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Arrangement Model on the Sustainable Coastal Settlement in Makassar

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ABSTRACT

Indonesia is an archipelago with a number of islands reaching 17, 508 and the coastline length is approximately 81, 000 Km (DKP, 2008). These characteristics make coastal areas becoming the mainstay source of public revenue for Indonesian. Generally, coastal areas can be defined as meeting areas among the local terrestrial ecosystems, marine ecosystems and ecosystems connecting in delicate balance (Beatly et al, 2002). The aim of this study was to develop an arrangement model of environment on the sustainable coastal settlements, so that planning concept can be run more effectively, as well as life can continue in harmony. Qualitative research method and Spradley model analysis were used to identify settlement arrangement model and to be developed that maximizing relevant model to the local environmental conditions of coastal areas. Temporarily, the results showed that arrangement models of environmental settlement tend to cluster and spread irregularly with settings orientation based on mere needs without regarding to healthy conditions of environment and passage ships/boats.

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INTRODUCTION

Background:

Cities located on the seaside tend to change quite rapidly, causing a variety of problems such as the increasing need for land housing, industry, trade and services, ports, warehousing, marine tourism, and infrastructure, so it is necessary to expand through reclamation. Makassar includes as one of coastal cities located in Indonesia. Makassar has beaches elongating on the western and northern parts of the city which the majority is used for housing.

As a coastal city that most of its parts are flat. Makassar height ranges from 1-25 meters from sea level and with slope averages 0-5° toward the West. Based on the geological map, Makassar and its surrounding covered with tertiary and quarter rocks such as volcanic rocks and alluvial deposits.

According to Kay and Alder coastal areas are unique, because in the context of the landscape, the coastal areas are meeting places of land and sea. Furthermore, the coastal region is an important area in terms of various viewpoints of planning and management. Department of Maritime and Fisheries in its law draft of management of the Integrated Coastal areas defines coastal areas as transition areas connecting the terrestrial ecosystem and marine ecosystems located between the boundary demarcation towards the ground as far as the highest tide and towards the sea as far as the effect of the

activities of the mainland. Coastal area has a high economic value, but its sustainability is threatened. With the unique potential and economic value, then it is faced with the high threat, therefore it should be handled in special manner, so that these areas can be managed sustainably.

Coastal city on the seaside is as one of the waterfront cities basically rooted in geography and history factors that for centuries has been a part of the international trade lanes. In the further development this area becomes an attractive place for settlement. These symptoms can occur for many reasons, among others:

- an alternative area of urban settlements for the poor urbanists.
- an opportunity for ease of transportation.
- a natural gateway for trade between places separated by the sea.

The condition causes the high rate of urban growth, where the coastal urban areas tend to grow faster, both demographically and economically than cities in other regions. But due to the rapid development of road transport and activity centers outside the edge of the water area, the waterfront area of the city begins to lose its leads. Most of the region of space utilization is only used for port activities, warehousing and fisheries. With the variety of different interests, the development of the waterfront city can lead to conflict among others:

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- interest between government institutions and port management; both national and regional
- between commercial and social interests;
- between the public interest and the individual interest.

Aim And Targets:

Aim:

The aim of this study was to find out arrangement model of Sustainable Coastal settlements in Makassar. The results of this first study is used to map residential areas in an attempt managing the coastal areas in Makassar.

Target:

1. As an input for local government in order to provide supports both moral and material to the people on the coastal area of Makassar, specially in District Ujung Tanah, Tallo and Biringkanaya in perfecting system of environmental arrangement in their settlements, so that it can maintain the existing ecosystem on the coastal areas.
2. After reviewing the environmental governance system in the coastal settlements, it can create models of settlements arrangement in improving the system, so it is expected to maintain the coastal ecosystem and can be applied to residential areas on the coastal areas in the other locations of Indonesia.

