Comparison between Green Area Ratio of Yangon’s Housing Estates and Foreign Housing Estates

Hnin Su Mon Win¹, Maung Hlaing², Theingi Shwe³
¹Researcher, Master of Architecture, Department of Architecture, Yangon Technological University, Insein, Yangon, Myanmar
²Professor, Head of Department, Department of Architecture, Yangon Technological University, Insein, Yangon, Myanmar
³Associate Professor, Department of Architecture, Yangon Technological University, Insein, Yangon, Myanmar

Abstract—Because of the scarcity of land as a result of a rapid population growth and internal migration in Myanmar, especially in Yangon city has the problem of the high demand of housing estates and the green area ratio for these housing estates become the common issue. In the last decade, Yangon has the suitable green area ratio within the housing estates and that is now decreasing sharply especially for basic standard level housing estates. Urban heat island effect, flooding, air pollution affecting the ecological balance are all concerning with the green area ratio of the residential housing estates. Conditions of both Yangon’s residential housing estates and foreign residential housing estates will also be compared with international laws and standards.

Keywords—Housing Estates, Green Area Ratio, Physical Buffer, Urban Heat Island Effect, Air Pollution, Ecological balance

I. INTRODUCTION

In Yangon, most of the housing estates are constructed by the land owners and contractors. Due to the scarcity of the land and for the profit, the contractors always trying to use project plot area into the part of the building and trying to reduce the set back as much as possible. Most of the housing estates have the concrete driveways and concrete paving between the building and set back area and this is leading to cause of urban flooding and urban heat island effect. As a result of reducing the greenery area in the housing estates leads to be a urban jungles and lack of place for the children and elders to make physical exercise and relaxing places. Because of these facts, green area ratio for housing estates become more and more important and all of the nations in the world is also now leading to the green architecture using the nature and sustainable materials and technologies to improve the ecological balance. International standards, Laws and Regulations also give the guidelines to sustain the green area ratio for the housing estates. The green area means land that is partly or completely covered with grass, trees, shrubs, or other vegetation [3]. In this paper, the green area ratio (GAR) [3] can be calculated as follows.

\[ \text{GAR} = \frac{\text{Total Green Area}}{\text{Total Plot or Project Area}} \]

Another thing is the green space is part of the open space and the open space ratio (OSR) of the housing estates is also important.

\[ \text{OSR} = \frac{\text{Open Space Area}}{\text{Total Plot or Project Area}} \]

II. BACKGROUND STUDY

After 1988 in Myanmar, the Government provided the two types of Housing Delivery Scheme: Public and Rental. And also advocate the joint housing scheme since the mid 1960’s. The different types of Housing Scheme of Myanmar [1] are as follows.

A. Public Housing Scheme
B. Joint Housing Scheme
C. Programs for Individual Housing Estates
D. Sites and Services Scheme
E. Slum and Squatter Upgrading (Hut to Apartment Scheme)
F. Urban Redevelopment Projects
G. Area Development Projects
H. Low Cost Housing Estates

Among these types of housing scheme, most of the people except government employee are living the different kinds of housing estates which are established by the private companies and developers. In this research paper, the types of the housing estate will be divided into three groups and as follows:

1) Single Family Landed Housing Estates

This type of housing estates means the individual plot with individual house owners with the landed area for landscape and greenery area.

2) Multi-Family Housing Estates

In this type of housing estates will contain walkup apartments and high-rise buildings and condominium buildings.
3) Mix Use of Single Family and Multi Family Housing Estates

This type means it includes both single family landed housing types and multi-family type buildings in its housing estate.

![Location Map of Yangon City](image1)

For the local case study, six housing estates of Yangon are selected. These selected housing estates are located in the outer urban ring, old suburb and northern suburb area of Yangon and have the medium density in these areas.

<table>
<thead>
<tr>
<th>Categories of Housing Estates Of Local Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family Type</td>
</tr>
<tr>
<td>FMI</td>
</tr>
<tr>
<td>Mindhama</td>
</tr>
<tr>
<td>Myakanthar</td>
</tr>
</tbody>
</table>

### III. SUN ANGLE STUDY AND GREEN AREA STUDY [4]

The sun angle calculation is different from each location of the project housing estates. The sun angle study will be describe in the figure 2, 3 and 4 with the green area location in these projects.

### IV. WIND DIRECTION STUDY OF YANGON [5]

Yangon has the tropical monsoon climate and short dry season. The wind direction is mostly blown from the southwest direction during the rainy. During the cool season, the night time is longer and temperature is range between 18 degree Celsius and 23 degree Celsius.
Four foreign residential housing estate projects are selected from Singapore, Hong Kong and Washington D.C. The sun angle studies and green area location of these foreign case studies will be shown in Table V and VI. The selected projects locations are different from each other and located in different countries thus they have different sun angle and different green area provision for their local standards and laws.

