Study of Green Architecture in Slum Settlements at Belawan Harbor City

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ABSTRACT

The Bagan Deli Sub-district settlement in Belawan Harbor city is a densely populated settlement. The dense population is not evenly distributed but at certain points only. The condition of this settlement has a lowland with an altitude of 1 (one) meter above sea level. The problems that occur in Bagan Deli are garbage accumulation, tidal flooding, poor drainage systems and lack of awareness of throwing garbage into drainage. Tidal flooding occurs every time so that water enters the house causing the house to become dirty and seem very slum and unhealthy in the Bagan-Deli settlement. The method used by Green Architecture refers to the Building Green Building (BGH) regulation. The goal is to increase the efficiency of energy use, water, and the use of house materials. Green Building related regulations are Number 21 of 2021 concerning Technical Planning Stage Parameters for Green Areas The criteria that become requirements include; improving the welfare of the local population, improving the service function of infrastructure and facilities in the area, controlling the microclimate and preserving the ecosystem in the area, reducing the thermal impact on other areas in the dry season, reducing the burden on infrastructure and facilities, using environmentally friendly materials.

Keyword : Belawan; **Architecture**; **Waste; Flood; Settlement**

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1. INTRODUCTION

Belawan City is an international port with very high intensity. As a gateway port for sea transportation. This area is one of the growth centers of the national strategic area. As an international port city, it is very contradictory, the port area and its settlements should be well organized in such a way that it can bring in more investors or visitors to do business and travel. Belawan City does not seem to be in line with the economic conditions of its citizens, especially in the Bagan Deli Village area, the majority of whom earn a living as fishermen or shellfish catchers at sea. In addition, coastal pollution has also occurred from industrial/factory waste upstream and household waste. Garbage is still a problem because it has polluted the river and the location where the community lives. This is because there are still many community members who throw garbage into the river.

As a result of this pollution problem, the Bagan Deli area also has a slum problem. The houses in this area are semi-permanent, relatively small in size, and made of boards and tepas. The houses are built improvisedly on plugs that at low tide look very dirty due to scattered garbage, making the neighborhood very shabby.

1.1. Bagan Deli settlement of Belawan Harbor City.

Bagan Deli sub-district in Belawan Port city is a densely populated settlement. The population density isnot evenly distributed but only at certain points. The condition of this settlement has a lowland with an altitude of 1 (one) meter above sea level. The problemsthat occur in Bagan Deli Village are the accumulation of garbage, poor drainage system and lack of publicawareness not to throw garbage into the drainage. In addition, flooding caused by high tides is called rob. Tidal flooding is caused by water deliveries that occur because the land upstream receives large rains that flow into the downstream area.

Tidal flooding can be prevented by building houses on stilts. However, due to the impact of global warmingand the flow of water clogged in the drainage due to garbage, then stilt or floating houses become a design solution. In addition, according to Kaspan (2017), health problems that exist

in this slum environment areARI diseases, skin diseases and low fulfillment of basicneeds which include incomplete nutrition. Based on these conditions, it is a special concern in the field of urban planning to make the city cleaner and healthier for its residents who are feasible in accordance with applicable standards and regulations. Therefore, the author tries to analyze the condition of the settlement with the Green Architecture approach.

Fig.1. Settlement condition in Bagan Deli sub-district.

1.2. House Condition in Bagan Deli neighborhood

The condition of houses in Bagan Deld can be seenfrom the floors of houses made of wood with conditions,the walls of the houses are mostly made of boards, namely 66%, the foundation is still made of wood around22%, the roof is made of zinc, but without a ceiling so itis hot during the day. The following can explain the condition of the house one by one;

1) House Type. The condition of the buildings is mostly non-permanent with minimal area and

unorganized and does not meet health requirements. The building materials used are makeshift and inadequate.

2) Building Density. Building density is high with anaverage of 10-25 families in each alley with a total of 199 families in Lorong Mesjid. The increase in population results in an increased need for housingwhich results in building density. Seeing thelimited land conditions results in the absence ofdistance between residential buildings in accordance with the specified standards so that this area becomes slum due to the density of houses built.specified standards so that this areabecomes slum due to the density of houses built.
3) Number of Occupants. The number of occupantsin a house also contributes to the slums of an area.The ideal number in a house is 5 people, but in factin Lorong Mesjid Lingkugan there are an average of 6-7 people occupying the house. If the number of occupants increases, the homeowner adds or expands the building regardless of the applicableregulations. Air circulation and ventilation.
4) Road circulation in the neighborhood is 2.7 meters. The road material is heavy, making the settlementlook dirty and shabby. Air circulation is also unhealthy because the houses are not neatly arranged, causing the circulation of air to be unbalanced.