Research Methods:

The research method applied was a qualitative method since the study was conducted ⁵ on the natural condition or natural object. Natural object is an object that is growing as it is, is not manipulated by the researcher or the researcher's presence does not affect the dynamics of the object. Qualitative research in addition to searching for the truth, is also trying to figure out how the respondents perceive the world around them in terms of perspective (emic perspective), according to the thoughts and feelings ⁶ (Sugiyono, 2007). Qualitative research purpose is not to test the hypothesis which is based on a particular theory, but rather to find patterns that might be developed into a theory. This theory gradually transforms into a particular form based on the analysis of data growing throughout the course of the study.

The reason for using qualitative method, because qualitative research discerns to the object as a whole (holistic). Every aspect of an object that has a unity that can not be separated, it is dynamic, full of meaning and relationships and interactive symptoms (reciprocal). In qualitative research, the meaning is something that can only be obtained if it is connected with the information and context. Information (eg. what happens) and context (things relating to b.

surroundings). The information which is omitted from its context will lose its meaning.

Therefore, in a qualitative study, researcher intended to understand the social situation deeply, find the process, patterns and theories. Research with qualitative methods used to obtain in-depth data, a data implies meaning. The meaning is the actual data, the actual data is value behind the apparent data. Therefore, qualitative research emphasizes more on the meaning. So ¹³ in this study used a qualitative research method.

Research Sites:

The research was taken place on the area of Coastal Categorized slums. The study involved three (3) areas. They were sub-Cambaya district-Ujung Tanah, sub-Tallo district-Tallo and sub-Biringkanaya district-Untia.

Data Analysis Method:

The data analysis was conducted using spatial analysis techniques and descriptive statistics analysis (table frequency or cross table). In this study, the researchers use analysis unit of coastal slums settlement. The object being studied in the first year for each unit of analysis are: (1) map of coastal slum characteristics include: (a) the distribution pattern of the settlement; (b) the density of settlements; and (c) the permanence of the building; (d) the type of disaster that ever hit settlements; (e) topography of settlements; (f) the geography of settlements; (g) security tools of settlement around the beach; (h) facilities infrastructure (infrastructure) slum; (i) (2) socio-economic and cultural characteristics of the population include: (a) type of work; (b) the economic level; and (c) level of education; (3) physical environment characteristics include: (a) Characteristics of the coast; (b) land form; and (c) physical accessibility.

Results And Analysis:

A. Region Position of City BeachL

The end result of research in the district Land, Tallo and Biringkanaya and secondary data study of some similar locations / regions showed that:

a. Boundary of coastal areas do not only cover part of the city on the ground and face the sea, but also include a part that is above the water. Even previous developments were initiated by the presence of some settlements on the water area.

b. Orientation activities on coastal area of land and sea -based, such as trade, ports and transport, fisheries and settlements.

B. Overview Specific Coastal Area of Makassar:

1. Patterns of settlement distribution:

- a. Sub-Cambaya district-Ujung Tanah

**Fig. 2:** Air Map Sub-Cambaya

Source : Tele Atlas (Google Earth) 2012

The first location of this study is one of the coastal areas in Makassar, located in district-Ujung Tanah in sub-Cambaya. sub-Cambaya directly adjacents to the boundaries of the region :

- North: Makassar Strait district-Ujung Tanah
- South: Sub-Camba Berua District-Ujung Tanah
- West: Sub-Gusung district-Ujung Tanah
- East: Sub-Buluo District-Tallo

Geographically, location has at 5 ° 06 39.13 S - 119 ° 25 35.82 Cambaya E. In Sub-Cambaya, there are 5 RW and 22 RT.

Cambaya population has 6, 079 inhabitants, which consists of 3581 men and 2498 women. Of the 6, 079 inhabitants of population consist of 1, 255 households. with its population density is 12 015 / km². The total area of settlements is 0.53 km² and altitude of settlements is < 500 m, and the distance from office-sub to office district is 300 m², and a total building area of 0.30 ha school / m². While the height of the area from the sea level is 2 meters.

