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The Dynamics of Densification of Dualistic Settlements in the Sub-Urban Area of Makassar City, Indonesia

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Abstract. The development of the densification pattern of suburban settlements is an increasingly interesting subject since it relates to urban development policies and the concept of a planning approach. The purpose of this study was to analyze; characteristics of spatial physical transformation, transformation to densification, and densification as process. The research method used was the qualitative descriptive method. The data were obtained by direct and indirect observation. The results showed the growth of planned and organic settlement densification patterns through the formation and development phases. The development phase is a process of the space function change from a residential area to a service and trade function. The development of densification patterns and spatial transformation of the residential area of Bumi Tamalanrea Permai was due to the land plot policy which has implications for the infilling development process. the area development process around the pattern development and transformation phases was influenced by the development of the BTP (central business district) as a growth center. This study recommends considering spatial transformation as a determinant of the growth of settlement densification patterns followed by future management policies for the settlement area of Bumi Tamalanrea Permai and its surrounding areas.

Keywords: densification, dualistic, housing and settlements

1. Introduction

There are two basic types of urban development, namely growth and transformation [1]. Urban development includes all types of land use, especially those related to the internal processes of the city. This is an important thing to study from a global urban perspective in the future. Residential growth processes lead to two types of development; the construction of new housing units within existing residential areas (densification) or the development of new residential areas on land that was formerly open (expansion) [2]. Transformation is a total transfer process from a particular shape into a new figure which can be interpreted as the final stage of a changing process. Transformation, as a gradually progressive process, utilizes space and time factors becoming the aspect that greatly influences the change until reaching the ultimate stage. The changes are completed by responding to the influence of external and internal elements which will lead to a change from an early familiar form [3]. Densification is used as a planning approach to promote the implementation of the compact city model and to discourage urban sprawl [4].

Statistical data shows that the population growth in Makassar City reached 1,508,154 people or 1.29% [5]. The increasing number of urbanization and migration flows in Makassar City reached 467,518 people or 30.99% [6]. Future growth is also predicted by The World's Cities in 2018, in which Makassar City will reach 1,900,000 people in 2030 [7], while in World Urbanization Prospects, The 2018 Revision, the population will reach 1 million to 5 million based on urban settlement size class [8]. Urbanization is an increased concentration of population in the larger settlements of the territory, and an increasing density of population within urban settlements [9]. The trend and increase in population growth in an urban area will be followed by an increase in space requirements and lead to infill development [10]. The increase in space requirements is a process of settlement densification that occurs in suburban areas [11]. The increase in the use of space both horizontally and vertically, within an existing area or property, thereby increasing the number of housing units, is called densification [12].

The residential area of Bumi Tamalanrea Permai is a large area of land cover in the dominant residential area located in the sub-urban fringe and is a transition zone for urban and non-urban areas. Historically, this settlement is a kampung settlement area, which consists of agricultural land, catchment area, or a mixture of land uses. In the development of the residential area of Bumi Tamalanrea Permai, 1989-1991 was the initial period of planning and development of residential areas. One of them is the development of the Regional VII Perumnas (national housing) business area, namely the development of the Bumi Tamalanrea Permai residential area in Tamalanrea, Makassar Cit [13]. Administratively, this residential area is located in two development areas, namely Tamalanrea District and Biringkanaya District. According to the 2015-2031 Makassar City Spatial Plan, these two areas are designated as low to medium density residential areas, education areas, natural and artificial green open spaces (RTH) and function as environmental service centers [14].

The shift in the function of urban space to the suburbs has implications for the growth pattern of densification and is followed by continuous and recurring transformations in meeting the needs of urban communities. For this reason, it is important to explain the process the dynamics of densification of dualistic settlements in the sub-urban area. The focus of this study is to answer the following research questions: (1) How is the characteristics of spatial physical transformation, (2) How is the transformation to densification, (3) How is the densification as process.