1.3 Characteristics of slums

The characteristics of slums are often described and synonymous as irregular, shabby, unhealthy, unaesthetichousing areas whose conditions are no longer in accordance with the development of urban planning, andare closely related to the economic conditions of the lower middle class (poverty). Slums are settlements thatare not habitable because they are located on land that isnot in accordance with the designation or spatial layout,very high building density in a very limited area, prone tosocial and environmental diseases, low general quality of buildings, not served by adequate environmental infrastructure, and can endanger the survival of itsresidents. (Novalinda, 2022).

Characteristics of settlement formation The characteristics of the formation of these slums can be influenced by the presence of a center of activity in theform of activities activity center in the form of a ferry portand also its location in the coastal area is also a settlementabove the water or in the tidal area so that it can be categorized as settlements above the water or in the tidalarea so that they can be categorized as tidal area slumsand slums close to the center of economic activity economic activities.

The physical condition of buildings, facilities, and infrastructure of a settlement includes, among others: According to BPS (2015), a livable house has a construction that is safe and strong for the residents inside, the building materials are good and durable, the building materials owned are permanent, easy to maintain and there is an electricity network in it. Meanwhile, uninhabitable houses based on the type of construction are houses with dirt floors or low-quality wood.

2. RESEARCH METHOD

The method used to discuss the problem of slum environments is to use qualitative descriptions by explaining the existing conditions of the Belawan Portcity area. The assessment of the level of sustainability is considered through social aspects, economic aspects and environmental aspects (Circular Letter Number: 01/SE/M/2022). The criteria for assessing the sustainability of housing or settlement areas consist of 6 (six) criteria, namely

1) Improvement of the welfare of the localpopulation.
2) Improving the service function of infrastructureand facilities in the area.
3) Controlling the microclimate and preserving theecosystem in the area.
4) Reducing the burden on infrastructure andfacilities.
5) Reducing the thermal impact on other areas during the dry season.
6) Use of environmentally friendly materials. Environmentally friendly materials are materials that when used and disposed of, do not have the potential to damage the environment or surrounding ecosystems or interfere with health.

Green architecture is a building planning approach that can minimize various harmful effects on human health and the environment and is sustainable. The elements contained therein are landscaping, interior, which become a unity in terms of architecture. The main goal of green architecture is to create eco design,environmentally friendly architecture, natural architecture and sustainable development. Green architecture can be applied by increasing the efficiencyof energy use,

water and the use of materials that reducethe impact of buildings on health. Green architecture design includes the layout, construction, operation andmaintenance of buildings and bulding configuration.

According Fukuda (2018), building configurations with different compactness significantly affect the microclimate. Insolation through urban form has a significant impact on temperature change. Urban form and microclimate on the hottest day reached the highest RH with the main orientation facing the wettest direction, showing the importance of proper orientation.Building plots with North-South orientation achieve the lowest air temperature, while square plots have the highest wind speed.

2.1 . Green Area Assessment Criteria

The method used to discuss the problem of slum environments is to use qualitative descriptions by explaining the existing conditions of the Belawan Portcity area. Based on these conditions, it will be analyzedthrough Green Building parameters with green area parameters so that it can solve the slum area design problems of Belawan Port City gradually and sustainably. Planning and Assessment Stage Green areais a tool to assess or evaluate the level of sustainabilityof housing and residential areas both new and existingareas.

2. Analysis and discussions

The first thing that will be analyzed in this slum problem in Bagan Deli Belawan is to make a priority scale based on (Circular Letter Number: 01/SE/M/2022). Analysis of the Belawan Bagan Deli settlement environment with the following indicators;

