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The Harmony of Nature and Built Environment: Its Impact For Children Growth in Karangantu Eco-Village

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ABSTRACT

Man and the development cannot be separated, both of them are working together to bring changes to the existing ecosystem. The planning has to consider the harmonious between the natural and its physical development. Children grow and develop in an environtment which created by adult, and it is our responsibility to create a positive environment and ensure their positive and creative growth. The study was conducted from two directions; to evaluate the Eco Village Concept using indicators of ecological planning, and evaluation of development of the child's behavior at Bugis Village as the user of the Tapak Bumi Ecovillage. The results is the Environment Elements as Children Development Stimulator, which will be used as input datas for the planning process of our second's year research which grant by DP2M DIKTI

Keywords: Natural Environment, Ecovillage, Children Behavior, Ecological Planning

1. Introduction

Man and the development cannot be separated, both of them are working together to bring change to the existing ecosystem. Ecosystem itself can be grouped into two major groups; natural ecosystems and artificial ecosystems. Both are usually overlapping each other. Therefore in the construction, what will be built should be reviewed as part of an ecosystem.

The formation of new ecosystems due to development will certainly develop an impact on the development of the existing living things; plants, animals and humans including children. Child growth and development will be strongly influenced by the environment in which he lived. If the natural and built environments are living in balance harmony, it is certain that the children would grow healthy.

Children in the village Karangantu, Serang is one example of those who are expected to grow a healthy, since the physical development in the area have led to the harmony of the natural environment and built environment. One of the examples is The Karangantu Eco Village, built on arable land seasonal aquaculture. Its development helped the Children of Karangantu with certain supporting facilities. The research that we did was look for aspects that can be used as direction / guidance development plan that considers the alignment of the natural environment and the built environment in order to be a positive stimulator of growth and development of children.

2. Literature Review

2.1 Ecological Design

Design thinking in general, only to see the building as part of aesthetics, space, form and other elements frequently used in the architectural design. This thinking is commonly referred to as deterministic-traditional thinking. However, from ecological point of view, buildings are seen in the context of its environment or as part of the ecosystem. Ecological point of view also sees society as a component of life in the ecosystem, such as organisms. So by using this ecological insight, design is no longer the built environment separate from the ecosystem (Yeang, 1995).

Ecological design according to Van der Ryn (1996) is based on 5 principles:

- To know the site characteristic, condition and its limitation.
- To consider ecological values, such as the amount of natural resources, and also the damage of the environment had already happened.
- To incorporate natural element in design, in nature, material keeps on moving to form a basic components to build a new life.
- Anyone can act as designer. To van der Ryn, a good design is when the designer follows the will of the nature, so there are no exact solutions for every problem. The solution grow organically depends on the situation, process and communication pattern.
- Naturally design is needed, a design stressing the nature potentials.

Another thing that needs to be taken into consideration is the activity occurs in any built environment. Each activity must have input and output as a process of life. Input and output that occurs naturally requires ecological consideration, i.e. how much use of natural elements as input and how much waste occurs as the output activity on natural process. Therefore we can conclude several aspects of planning that considers the ecological concept (Astrid, Dianna, 2000)

Table 1: Planning Based on Ecological Concept

ASPECTS	ECOLOGY CONCEPT PLANNING ELEMENTS
ARCHITECTURAL ASPECTS	• At construction stage; attempted use of local materials, minimizing the use of tools that produce CO_2 • Use of remanufactured/reuse materials • multipurpose room order and flexible forms in connection with the ratio of the mass dimension of the surface soil • the use of natural energy to optimize buildings orientation (wind, solar)
WASTE MANAGEMENT ASPECTS	• 4R concept for the management of rainwater, wastewater and solid waste as well as other forms of pollution
LANDSCAPE ASPECTS	• Minimize the percentage of land on the soil surface wounds, such as not to cut and fill, while maintaining the open green spaces, etc.. • Maintaining groundwater ecosystems, habitats of land, rivers and others from contamination • Maintaining continuity of microclimate quality such as by reforestation and others.

Source: (Astrid, Diana, 2000)

Humans, including children, as part of the ecosystem has the characteristics, needs and desires that need to be accommodated appropriately in order to live healthy. For that, development planning needs to conduct an ecological approach to the characteristics, needs and desires of man, in this case children, which can be tolerated by the natural environment.

