. Every 250 inhabitants require at least 1 (one) park and at the same time a playground for children with the area of at least 250 m^2, or with the standard of: 1 m^2/person.

b. For the scale of 2,500 inhabitants, it requires the addition of open spaces (parks/playgrounds) with the standard of: 0.5 m^2/person.

c. For the scale of 30,000 inhabitants, it requires the addition of parks and sporting places as much as 9,000 m^2 with the standard of: 0.3 m^2/person.

d. For the scale of 120,000 inhabitants, it requires the addition of parks and sporting places as much as 24,000 m² with the standard of: 0.2 m²/person.

e. Besides the above open parks and sporting places, green paths should be provided as the back up/natural resources with the standard of: 15 m²/person.

Figure 6.
A Green Open Space in a Housing Area
Source:www.lifestyle.okezone.com, accessed on October 8, 2008

So far, many big cities in Indonesia tend not to pay any attention to how important green open spaces are, especially for housing areas. The provision and arrangement of green open spaces correctly may be able to play a role in improving atmospheric quality of those areas, air refreshing, lowering temperature of those areas, sweeping the surface dust of those areas, reducing air pollution concentration, and absorbing noise. The research conducted by Gerakis (in Hakim and Utomo, 2003), every 1 (one) hectare of green open space may produce 0.5 ton of oxygen for 1,500 people per day.

3. GREEN HOME : FUTURE OPPORTUNITY AND CHALLENGE

To realize green home concept is the opportunity and challenge for involved stakeholders, especially in the provision of mass houses. However, in a simple way, green home concept is basically a part of what we call as Indonesian local architectural wisdom. The green home characteristics that have been described in details have basically been the part of Indonesian local architectural wisdom. Indonesian local architectural richness has the characteristic of very flexible to temperature and humidity changes, avoidance of radiation and reflection of sun

heat, perfect and comprehensive building ventilation in all room corners, utilization of natural building materials, high forms of roofs and ceilings to bring the hot air up, room organization efficiency, and adequate plant arrangement. The forms of that local architecture may be found in the traditional house of dwelling of some regions, such as, Central Java, East Java, West Java, Sumatera, Kalimantan, Celebes, Nusa Tenggara, Papua, and so on. Now, our duties are, how to maintain, fill, and develop the Indonesian local architectural richness because they have the architectural characteristics based on the wisdom that is adaptive and responsive to the humid tropical nature coexisting with architectural products coming from the outside of Indonesia that have existed before.

4. CONCLUSION

Basically, green home concept is a necessity for people in big cities, especially those that prioritize area optimization, efficient energy utilization, environmentally friendly building materials usage, efficiency in using water and also recycling wasted water into clean water, good water penetrating system, and availability of green open spaces.

Green home concept with its various characteristics has basically been covered in the characteristics and criteria of Indonesian local architecture based on the wisdom that is adaptive and responsive to the humid tropical nature.

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