Based on the above data pattern of people settlements in Cambaya generally linear, irregularly with high building density. Uncontrolled population growth in Cambaya causes dense district and slums. The highest population density in cambaya is located in RW 1 reaching 65 % and RW RW 3 and 4 also have a very high density that is 80 %, which resulting in a lack of green open space on the those 3 RW dan also causing the circulation of the road very narrow. Almost all parts of the districts have been built with the houses, so that only ± 10 % of the surface of the land is open space.

Patterns are applied in a row house in settlements in Cambaya only divided by the environment with the road width ± 1.2 to 2 meters. and the population density causing the environment is not maintained, causing a decrease in the quality of settlements. There are about 70 % of 100 % of the population in Cambaya admitting to the local area is very dense about 97 % of 100 % of the population has an extensive yard / vacant land < 10 m².

The length of period of People live in Cambaya from birth or over 20 years is 72 % and who live less than 10 years is only 10 %. Most people want to build a house not far from their relatives' or family' house. One of the respondents said that almost all of houses or a population that lining around **her/his** house belongs to close relatives of the respondent.

Concerning to a number of households or people, there are a lot of land needs to be fulfilled. However, the land that is used by most citizens is government land. In this case the status of the land that they use is merely as right to use. Recorded of 50 % respondents who use the land is as right use, 33 % is with the status as proprietary right and 17 % exists as tenure right. As a result of the high rate of illegal land ownership status can decrease settlement quality.

Under these conditions, strong winds can be anticipated but it tends to be vulnerable if there is fire. The houses located on the edge of the sea line very densely, If noticed between the distance of the beach and the settlement in Cambaya do not sustain coastal border. Due to the the high level of building density, vegetation is scarcely found.

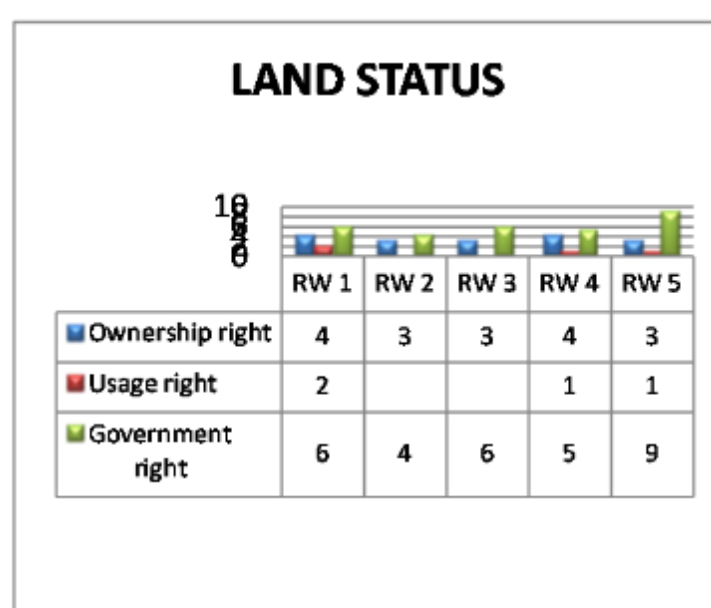


Fig. 3: Pie Chat of Land Status of Sub-Cambaya
Source: Analysis

c. Sub-Untia Districts-Biringkanaya:



Fig. 4: Air Map of Sub-Untia
Source: Tele Atlas (Google Earth) 2012

Sub-Untia is one of the subs located in district Biringkanaya. The total area is 2.89 km² and consists of 5 RW. This area is included in the area of the development of residence, industry and tourism. It encompasses Sallodong and Ir. Sutami streets. In Untia, there area also some places only as a path and a small hallway. To get there, the north borders on Maros region.

The total population in Untia is 2, 060 consisting 1, 073 men and 987 women with a number of households is 421 people. RW 2 is known as highly inhabited. There are 576 people. While RW 4 is the fewest inhabited by men. There are 432 people in RW 1 and it is considered as the most highly occupied by women. And the fewest number of women can be found in RW 3.

From the observation of the location of the settlement pattern in Untia generally uses Linear following the pattern of road network. It is regularly managed with its medium building density. Land use is dominated by the settlement of fishermen and the remaining is open space. House pattern is similar to

the previous one that is progression system divided by the environmental road with its width $\pm 1, 5 - 2, 5$ meters.