2.2 Ecological Thought on The Process of Children Growth

Stage of development and children's concept of thinking vary according to age and neighborhood. If the child is born in a healthy condition, then the growth will be in accordance with increasing age. Still there is a possibility of distortion in the process of growth if the built environment where he lived did not provide the necessary stimulation.

Jean Piaget said that children develop and grow according to developmental age (which affects cognitive ability) in interacting with their environment. A good environment is a physical environment that still has the natural elements (the potentials of nature such as vegetation, topography, rivers, mountains, seas and so on). Therefore, children who grow up in environments rich of natural element, will be different than children who are raised in crowded environments.

In the built environment, the role of the architectural meanings in an environmental element becomes important. Meaning affects human behavior, in which the human reaction to the

environment will greatly depend on the meaning of the environment captured by the man himself (Altman, Irwin). Meaning of place forms the man self-concept, including children. The meaning of space will greatly affect the behavior, and emerging environmental behavior can be different due to the interpretation of any different meaning, depending on each individual child. It is the children's Age who will determine the ability of capturing the meaning, then to reflect it in their behavior. (Dewiyanti, Dhini, 2010).

Table 2: Developmental Stages Based on Aged and Self Concepts

CONCEPTS	EGOCENTRIC PHASE	SPECIIFIC PARTICIPATION PHASE	MUTUAL PHASE	FAMILIARITY PHASE
	Age 2-4 year	Age 5-8 year	Age 9-11 year	Age 11-14 year
THINK CONCEPTS	▪ Massive (everyone is him/herself) and total thinking (you and me are I) */self concept*	▪ Participatory thinking (me, him, her, you are my group, the others are not belong to my group) only not based on the status	▪ Participatory-selective thinking based on sex, race, social-economy status ▪ On the other hand, tolerance for other is developed	▪ Make an evaluation empirically, according to the ability to think and to see.
SPACE CONCEPTS	▪ Recognize the distance not more than 2 inch, where the relationship and position between children and their environment is topographic, related to near, far, order, dislogic. ▪ Landmark is a move mother rather than static one. ▪ To recognize simple horizontal and vertical aspects.	▪ Understanding of metric measurement, composition, configuration, left-right and front-back. ▪ Recognizing a landmark automatically. ▪ Learning a concept of *geometric order.* ▪ Started to interest in knowing the place	▪ Using tools to know the distance (ruler, weight, etc.) accurately measure in meter, kg, etc. ▪ To know the site landmark, with the ability to mention the object form articulation. ▪ Diagonal concept, able to recognize the spatial space relationship and accurately mention the place. ▪ Able to mention space/place along with context and geographical condition around.	▪ Able to compare between spaces. ▪ Abe to use direction concept.

Source: (Dewiyanti, Dhini, 2010)

From the stage, it seems clear that at the age of 5-8 years children begin to think participatory, interacting with the environment and begin to recognize the place. Meanwhile, at the age of 9-11 years self-concepts is growing more concrete, selective and tolerant. It is understandable that when he/she is mature, the person will behave in accordance with the environment in which he/she lived.

Built environment planned and built with the basics of ecological thinking, will greatly affect the child's self-concept and behavior in the process of growth. This happens because children are involved as part of the existing ecosystem. Children will be aware of its contribution to environmental sustainability of the natural and built environment in which he grew up. Introduction to optimization and energy efficiency, waste management and processing along with treatment of the natural environment itself will appear according to the architectural meaning absorbed.

2.3 Karangantu Eco Village Serang

Karangantu Eco Village is located on the north coast of Serang city overlooking the Bay of Banten, Java Sea. The extent of approximately 4 acres, built on sand and mud ponds. Almost the entire area is brackish water, fortified from the blows of the waves by a belt of mangroves, the rest is mud mixed with sand, used as a footpath for access and sludge disposal sites of the Milkfish farmers. Only the weeds and shrub, just a few specific plants, such as *Petai Cina* and *asem* grow on dry and barren land.

Eco Village is very close to the Karangantu harbor, Serang, formerly known as an international trade port in Banten sultanate era. Now the port is no longer used as its first function. Condition of the harbor and the surrounding settlements and activities are currently experiencing a loss of

quality, therefore Eco Village development plans around the port is expected to increase again the quality of the environment, social and economic value there.

