The development of private green open space in the residential area in Makassar

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Abstract. This study aims to 1) analyze the need for private green open space and community participation in the development of private green open spaces; 2) conceptualize the development of Private Green Open Space in accordance with the conditions of the land in the residential area of Makassar. This research is descriptive in nature. This research was conducted on residential in Tamalanrea and Mamajang Sub districts. To collect the data, it was done through collection observation, interviews, and questionnaires. Respondents involved were household heads who were randomly selected. Then, data were analyzed by quantitative and qualitative analysis. The results of the study indicate that the two research locations have the same development direction. The concept of developing private green open spaces is analyzed based on the availability of land, which is directed to the area of land for residential areas that still has open space and to the roof area for residential areas that do not have open space. In the green garden type land, it is developed a pot scaping, while in the roof field the type of green layout developed is a green roof.

1. Introduction

To answer environmental issues, developed countries have carried out city development by focusing on sustainability that is integrated with three main aspects, namely economic, social, and environmental where it should be balanced carried out so that sustainability goals can be achieved. Therefore, it is important to preserve the green space in the city area, one of which is the city Green Open Space (RTH).

Based on data from the Regional Environment Agency of Makassar City in 2010, it shows that the total area of open space in Makassar City was 2.14% or 3.79 Km2 of the total area of 175.77 km2, while in Law Number 26 of 2007 regulating spatial planning, a city must have an open space of 30% of the total area of the city, consisting of 20% of public green space and 10% private RTH. Given the Private Green Open Space is an important part of the structure of open green space in urban areas, it is necessary to study a strategy in maintaining the existence of green open space in the form of Private Green Open Space Development in the Makassar City Residential Area. The purpose of this study was to analyze RTHP needs and to make the concept of developing RTHP in accordance with the conditions of the land in the residential area of Makassar City. As the scope of this study, that is the objects which were in residential areas in RW 02, Tamalanrea, Tamalanrea and RW 02, Bonto Biraeng, Mamajang District, Makassar City.

In Law No. 26 of 2007 concerning Spatial Planning and Regulation of the Minister of Public Works No. 05 / PRT / M / 2008 concerning Guidelines for the Provision and Utilization of Green
Open Space in Urban Areas, it is stated that the definition of Open Green Space is an elongated / lined and / or clustered area, whose use is more open, where plants grow both naturally and intentionally planted. In the Regulation of the Minister of Public Works No. 05 / PRT / M / 2008 concerning Guidelines for the Provision and Use of Green Open Space in Urban Areas, it classify Green Open Space based on ownership aspects, namely Public Green Open Space and Private Open Green Space.

The function of a Green Open Space is to guarantee the procurement of open green space as part of the air circulation system (city lungs); Micro climate regulators so that air and water circulation systems naturally can take place smoothly; As shade; Oxygen producer; Absorbing rainwater Provider of animal habitat; Absorbing pollutants in air, water and soil media.

Later on, the provisions for providing green open space for large home yards are as follows: 1) Kate houses with land area above 500 m2; 2) The minimum required green open space is land area (m2) minus the building area (m2) according to local regulations; 3) The number of protective trees that must be provided at least 3 (three) protective trees plus shrubs and ground cover and or grass.

In addition, provisions on the provision of green open space for medium-sized home yards are; 1) a house with a land area of between 200 m2 and 500 m2; 2) The minimum required green open space is land area (m2) minus the building area (m2) according to local regulations; 3) The number of protective trees that must be provided at least 2 (two) protective trees plus shrubs and ground cover and or grass as well.

Moreover, provisions for RTH planning procedures based on Minister of Public Works Regulation No. 25 / PRT / M / 2008 are as follows:
- Provision of RTH must be adjusted to the designation specified in the spatial plan (City RTRW / Urban Area RTR / City RDTR / City Strategic Area RTR / RTH Master Plan) determined by the local government.
- Provision and utilization of public green space carried out by the government is adjusted to the applicable provisions.
- The stages of providing and utilizing public green space include planning, land acquisition, engineering design, implementation of green open space development and utilization and maintenance
- Provision and utilization of private open green space carried out by the community, including developers, is adjusted to the provisions of development permits.
- Use of green space for other uses such as billboards or 3-dimensional billboards, must pay attention to things such as 1; applicable rules and regulations; 2) Does not cause interference with plant growth; 3) does not interfere with the visual quality of and to open green space; 3) Paying attention to aspects of security and convenience of green space users; 4) Does not interfere with the main function of green space

At last, the roof garden (Roof Garden) is a garden model that is specifically developed on the roof of a building (or other possible building structure) for a particular purpose. In this case, the roof garden is developed as an effort to obtain a number of benefits (especially ecological, aesthetic, and economic) needed for increasing the value of a building, the people inside it, and for the environment of the surrounding community. In addition to playing an important role in the environmental sanitation processes of the city, the presence of Roof Garden also contributes to reducing the energy consumption of electric appliances for air conditioning.

