Model of slums rejuvenation in Telaga Tujuh village: the case of Langsa city, Aceh, Indonesia

Mirza Irwansyah¹, Irin Caisarina¹, Dini Solehati²
¹Department of Architecture and Planning, Faculty of Engineering, Syiah Kuala University, Banda Aceh 23111, Indonesia
²Master of Civil Engineering Student, Department of Civil Engineering, Syiah Kuala University, Banda Aceh 23111, Indonesia

E-mail: mirza.hasan@unsyiah.ac.id

Abstract. Telaga Tujuh village is the only island inhabited compared to other islands in Langsa City, Aceh. Most of the houses are on stilts with very limited infrastructure such as lack of road facilities, local drainage, drinking water, wastewater, and garbage disposals. In determining the model of the slum settlements arrangement of Telaga Tujuh Village, there are some things to know that the characteristics of slums themselves and the causes of slum settlement. The aim of this study is to determine model of slum settlement arrangement that is suitable to be applied in the location. The method used is qualitative with sampling technique and qualitative analysis. To obtain the primary data used observation method, questionnaires, and interview. Secondary data obtained from agencies related to slum settlement arrangement. Based on characteristic analysis found that 365 residential buildings are irregular with the percentage of 100%, 365 residential buildings do not have safe drinking water supply, 365 residential buildings do not have waste water management. From the analysis shows that the appropriate model to be applied to Telaga Tujuh village is the rejuvenation model with the land consolidation system through the re-arrangement divided by two, 60% for the existing residential development and 40% for commercial development.

1. Introduction

Along with the growth of population in urban areas, the needs of housing, provision of facilities and infrastructure increased, either an improvement or new construction. Settlements and infrastructure need both in terms of housing or the environment of the neighborhoods that are affordable and livable yet fully can be provided by the community itself or the Government. Thus, the carrying capacity of environmental facilities and infrastructure of existing settlements began to decline and eventually contribute to the occurrence of the slums. One of the slums located in Aceh is in Langsa City, located in Telaga Tujuh village. The village has a total area of settlement 5.94 ha with a population of 1,574 people comprising of 420 families. Based on area and population, level of average population density is 152 people/ha. The number of built houses in Telaga Tujuh village totaled 365 buildings. The city government of Langsa has implemented programs related to the improvement of the environment, including the improvement of facilities and infrastructure of settlements, environmental sanitation and garbages, housing sanitation acceleration program, and provision of clean water, but was unable to reduce the slums. This is shown from a drinkable water supply is only 5%, the lowest order in Langsa city, sanitation for only 3%, ranks last in the city, low levels of public health is demonstrated from the number of cases of the disease environment often inflicted on the community i.e. cases of diarrhea.
Based on these conditions, then it is important to know the model of the arrangement of slums that are suitable to be applied on-site research.

2. Literature Review

2.1. The Slums
The slums are the settlement that is not habitable because of the irregular buildings, building density level is high, and the quality of buildings and facilities and infrastructure are not eligible. While slum housing is a housing that decreased the quality of function as occupancy (Act of the Republic of Indonesia number 1 Year 2011 about Housing and Settlement Area). The slums are part of the environment outside protected areas, urban and rural environment, functioning as residential or residential neighborhoods and places of activity that support livelihoods and livelihoods.

2.2. Characteristics of Slums
The characteristics of slums are:
1. The condition of houses in the slums were forced under the standards, an average of 6 m²/person;
2. These settlements for the physical benefit of principal that is close to the workplace and home prices are also cheaper both buying or renting.

Besides that, there are other opinions that mention the characteristics which are based on the slums, namely:
1. The slums inhabited by a dense population and huddle rooms, due to both natural population and high migration from the village;
2. Slums are inhabited by citizens who are on low incomes or producing sub-systems, living below the poverty line;
3. Housing in the neighborhood of low quality or fall into the category of home emergency (sustainable housing condition), i.e. the building houses made from the traditional materials, such as bamboo, wood, reeds, board and other rapidly destroyed materials;
4. Conditions of hygiene and sanitation are low;
5. Lack of urban services such as clean water, toilet facilities, sewage and garbage disposal systems and fire protection;
6. Unplanned growth so that physical appearance is irregular and neglected;
7. Socially isolated from other layers of society;
8. The settlements are generally located around the center of the city and are often unclear as well as the legal status of the occupied land.

