# Evaluation of The Connectivity and Visibility in Gembira Loka Zoo Using Space Syntax Analysis

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***ABSTRACT**: Zoo is a public space dedicated to rising, conserving and researching animals. As a public space that used for educational purpose, supporting elements that can improve the quality of the learning process must be highly considered. The value of connectivity and visibility are the aspects that greatly affect the learning process within the zoo area. Good connection between one space to another and the effectiveness of the pathways are the criterion of public space that are needed to enhance the knowledge absorption process. Other than that, the visual elements also plays a big role on shaping the perception of space of the visitors. This study aims to evaluate the value of connectivity and visibility in Gembira Loka Zoo. Evaluation will be carried out with space syntax method using Depthmapx software to find out the value of connectivity and visibility as well as its effect on the movement of visitors in the zoo area.*

**Keywords:** Connectivity, Visibility, Public Space, Zoo, Space Syntax.

## INTRODUCTION

Zoo is a public space that is used to rise, conserve and research animals. This space usually contains animals that are placed in large enclosures which are arranged in a sequence to be exhibited to the visitors. In spaces that have exhibited objects such as zoos, the formation of perceptions and learning experiences becomes very vital. According to Coe (1985), there are 6 elements that contribute in the concept of making a memorable Zoo experience:

1. Anticipation. Visitors anticipate to see large, wild animals since there are possibility of encountering them in the wild.
2. Lack of distraction. The surrounding can either support or distract the memory-making process. In some cases, noise or visual elements can distract the focus of the visitors.
3. Novelty. A wild-like environment can create a novel experience, thus making them alert and paying attention to their surroundings.
4. Full filled expectation. Visitors expect to see wild animals in the zoo, and they actually see one.
5. Emotional involvement. The fears they feel when they see a large wild animal could leave a strong impression in their memory.
6. Reinforcement. The story they tell about the animals they saw in the zoo reinforced their memory of their experience.

In designing a zoo, it is very important to consider these six elements. There are many ways that can be used to improve the quality of a zoo, some of which are by considering the connectivity between spaces and also the visual elements that exist within the zoo. We can find out the level of connectivity and visibility in space with Space Syntax analysis method. Space syntax is a science based method that focused on human used to investigate relationship between spatial layout and a range of social, economic and environment. Space syntax measures the interaction pattern between space configurations using local and global scales that will be visualized with graph and statistic data (Siregar, 2014).

Space Syntax offers analysis on connectivity and visibility that will be used in this research. Connectivity is an approach that measure the interaction level of a space by calculating the number of space that directly connected to other spaces inside a space

configuration (Hillier et al :1993 dan Hillier et al: 1987). And visibility is a factor that closely related to the human movement in space configuration inside a system (Bafna, 2003). By measuring the visibility value in certain area, we can understand how easy an area to be recognized by the visitors. Visibility is also be affected by the shape of a space, making them an important factor that need to be considered when forming a space.

This study aims to evaluate the value of connectivity and visibility in the Gembira Loka Zoo. This research is expected to help provide an overview of the pathway conditions and the visual elements in Gembira Loka Zoo and their relationship to visitor's movement flow.

**METHOD**

This research is conducted using the space syntax analysis method to determine the value of connectivity and visibility in the zoo. In the analysis regarding connectivity, the object observed is the main circulation path of Gembira Loka Zoo. Analysis to measure visibility value in this area is also done by identifying visual elements within the Zoo. This simulation research will be performed using space syntax analysis theory to get the picture of connectivity and visibility value that will be explained in a descriptive manner.