2. Methods
The type of research is action research which is one form of research design that is descriptive and explorative. The research has been carried out lasts for 4 (four) months from April to August 2011. The research location was in the residential area of Makassar City, RW 02, Tamalanrea Village, Tamalanrea District and RW 02, Bonto Biraeng Sub-District, Mamajang District. The basic consideration for determining the area is the high development of housing developments in that location. The population in this study is a limited population based on the location of the research
location, namely the residential area of Makassar City which consists of the District Tamalanrea totaling 236 Houses and the District of Mamajang totaling 139 Houses.

The sampling technique used is the probability sampling technique. It is done through simple random sampling. And to determine the sample, it was used the formula by Taro Yamane quoted by Rachmat (1998: 82) as follows:

\[ n = \frac{N}{N \cdot d^2 + 1} \]

Where
- \( n \) is the total sample
- \( N \) is the total population
- \( d^2 \) is set up precision

So, from 236 houses in Tamalanrea Sub district there are 70 houses choses as samples with criteria as from 44 houses with an area of 101-150 m² is chose 13 samples; from 118 houses with an area of 101-150 m² is chosed 35 samples; and from13 houses with an area of 201-250 m² is chose 4 samples.

In addition, the sample in Mamajang Sub-district became 66 hoses from 193 houses. By the clasification that from41 Houses with an area of 101-150 m² is chose 14 samples; from 32 Houses with an area of 101-150 m² is chose 11 samples; from 26 Houses with an area of 201-250 m² is chose 9 samples; from 30 houses with an area of 251-300 m² is chose 10 samples; and fro 38 houses with an area of> 301 m² is chose 13 samples.

The equipment used in conducting the research is a map of Sateli’s image, Spatial Map, Digital Camera, Stationery, Questionnaire. The types of data used in this study are quantitative data and qualitative data regarding the condition of private open green space in residential areas in Makassar. The sources of data were from primary and secondary data obtained through surveys and direct observations to the research location.

### Table 1. Types and Data Resources

| No | Variable                          | Evaluation Criteria                                      | Data                      | Sources               |
|----|-----------------------------------|--------------------------------------------------------|---------------------------|-----------------------|
| 1  | Private RTH Needs                 | The availability of RTHP                                 | Location on Settlement    | Observation Interview |
|    |                                   | Width of Area                                           |                           |                       |
|    |                                   | Width of KDB                                            |                           |                       |
| 2  | Green Arrangement of Private RTH  | Green arrangement concept                               | Types & criteria green layout | Observation Information |
|    |                                   | Kinds of Vegetation                                     |                           |                       |

To collect the data, it was done through observation, Interview and documentation.

### 3. Results and Discussion

3.1. Width of private green open space

Based on the results of observations on a predetermined sample, data obtained on the condition of Private Green Open Space referring to the Minister of Public Works Regulation Number: 05 / PRT / M / 2008 concerning Guidelines for the Provision and Use of Green Open Space in Urban Areas which states that the standard for area Private Green Open Space for each residential area is 8% of the total building area. The data on RTHP availability in the study location can be seen in the following table 2.

### Table 2. Availability of Private Green Open Space

| Width | RTHP Tamalanrea sub district | RTHP Mamajang Sub district |
|-------|-----------------------------|---------------------------|

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Based on the data above, it can be seen from the two study locations that the smaller the building parcel, the more the Private Green Open Space will be reduced.

