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# Ecosolution: new organic architecture on Wonocolo Geo-Heritage Center

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**Abstract.** New Organic Architecture stated that building must belong to the hill, not of the hill. One of the new organic principles is to be inspired by nature to be sustainable, healthy, conserving, and diverse. This paper explains how the new organic architecture approach is applied on the building to create the illusion of no boundaries between interior and exterior of the building. Methods of this study is descriptive qualitative methods on how the building applied the new organic architecture principles, adopting content analysis and cross-reference by the Holy Qur'an and Hadiths. Producing environment-friendly building which merges with surrounding nature.

## 1. Introduction

### 1.1. New Organic Architecture

Frank Lloyd Wright is the most known architect who uses Organic Architecture as his architecture style. He first used the term 'organic architecture' in an article for Architectural Record in August 1914. He said that the ideal of an organic architecture is a sentient, rational building that would owe its 'style' to the integrity with which it was individually fashioned to serve its particular purpose—a 'thinking' as well as 'feeling' process [1].

Organic architecture is not a stylistic or aesthetic movement. Each building is a response to its program, the character of its occupants, the time in which it is designed, the conditions and the qualities of its site. Because each of these conditions will never be identical, each Organic building will be unique.

Architect and Planner David Pearson proposed a list of rules towards the design of new organic architecture. These rules are known as the Gaia Charter for organic architecture and design [2]. It reads:

“Let the design:

- Be inspired by nature and be sustainable, healthy, conserving, and diverse.
- Unfold, like an organism, from the seed within.
- Exist in the “continuous present” and “begin again and again”.
- Follow the flows and be flexible and adaptable.
- Satisfy social, physical, and spiritual needs.
- “grow out of the site” and be unique.
- Celebrate the spirit of youth, play and surprise.



- Express the rhythm of music and the power of dance.”

From the Gaia Charter by Pearson, 2001 can be concluded some basic concepts of the new organic architecture, such as:

#### 1) Building as Nature

Organic architecture meant a living architecture in which every composition, element, and detail was deliberately shaped for the job it was to perform [3]. A natural building where nature is the subject and inspiration of Organic Architecture. Forms of organisms and its structures can become an endless concepts and ideas in the design of Organic Architecture. Organic architecture uses curves as a signature just as modern architecture uses straight lines. The organic structures must be influenced by the natural surroundings for the sake of conserving the environment [4].

#### 2) Continuously Present

A special characteristic of Organic Architecture design is that Organic Architecture is an architectural design that continues, never stop and always in a dynamic state that develops by the times but still brings the element of authenticity and freshness in a design.

#### 3) Form Follows Flow

The shape of the building should be created by following the flow of natural energy. Organic Architecture must be adapted to the surrounding nature dynamically and not against it. Organic architecture grew out of the site from within, employing natural shapes, complex geometries, and new building materials and technologies to unify all elements of the design – site, structure, spaces, fixtures, finishes, and furnishing - into a single harmonious unit [5].

#### 4) User-Friendly

Organic design created a creative and sensual connection to the building user. Designing the building forms and structures, were designed based on the user’s needs. Designing for user convenience is also very important.

#### 5) Belong to the hill

Organic Architecture involves a respect for natural materials blending into the surroundings and an honest expression of the function of the building. In that light, wood should like wood, a house should be of the hill, not on the hill, and a bank should not look like a Greek Temple. An Organic Architect is careful in surveying a piece of land. The structure must look like it has evolved from its surroundings. It is very similar to a seed that has sprouted into a green bush. A structure must look like it has sprouted among the vegetation [4].

#### 6) Local Material

To enhance the connection of the interior to the natural environment, natural materials such as stone and wood are commonly utilized in Organic architecture. Because large slick surfaces feel inherently artificial, where they are necessary, they are often given textures or applied with patterns to break up the surface characteristics [6].

#### 7) Youthful and Unexpected

Organic Architecture usually has an individual character. Sometimes Organic Architecture is like an unconventional organization, provocative, and anti-power. Organic Architecture looks young, interesting, and contains childish joy, full of surprises.