2. Research Method

This study used a qualitative method. The qualitative analysis was strengthened by a combination approach of case studies and phenomenology. The case study approach in this study was determined with the following considerations: (a) The Bumi Tamalanrea Permai settlement area is a suburb of Makassar City which has a specific characteristic of a large-scale settlement managed by government developers through Perumnas VII, growth dynamics also occur around the residential area of Bumi Tamalanrea Permai, including the development of urban village settlements and cluster housing, as well as supported by higher education and regional health center functions; (b) this suburban residential area of Makassar City continues to grow and experience massive and complex changes including an increase in built-up areas, changes in function, and change of land function from agriculture to non-agricultural. (Figure. 1)

The phenomenological approach was by interpreting and perceiving the events or symptoms that occur [15]. The analytical method used was descriptive analysis to identify, describe, summarize and analyze the various data collected in the form of direct and indirect observations of the symptoms of densification growth patterns and their transformations through the google earth pro 7.3 (earth viewer) application in 2000 and 2019 with the use of polygon edit window in measurement facility column.
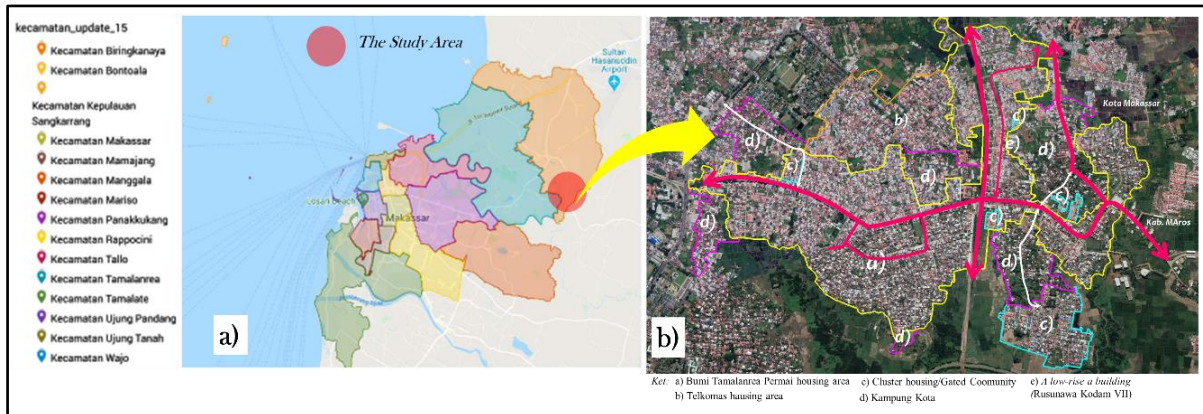
Figure 1. a) Map of Makassar City [46], b) Map of Bumi Tamalanrea Permai housing area and urban kampung

The phenomenon of urban development because of the rate of urbanization and population density has implications for the growth of densification patterns and the process of transformation, these implications are the process of forming and developing suburban residential areas, increasing built-up space, shifting area functions, the process of building concentration that leads to the densification pattern of the settlement of Bumi Tamalanrea Permai and its surrounding areas. The conceptual framework of the study is shown in. (Figure 2)
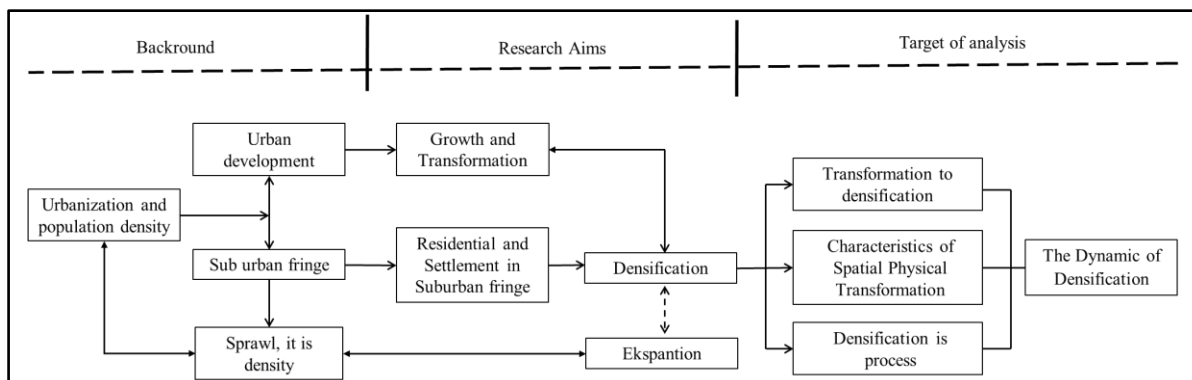