2.3. Model of Rejuvenation
According to Law number 1 Year 2011, the rejuvenation model is an effort to dismantle part or all of the housing and settlement environment and then in the same place constructed new housing and settlement infrastructure and settlements that are more suitable in accordance with the regional spatial planning [1, 2]. The main purpose of this activity is to increase the value of optimal land use in accordance with the potential land. In addition, it is expected to provide the consequences of the technical form of structuring as well as land consolidation, land re-adjustment, and land sharing [2]. According to Trianto, one of the strategies in rejuvenating is consolidation of land [2]. Land consolidation is the incorporation of several parcels of land (owned by different owners) and removes the ownership limit into a large site that can be used for a planned development project. This scheme is typically conducted in the old neighborhoods with low-density in the center of the city, and transforming it into part of a new, high-density city with smaller units of houses, more efficient designs, better public facilities and infrastructure [3].

The principle of land consolidation can be done in several ways including [2]:
1. Rights to land before and after consolidation are not changed to be higher or lower.
2. Land pooling by the government. The land collection is a land adjustment technique whereby the entire rebuilding process must be carried out by the government and allocated in some areas for the old occupants.

3. Land consolidation (reblocking) in the slums. Land consolidation can be done by leveling the entire building with the land, and rebuilding from the beginning a denser and more efficient settlement in the utilization of its space.

4. Involve the active participation of landowners.

5. Land given back to the owner has a higher value than before the land consolidation.

3. Research Location

Pusong. The village of Telaga Tujuh is a densely populated island and is the only inhabited compared to other islands in Langsa City. Geographically Village of Telaga Tujuh is located between 04° 46'77.05" North Latitude and 97° 96'57.04" East Longitude. The width of Village of Telaga Tujuh is 5.94 ha with a population of 1,584 people and has 420 Family Heads (KK) spread over 5 (five) Dusun (hamlet), Dusun Aman, Dusun Damai, Dusun Rukun, Dusun Sejahtera, and Dusun Sentosa. The village of Telaga Tujuh has borders as follows:

1. The West is bordered by Village of Kuala Langsa;
2. The East is bordered by Village of Manyak Pahed (Aceh Tamiang);
3. The North is bordered by the Strait of Malacca; and
4. The South is bordered by Village of Langsa Lama.

The village of Telaga Tujuh has a height of 2 m above sea level. The distance from Kuala Langsa to Village of Telaga Tujuh 6 miles or 9.6 km with 45 minutes travel time using boat or boat with cost per person Rp. 5,000.

Figure 1. Map of slums area of Village of Telaga Tujuh
4. Methodology

4.1 Data Collection Method
Data collection methods in this study divided by 2 (two) namely the primary data collection and secondary data collection.

4.1.1 Primary Data Collection
Primary data collection is done by observation, questionnaire, and interview. Observation is done by visual observation, visual recording, and measurement. Questionnaires were conducted by absorption of aspirations to obtain information on the problems and potential of the area at this time and to explore the perception of the inhabitants of the region on the condition of their living environment. Interviews conducted in the form of semi-structured by asking questions to the policyholders associated with the slum settlement.

4.1.2 Secondary Data Collection
Secondary data collection was conducted through surveys to several government agencies that became the source of data, namely: Regional Development Planning Board (BAPPEDA) of Langsa City, Public Works (PU) of Langsa City, Central Bureau of Statistics (BPS) of Langsa City, Forestry Office of Langsa City, PDAM of Langsa City, Tourism Office of Langsa City.

4.2 Data Processing Method
If the data collection has been done, then the data that has been collected must be processed. The data processing procedure that will be done in this research is as follows:
1. Editing, i.e. sorting back the completeness and correctness of data needed;
2. Tabulation, i.e. by grouping data to simplify the process of analysis;
3. Classification, the data selected based on the needs of the analysis to be done.
After the data is processed and classified, then presented in certain forms such as tables, diagrams, graphs, and others to facilitate the reading and understanding.

4.3 Data Analysis
After doing the data processing, continue the data in the analysis. The analysis used is qualitative descriptive analysis for the characteristics of slum settlement of Village of Telaga Tujuh, and determine the model of slum rejuvenation of Village of Telaga Tujuh, Langsa City, Aceh.