Under these conditions, strong winds can be anticipated very well. Placement of vegetation can also reduce the strong winds that often occur in Sub-Untia. The house located on the edge of the sea line very densely, it is influenced by the laying of vegetation. If we notice such distance, people in Untia keep retaining the coastal border of ± 20 meters.

d. Sub-Tallo District-Tallo:

The second location of study is one of the coastal areas in the ci Makassar. Administratively, Tallo is located in District Tallo, Regional Level II Makassar.

The geographical position of its office is located at S 05 o06'26, 7 " and E 119 o26'22, 9 ", with boundaries :

- North: Makassar Strait

- ⁴ South: Tallo River District. Tamalanrea
- West: Makassar Strait
- East: Sub-Buloa District-Tallo



Fig. 5: Air Map of Sub-Tallo

Source : Tele Atlas (Google Earth) 2012

Tallo is inhabited by 8017 people, made up of 3,898 men and ⁴ 4,119 women. Number of pre-prosperous family in Tallo is 1,043 families.

Based on field observations the pattern of settlements in the Tallo generally linear and Spread following the road network . It is irregularly managed with medium building density. Land use is dominated by residence, the oil processing industry and the remaining is private open space.

House pattern is similar to the previous one that is the progression system divided by the environment with the road with its width $\pm$ 1.2 to 2.5 meters . Under these conditions a strong wind disaster can still be a threat. However, if there is a fire can still be

solved quickly. The houses located on the edge of the sea line ver densely, If it is noticed between the distance of the beach and the settlement do not sustain coastal border. Even still there are houses that settled over the water.

2. Physical Condition of Building

a) Sub-Cambaya District-Ujung Tanah:

Questionnaire recapitulation result is in accordance with the physical condition of the building that can still be found a simple and semi-permanent buildings reaching 27 %, 37 % of permanent buildings, 27% of stages, and 9 % of non-permanent buildings.

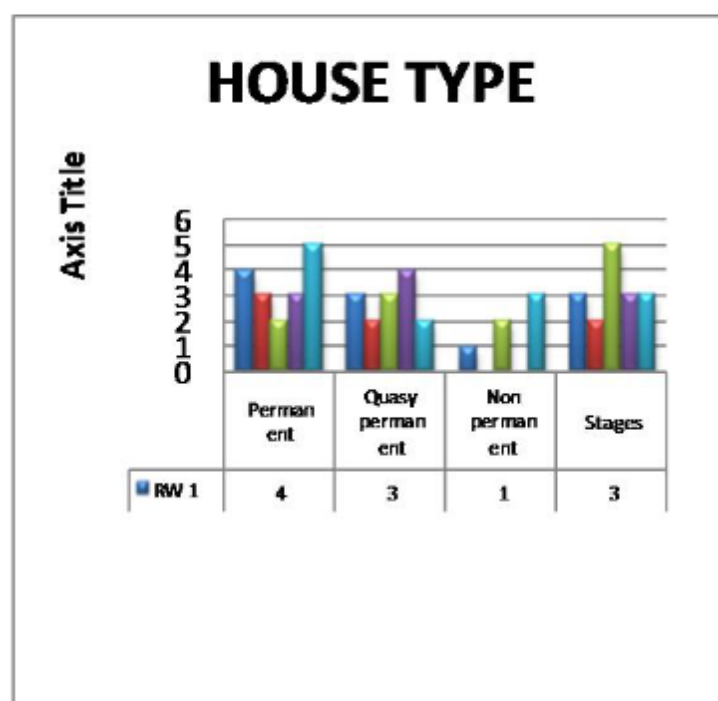


Fig. 6: Pie Chat of Building type of Cambaya

Source : Analysis

Building occupied by society are diverse. there exist sizes of 36 m² and 21 m². In the vast building structure has about 36 m² that can hold 6-7 people therein, and on then average in a single unit has two

families, and a building which has width 21 m² inside inhabited 3-4 people and on the average of 1 family. Secondary Cambaya data in 2007, there were 300 houses that used the wall, 100 houses used

wood, 50 houses used bamboo. While there were 100 houses with floor-tiles, 100 houses with cement and 50 houses were merely with land. Besides the condition of the building floors, there were 500 homes with tile, 100 homes used wood and 10 used concrete.

