

## Ananas Park: Institutional Cultural Center through the Influence of Bioclimatic Urbanism

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### ABSTRACT

The urban air temperature is increasing gradually in all cities in the world. Especially tropical country where the most population living in, the heat islands effect causes the uncomfortable for the built environment. The consequences are significantly creating global temperature issues and its influences the future of the earth. As the urbanization expanding, man-made structure has replace the natural forest which the forest could protect and provide good air quality and comfortable living temperature. The concrete planning and architecture destroy the nature of environment and it also creates social issues like traffic jam in the city and overloaded of functionless space. Urbanization and architecture plays a role in contributing heat island effects. Bioclimatic urbanism is one of the effective concepts to bring back the nature into building. Climatically and contextually responses to perform a sustainable and natural living space are the main character of bioclimatic design. No doubt, the future city development has to move towards ecological design balance and the architecture serves the function being a part of urban. Several case studies have been conducting through visual survey method. The purpose of the study is to analyze the method of applying bioclimatic concept and then to propose structures that based on the concept. At the conclusion of the study, there will be a proposed recommendations that could help to reduce heat island effect and to promote healthier living condition that contribute to the public, society and the environment.

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## INTRODUCTION

Urbanism is a relation between human and built environment. But, human is innocent that an urban without contextualized will create impacts for the society. In "Notes on the Synthesis of Form", Christopher Alexander said when a building is proposed it changes the context, it influences the built environment as well as urbanism. Likewise urban sprawl without contextual responses is equal to destroy our mother earth [1]. Sadly, the history of development merely emphasized on the contribution of green and the power of nature forces. In the "Sustainable Parameters for Latin American Cities", the authors carry out the urban planning issue sustainability in Latin American that there is disconnection between urban built and natural environment [3].

The urban air temperature is gradually rising in all cities in the world. In tropical country like Singapore, the heat island effect is increasing comparing to the past. Because of the rapid population influx has led to demands for converting natural areas to public housing [2]. Apart from that, inefficient public services, the formation of urban heat islands also causing a negative living quality and energy consumption. The unsustainable planning causes the country has lost the ability to live with greenery. It means that land use planning becomes critical in determining the environment quality [6].

The truth is that almost half of the world population lives in the tropics [7]. However, human have paid very little attention on architecture and structural design to the local climate conditions. In other words, the rainforest is being sacrificed to fulfill human needs. What can the rainforest do? Actually it is an error that deforestation happens to this country. Because rainforest is one of the natural gifts to protect comfort environment and control temperature.

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The deforestation activity is destroying rainforest, then CO<sub>2</sub> emission increase coherently with the local temperature. Besides, most modern buildings reflect no understanding of ecology or ecological process. Therefore, bioclimatic urbanism is necessary to led significant efforts at minimizing and mitigating the adverse environmental and human health impacts of modern development [5].

For a building, fundamental design task is the form of building to response to the orientation of the sun and sun, to compromise natural elements as part of design criteria. For urban, design consideration involve multiple and several of buildings to response to context which is topography vegetation and water surfaces. Again to response organism above the soil, atmosphere and humidity of the place [4].

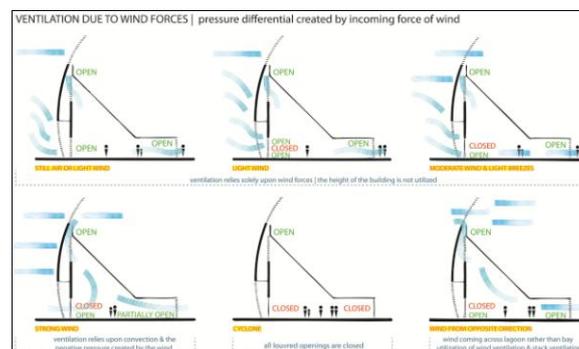
Bioclimatic is defined as the design of urban planning and architecture which has to connect with nature. Christopher Alexander said, "The form is the solution to the problem; the context defines the problem" [1]. Other than responding to the climate, the consideration also includes material used, density of occupant, energy consumption, and future cost. No doubt, the development of future cities has to be reviewed and directed to sustainable urban criteria.

#### *Purpose:*

The purpose of this study is dealing the issue of urban heat island effect in the scope of urban planning and architecture design. The synthesis has been made that the influence of bioclimatic design would enhance the living comfort and temperature. Besides, it also explains the importance of natural and architectural design through a thesis project.