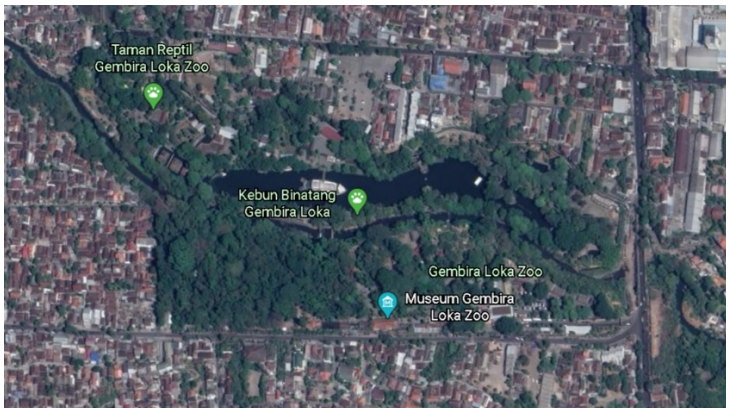



Figure 1. Aerial Map of Gembira Loka Zoo
Source: Google Map, 2020

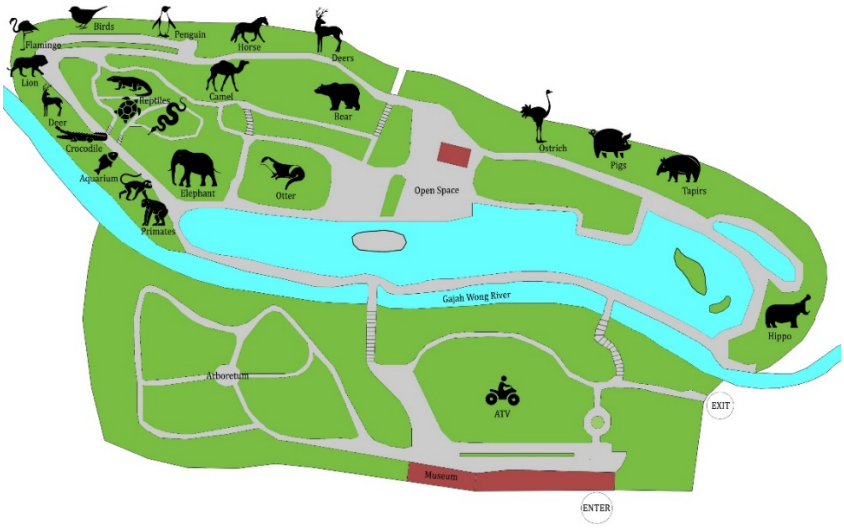



Figure 2. Gembira Loka Map
Source: Writer's Document, 2020

The data used in this research is acquired from the aerial map of Gembira Loka Zoo, which was obtained through Google Maps. To clarify the layout of the animal enclosures, data refinement is also carried out using the official guide map of Gembira Loka Zoo and field observation to ensure the position and condition of visual barrier. These data then traced to produce two maps, street network map and visual map to run the Space Syntax analysis.

Street network map is a map that only display the outline of the pathway that are likely to be passed by visitors. This map is used to analyze the values related to the connectivity between elements and the movement flow of visitors.

Visual map is a map created by tracing the outline of sections that have the potential to become a visual barrier, which is barrier objects that have a height of more than 1 meter, such as bushes between the roads and trees of certain density.