As for the recapitulation of the existing facilities inside the houses recorded 73 % has a bathroom and a toilet. And 27 % has a bathroom and a toilet outside the house. In addition to the bathroom and toilet as facilities, also recorded the room facilities that provided in the house. 65 % has a living room +

kitchen + sleeping area, 20 % has a living room + sleeping room + kitchen + tavern, and 15 % has living room + bedroom. From Recapitulation of the data above can be concluded that it is necessary to apply a tactical step to solve the problem, that is by providing an understanding to citizens on how to take shelter with a capacity in accordance with the size of their houses, protecting the environment to stay clean and healthy. As well as providing an understanding of the use of natural building materials.



Fig. 7: House Stage Combination

Source : Sub-Cambaya, District-Ujung Tanah

a) Sub-Untia Distric-Biringkanaya:

Physical conditions of Buildings in Untia influenced by ownership land status in which there are still many families live there only have tenure

because the houses in the study area belong to fisherman facilitated by Makassar government, it can be seen from Fig following diagram:

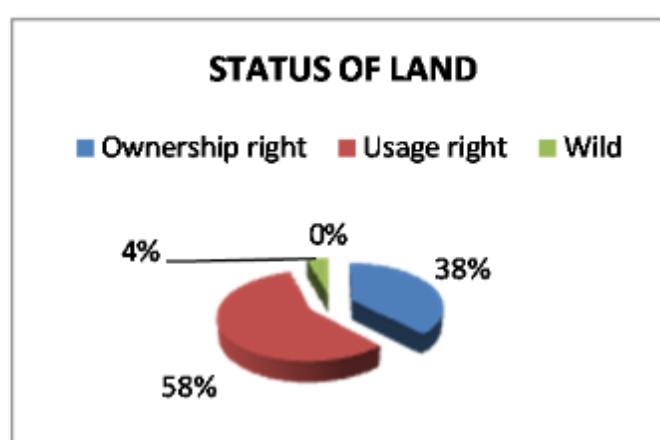


Fig. 8: Status of Land Ownership

Source : Analysis

It can be seen that land status in Untia on average is still as tenure right. This is because Untia residents on average are from other areas that take advantage of the government's empty house because it has not been occupied and also they already have

new families. Land status may also affect maintenance and development. On the average the houses in Untia are designed and built permanently and semi-permanently. It can be seen from Figure of the following diagram:

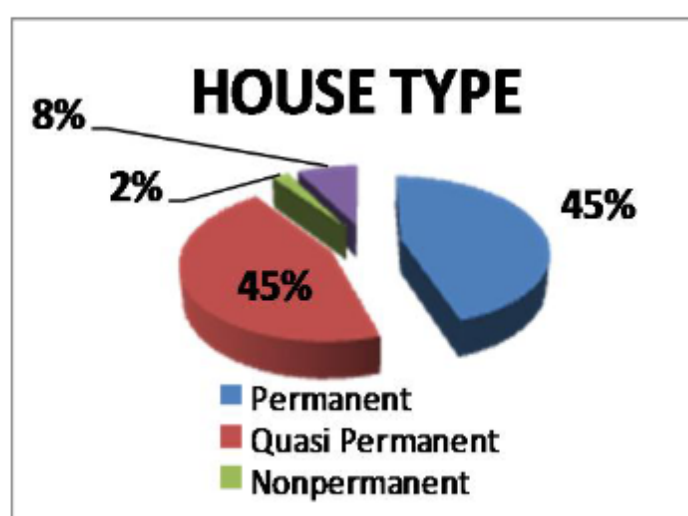


Fig. 9: House Type
Source : Analysis

In this diagram, we can see many people develop the houses into permanent types because they already have land status there. But some of them still maintain the old house type. They choose not to renovate houses because of several factors such as the land status is merely as use right and as well as economic factors.