Figure 2. Reaserch Framework

3. Result and Discussion

3.1 Characteristics of spatial physical transformation

Bumi Tamalanrea Permai Housing consists of 13 groups of Rukun Warga with various types of houses – ranging from type 18, type 21, type 36, type 45, type 54, and up to type 70 – and commercial buildings in the form of shop-houses with 1 to 3 floors. Data obtained from the Perum Perumnas Regional VII in the Makassar region shows that the total number of existing houses is 10,245 units. This area has an area of ± 265 Ha and consists of 19 housing blocks, namely Block A-M and Block AA-AF. The following is the Perumnas Bumi Tamalanrea Permai master plan:
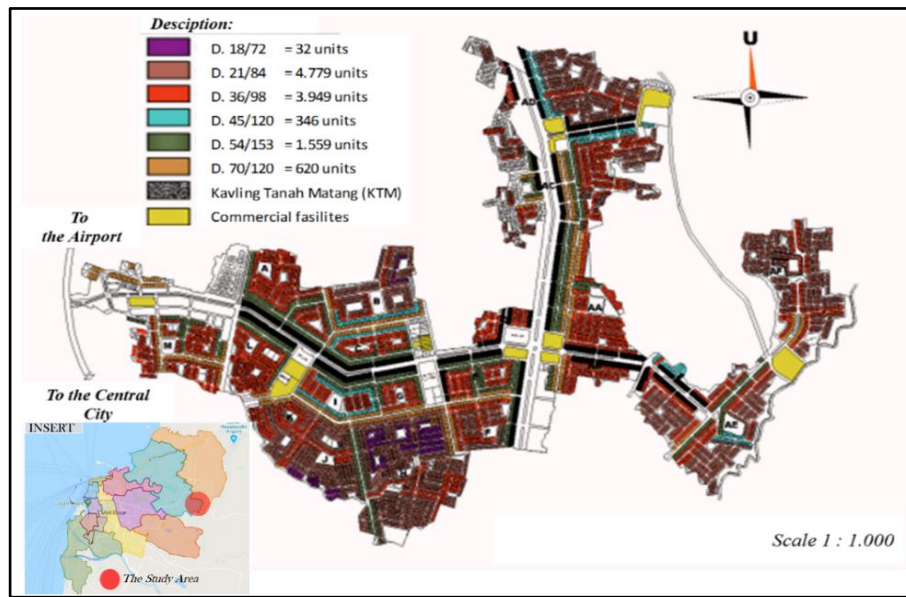
Figure 3. Master Plan of Perumnas Bumi Tamalanrea Parmai Makassar [13]

In the development and construction of the Bumi Tamalanrea Permai housing area, there are two phenomena of rules and regulations that greatly influence the transformation of the area; a) Makassar City Spatial Plan, and b) Bumi Tamalanrea Permai Housing Master Plan. The existence of a gap between planning and reality is an epistemological problem in its existence. In the Makassar City Spatial Plan, changes in residential functions to trade and services functions, the lack of green open space, privatization of public spaces, massive housing development around the AC and AD Blocks are threats to the function of protected areas, especially the lake border. Gaps also occur in the planning of the Bumi Tamalanrea Permai Housing Master Plan, such as the construction of residential types that are not in accordance with the plan, for example type 32 in the AC Block which is not in the master plan.

The increase in growth caused by the rate of invasion in the Bumi Tamalanrea Permai Region is physically marked by the high conversion of non-developed land to developed land (increase in urban land). The area of developed land reached 57.36 Ha or 21.65% in the 1989-1999 period and this increased to 114.49 Ha or 43.20% in the 2000-2018 period, with the addition of the developed land of 171.85 Ha or 64, 85%. The addition of developed land is due to the high occupancy needs in strategic regional locations, such as the airport, university center, and downtown locations. This residential area was previously a rice field area, mixed land and water catchment area. The developed land becomes the dominant land along with the rapid growth of the region.