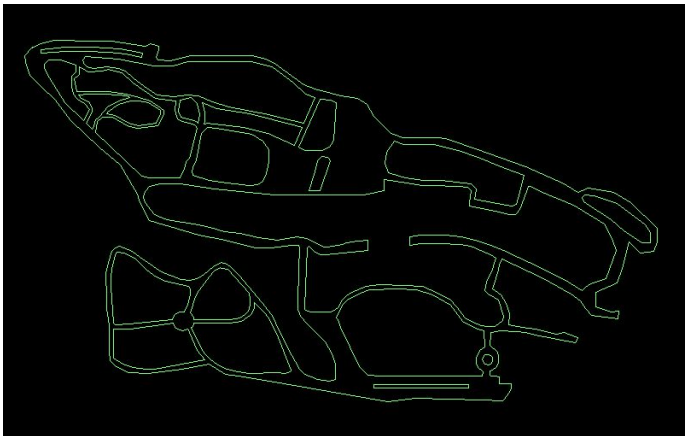


Figure 3. Street Network Map
Source: Writer's document, 2020

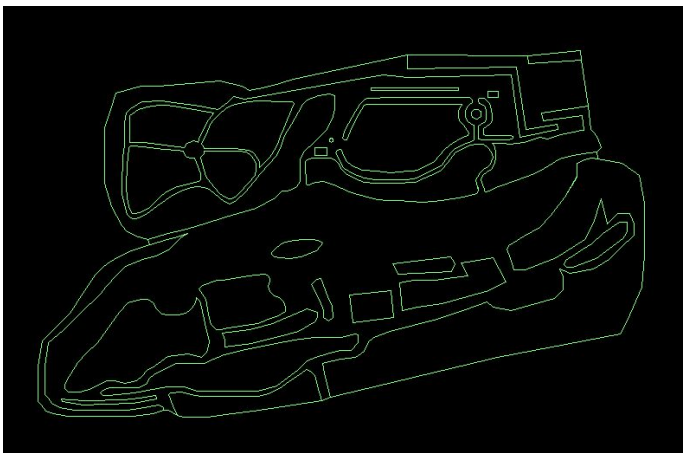


Figure 4. Visual Connectivity Map
Source: Writer's Document, 2020

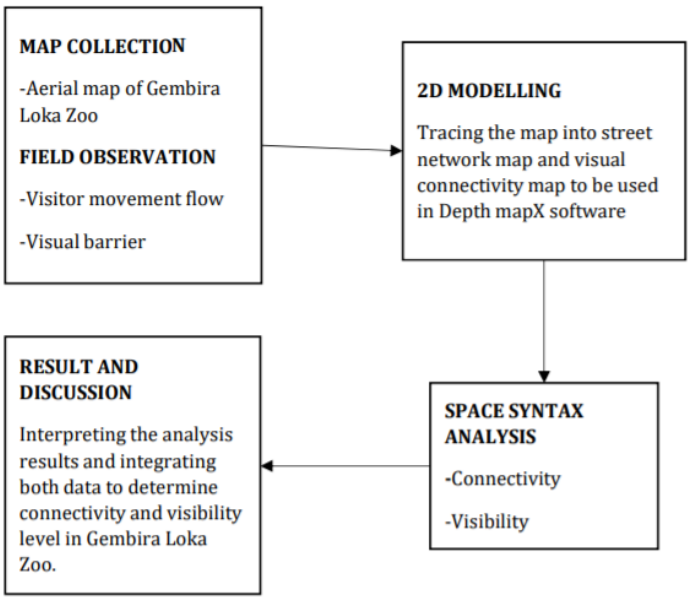



Figure 5. Procedure Diagram
Source: Writer's Document, 2020

## RESULT AND DISCUSSION

1. Observation on Pathway and Visual Barrier

Connectivity not only plays an important role in shaping visitors' perceptions of animals, but also greatly influences visitor movement patterns. Gembira Loka Zoo is a park with area of 2 hectares, this zoo is generally divided into two areas with different elevations, the higher area and lower area that is separated by Gajah Wong River and are connected by bridges and stairs. All areas in this zoo can be traversed by walking through the main pathway that can be seen in figure 6.