### *1.2. Background of the Design*

Wonocolo is a village located ±50 kilometers away from Bojonegoro city. It has hundreds of oil extraction wells since Dutch’s colonial era in Bojonegoro. The deepest well is up to 400 meters from the surface. However, the lack of infrastructures and facilities makes it not fixed as a Geo-Heritage yet. On a scale of A to D, Wonocolo Geo-Park got D which is the lowest score. Therefore, Wonocolo Geo-Park needs to be improved. Allah instructs us to learn about the previous’s mistakes and to not

damage the earth to be worse. We instructed to discover the earth so that we make use, manage, and nurture the natural resources by not disrupting them.

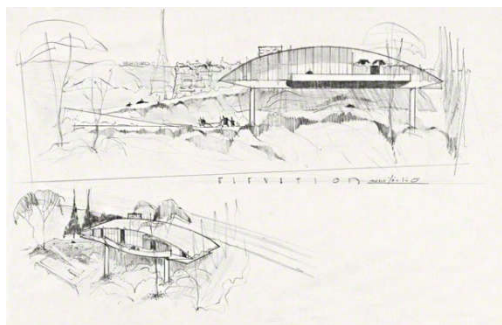
This project design is based on three main issues, that is technology development, land conservation, and locality, which then become the cause of the using of Organic Architecture concept to answer them. This design is planned to be “merged” with nature because Organic Architecture is a natural architecture – the architecture of nature, for nature [7]. Frank Lloyd Wright believed that architecture should be developed in harmony with the environment rather than as an external imposition of nature [8]. In this design, Organic Architecture principle from Gaia Charter by David Pearson is used, they are: Building as Nature; Continuous present; Form follows flow; User-friendly; Of the hill; Local materials; Youthful and unexpected.

Technology development is applied to how the building will respond to the environment, for example by using Solar Panel technology as a response to the climate and also as an alternative source of electricity. Organic Architecture concept will minimize the construction impact on the environment because it is maintaining the environment’s existing form as much as possible. In this Petroleum Geo-Heritage Center’s design, locality aspect will be highlighted in the use of local material such as teak wood as an ornament and the adaptation of the tree branches as the ornament. In short, Organic Architecture encourages us to not damage the environment by too much damaging them. Allah SWT said, “And do not do damage on the earth, after it has been set in order, and invoke Him with fear and hope; Surely, Allah's Mercy is (ever) near unto the good-doers.” [9].

### 1.3. Garcia House – John Lautner

The precedent of the new organic architecture approach can be seen in the design of Garcia House by John Lautner in 1962 (figure 1). The architect who is also one of the pupil of Frank Wright applied new organic architecture in his work. Located in the Hollywood Hills, John Lautner often began projects by taking a topographic map to the building site and indicating desirable viewpoints and orientations directly on the map. Then, he would return to his office and spend days trying to visualize the project [10].

He visualize his projects in the form of programmatic diagram of room functions, furniture arrangements, material notations, site conditions, and viewing angles. He rarely designed in elevation, diagramming projects instead in plan and section (“John Lautner: Diagramming Vision in Los Angeles”, AIA California Council, accessed 30th June 2018). John Lautner focused more on the inside to outside effects. Lautner’s forms curve primarily to accommodate views from the interior.



**Figure 1.** Early Sketch of Garcia House by Lautner 1962.

## 2. Methods

This research uses qualitative methods by describing the application of Organic Architecture principles into the building design (Building as Nature, Continuously Present, Form Follows Flow, User-Friendly, Belong to the Hill, Local Material, Youthful and Unexpected) by adopting content analysis and cross-reference by emphasizing on the divine sources; the Holy Qur’an and Hadiths.

2.1. Literature Study

For the aim of this study, we pooled theories of Organic Architecture from Frank Lloyd Wright as the pioneer of Organic Architecture and the recent architects who use Organic Architecture as their style. Also, the Tafseer or Al-A'raf:56 to strengthen those theories in the Islamic way. The theories were pooled to obtain a larger comparison and explore an overall pattern of Organic Architecture principles.

2.2. Descriptive

The application of the literature study that has been explained in the introduction to the building design. We first examined the site condition (dimension, climate, topography, and sensory) in the form of descriptive text and infographic diagram. Then, we analyze the application of new organic architecture principles on the building design.