**Table 1.** Land use changes in Bumi Tamalanrea Permai Housing, 1989-2018

Year	Land use changes in 1989-2018	Area (Ha)	%
1989-1999	Developed Land	57,36	21,65
	Non-Developed Land	207,64	78,35
2000-2018	Developed Land	114,49	43,20
	Non-Developed Land	150,51	56,80
1989-2018	+ Developed Land	171,85	64,85

Source: [13] and analysis result

The massive conversion of land to built-up land in the residential area of Bumi Tamalanrea Permai includes control of private land through land plots, land tenure rights and large-scale land/land banks, control of the master plan concept that is not in accordance with the plan. This gives rise to infill development which is exclusive residential. Tenure of land and inconsistencies in plans have implications for the exclusive management system of Perumnas. Exclusion in residential and land management is carried out through a land bank.

There are two forms of spatial expression that occur in connection with the shifting of space from the means of production to spatial reproduction, namely; a) longitudinal (linear) spatial physical development and b)

concentric spatial physical development [16]. The development of the area which is marked by a physical spatial length (liner development) has an impact on the transformation of building functions and land functions which have implications for increasing the built-up space with the infill process. Liner development is also a pattern followed by the development of continuous changes in both old and new land use types. the surrounding formal housing utilize the facilities and infrastructure found in the Bumi Tamalanrea Permai residential area.
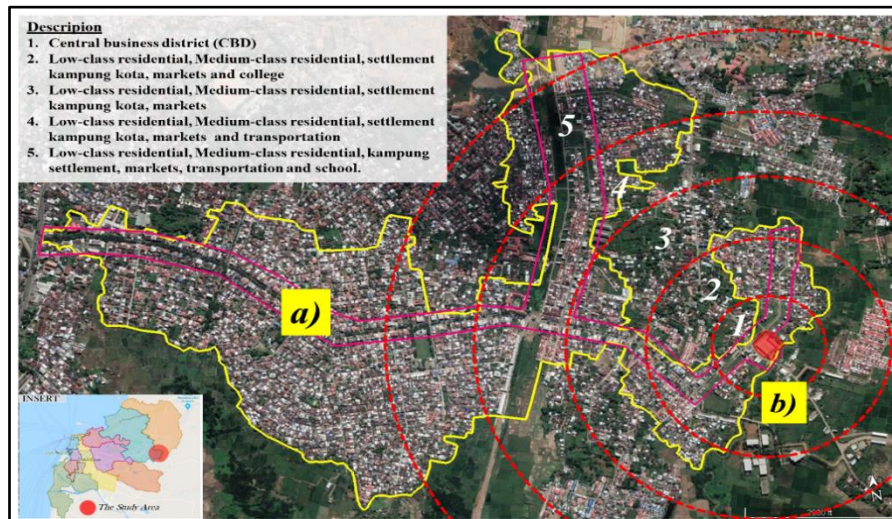
Figure 4. Spatial physical development; a) liner development along the Tamalanrea Raya road, and b) Concentric development that brings together the 'built-up area'

The development of the area is characterized by a well-conserved spacial physique. Perumahan Bumi Tamalanrea Permai is the center of growth in the suburban area, the central business district of BTP (central business district), campus of Hasanuddin University (Unhas), campus 2 of Ujung Pandang State Polytechnic, and royal spring housing. The proliferation of cluster housing and the distribution of trade and services have accelerated the area's change, especially the infill process on land planned by Perumnas and vacant land belonging to rural communities that have not yet been built into new settlements among old settlements leading to settlement densification. The spatial development of concentric centrifuges is a form of urban area development that occurs on the sides of an area that is built and cohesive [16]. The spatial physical development in the residential area of Bumi Tamalanrea Permai and its surroundings is not only marked by an increase in built-up land, but also a process before leading to the compact concept, namely the settlement densification process.

3.2 Transformation to densification

In the development of the Bumi Tamalanrea Permai residential area in the sub-urban fringe of Makassar City, one point that has drawn the attention is the residential growth processes that lead to the type of development densification. The development of the residential area of Bumi Tamalanrea Permai and the surrounding area consists of an internality phase and a regional externality phase.