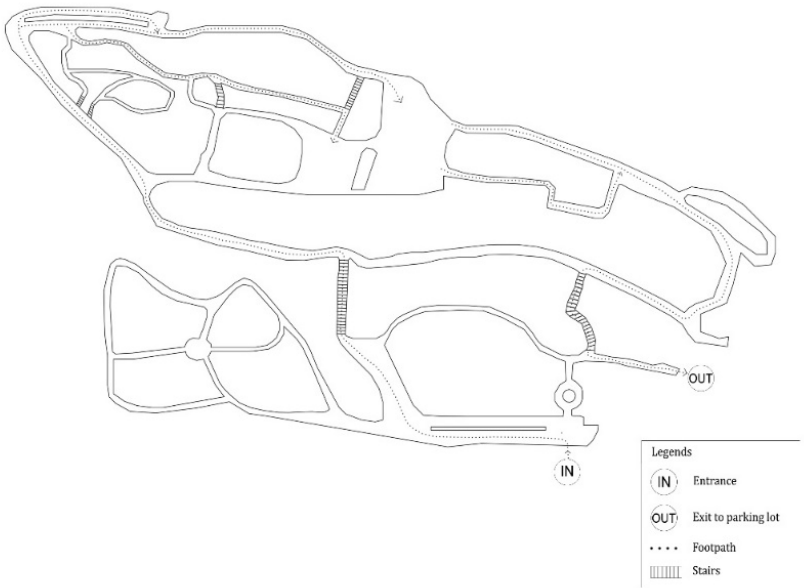



Figure 6. Identification of movement flow
Source: Writer's Document 2020

This observation was also carried out to observe visual elements that are scattered throughout the zoo area. During data collection process, several elements that could potentially become a visual barrier to the visitors were found, including plants in the form of tall trees and bushes along the side of the road, animal enclosures in the form of high walls and fences, stairs, supporting buildings such as museums and restaurant and also hills around the river that separate the zoo into two parts and hills that border the west part of the zoo.

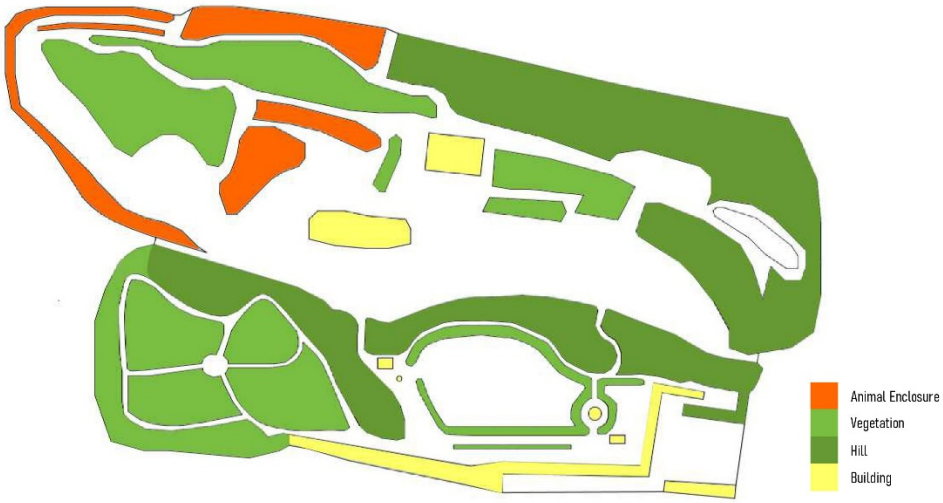



Figure 7. Visual Connectivity Map of Gembira Loka Zoo.
Source: Writer's Document, 2020


Figure 8. Visual Barriers in Gembira Loka Zoo
Source: Writer's document 2020

2. Space Syntax Analysis Results

The connectivity value in Gembira Loka Zoo was measured with Axial Map in Space analysis method. Connectivity value measured by calculating the number of space that connected with each other. The result from this simulation can be used to identify potential area in smaller scale.