4.4 The number of samples
This research uses data probability sampling technique in the form of stratified random sampling. Prior to sampling, the population has been calculated first. The total population used is the total of residential buildings of slums of Village of Telaga Tujuh as many as 356 units. Research sample using Isaac and Michael formula [4]:

\[ s = \frac{\lambda^2 \cdot N \cdot P \cdot Q}{d^2 (N - 1) + \lambda^2 \cdot P \cdot Q} \]  \( (1) \)

Whereas:
- s : Sample
- \( \lambda^2 \) : \( \lambda \)-value with significance level of 5% (\( z=1.96 \))
- N : Population
- P : Proportion in population (0.5)
- Q : 1-P (1-0.5=0.5)
- D : Significance level 5% = 0.05
The sample size is 188 units using stratified random sampling.
5. Results and Discussion

5.1. Characteristics of Slum areas of Village of Telaga Tujuh

5.1.1. Condition of Residential Buildings
Ideal building with a distance of 3 m, based on the existing condition, the residential building is 0-1 m. According to Prayitno [5], the high density of buildings is more than 100 buildings/ha with a population density of 200 souls/km, this is experienced by Village of Telaga Tujuh where the density of buildings of more than 150 buildings/ha and population density 200 soul/km. According to PERMENPERA Number 22 Year 2008 regarding Minimum Service Standards in the Housing Sector of Provincial Region and District or City Region, the house can be categorized as habitable occupancy if the per capita floor area is greater than 7.2 m². Meanwhile, on the existing condition of floor area per capita less than 7.2 m² amounted to 280 units. So that 80% of residential buildings of Village of Telaga Tujuh unfit for habitation.

Figure 2. Residential Building Density Condition of Slum of Village of Telaga Tujuh

5.1.2. Local Road Condition
The local road network is a major component in a residential area. An access can be made only through the existence of the local road. A matter of urgent which importance to the existence of local roads to be passed by four-wheeled vehicles. This is related to the interests of fire-fighting vehicles. Likewise, irregular road patterns cause inconvenience to road users. Although with the condition of Village of Telaga Tujuh 1-1.5 m, it is still possible to pass by bicycle and pedestrians. However, because many misused such as drying salted fish, drying clothes, and used by traders until this road is not comfortable or safe to pass. From the analysis result, the length of road with width of $\geq 1.5$ m, hardened surface and not damaged only 78 meter from total road network of 2,350 meter causing road network quality decreased, this is not in accordance with General Directorate of Cipta Karya (2013) standard width minimum pavement for 2-way road 4 meters.

Table 1. Quality of Local Road of Slums Area of Village of Telaga Tujuh

| Quality of Road Surface | Length (m) | Percentage (%) | Area of Settlement (ha) | Percentage (%) | Road Infrastructure | Photo |
|-------------------------|------------|----------------|-------------------------|----------------|---------------------|-------|
| Local road concrete (good condition) good quality | 105 | 21 | 1,76 | 22 | There are no street lights and no drainage |
5.1.3. Local Drainage Condition

Drainage is an important part of the spatial structure in the settlement. Based on the analysis of the inundation area in the 5 ha settlement, where Village of Telaga Tujuh does not have drainage with 0% percentage. This is not in accordance with the mandate of Law No. 1 of 2011 on Housing and Settlement Area, where the drainage of the environment is not connected with the city system, must be prepared local recharge or retention ponds. The drainage condition of the slum neighborhood of Village of Telaga Tujuh 100% is not served by drainage from 8 ha of slums. This is based on the parameters of the assessment of slum conditions that refer to PERMEN PUPR. No. 2 of 2016. Besides drainage can also affect the bad environmental conditions as happened in Village of Telaga Tujuh.