The growth of the area addressed to become a minapolitan city, a village based on the lives of fishermen, which gives more attention to the balance of environmental, economic, education, and energy.

Source: (Syuhada, Mukodas, 2010)

Figure 1: The Concept of Tapak Bumi Ecovillage

Another purpose of this development is the use of farm milk fish ponds, on the coast north of Serang, while building an independent economy. Development begins with establishing several houses and social buildings such as multipurpose buildings and libraries. Supporting facilities such as electricity obtained through the concept of wind turbines, while the clean water obtained from seawater distillation techniques using wind energy (drinking with the wind)

Floating building with the size of 5.6 m 11.2 m was built on the ponds and fish, to deal with the ups and downs, while the social construction built to the design stage on a narrow area (galengan / embankment) among ponds. The material used is a local bamboo and reeds as the roof cover. So far the buildings and facilities have been built is still a model settlement that will be developed further

Source: (Dewiyanti, Dhini, 2011)
Figure 2: Multipurpose Building

Source: (Dewiyanti, Dhini, 2011)
Figure 3: Floating House

Source: (Dewiyanti, Dhini, 2011)
Figure 4: Reception Building

Source: (Dewiyanti, Dhini, 2011)
Figure 5: Bamboo Library

Source: (Dewiyanti, Dhini, 2011)
Figure 6: Path between the mangrove forest

Source: (Dewiyanti, Dhini, 2011)
Figure 7: Windmill as the power source and landmark

3. Methodology

The study was conducted from two directions; to evaluate the Eco Village development using indicators of ecological planning, and evaluation of development of the child's behavior in the presence of the Eco Village. Evaluation of the child's behavior is doing for children aged 9-11 years (grade 5) with consideration that those children already have the concept of thinking and socialization, as well as the already been well developed communication. Evaluation is done by distributing questionnaires and observation techniques, as well as a number of interviews on parties considered to be related, like parents, teachers, or the government. The results of this research are expected to get an idea of the extent of influence of the development of Eco Village over the children's process of development.

4. Results and Discussions

Environment Elements as Children Development Stimulator
From the observation, questionnaires and interviews, it can be concluded that there are some elements of the environment at the center of attention of children, as well as stimulators their growth process.

4.1. Accessibility/pedestrian/footpath

Levees/fish ponds that serve as access to location is an interesting built environment element for the children. The number of alternative accessibility provides its own fantasy for children.

A land bridge connecting the mainland also became part of interest to children. At this place the kids do a lot of adventure games or role playing. The bridge and path served as one of the environmental elements stimulating the growth process.

Source: (Dewiyanti, Dhini, 2011)
Figure 8: The bridge and path served as one of the environmental elements

4.2. Building Mass

Several buildings gave a good stimulation to children:

- *The house*

Built above the pool in the floating concept. The concept and building forms are made to anticipate the possibility of high tides, in addition to aiming the land optimization. The fact is, this concept gave birth to children creative thinking, as well as awareness of the different characteristics of water and soil. The distance between the mainland and the floating house, also helps the concept of strategy and estimates on children's cognitive, as well as awareness for mutual aid/cooperation at the time to reach the floating house.

- *Multi function building*

2 levels building, built on the dike has a width of approximately 4 m, made with a system of houses on stilts. This is done also to anticipate the possibility of high tide. Versatile functions on the ground floor was very effective facilitate the activities with local communities, as well as for children. The addition of library functions on the 2nd floor adds charm to stop off and make it a place to play while learning. Separation of functions on the upper zone and lower zone turned out to provide children awareness about group and territory.

- *Mushola*

Function to give a spiritual consciousness to children, as well as to develop a time concept.

- *Windmill*

Serves as a power plant, the main attraction for children because of the shape and how it works. Children are aware of the nature of the role of wind in meeting the needs of their lives,

Windmill form is different compared to the surrounding buildings; it could become a landmark for the location of the Eco Village. Children aged 9-11 years are in the process of understanding the concept of space and thus require landmarks / landmarks to understand the space and the existence of a location.