Although residents preserve the house, but this is not in line with the maintenance of the environment. Many residents litter garbage in canal. As a result, garbage piles up. it is also highly influenced by the lack of facilities that exist in the area, both in terms of facilities and infrastructure.

in figure 10 below we can see a house stage which is dominantly built with wood and a zinc roof.



Fig. 10: House Stage
Source: Sub-Untia, District-Biringkanaya

Based on our direct interview data in the field, the length of time of people live in Untia as follows:

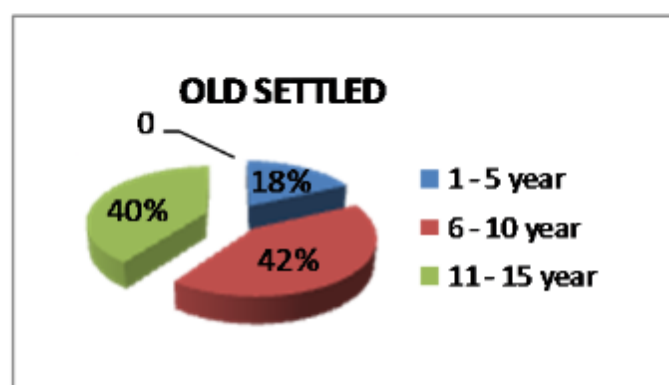


Fig. 11: old settled diagram
Source: Sub-Untia, District-Biringkanaya

b) Sub-Tallo distric-Tallo:

Based on field observations of the physical condition of the buildings in Tallo, it can be concluded that it is very diverse. Starting from the

House Permanent and semi - permanent seen in Figure 30, clearly visible the wall uses bricks, the finishing and the floor use ceramics, but most of parts of the house use wood and zinc roof.

**Fig. 12:** Permanent Stone House

Source : Sub-Tallo, District-Tallo

In addition to the physical condition of the building above, there are still some houses built above the water. Generally, those who live on the water or floating house work as a fisherman, the condition can be seen in figure 31 below. most of the

structures of the house use wood, for roof and wall they use zinc. Those who live above the water does not have a decent toilet and bathroom, they dispose of household waste directly into the sea.

**Fig. 13:** Floating House

Source: Sub-Tallo, District-Tallo

3. *Environmental Physical Condition:*

Makassar is a coastal city in which its area is flat and only a small parts as high lands, located in Biringkanaya, Along the River watershed Tallo, ² Tamalanrea, Manggala, Panakukang, Ujung Pandang, Wajo and Ujung Tanah. Overall the height for this area ranges between 1-25 meters above sea level with an average slope 0-5 ° westward.

In Topography, it is a meeting between land and water, sloping plains, and frequently, there occurs erosion, abrasion and sedimentation causing silting of water bodies.

In hydrology, it is a tidal area, has a high ground water, there is pressure of sea water on groundwater, as well as a retention area so that the run-off water is low. Makassar affected by hydrodynamic beach / sea which consists of several elements, such as wind, wave / surge, underwater currents, tidal currents, tides, abrasion, and sedimentation. Relating to these matters, the physiographic of Makassar is relatively unstable, because in the dry season sedimentation direction is from north to south, while in the rainy

season sedimentation direction is from South to North.

In Geology, most of parts have loose rock structure, soft soil, as well as it is prone to get sunami. High relative humidity ranges between 71 and 89 %. Large rainfall on average of monthly scale ranging from 5 to 692 mm with the lowest rainfall occurs in September-October and highest is in January-February. Temperature / air temperature in Makassar is on average about 26 ° C to 33 ° C. The speed ranges between 9 and 16 knots. Sun on average of monthly scale ranges between 38 and 95 %.

Solar radiation tends to increase from January to May and then declines in June and July, and reaches a maximum in August, then declines until December. Displacement of marine function resulted from its surrounding activities causing some environmental problems, such as pollution, sedimentation and catastrophic flooding / inundation.