1) Improving the welfare of the local population. In terms of achieving welfare, most of the residentsin Bagan Deli earn their livelihoods as fishermen,so it can be ascertained that their daily income isstill low; some are Rp. 30,000 - Rp. 50,000 per day. Meanwhile, family needs are numerous, such as school fees, food, and other monthly needs. All of this is not enough to achieve family welfare.
2) The need to fulfill the necessities of life, such asclothing and food, is the main priority for residents in allocating their expenses. So as to provide comfort and satisfaction for residents tooccupy this environment.
3) Improving the service function of infrastructureand facilities in the area. Creating a house area with a block-by-block system, with the consideration that it is monitored in detail to obtain environmental facilities such as drainage,street lighting, environmental roads, pedestrians, landfills and others.Each neighborhood road hasa width of no more than 1.5 meters and does notyet have neighborhood street lighting facilities, so at night the alley in the Lorong Mesjid Neighborhood becomes dark and is only lit by residents' house lights.
4) Control the microclimate and preserve the ecosystem in the area. The condition of the ecosystem in the Bagan Deli settlement is very low. In addition to the very hot weather, it makes it difficult for living things such as birds to live. As a solution, vegetation and trees should be planted that can serve as an ecosystem or habitat for living things, trees as green plants also bring in animals such as birds. So that the balance of air and the environment becomes beautiful and comfortable for humans.
5) Reducing the burden on infrastructure and facilities. Ecosystem or habitat for living things, trees as green plants also bring in animals such as birds. So that the balance of air and the environment becomes beautiful and comfortablefor humans.
6) Reducing the thermal impact on other areas during the dry season. Reducing the burden on infrastructure and facilities. Drainage conditionsare not free from scattered garbage, this is due tothe absence of adequate landfills in Bagan Deli Village.
7) Use of environmentally friendly materials. Houses in port or coastal areas should use natural materials such as wood or bamboo. Making the material of the city as a whole as themain guide in the form of design and layout equipped with Green Building relatedrequirements in the port city area in Belawan.

To anticipate the occurrence of flooding in the environment that settlement, the researchers studied theformulation so that tidal flood water does not enter thehouse, among others by designing a form of house layout arrangement and in blocks and clusters as follows

1) The arrangement of the area is designed in groupsor clusters that form a green open space in the center. Making blocks of houses with consideration must have green open space as a play area or as air circulation in the house area.
2) Creating a floating house foundation solution in areas where tidal flooding often occurs. Accordingto Novalinda (2022), a suitable house foundation for coastal houses at risk of tidal flooding is a floating foundation using drums that areassembled so that they float in the event of tidal flooding (rising water).

Fig.2. Facility and infrastructure design

Fig.3 Illustration of the design perspective of theBagan Deli-Belawan residential area

In addition, house facades and roofs are also ofparticular concern in the Belawan area as a port city. Asthe elements most exposed to solar radiation, roofs andfacades offer important heat exchange surfaces. Their design can help reduce overheating of buildings, without wasting energy. Beside, the existence of Green Open Space (GOS) is needed in this port city, an elongated area/path and or grouping, whose use is moreopen, where plants grow, both naturally growing plantsand those are deliberately planted. Currently, the city of

Belawan has a hot temperature above 34 degrees..

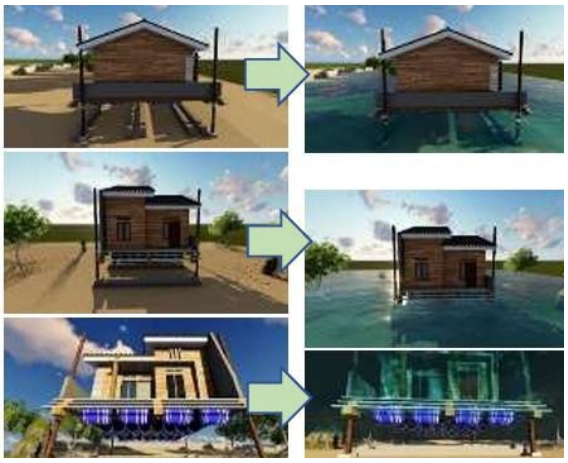

Fig.4 Illustration of a floating house

3. Conclusions

From the above analysis, conclusions can be drawn,among others;

1) Improve the welfare of the community in the residential area in Bagan Deli. By increasing the income of residents who meet their daily needs andchildren's school fees will make the welfare of the community area aims to maintain local characteristics in the area which include local architecture, cultural heritage buildings and local community participation.
2) In the arrangement of settlements, it is recommended that houses and settlements bedesigned in clusters that form one green open spacein the middle of the building, this is so that settlements get good air and circulation. Creating a block-by-block system housing area, with the consideration that it is monitored in detail to obtainenvironmental facilities such as drainage, street lighting, environmental roads, pedestrians, landfillsin settlements..
3) Creating a floating or stilt house foundation solutionin areas where tidal flooding often occurs, so that houses can respond to flood hazards that can occur at any time. By paying attention to water circulationand proper drainage channeled on its path.

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