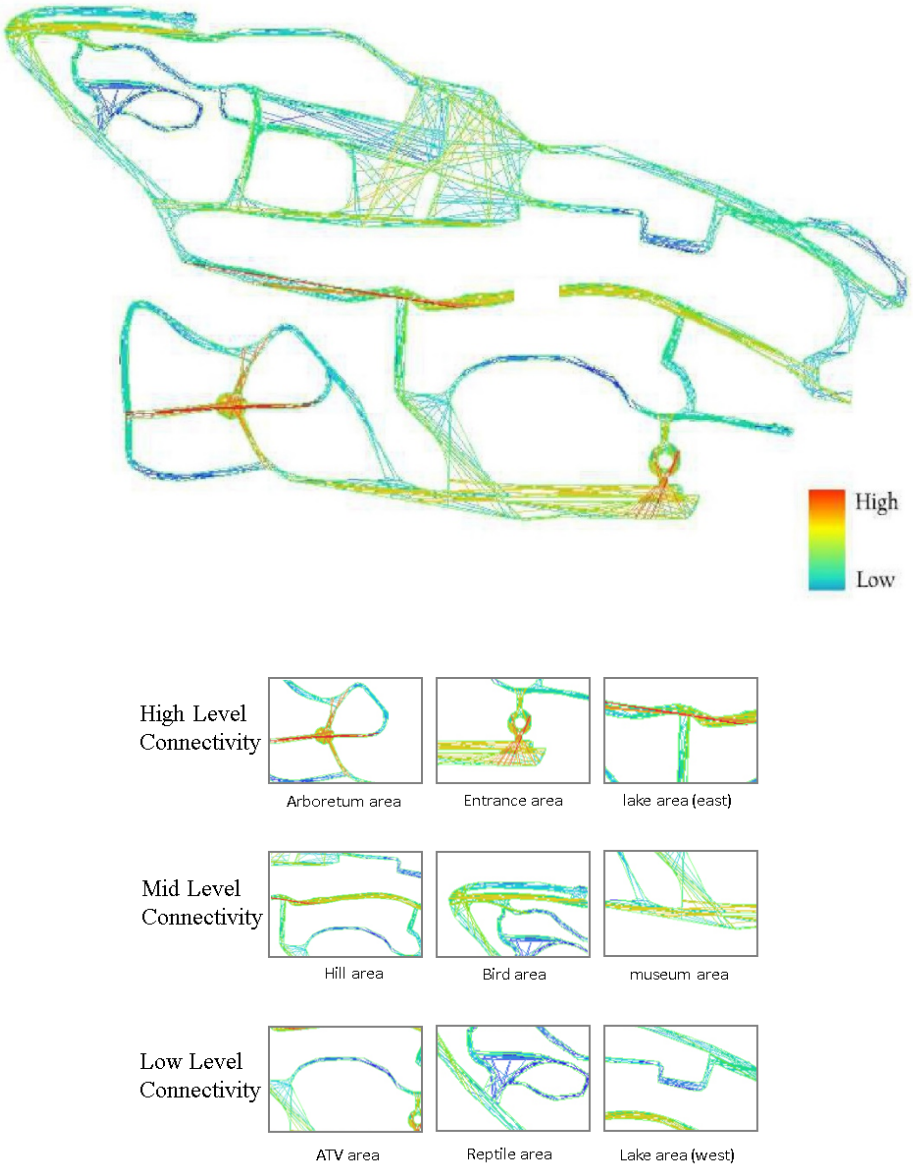



Figure 9. Connectivity analysis of Gembira Loka Zoo
Source: Writer's document 2020

In figure 9, we can see the level of connectivity of each area in Gembira Loka Zoo. the area with high connectivity result illustrated with red lines, and the low level illustrated with blue lines. In the result above, Arboretum and area near the entrace are dominated with red lines, indicating that this area provides more path options. These area seems to have more potential destination than the other area. In other hand, the lowest connectivity level can be found in reptile area, the north west part of the lake and the ATV area. These levels are measured by considering the lack of intersection, no shortcut path and non-straight pathways.

The visibility value in this map is analyzed using Visibility Graphic Analysis with depthmapX. Visibility is the ability of a space to be seen from certain observation point. The data for this visibility analysis were obtained by tracing only the visual barrier above 1

meter in the map. Visibility analysis shows the range of visibility from certain areas within the zoo. The results of this analysis can later be used to predict the areas with the broader range of view and the narrowest.

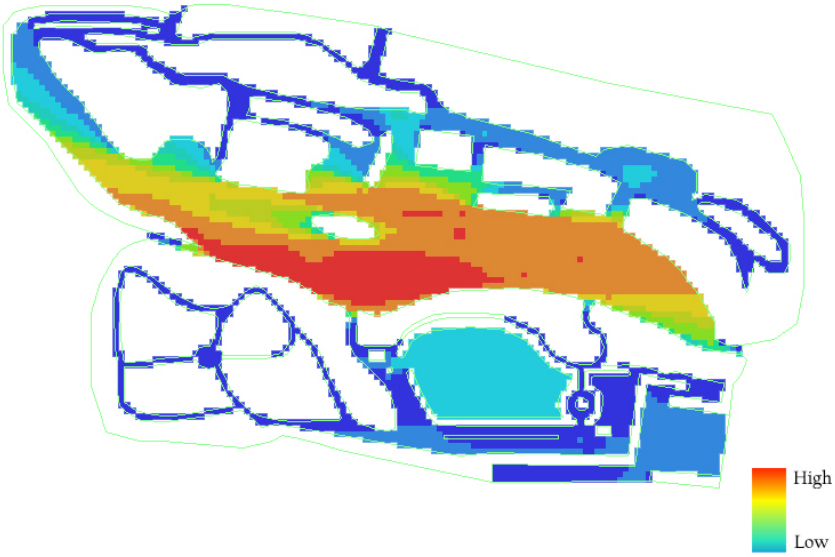
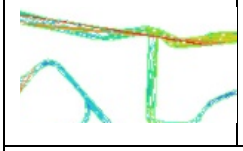
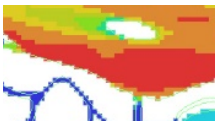