5.1.4. Condition of Drinking Water Supply

Slums are identical to inadequate infrastructure, including clean water or drinking water infrastructure. Based on observations in the field, 365 residential buildings in the study area did not have drinking water facilities for drinking, bathing, and washing with 0% percentage. The drinking water used by the community obtained from PDAM is in the form of Water Tank. Drinking water from PDAM Langsa City is brought to Village of Telaga Tujuh once every 7 days with good quality water taps no smell, no taste and no color just water quality from PDAM not able to fulfill the requirement of everyday citizen needs because of limited distribution and water price quite expensive. Residents buy water from PDAM for Rp. 20,000 to Rp. 25,000 per 20 liters. Regarding the habit of the residents during the rainy season that provides empty places to accommodate when it rains, the water will be used as bath water and washing. Based on the above analysis, there are 365 residential buildings unfilled drinking water 60 liters/day for 1,574 people with 100% percentage caused by the community only rely on clean water supply from PDAM, based on this matter not in accordance with PERMEN PUPR Number 2 Year 2016, minimum requirement is 60 liters/person/day with minimum service capacity of 201/person/day. The need for drinking water can be fulfilled with the Drinking Water Supply System with the piped network (SPAM) and the Non-piped Water Supply System (SPAM BJP).
5.1.5. Sanitation Management Conditions
Based on the results of the analysis it is found that the slums of Village of Telaga Tujuh are using individual waste management system. In addition, the sanitary waste disposal system is conducted on-site, where the wastewater is not collected in a channel on the network that will lead to wastewater management or receiving water body, but to the land part of the house or directly discharged to the coast. Such wastewater management systems are poor because the waste that directly sinks into the soil can pollute groundwater quality and also damage the coast. The waste management system in the slums of Village of Telaga Tujuh is very poor as all households dispose of household waste individually and on-site. From the analysis result, 365 residential buildings do not have a good wastewater management system with 100% of the slum area of Village of Telaga Tujuh slum, this is not in accordance with the mandate of Law no. 1 of 2011 that settlements are habitable settlements that have a centralized or local wastewater management system.

5.1.6. Condition of Waste Management
Based on analysis result, 365 residential buildings do not have good waste management with 100% percentage do not have technical condition of facilities and infrastructure. This is evidenced by
household waste placed on certain places side or back of the house that has a yard or vacant land. There are 365 residential buildings with no garbage bin or TPS or TPST, and no garbage transportation by officers or government of Langsa City and no 100% processing system. The distance between Langsa City to the slums.

5.1.7. Condition of Fire Protection
Based on PERMEN PUPR Number 2 Year 2016, slums area have narrow roads and alleys that make it difficult for citizens to access emergency services. Fires are a frequent disaster in the slums. Based on the analysis results obtained the existence of water supply from the sea, meanwhile from the analysis that there are no means of supporting fire protection such as fire protection facilities related to the provision of Fire Extinguishers (APAR), pump cars, thrust pumps, motor pumps and ladder cars. This is because the supporting facilities for firefighting operations from the Langsa City government have not been able to balance the need for fire prevention. Public awareness of fire hazards is also very low where the fire prevention system is one of the priorities that must be owned by people in slums.

5.1.8. The Condition of Land Potential
The results of the analysis obtained from observations and interviews with the group of Program Improvement of the Quality of Settlement Area (P2KKP) and Geuchik that Village of Telaga Tujuh has potential as fishing port spread in 6 (six) locations. The village of Telaga Tujuh also has potential as mangrove ecotourism because it is adjacent to mangrove island so that it can improve the regional economy. The potency of land owned by Village of Telaga Tujuh with the high category. Slums that have a high potential land model suitable for structuring are rejuvenated models with a land
consolidation system such as Sulestianson [6] states that slum settlement arrangements with a consolidated model of land rejuvenation should have the potential to be developed into functional areas that are more strategic than residential.

5.2. Arrangement Model of Slum Settlement of Village of Telaga Tujuh
The result of analysis related to 8 (eight) characteristics of slum settlement in the form of residential building condition, local road condition, drainage condition, condition of drinking water supply, wastewater management condition, solid waste management condition, fire protection condition, land potential condition as base in determining model arrangement of slum settlements of Village of Telaga Tujuh. Based on the slum characteristic analysis that Village of Telaga Tujuh has high density, poor facilities and infrastructure, low sustainability level, and has the potential of land that can be developed to improve the regional economy, it is still possible to become a residential area. This makes it possible to apply rejuvenation models with land consolidation systems, as Sulestianson [6] states, the terms of land consolidation for unpatronized settlement layouts, with diverse uses, and the potential to be developed into functional areas more strategic than shelter. Land use in land consolidation is divided into 2 (two), 60% is used for resettlement for existing densification landholders, and 40% of the land is used as commercial land to cover the cost of housing, facilities, and infrastructure. This is as Prayitno [5] says, on 60% land, alternatives are created for two schemes, namely the development of a series house or flats where to accommodate 100% of the population currently occupying the existing land.