Figure 2. Steps of the method.

3. Discussion

3.1. Site Existing Data

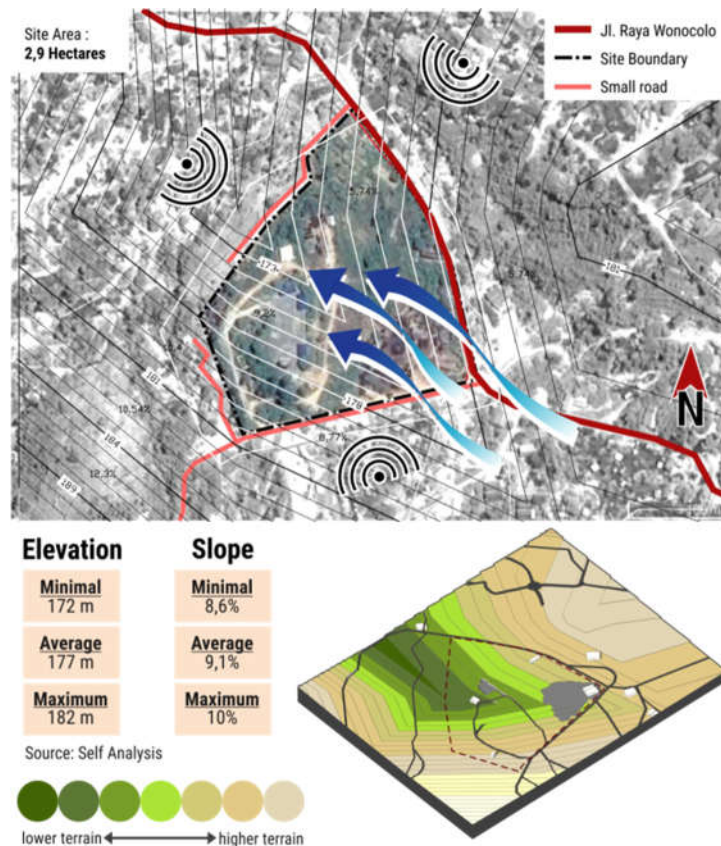


Figure 3. Site Profile (Analysis Result).

- Temperature : 26°C - 33°C (average)
- Precipitation : 4% (average)
- Humidity : 71%
- Wind : 10 km/h (average) [12]

The object's site is located on the hill surrounded by oil mining wells (figure 4), causing the surrounding soil to be less fertile and mostly barren. Wonocolo temperature is mostly hot, so building which can lessen the hot temperature is the answer. The hot temperature also resulting in a lack of water sources, causing less variety of plants that can survive. Surrounding the site location is oil mining area contributing to the source of noise and foul odor of raw oil from the oil mining activities (Figure 3).



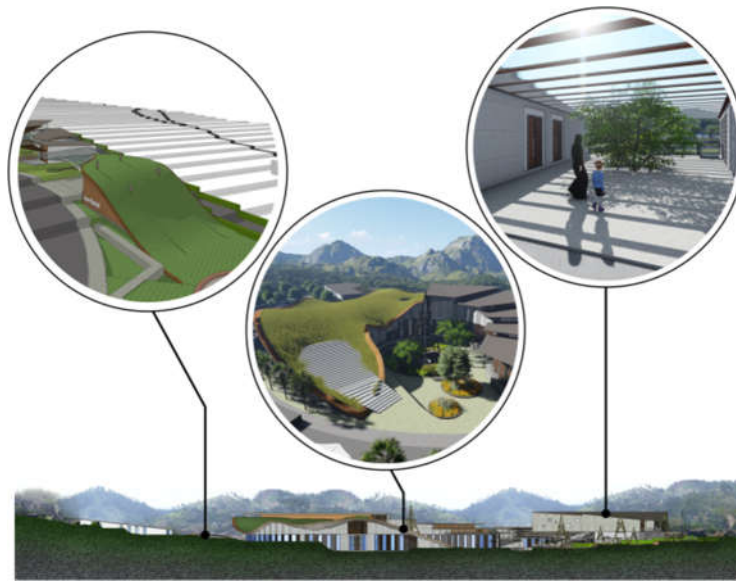
**Figure 4.** Site Condition.