Table V
Akwa Ibom State Nozaria Housing Estates With Its Sun Angle Study & Green Buffer Location

Table VI
900G NE, Pinggol Waterfront Town & Yue Long Housing Estates With Their Sun Angle Study & Green Buffer Location

V. LAND USE CLASSIFICATION OF THE SELECTED HOUSING ESTATES

1) FMI Garden Housing Estate
For FMI garden housing estate map is shown in figure 3. It has the residential area, road area, water area, green area, paved area, commercial area and others. Based on the calculation of each category, Figure 4 is showing the result of land use classification percentage.

2) Mindhama Housing Estate
Mindhama housing estate is a mix type of single family landed housing type and multi-family condo type. The following figure 5 is showing the map of the project site and Figure 6 showing the percentage of the land use area.
3) Myakanthar Garden Housing Estate

Myakanthar housing estate is established in 2010 and it has a swimming pool and gym house as one of the facilities of the housing project.

4) Golden Palm Housing Estate

The golden palm housing estate is finished in 2011 and the land use area utilization is as follows.

5) Shwe Poneyut Housing Estate

This housing estate is has no public facilities and has the least landscaping area in the project site.

6) Akwa Ibom State Nozaria Housing Estate

Akwa Ibom State Nozaria Housing Estate is providing enough green area for the whole housing estate and it has about 25% of green area ratio of the project site.
The building blocks are positioned to achieve the most views and natural lighting and ventilation as much as possible. In this case study, even the walkways are constructed by the help of planted green roof above it as show in figure 17.
These foreign case studies provide the suitable green area ratio based on their regional laws and standards. The second case study of Washington D.C provides the greener area but not with large trees and so thus the parking area and pedestrian area do not have the canopy. The rest case studies found that they planted large trees not only for the canopy and architectural aesthetic by landscaping but also it could help to reduce urban heat island effect and sustain the ecological balance.

VII. COMPARATIVE CASE STUDIES

After studying the local and foreign green area of the housing estates, the following factors are found to be considered comparatively for providing more suitable relaxing environment and to maintain the ecological balance.

1) Green area and open space

According to the studies, most of the local housing estates could not provide enough greenery area than the foreign case studies because Yangon is now at the planning state to control the building laws and regulations sticky to prevent the concrete jungle and urban heat island effect. Although there is a relation between green area and open space, the local multi-family residential building blocks provide the less openness between the adjacent buildings than the foreign case studies.

2) Site Planning

Building blocks and individual plots for single family landed housing estates of the foreign case studies have more priority to catch the natural lighting and ventilation and also providing enough open space between the blocks. Local case studies point out the use of concrete paved area instead of the natural permeable area with ground covers which helps to prevent flooding and to reduce the urban heat island effect.

3) Green Area Ratio

In general, a comparison on the facilities, amenities and standards of the residential housing estates is shown as the following table.

<table>
<thead>
<tr>
<th>Facilities and Amenities</th>
<th>Literature [12]</th>
<th>Foreign Case Studies</th>
<th>Local Case Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAR</td>
<td>30%-60%</td>
<td>20%-50%</td>
<td>Under 20%</td>
</tr>
<tr>
<td>OSR</td>
<td>&lt;25% of plot</td>
<td>20%-40%</td>
<td>15%-35%</td>
</tr>
<tr>
<td>Community Hall</td>
<td>Required</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Playground</td>
<td>Required</td>
<td>Available</td>
<td>N/A</td>
</tr>
<tr>
<td>Outside Seating Area</td>
<td>Not Limited</td>
<td>Available</td>
<td>N/A</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>Not Limited</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Landscape</td>
<td>Not Limited</td>
<td>Available</td>
<td>Available</td>
</tr>
</tbody>
</table>

4) Site Amenities

The local housing estates have not enough pedestrian area and footpath for the residences. Although a good drainage system is provided, the waste disposal and waste collection system is not so specific and like dry and wet kitchen waste separation which is different from the foreign case studies. Enough water and electricity distribution system are provided on both local and foreign estates. Enough parking and open space is provided in all estates. Containing Playground, community area, swimming pool, etc. for residence are depend on the level of the housing estates.

VIII. CONCLUSIONS

As green area is a part of the open space, it also helps to provide the buffer area for public and private property. If the residential housing estate is providing enough green area, it helps to promote the urban aesthetic. Large trees should be planted along the perimeter of the project estate to serve as the fire buffer and vision buffer. These large trees could provide the solar ray protector and severer wind protector for the adjacent buildings. By providing the green area also helps to reduce the health issues like asthma and wheeze. It also helps to reduce the urban heat island effect and helps to promote the human comfort by adding the enough green area in the residential housing estates.
Acknowledgement

Firstly, the author would like to express her special thanks to Professor Maung Hlaing and Dr. Theingi Shwe. Her special thanks also go to the Colleagues of Master of Architecture, Technological University of Yangon. She would like to express special graduate for her parents for financial support and encouragement for everything.

REFERENCES

[1] Yangon Final Report by JICA Team & YCDC
[8] Akwa Ibom State Nozaria Housing Estate
[10] Pinggol Waterfront Town Housing Estate
[13] Author’s Field Survey