Figure 8. Mangrove Ecotourism Potency
The distance of Gampong Telaga Tujuh to Mangrove Island 50 meters
The area of mangrove is approximately 500 ha and has potential as mangrove ecotourism for Gampong Telaga Tujuh so it can minimize negative impact to local environment and culture and can increase community economic income and conservation value. The mangrove island of Kota Langsa, including the largest mangrove forest in Indonesia (Kota Langsa City Forestry Agency, 2017)

Figure 9. Arrangement Model of Rejuvenation Settlements of Village of Telaga Tujuh
5.3. Concept Model of Fisherman Village Rejuvenation

5.3.1. Concept of Residential Buildings
The concept of residential development in slums should consider safety, comfort, health, and convenience for building users, and have permits. Several stages of the concept carried out in achieving decent residential development:

1. The mass of the building extends eastward and northwestward or elongated in the direction of the axis of the road;
2. The standard used for building floor plan is 60%: 40%, which are 60% for residential building and 40% for commercial area;
3. The minimum requirement of building area 9m² / person, and the standard number of residents on average 5 persons/families;
4. The shape of a house is a permanent building, the building undergoes a shift shape. Form of the house based on relationship or characteristics between buildings:
   a. A Single house, a stand-alone house and a plot, separated from the house adjacent to it;
   b. The house series, the house in pairs (coincide) usually one roof in a plot is usually a maximum of 6 rows;
   c. Flats, terraced houses built vertically in structurally functional sections.

Figure 10. Concept of Residential Buildings

5.3.2. Concept of Local Road
The concept of the development of roads in the settlement neighborhood of fishing village is as follows:

a) Opens the access area to connect with the city collector path
b) Development of the main line of the area surrounding the area
c) Development of access to central environmental units
d) Improving the quality of local roads in order to pass through three-wheeled motor vehicles.
e) Development the path of circulation of environment that is safe, comfortable and friendly for people with disabilities and the elderly
f) Development of area orientation with the development of marking elements as a benchmark of settlement in the of form of gate area
g) Development of local roads using paving block and concrete and absorption wells to accommodate rainwater flow to maintain road quality, road width 3 m.

Figure 11. Concept of Local Road
5.3.3. Concept of Drainage Management

The drainage handling concept in the Fisherman's Village Area is generally a concept of sub-catchment pattern arrangement of areas where the benefits of sub-catchment distribution smaller are the reduction of the burden on the parent channel serving the sub-catchment especially when on the channel has a lot of solid surfaces. Several stages of concept were done in achieving optimal drainage development include:

1. Development of drainage area and create new networks in the inundation area so as to support the creation of a healthy and comfortable settlement environment;
2. Development and improvement of drainage channels with minimal dimensions for local drainage $L=40$ cm, for main local drainage $L=50$ cm with river stone paving and minimum dimensions for drainage on primary circulation $L=100$ cm with river stone pavement;
3. Coastalization in the form of dredging, straightening, slicing of the narrow coastal part and the making of a wall of beach wall reinforcement on the vulnerable coastal wall;
4. Control of the beach not to become a garbage disposal by the community that it can cause siltation of the beach;
5. Control of the buildings around the beach and the orientation of the building is not back to the beach;
6. Greening along coastal areas bounded by road network and green open space on the beach border;
7. Production of absorption wells in every home construction, and local road.

![Figure 12. Concept of Drainage Management](image)

5.3.4. Concept of Drinking Water Supply

The concept of developing clean water infrastructure is enhanced by its capacity through the development of retention ponds as a source of water and flood control. Several stages of the concept that is carried out in achieving the optimal supply of drinking water include:

1. Pool retention as a source of water and flood control;
2. Clean Water Treatment Plant (IPAB) of sub-regional scale;
3. Primary drinking water network area;
4. Secondary sub-regional networks.
5.3.5. Concept of Wastewater Management

The concept of wastewater management of the area is directed to an integrated system of water treatment so that the quality of the discharged water is handled first and then flows to the coast in relatively good quality condition. This is done to reduce water pollution by ecoli bacteria as well as for handling rainwater directed to the provision of groundwater reserves through the procurement of absorption wells which located on the main local road.

![Figure 13. Concept of Drinking Water Supply](image13)

5.3.6. Concept of Waste Management

The concept of development of garbage in fisherman's village is spread in every settlement along the coast and the sub-regional center garbage in RW or Dusun. Development of access for trash carts on neighborhood streets and for trucks transporting trash to trashtrack.