### *3.2. Application of the Principles*

In the previous analysis, was mentioned that the site is surrounded by conserved oil mining area and green area which scattered in the vast nature of topographical land. Thus make this project has three main issues, that is technology development, locality, and land conservation. Because the location of this project is on the Geo-Park, so land conservation must be added to the issues but also can be a potential aspect. The idea of merging the building with nature comes from the Organic Architecture approach. It comes in the form of a building form and façade.

The purpose of using Organic Architecture as an approach is to develop Petroleum Geo-Heritage Center of Wonocolo Geo-Park as a new icon of Bojonegoro and environmentally responsive building, also to make the Petroleum Geo-Heritage Center of Wonocolo Geo-Park design be a commercial building with less environmental damage. Similar to what has been stated in Q.S. Al-A'raf:56 to not do deeds that cause damage to the earth and deeds that endanger its sustainability after it has repaired.

*3.2.1. Building as Nature and Belong to the Hill.* The surrounding hill and vast nature is the source of inspiration. Wavy lines and curved shapes suggest natural forms. The buildings mimic the hill into their form, some modified it into a wavy shaped roof, some into the difference of the building/roof staged height (figure 5). The mimicry is not only by the form but also the green aspect of it. The wavy roof is planted well-maintained groundcover in order to “substitute” the existing green area into a green roof.

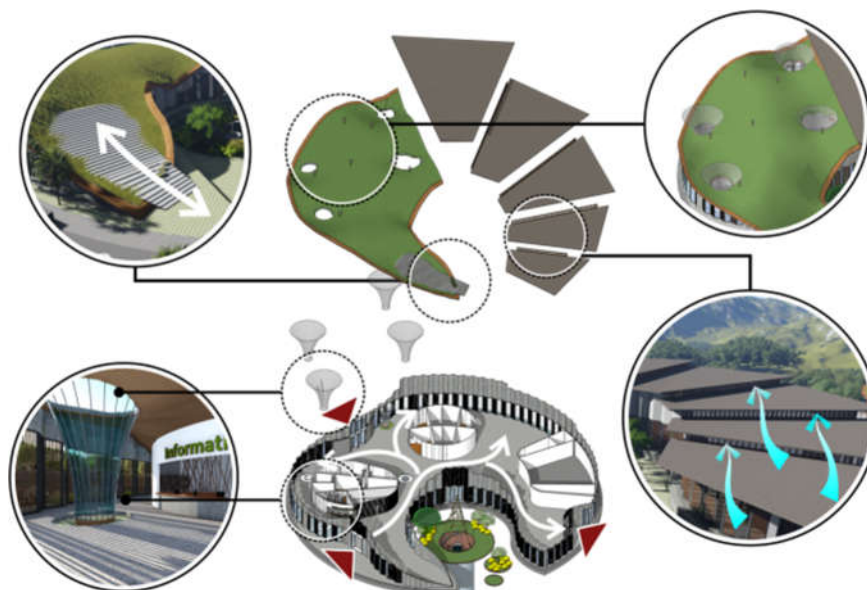


**Figure 5.** Building as Nature & Belong to the hill (Analysis Result).

The wavy-green-roof is also made into as if “growing from the hill” by “planting” the tip of the roof into the ground. The use of similar material to make the building belongs to the site. Because in structure and appearance a building should be based on organic forms and should harmonize with its natural environment [13].

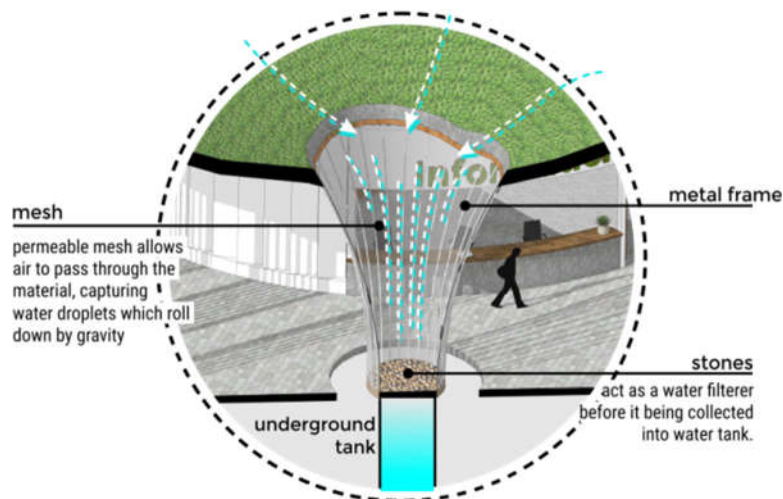
Prophet Muhammad PBUH said that “...He (Allah) discouraged making monumental mosques and encourages making it low in height,...”, as mosque is like the guideline of islamic architecture, then it can be interpreted that Allah prefers building that is not monumental, to keep it modest to the surrounding nature [14].