Table 3. Recapitulation of the Availability of Private Green Open Space

| Location                      | None RTHP (0%) | Not enough RTHP (< 8%) | Enough RTHP (≥ 8%) | Total |
|-------------------------------|----------------|------------------------|--------------------|-------|
| Tamalanrea sub district       | 17             | 24,29                  | 45,71              | 100,0 |
| Mamajang Sub district         | 11             | 16,67                  | 50,00              | 66    |

3.2. Private Green Space Needs in the Makassar City Residential Area

To determine the need for Private Green Open Space in a house plot, it can be done by referring to the Green Open Space requirement standards stated in the Minister of Public Works Regulation Number: 05 / PRT / M / 2008 concerning Guidelines for the Provision and Use of Green Open Space in Urban Areas, namely area Private Green Open Space for occupancy is 8% of the plot area.

Table 4. Availability of land for private green open spaces

| Width of the lot (M²) | Tamalanrea Sub district | Mamajang Sub district |
|-----------------------|-------------------------|-----------------------|
|                       | None (0%) | Available (≥ 8%) | Total | None (0%) | Available (≥ 8%) | Total |
| <100                  | 5          | 7,14            | 18    | 4          | 6,06            | 5     |
| 101-150               | 1          | 1,43            | 17,14 | 2          | 3,03            | 13    |
| 151-200               | 2          | 2,86            | 47,14 | 2          | 3,03            | 9     |
3.3. Private Green Open Space Requirements on RW 02 Residential, Tamalanrea Village, Tamalanrea District

Table 5. Availability of Private Green Open Space Land Tamalanrea District

| Availability of RTHP | Land Availability (≥8%) |
|----------------------|--------------------------|
|                      | n | %       |
| None (0%)            | 9 | 14,52   |
| Not Enough (<8%)    | 32| 51,61   |
| Enough (≥8%)         | 21| 33,87   |
| Total                | 62| 100,00  |

Based on table 5, 32 samples (51.61%) did not yet have enough Private Green Open Space but still had Open Space in building plots in the form of yards that could be developed to meet the broad standards of the needs of the Private Green Open Space.

3.4. Private Green Space Land Needs at RW 02 Settlements, Bonto Biraeng Sub-District, Mamajang District

Based on the results of the field observation data (table 6), it is known that about 57 samples (86.36%) have sufficient land for the development of Private Green Open Space in building parcels, while 9 samples (13.64%) have no land at all for the development of Private Green Open Space.

Table 6. Availability of Private Green Open Space in Mamajang District

| The availability of RTHP | Land Availability (≥8%) |
|--------------------------|--------------------------|
|                         | N | %       |
| None (0%)               | 2 | 3,51    |
Based on table 6, 2 samples (3.51%) that did not have Private Green Open Space and 33 samples (57.89%) that were not sufficient Private Green Open Space were known to still have Open Space in building plots of land that could be developed to meet the broad standard needs of the Private Green Open Space.

### 3.5. Development of RTHP on RW 02 Residential, Tamalanrea Sub-District, Tamalanrea District

#### 3.5.1. Analysis of RTHP Development Based on Land Availability

| The Availability of RTHP | Land for RTHP               | Total |
|-------------------------|-----------------------------|-------|
|                         | None (0%)                  | Available (≥8%) |     |
|                         | n  | %   | n  | %   | n  | %   |
| None (0%)               | 8  | 16,33 | 9  | 18,37 | 17 | 34,69 |
| Belum Mencukupi         |    |       | 32 | 65,31 | 32 | 65,31 |
| (<8%)                  |    |       |    |       |    |       |
| Total                   | 8  | 16,33 | 41 | 83,67 | 49 | 100,00 |

Based on table 7 data and looking at the condition of the land that has been built, it is very difficult to realize and restore the function of the actual Private Green Space in each dwelling, this is because the availability of open land for development is no longer there. The alternative development for covering the private green open space is the greening of roofs and greening in the yard.

#### Table 8. Land Direction for Private Green Open Space development

| Direction for the development of RTHP | Sample | %   |
|--------------------------------------|--------|-----|
| Greening on the Roof                 | 8      | 16,33 |
| Greening in the Yard                 | 41     | 83,67 |
| Total                                | 49     | 100,00 |

#### 3.5.2. Analysis of Development of RTHP Based on Types of Green Arrangements

After knowing the direction for the Green Open Space area, it can be analyzed and determined the type of green system to be used on the land.

Based on the public perception, there were 15.71% who chose the development of RTHP land by converting the area of the roof into a roof garden or green roof, arguing that the land area of the plot was no longer possible to be developed or converted back into the RTHP green system.