Several stages of the concepts carried out in achieving optimal waste disposal include:

1. Provision of iron containers at Trashtrack in RW or sub-village;
2. The construction of road ramp with a maximum slope of 3% with ratio (1:5) and road width of at least 3 (three) meters so that the road is quite sloping and can be passed by garbage cart, and garbage in this location can be transported out to TPS, or waste management is done by composting method by placing the composting points at some RTH points;
3. On the coast every 10 m will be placed household-scale trash can, so it is expected that residents can use the trash and do not throw garbage to the beach;
4. Conducted management 3R (reduce, reused and recycled) for example by sorting and composting organic waste.

![Figure 14. Concept of Wastewater Management](image14)
5.3.7. Concept of Fire Protection
Development of the concept of fire protection arrangement is as follows:
1. Provision of fire hydrants in each settlement environment;
2. Set the distance between buildings and the use of building materials.

5.3.8. Concept of Mangrove Tourism Potential
Mangrove forest tourism is a form of travel activities by traveling around the area of mangrove forest and enjoys all the uniqueness contained in it. Mangrove forest as one of the tourist area has a function as a place of travel for local and foreign tourists, with facilities provided by the manager. Mangrove area with a diversity of types of mangrove plant species and its animals can provide a unique tour activity and provide insight and experience with a different atmosphere. Types of tourism or tourism potentials offered by mangrove forest as one of the tourist attractions such as bird watching, fishing, cross country tracking, enjoying the scenery and the diversity of mangroves characteristic of mangrove tourism [7]. The concept of mangrove ecotourism cannot be separated from:
1. The value of education;
2. Local community participation and economic value;
3. Conservation and environmental management efforts;
4. Minimize environmental impacts and impacts.

6. Conclusion
Based on the results of research and analysis and discussion that has been done can be concluded as follows:

A. The results of the analysis of the characteristics of slum settlement of Village of Telaga Tujuh are identified as 365 residential buildings having high density with 100% percentage of irregular buildings and unsuitable for occupancy, 20% of poor local roads with dirt pavement, 365
buildings do not have local drainage with 100%, 365 residential buildings are not met the need to drink, bathe, and wash at least 60 liters/person/day with 100% of safe drinking water unavailable, 365 residential buildings do not have waste water management with 100% percent unserved, 365 buildings do not have good waste management, and identified 50% of fishery land potential in 6 locations and 1 location of tourism.

B. The village of Telaga Tujuh is an area that has the potential to be developed as a function of the settlement, and commercial. The location with fish dock and mangrove forest facilities, makes this area has a high-value dan it is worth doing a rejuvenation area in that area.

C. Model of rejuvenation with land consolidation system by building a house series are:
   a. The rehabilitation of the Village of Telaga Tujuh rebuilding house series was established on 8 ha of land with 36 type houses. While the size of the building space which is the demand of the space of case studies and interviews with related parties can be used as a reference in the design strategy, in addition to the standard space for ideal or predefined house occupancy.
   b. Development of settlement is done by dividing 2 (two), 60% for existing building as much as 365 buildings, and 40% for the commercial area which will be developed as fishery and mangrove ecotourism.

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References
[1] Law of the Republic of Indonesia Number 1 Year 2011 on Housing and Settlement Area. State Gazette of the Republic of Indonesia Year 2011 Number 5188 (Jakarta: Secretariat of State, from http://ehousing.perumahan.pu.go.id. (accessed on 28 November 2016)
[2] Trianto A 2016 Pattern on handling slum settlements Cimahi City Master Program Thesis (Bandung Institute of Technology)
[3] UN-HABITAT (United Nations Human Settlement Program) 2008 Housing for the Poor in Asian Cities, Bangkok http://unhabitat.org. (accessed on December 4, 2016)
[4] Sugiyono 2016 Quantitative Research Methods, Qualitative and R & D (Alfabeta Publishers; Bandung)
[5] Prayitno B 2016 Scheme of innovation for handling slum areas (Gadjah Mada University Press; Yogyakarta)
[6] Sulestianson E 2014 Handling slum settlements with characteristic approach and slum factor case study: slums in Taman Sari and Braga Urban Villages Journal of Regional and City Planning B Sappk 3 261-270
[7] Pranatha I M A, Arthahana I W, and Utmani N W F 2015 Mangrove tourism landscape planning at Akame Restaurant, Benoa, Journal of Landscape Architecture (Faculty of Agriculture, Udayana University, Bali) 1