 1)   The internality phase in the core area of the Bumi Tamalanrea Permai residential area includes;
    a)   Formation and development of figural spatial patterns. The initial pattern formation is through the physical elements of the area. This change in residential to commercial function became the forerunner of changes that occurred along Jl. Tamlanrea Jaya which is distributed to environmental roads in line with the increasing accessibility of transportation modes.
    b)   The formation and development of the hierarchy and the massive transformation of spatial functions along the main road, the construction of new housing, the increase in the densification process through infilling development marked by the emergence of low-cost apartment building (Rusunawa Kodam VII), residential clusters of Bawakaraeng and Tamalanrea Mas which are managed by State-Owned Enterprises. VII, and the emergence of cluster housing managed by private parties located on the main road corridors and neighborhood roads. The formation of this hierarchy is a factor that has implications for land use changes that are preceded by infrastructure development and regional movement.

    c) Urban space relations. In the development of residential areas and their surroundings, the relationship between spatial patterns and structures will continue to undergo a phase of transformation both socio-culturally and economically.

2) Internal phase in the sub-core area of Telkomas housing, Kodam VII Rusunawa, cluster housing and rural-urban settlements, includes;

    a) The formation of urban kampung patterns also originated from local communities and immigrant communities from the area around Makassar City who worked in farming, services and trade to fill empty spaces and live side by side with local communities.

    b) The formation and development of the hierarchy in the rural-urban shows an unstructured road network and the development of the physical transformation of buildings from stilt houses to permanent to semi-permanent houses.

3) The internality phase in the sub core area. The residential area of Bumi Tamalanrea Permai and its surroundings forms and encourages a wide spatial configuration process through a growth pattern of spatial expansion (extended urban area) and continues the process towards suburban densification.
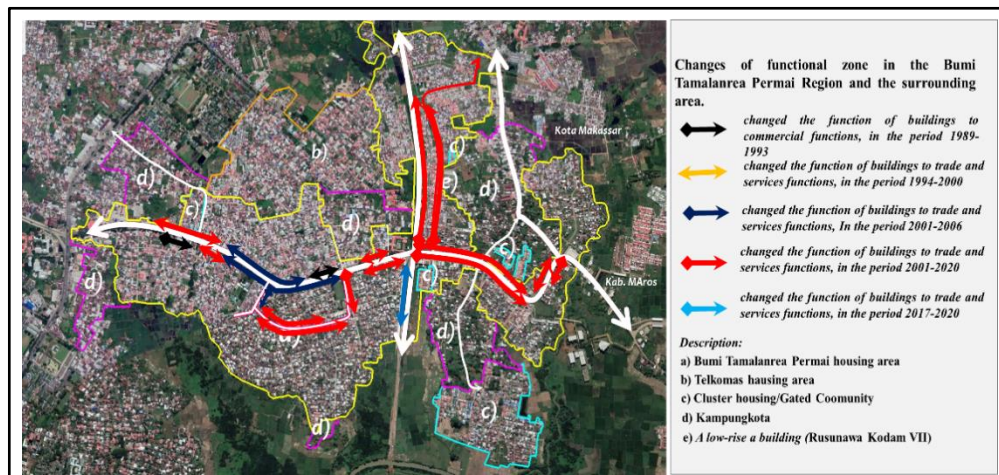
Figure 5. The period of area formation and development followed by changes and efforts to settlement densification

3.3 Densification as process

Reasonable densification of cities or their parts is an important and effective way to support sustainable development [17,18], but in terms of entity and existence, both of them simultaneously postulate that the concept of densification in residential areas that grows into new areas and growth centers in sub-urban areas with a planned and massive large-scale housing management system will transform and give bad impacts in spatial balance. The densification process must be studied, evaluated and expanded by questioning the definition of a dynamic and complex spatial process when open or public space is still minimal and the provision of basic facilities is still limited. The concept of densification control should be a prototype in management action. Therefore densification must be seen as a process. Densification is usually a step-by-step process [19]. Densification in the city has occurred in both planned and unplanned ways [20]. Strategic potential densification in downtown neighborhoods; a) Ground-based dwellings, b) Water dwellings, c) High-rise dwellings, d) Skyborn, d) Infill, e) Do-it-yourself (DIY) [19].