C. Sustainable Management Strategy:

Integrated coastal zone management requires the existence of a common vision among stakeholders. Realizing the importance of the management vision, it is necessary to spearhead the formulation of mutual vision as the realization of the management of coastal resources that is environmentally and sustainably sounded, supported by improving the quality of human resources, regulation and law enforcement, as well as the arrangement space for the realization of people's welfare. Referring to this vision, the strategy of sustainable integrated coastal zone management must consider the aspect of human resources, legality, space, and the common welfare.

Coastal zone management strategy will be focused on addressing the main issue that is the conflict utilization of coastal area, which simultaneously also associated with the handling of other issues. The basic idea in the formulation of management strategies includes sustainability, protection and preservation, development, equity, and communication. From this idea, it is formulated that management strategies accommodate the values, issues, and management vision.

Coastal management strategy focused on utilization are as follows:

1. Identifying the space users and needs.
2. Preparation of coastal spatial planning to address the conflict issue.
3. Determination of coastal border and mangrove planting.
4. Control of reclamation.
5. Tightening the standard of waste quality and waste management.
6. Slums arrangement.
7. Improving drainage system.
8. Consistency of law enforcement

D. The concept of structure of sustainable coastal settlements in Makassar:

Some examples of the concept of the design elements that can be applied to the coastal region of Makassar through structuring a sustainable built environment, by controlling the micro climatic factors (sunshine, wind, humidity, rain, vegetation, and water), among others, by:

1. Creating linkages between water management, green layout, tat open space, and land use planning in urban scale in an integrated Citywide Linkage.

2. Creating shade elements in condition veranda is in the scale of the building in the form of an atrium, hallways, balconies, plaza, park roof (roof garden) or Clio, the completion of wall that extends vertically as well as the temperature of the cooling water system for vertically or Horizontally built (fountains, ponds, waterspray).

3. Creating shade elements in the scale of the region through the design of pedestrian pathways ornamented with shade elements such as pergolas, aquatic landscape design and vegetation in open spaces, the design of the road surface material that can absorb water.

4. Designing buildings that can optimize the use of natural air system and avoid radiation heat stored in the walls of the building.

5. Controlling air flow system from-to urban areas through the arrangement of corridors and pockets of open space for air circulation to avoid occurring of heat island in the source of temperature rise.

6. Creating open network spaces and vegetation in certain scale of urban city.

E. Guideline of arrangement model of Sustainable Coastal settlements in Makassar:

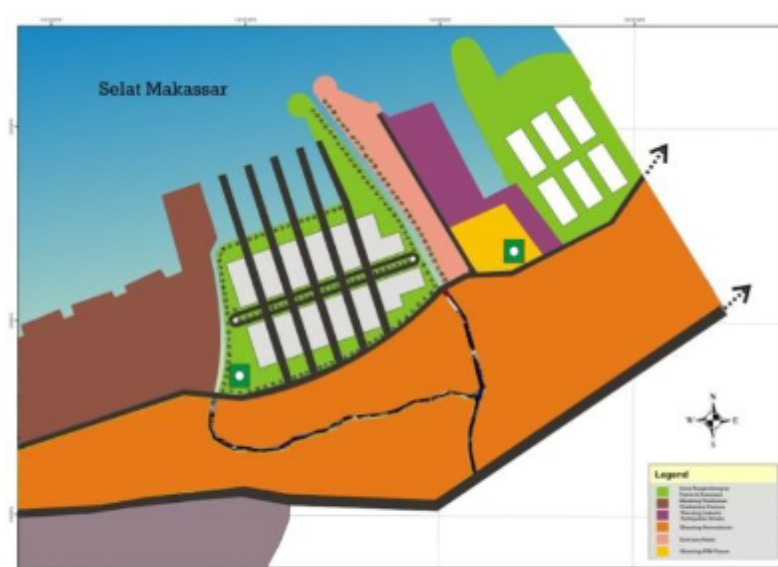


Fig. 14: Guideline Cambaya Zone Village Area, District Ujung Tanah

Source : Design Analysis

In cambaya, it uses grid pattern, previously the pattern used was not clear, untidy and grubby due to the very high level of house density that it required a fairly complex concept approach. considering these conditions, offered a new residential concept called

'Rusunami'. Concerning that the area is prone to get fire and flood tide. Besides that they earn living as fishermen and fishmonger, so building some piers is necessarily conducted in this area.