*3.2.2. Continuously Present and Form Follows Flow.*



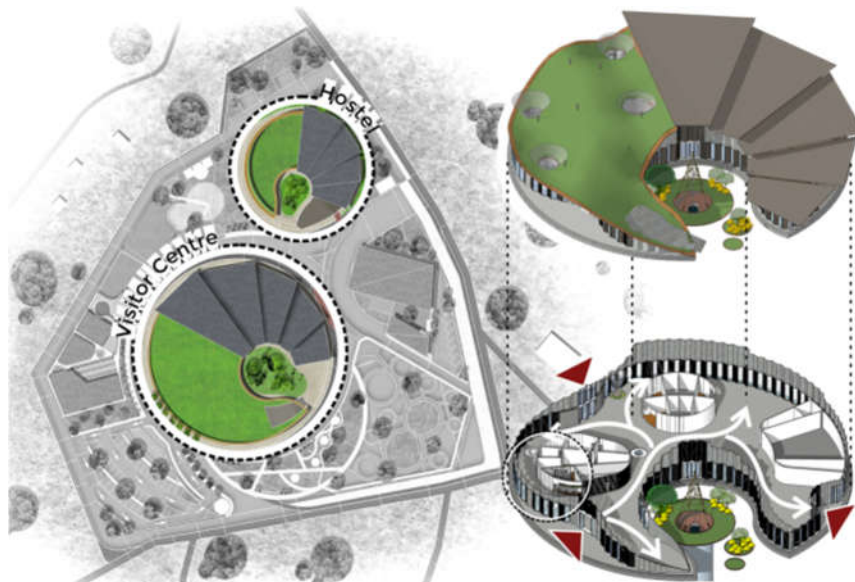
**Figure 6.** Continuously Present & Form Follows Flow (Analysis Result).

The form follows the flow of the climate. The building responds to the site to it can optimize the site condition into potential. From figure 6, There is the application of rainwater collector into the wavy roof to catch the rain to reuse them after being recycled so the water would not turn to waste (see figure 7 for the detail). The wavy roof's tip is tilted downward to let the green roof to be accessible by the visitors. Lastly, the air ventilation installed in every nook of the roof in line with the wind direction to let it enter the building. Wavy lines and curved shapes suggest natural forms which applied because of its ageless effect. It also captures breezes from all directions and also ensures an even and constant ventilation throughout the building.



**Figure 7.** Rainwater Collector Detail (Analysis Result).

### 3.2.3. User-Friendly.



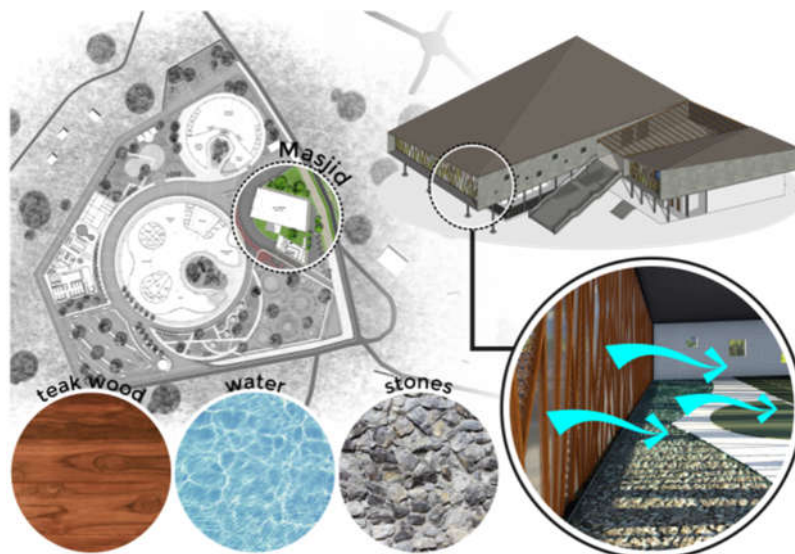
**Figure 8.** User-Friendly principle in Visitor Center and Museum (Analysis Result).