The conceptualization of the densification process in the residential area of Bumi Tamalanrea Permai and its surroundings occurs in several stages, including;

a) Plots of land

    The program of selling land plots in the management of residential areas is the start of a physical transformation process on main roads and other strategic locations. Types of lots include mature land plots, area commercial lots, and shale land lots, most of which are located on the main road network. This changes the function of the area into an area of services and trade. Commercial lots area with a land area of $\pm$ 3 to 7 Ha has led to the internality gentrification process in the form of cluster housing and the commercial function itself.

b) Infill development

Infill development is a process of renovation, rehabilitation, and restoration of the attractiveness of urban areas [21]. This phase will continue to fill in the empty spaces. The addition of buildings to the remaining land in the unit/dwelling will lead to an infill development process and add new buildings among the existing buildings and occupy strategic and high value spaces. This process almost occurs massively in the settlement densification process. This process also causes a reduction in the proportion of green open space. (Figure 6)


Figure 6. a) Mature plots of land and change of fuction funftion the service and commercial functions, b) Commercial plots of land c) Serpihan plots of land

Figure 7. The infilling process also occurs in green open spaces

c) A low-rise a building

Densification definition is "The increased use of space, both horizontally and vertically, within existing areas/properties and new developments, accompanied by an increased number of units and/or population threshold [22]. The growth of the residential area of Bumi Tamalanrea Permai and its surroundings stimulates the growth of new buildings and increases in vertical space. In the future, this will create low-cost apartment building (rusunawa), hotels, and rental housing units. (Figure. 8)
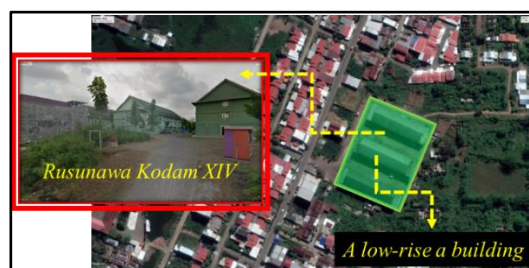
Figure 8. A low-rise a building increase in vertical space intensity at the height of the building 3 floors

d) Water dwellings
The process of occupying empty land and away from other activities is a characteristic of informal settlement. The designation consists of; a) buildings and land are used for business and residence, b) buildings and land are used for residence. Building characteristics include location on the water and around the water.
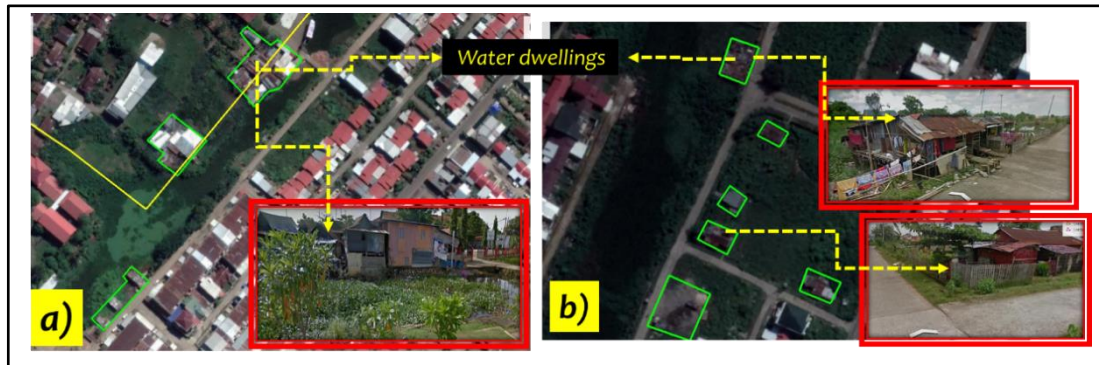

Figure 9. a,b) Water dwellings, some of which are used for informal settlement

3.4 Densification of dualistic settlements

Contemporary building structures give an interesting nuance to certain areas, but the form of the city is still dominated by a dualistic model landscape, namely between traditional and modern, formal and informal forms, as well as rich and poor [23]. In the concept of global urban development in the future, the fulfillment of the characteristics of dualistic settlement elements is an integral part of urban spatial planning in Indonesia [24].