Fig. 15: Guideline Zone of Sub-Tallo, District-Tallo
Source : Design Analysis

In Tallo, it uses Combination patterns of Radial and Grid, in which previously, the pattern applied was not clear, irregular but house density is still in the moderate category, so it is still possible to develop with environmentally friendly concept.

Mangrove and Nipah ecosystems in Tallo used to grow very much, but now, it is almost exhausted. Therefore special reforestation is necessarily done for the continual and existing fish life in seashores

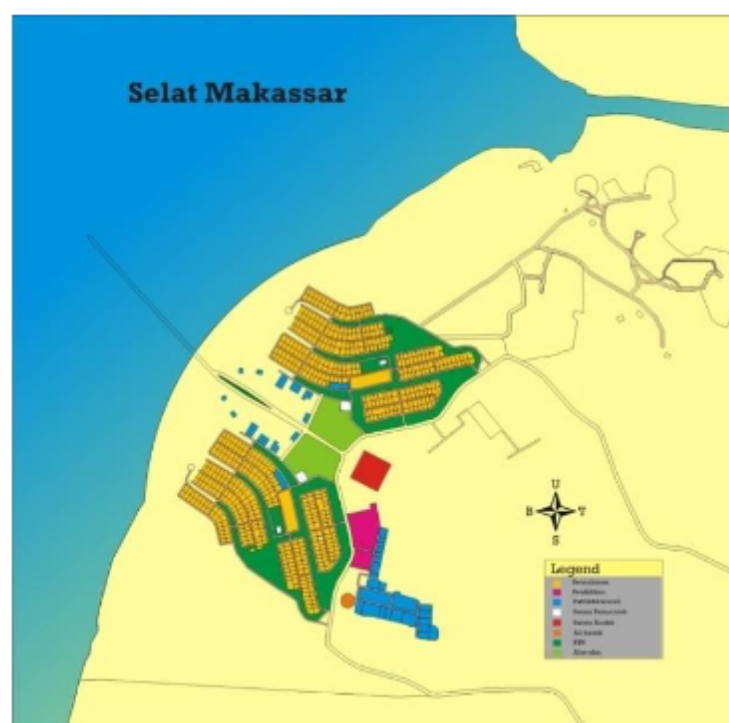


Fig. 16: Guideline Zone of Untia District-Biringkanaya
Source : Design Analysis

In this zone it applies Grid and Cluster patterns, as recorded the population is still in small number. the people here work as Farmers and Fishermen. This area is known as Integrated Relocation fishermen region. This pattern is very suitable to apply in Untia concerning its population number is still low.

Conclusion:

a. Characteristics of Marine Areas / Coastal Areas:

- Coastal area is a strategic area because it has topograph which is relatively and easily developed

and has very good access (by using sea as movement infrastructure).

- Coastal is rich area in natural resources, both contained in the mainland and in sea space, which is needed to support human needs.

b. *Settlement patterns:*

The formation of a built environment that referring to a settlement, is a functional coordinating process that is based on human activities and the influence of settings (environment) both physically and non-physically (social and culture) that directly affect the pattern of activities and coordinating process. Based on the existing condition of the study area examined from three different locations that obtained three (3)

distribution patterns of settlement that is linear in Cambaya, cluster pattern in Sub- Untia district-Biringkanaya while Tallo is a combination between linear and Cluster.

Suggestion:

The concept of settlement arrangement of the coastal area sustainably focuses on the characteristics of its settlements, which are managed with consideration of environmental parameters, conservation, and quality of life, identified comprehensively and integratedly through public

cooperation, scientists and governments, to find proper coastal management strategy.

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