#### *Method:*

There are several case studies selected to be reviewed and analyzed in order to generate useful design guidance. The benefit of having case studies is to draw out the respondent's experience and knowledge on the topic in terms of program input, process and result. The reviewed perimeter of the selected case studies will be: a) Science and technology; b) Spatial quality and comfortability; c) Social and environmental impacts; d) Energy efficiency. For example, the most significant and tropical design is the Jean Marie Tjibaou Cultural Centre in New Caledonia. It strategies were using the cross ventilation from adjacent forest through internal spaces to maintain cool air inside.



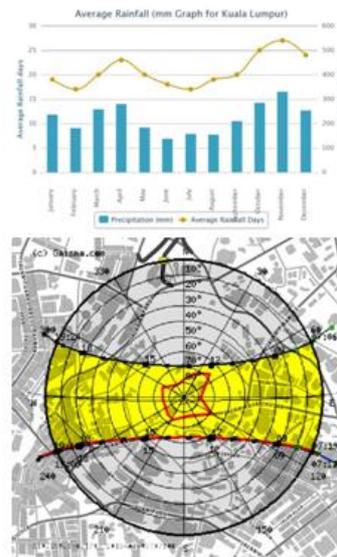
**Fig. 1:** Principle of natural ventilation system of the Jean Marie Tjibaou Cultural Centre. (Source: <http://pzarch14.wordpress.com/2012/11/15/jean-marie-tjibaou-cultural-center-renzo-piano/>)

## 2. Backgrounds Study:

The thesis project selected a site at Bukit Nanas where concrete buildings are surrounding it, hence they have over taken the image of reserve forest. The site is also a commercial land sits beside of Bukit Nanas Forest Reserve. Due to urban development, office buildings are increasing in the heart of KL. Bukit Nanas slowly losing its focus point, the interesting history and value of land has been forgotten. The selected site is a solution to begin to evoke awareness of preserving forest for the people and there is good location for developing the idea of bioclimatic design.

There are constraints on the site, first is the high market value for commercial development on the land properties. Profitability for a commercial tower has higher value than any other building type. Second is the connectivity that invites people to engage the site. There is no connection across the hill that can link up the surrounded spaces. Third is the building height of structure shall not higher than the KL Tower ground level. However, these constraints have become opportunities to enhance the thesis project. Case 1, to join up all land on Bukit Nanas to become one historical theme park that serve every part of the space will generate profit constantly to cover its actually profit value. Case 2, the building typology should include linkage connection that has the potential to link the adjacent area to invite human flow as well as providing functional space within the linkage. Case 3, height control is good to propose low scale of building without obstruct the tower. The

challenge is how to shine the proposed project within the context and stand out among these tall building. The solution may not be introduced again a taller structure, but to propose interesting function and aesthetic appearance structure that break down the conventional design.



**Fig. 2:** KL sun path and graph of average rainfall (Source: <http://www.worldweatheronline.com/Kuala-Lumpur-weather-averages/Kuala-Lumpur/MY.aspx>).

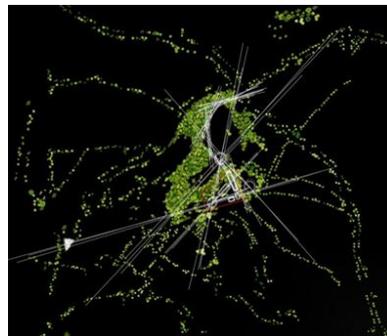


**Figure 3:** Site Section  
(Source: Author)

**Fig. 3:** Site Section Source: Author.

### 3. Design Process:

A total of 10.0 acres land combines few sub division lots to be the site for the proposal, Ananas Park. A justification has been made that this Ananas Park will be an institutional cultural center which consists of new structure like museum, gallery, community space, and theater. They integrated with a connection link to connect adjacent area, Forest Reserve, KL Tower, offices, school, and Monorail station to complete a circle programming.

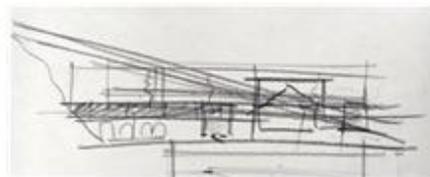


**Fig. 4:** Concept mapping (Source: Author).



**Fig. 5:** Line and Component mapping the past, present and future (Source: Author).

Figure 4 shows the urban design approach is by the influence of bioclimatic urbanism. Where the concept is to spreading out the canopy trees or landscaping starting from Bukit Nanas and uses these trees as a connection network to connect other forest and garden. The city will be full of trees that help to reduce heat island effect. Figure 5 defines two important axes on site to trace back the history and the future. The mapping start on a macro scale to link to the first foot step on KL and second link the iconic KL Tower by axes calls 'back to the future' and 'architecture development'. Components sit on these two axes to complete the story.