In another theoretical perspective, it is explained that the settlement densification process gives rise to slum settlements and building compaction or densification due to population growth. As a result, the need for housing is increasing and there is a tendency to occupy existing vacant lands [25]. The slum densification process will be followed by the infilling process and settlement involution [26]. Although this process occurs on land that is legally legal, a further taudification process will take place. In line with the above perspective, the results of the research and slum completion program through the 2017 Kotaku policy show that the kampung of Bontoramba is categorized as mild slum. Slum areas are also found in the Bumi Tamalanrea Permai settlement, blocks K and J, which are included in the medium category of slum areas. (Figure 10)
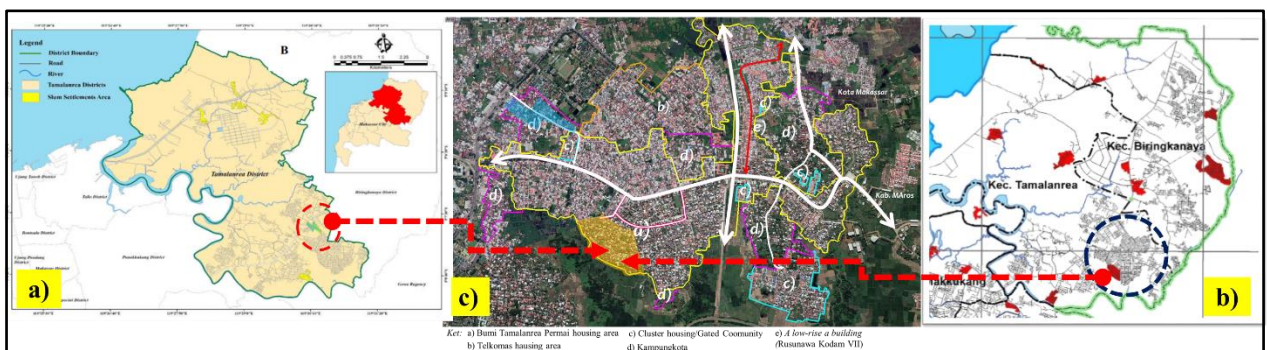

Figure 10. a) Slum areas in the rural-urban Bontoramba, Tamalanrea Jaya Village [27,28]; b) Slum areas of Blok J and K in Bumi Tamalanrea Permai settlement [29]; c) Research location

The interesting thing about this research location is the negative impact of the growth pattern of the dualistic settlement densification, including;

1) Slum areas in the villages of Bontoramba. The history of the formation of the pattern of the kampung of Bontoramba originated from the typical house on stilts, the formation of an unstructured hierarchy, the physical building of the house on stilts which has gradually undergone an aging process, and the readiness of basic infrastructure that has not yet been fulfilled, leading to interim taudification. This slum area illustrates that the poor in the Tamalanrea slum area are identical with a low educational background, erratic work orientation, and an inability to access adequate housing [28];

2)   Slum areas in planned settlements prove that management and control are still weak, especially in Indonesia's spatial planning and housing policies in the past, encouraging the growth of slum areas. Indications of this formation originated from the policy of 'very simple house (RSS). In the residential area of Bumi Tamalanrea Permai, the water's edge area is also used by informal settlements so that the lack of access to facilities and infrastructure creates a slum area. The water's edge process is a pattern of growth in an area called water dwellings (Figure 10).

The interpretation of the dualistic settlement densification process has the following characteristics: a) the growth of the Bumi Tamalanrea Permai residential area through the process of increasing the built-up land and followed by a transformation pattern, especially along main roads and environmental roads that are influenced by public transportation modes of transportation (pete-pete), and spatial physical transformation of the road network from a residential process to a horizontal type to a service and trade function with a typical vertical building with a variation of 1-5 floors; b) organic growing settlements which are ontologically depicted in the vicinity of the Bumi Tamalanrea Permai settlement area; c) settlement areas, symptoms and implications for spatial use of the area can be seen in patterns spacial distribution.

The densification process in the residential area of Bumi Tamalanrea Permai has negative implications so that for the distribution of built space. The patterns in the small types of dwellings 18, 21, 30, 32 have implications for the aging process and lead to temporary taudification (temporary slum). The cause of building aging is the type of ownership that is intended for the middle to lower class communities, so that repairs will take a long time. However, the reality on the ground also provides an inverted fact; Very simple type of house (RSS) and simple house (RS) transforms well, including renovation, rehabilitation, and restoration into type 30 and type 32 houses with varying areas, especially in the front location of the inner ring road plan.