The visitor center as the heart of the site has four doors functioned as entrance and exit, except one door that only accessible for the patio area (figure 8). The visitor can access the other buildings and area by the visitor center. The interior of the visitor center applied “invisible barrier” concept to create a flexible and adaptable room to accommodate various activities that support the function of the visitor



center and the geo-park. Organic design of the glass windows complimenting the facade of the building created a creative and sensual connection to the building user. Designing the building forms and structures were designed based on the user's needs. Designing for user convenience is also very important, so the access to the roof is accommodated by stairs to ease the visitor's journey to the green roof.

**3.2.4. Local Material.** The main material that the buildings used is teak wood, exposed concrete, and stone. Those are local materials that can be found easily in Wonocolo. To enhance the connection of the interior to the natural environment, natural materials such as stone, wood, and water are utilized in the water pond design order to mimic river calming effects (Figure 9).



**Figure 9.** Local Material principle in Masjid (Analysis Result).

The water pool is located close to the opening of the room so the combination of the water and wind create cool and holy ambient to the interior. The reflecting pool symbolizes unity; the pool also acts as the center, mirrors the heavens and unites them with the earth [15]. The material of the exterior and the interior is left rough and have “unfinished” touch to break the artificial look. The collaboration of nature's colors such as brown (wood), green (plant), grey (rock) and exposed materials makes it hard to differentiate the interior and exterior of the building, thus creating a continuity of space, where the visitor experiences both contemplative and sensuous connection to the area and its history. As Allah says: “Those who remember Allah (always, and in prayers) standing, sitting, and lying down on their sides, and think deeply about the creation of the heavens and the earth, (saying): "Our Lord! You have not created (all) this without purpose, glory to You! (Exalted be You above all that they associate with You as partners). Give us salvation from the torment of the Fire” [16]. The use of local material is also to keep the sustainable concept of the building.

**3.2.5. Youthful and Unexpected.** The hostel consists of four individual buildings which have their own characteristics yet complement each other when it is combined. The four-building mass is organized on different height and surface. This is because of the topographical land area that needs to be conserved as much as possible to keep its originality. Thus created the idea of making one of the roofs connected with the green land below it (Figure 10). The green roof then transformed into a communal area that can be accessed from the park beside it.



**Figure 10.** Youthful and Unexpected principle on Hostel (Analysis Result).

Connecting the four buildings are a series of wire meshes and pergola to control the amount of the harsh sunlight and rain to enter. They are also functioned to blend interiors and exteriors and create a harmonic built environment not separate or dominant from nature but as a unified whole.

#### 4. Conclusion

New Organic Architecture principles help Wonocolo Geo-Heritage Center blends with its surroundings and uses the existing topography to minimize the visual impact on the natural scene. Allah prohibits deeds that cause damage to the earth and deeds that endanger its sustainability after it has repaired, and commands to keep modest according to its sustainability.

The building's staged height adjusting with the contour makes it look like it grows from the landscape. The collaboration of nature's colours such as brown (wood), green (plant), grey (rock) and exposed local materials makes it hard to differentiate the interior and exterior of the building, thus creating a continuity of space, where the visitor experiences both contemplative and sensuous connection to the area and its history. Unlike other similar building which just accommodates the visitor without making a connection with the surrounding nature. This thus highlights the Islamic value of Q.S. Ar-Rum:41, Sharia Value, which teaches about responsibility by obeying the laws about humans' duties as one of Allah's creatures on earth to learn and to take care of the mother nature. User-friendly features such as accessible building that also acts as the heart of the site, "connecting" every area of the site.

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