**Fig. 6:** Section and Form study (Source: Author).



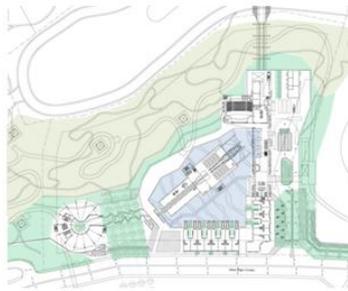
**Fig. 7:** Master plan sketch (Source: Author).

As shown on figure 6 and 7, there are 3 abandon components to be sit on the axis where reflect or map the history of planning. Then, another 3 new components integrated as a whole. In this site, it is about debating and fighting as reflect back to the history which calls a battle ground. It debates between natural and concrete forest, it debate between bioclimatic and hectic, it debate between commercial value and humanity moral, it debate between work and art culture, it debate between the past and the future.

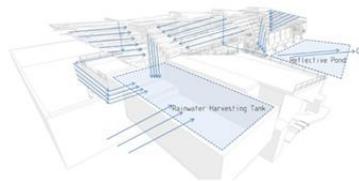
#### 4. Design Solution:

In this proposed project, trees and water are the main elements to provide cooling effect. Besides, universal friendly design in terms of space usage and accessibility is a bonus to contribute a better living quality, meanwhile reducing the dependence on car. Figure 8 shows the existing greenery, proposed greenery, and water body that surrounding buildings. The total coverage of greenery has achieved 50% of total land area. This strategy encourage canopy tree to be shading device from direct sun light and it helps to reduce the use of air

conditioning system to cool down the environment. Bioclimatic urbanism highly focus on planning strategy which does not depend much on modern technology to simulate the effect, in fact simple to provide more horizontal planting is the essential way in doing urban planning.

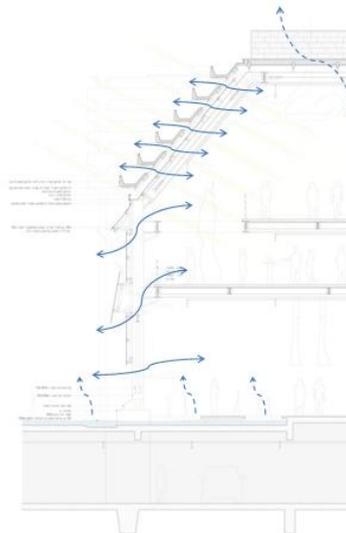


**Fig. 8:** Master plan (Source: Author).



**Fig. 9:** Rain harvesting Strategy (Source: Author).

Rainwater harvesting is the most important sustainable strategy in this project. The site condition has the potential for water catchment due to its terrain and slope explained in figure 9. Therefore, the rainwater catchment will involve the entire site lead the rainwater flow into the rain harvesting tank by drainage. On the other hand, the building design has to perform as a huge gutter in order to catch and lead rainwater fall into the rainwater harvesting tank in size 15mx10mx5m.



**Fig. 10:** Sectional Detail (Source: Author).

For the main building design, the bioclimatic concept is a new application of traditional thought. The structure design allows air flow in and out to maintain the temperature, quality and comfort. In figure 10, the arrows indicate air flows pattern. The water body provides cooling effect to the level below and the space above. The top most floor contain more heat, therefore the space was raised to be double volume to allow hot air and heat contain away from human.

Figure 11 shows the interior space quality of the architecture gallery with sun penetrating in at 3pm. The space is protected by insulated timber roof and layers of timber gutter, utilize the cross ventilation to blow away the heat contained in the material. The surrounding trees play an important role to reduce island heat effect so that it does not affect the gallery indoor comfort. Figure 12 shows the indoor natural lighting quality at 12pm at the theater corridor.



**Fig. 11:** Interior view 01 (Source: Author).



**Fig. 12:** Interior view 02 (Source: Author).

#### Conclusion:

The sprawling of concrete urbanization has taken over the beauty of greenery of a place. Landscape and vegetation is always being sacrificed from a development due to the reason of profitability, economy and maintenance. People argue that it was the job of landscape architect; no doubt architect actually plays a role to be responsible on such consequence for structuring a city. Urban sprawl is an expression of loss. That is why this proposal has to design something that responds to the city green lung at Bukit Nanas and to repair the scar of the forest reserved. From the aspects discussed above, the context, history, poetic space and function is the direction to respond, respect and redraw the idea of greenery architecture rather than following the trendy way to respond to the landscape and green. Natural green and landscape is hardly to be created by man that how valuable to the environment.

As a conclusion, building and city nowadays shall move towards the direction of sustainable and environmental friendly. Bioclimatic concept shall become an ecological design approach to reflect the idea of humanity and environmental friendly design.

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