To develop a green system on the roof, it is necessary to pay attention to the condition of the building, especially the roof which will be converted into RTHP. The condition of the building at the
location of this study is 100% permanent building which generally uses reinforced concrete structures in the building column, wood construction on the roof with an average main roof 300 slope. Existing Building Design method is planning carried out on a building that has been established so that the type of green system to be developed must be adjusted in advance with the roof area of the building, the overall structure of the building, and the function of the building itself.

Looking at the function of the roof only as a cover of a building with a slope that does not allow people to do activities above it, the green layout above this roof will be Extensive (Green Extensive Roof) or commonly categorized as Extensive Green Roof. This type of Green Roof requires a fairly low maintenance cost, shallow (soil) planting media, and light plants used. This type of Green Arrangement has a lightweight and narrow building scale that is widely used in parts of the house that are not too large such as garage roofs and home terraces.

Unlike the conversion of the green layout on the roof, the green layout in the yard is easier and there are many choices in determining the type of green layout. The yard at the location of the study was originally a Private Green Open Room whose function was replaced by various activities that directed respondents to do pavement and closure of the private green open space area, with easy reasons for maintaining and cleaning the yard. To restore its function back to being a Private Green Open Space without changing the existing reasons, one of the alternative green systems that will be developed in this yard is a type of green arrangement in the form of Pot Scaping.

The reason that is in line with the alternative type of green arrangement in the form of Pot Scaping in this yard is the perception of the people who want the development of Pot Scaping for the Private Green Open Room at 74.29%.

Based on the analysis above, it can be concluded that the development of Private Green Open Space can be directed based on the type of green layout that is suitable for the land available at the location of this study. The conclusions of the direction can be seen in table 9.

Table 9. Direction for developing the Green Arrangement Type at RTHP

| No | Sample N (%) | Direction of Development | Types of Green Arrangement |
|----|--------------|--------------------------|---------------------------|
| 1  | 8 16,33      | Roof                     | Green Roof                |
| 2  | 41 83,67     | Yard                     | Pot Scaping               |
|    |              |                          |                           |
| Total | 49 100,00    |                          |                           |

3.6. The Development of RTHP on RW 02 Residential, Bonto Biraeng Sub-District, Mamajang District

The analysis of RTHP Development Based on Land Availability that can be seen in table 10.

Table 10. Land Availability for the development of RTHP

| The Availability of RTHP | Land For RTHP | Total |
|--------------------------|---------------|-------|
|                          | None (0%)     | Available (≥8%) |
|                          | n  | %  | n | %  |
| None (0%)                | 9  | 20,45 | 2 | 4,55 | 11 | 25,00 |
| Not Enough (<8%)         | 33 | 75,00 | 33 | 75,00 |
| Total                    | 44 | 100,00 |

Based on the analysis above, it can be concluded that the development of Private Green Open Space can be directed based on land conditions which can be seen in the following table 11.
Table 11. Land Direction for Private Green Open Space development

| Direction for the development of RTHP | Sample |
|--------------------------------------|--------|
|                                      | n     | %    |
| Greening on the roof                 | 9     | 20,45|
| Greening in the yard                 | 35    | 79,55|
| Total                                | 44    | 100,00|

After knowing the direction for Green Open Space land, it can be analyzed and determined the type of green system to be used on the land by Developmental Analysis of RTHP based on Types of Green Arrangement and it can be concluded that the development of Private Green Open Space is directed according to the following table 12:

Table 12. Direction for developing the Green Arrangement Type at RTHP

| No | Sample | Direction for the development | Types of Green Arrangement |
|----|--------|--------------------------------|-----------------------------|
| 1  | 9      | Roof                           | Green Roof                  |
| 2  | 35     | Yard                           | Pot Scaping                 |
|    |        | Total                           | 44                          | 100,00                      |

4. Conclusion

From the two study locations, it was found that residential conditions that did not have Private Green Open Space (0%) were the most dominant in small plots (<100M2) so that smaller building plots would reduce the Private Green Open Space. Based on the availability of land, the development of RTHP is directed to the residential area for the residential area which still has an Open Space and to the roof for residential areas that do not have Open Space. Development of RTHP Based on Green Types of green layout that should be developed in each research location is Pot Scaping, while in the roof field the type of green layout developed is a green roof.

5. References

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