The infilling process also occurs in empty spaces and transitional areas that are mostly used as informal settlements, which are usually become the slums. The standardization of facilities and infrastructure is minimal and it is on the illegal area that uses the land belonging to the Telkomas housing estate. (Figure 11)

Figure 11. Example The condition of informal settlements located in the Telkomas Housing area and the Bumi Tamalanrea Permai settlement

The growth pattern of densification in the urban kampung Cokro is a form of settlement entity in the suburbs of Makassar with the physical characteristics of the building consisting of houses on stilts. The physical characteristics of the buildings also shift the typical local housing into permanent housing types. The house on stilts has also turned into a semi-permanent one. The pattern formation phenomenon also affects the environmental density process. One plot of land with an area of 282 M^2 is occupied by a family head with 4 children so that the heirs must get 4 building units, or 4 heads of families fight over 1 parcel of the building used for business, with the remaining 64 M^2 empty land. (Figure 12)
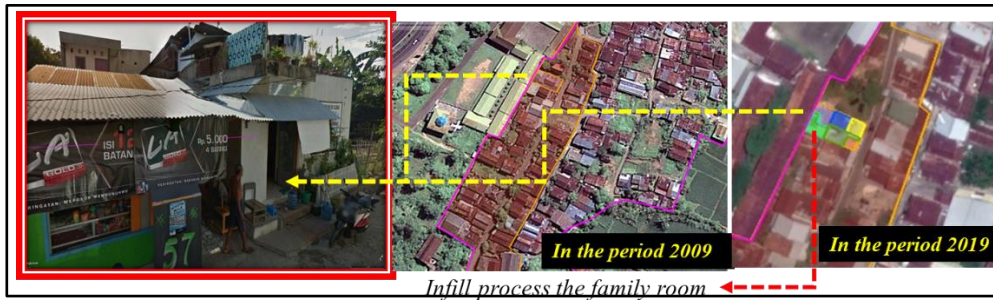
Figure 12. Example The condition of Kampung Cokro, where 4 heads of households and 4 dwellers occupy 1 plot of land.

The phase or process of forming physical elements on the suburban still occurs in the residential area of Bumi Tamalanrea Permai. Hierarchy formation and connectivity between regions indicate a transformation along the main road. However, it is different in the case of urban kampung settlements around the Bumi Tamalanrea scenic area, the physical changes of the buildings and their functions are found in connecting the main road to the rural-urban neighborhood road. The addition of commercial space also occurred. However, the number of 4 dwellings which are inhabited by 4 heads of families in 1 plot of land gives rise to compaction; the building structure looks disorganized. Social and cultural conditions affect the formation of densification patterns of urban kampung.

4. Conclusion

In this paper, we propose to take advantage of the Google Earth Pro application as a simple spatial data processing method to find the spatial potentials, especially in the symptoms of differentiation and changes in urban kampung patterns at a detailed scale. In the case of residential development in the sub-urban fringe, the basic type of urban development begins in the formation phase followed by a growth pattern towards settlement densification and expansion in its surroundings. This will continue to be a cycle of development process for the suburban.

The growth of densification patterns in the settlement of Bumi Tamalanrea Permai forms the formation and development phase and the transformation phase. The transformation phase includes; (a) The change from a residential area to a service and trade function, (b) the land plot function consists of both a service and trade function and residential function. The urban kampung settlement also experiences a phase of formation and development but the transformation phase is different in the changes include; (a) The residential function that changes to commercial functions, the tendency of change will lead to phenomena of phasing out community land for other functions (filtering up) and have implications for social impacts towards gentrification.

In the characteristics of planned settlements on the outskirts of Makassar, the growth of densification patterns are influenced by the policy of plots of land with an area up to 3-7 Ha which have the potential for infilling development on a cluster housing scale, this infilling process also has an impact on reducing green open space. The potential development of the densification pattern being developed is a low-rise building as a unit of low and medium residential areas. Even though the residential area of Bumi Tamalanrea Permai has helped the growth of Makassar, the growth of informal settlements is also a factor in the increasing built-up space in swamp areas, this is called water dwellings.

5. Acknowledgements

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