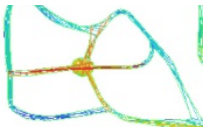
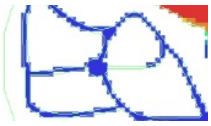
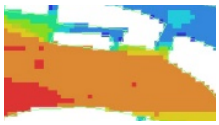
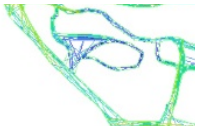
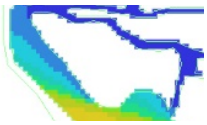

Figure 10. Visibility Analysis of Gembira Loka Zoo
Source: Writer's document 2020

The result of visibility analysis above shows which area can be seen easily and which area cannot be seen easily by the visitors. The red color in this map indicate the high visibility level, meaning that we can see broader view as we are standing in this particular area. The blue color shows the low visibility level caused by visual barrier surrounding the area. In Figure 8, it can be seen that the area with good visibility value is only centered on one area that is the area near elephant enclosure. This is because this area is an open area that does not have a lot of visual barrier around it.

Connectivity and visibility value plays a big role in determining the human movement pattern inside Gembira Loka Zoo. Both connectivity and visibility analysis results need to be considered to get more accurate description of the actual condition of Gembira Loka Zoo. This research has identified 4 types of area by integrating the connectivity and visibility results that can be seen in Table 1.

Table 1. Integration of Connectivity and Visibility Results

| No. | Connectivity | Visibility | picture | Information |
|---|---|---|---|---|
| 1 | Good  | Good  |  | -animal enclosure around this area have shorter fence<br>-this area is a wide space and the most crowded area in the zoo. is also used as the meeting point. |
| | Intersection near lake area | | | |

| | | | | |
|---|---|---|---|---|
| 2 | Good  Bad  Arboretum Area | |  | -located at the center of a dense garden<br>-rarely visited by the visitors. |
| 3 | Bad  Good  North east Part of The Lake | |  | -only used as a footpath around the lake.<br>-there are no visitor buildup in this area |
| 4 | Bad  Bad  Reptile Area | |  | -Has a really narrow footpath<br>-Has a rather dense trees at the entrance<br>-Often crowded during peak hour |

Source: Writer's Document 2020

## CONCLUSION

Based on the results of the analysis using space syntax, it was found that the majority of the area within Gembira Loka Zoo still have low connectivity value. This is influenced by the lack of shortcut and also the distance between one areas to another. The level of visibility of the zoo is also considered low, looking at the results of space syntax analysis which shows that the highest level of visibility only centered at the intersection near the lake area. However, this low connectivity and visibility value do not only give bad impacts. In some area where the paths do not have shortcuts, visitors are encouraged to explore the zoo as a whole. The visual elements along the path that block visitors' view toward certain object can also draw their curiosity so that their zoo experience becomes more real and memorable.

By comparing the results of field observations and the results of space syntax analysis it is also known that these two aspects are closely related to one another. This is evidenced by the tendency of visitors to gather in areas with high levels of connectivity and visibility as well as the lack of movement flow of visitors in areas with low connectivity and visibility. There are also areas with high connectivity value but rarely passed by the visitors because they are not supported by good visibility and vice versa.

From this research, we can that other than connectivity and visibility, there are other factors that could affect the zoo experience and the movement of visitors. For further research, it is recommended to examine these other factors so that they can be implemented in the zoos so they can create a better experience for he visitors.

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