Source: (Dewiyanti, Dhini, 2011)
Figure 9: The distance between the mainland and the floating attract children

Source: (Dewiyanti, Dhini, 2011)
Figure 10: Reception Building

Source: (Dewiyanti, Dhini, 2011)
Figure 11: Floating Mosque

Source: (Dewiyanti, Dhini, 2011)
Figure 12: Widmill as the main attraction for children

4.3. Space in Between

Spaces between buildings that is not too wide, becoming a space of transition from one function to another. The space is used as playing fields, running, sitting etc. This kind of space increasing the level of familiarity with each other

4.4. Flora and Fauna

Bamboo plants that grow in the vicinity of Serang, can be used as alternative building materials. Characteristics of bamboo must be understood, so that strengths and weaknesses can be tailored to the needs of planning. The use of local materials raising the children awareness regarding the role of vegetation in their environment. Another example is the presence of mangrove trees, as the seat belt on the beach.

Milkfish aquaculture in fish ponds, require the preservation of ecosystems. The aim is that these fish can be used as commodities to improve the economic welfare of local communities. Children are very aware of it, so it grows in their mind to participate in preserving the fish ecosystem

4.5. Water

Brackish water ponds around the eco village are helping the children to recognize different types of water and habitat characteristics. Children around the Eco village also recognize the ocean as part of nature. With the diverse types of water and habitat around them, children can be more creative and have more developed motor skills, leading to increased intelligence.

Source: (Dewiyanti, Dhini, 2011)
Figure 13: Tree House inspiring togetherness

Source: (Dewiyanti, Dhini, 2011)
Figure 14: Fish Pond as Learning Area

Source: (Dewiyanti, Dhini, 2011)
Figure 15: Water has always attracted the intention of children

The description above can be making a systematic explanation of the relationship between the natural and built elements of child development, as follows:

Table 3: Relationship between The Natural and Built Elements in Child Development

ECOLOGICAL INDICATOR	ECO VILLAGE KARANGANTU SERANG	IMPACT ON CHILDREN AGE 9-11 YEAR DEVELOPMENT		
		SOCIAL CONCEPTS	THINKING CONCEPTS	SPACE CONCEPTS
Material and construction	Local materials: Bamboo with dowel construction.	Working together	To realize all the nature potential	-
Space order	Stage building 1 storey → Multipurpose room stage 2 → library	The children play while still with the parents	Understand the characteristic along with group activity	To know area/territory/zone
Building orientation	Facing north-south to avoid direct sunlight	-	To know nature potential	-
Fresh – Black water	Water desalination	-	To understand applied technology	-
Light and ventilation	Using wind turbine to produce electricity	-	To understand applied technology	To understand landmark
Ground wound percent	Building on ground→stage Building on water → floating	The children learn to work together helping each other	Causal thinking	The ability to recognize land, water
Ecosystem	Cultivation of fish according to brackish water conditions	Children learn to work together	To know ecosystem concepts	To know ecosystem concepts
Micro climate	Dry, rare vegetation except for *asem* and *petai cina*	-	To understand the importance of greening	To understand the concept of guarding space

Source: (Dewiyanti, Dhini, 2011)

5. Conclusion

Built environment is actually part of the natural environment, so more and more of the built environment is built it will be able to disrupt the ecosystem balance in the natural environment and consequently lead to imbalances in the ecosystem.

Children are part of both natural and artificial ecosystems that grow and thrive in it. Responsive architectural elements will produce a positive meaning that can change behavior. Hence with this awareness, development actors; architects, owners, society and government should be able to make this step of planning, which is based on the impact of child development.

By studying the cases in the Eco Village Karangantu, Serang, some things can be a concern for the perpetrators of such development:

1. To realize that children are part of the ecosystem means a "user" has to be put into consideration on the decision making.
2. Using architectural elements that can stimulate the development of the children, including: the use of landmarks, the clarity of the space group, using of environmental friendly materials, safe and comfortable textures and colors and the availability of open space. Games range, scale and proportion can be taken into consideration in order to foster the concept of thinking of them; systematic thinking, creative, strategy and children planning.
3. Maintaining the natural elements, such as water, soil, air, light, topography and the flora and fauna. These elements can be used directly or through a particular technology. This practice problem solving skills, socialization, empathy, and strategies on children.
4. Use of safe appropriate technology for the environment. It can stimulate the concept of children's thinking in terms of "problem solving" and tolerance, especially in natural ecosystem.
5. Social facilities or public facilities should prepare magnets activities to accommodate the development of the child with regard to children security and safety, as well as the possible distance range

Further testing needs to be done at other locations in order to produce the more accurate conclusion can be used as a permanent reference for the development actors.

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