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S.M.A.R.T. eco-village for hazardous coastal area in Bedono Village, Demak Regency

Novia Sari Ristianti^a *

^a*Department of Urban and Regional Planning, Diponegoro University, Semarang 50264, Indonesia*

Abstract

Coastal areas tend to have more volatile nature, both in the physical and socio-economic characteristics. Rob and abrasion is a problem that causes Villages in Bedono lost, some homes are isolated due to tidal still survive today, causing major problems in the study area that is quality decreasing of coastal settlements in Bedono, Pandansari and Tambaksari hamlet. The concept "SMART ECO-VILLAGE" to solving problems about Bedono's settlement. This concept integrates ecological, social, spiritual, and a sustainable economy with eco-village approach through S.M.A.R.T (Sustainable Management and Redesign Settlement) and Eco-Village principle to integrate a social environment that supports the life of "a low impact" or that have a small risk. It's integrate various aspects of environmental design consisting of ecological design, eco-friendly buildings, lots of green open space, permaculture (permanent agriculture), using alternative energy, using a communal building, etc. The aim is to formulate design concept strategy for resettlement of Bedono Village. Methods research is qualitative descriptive where it begins with identification of issue coastal settlements than formulated a concept and strategy in solving the problem of settlements. The research output is the application and development of SMART Eco-Village in Bedono Settlement.

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1. Introduction

Rob and abrasion phenomenon is most feared by the coastal communities. This led to settlements coastal region experienced a very complex problem and need serious treatment. For example, coastal areas in Demak which suffered

* Corresponding author. Tel.: +62 85640817731; fax: +0-000-000-0000 .
E-mail address: novia.sari@pwk.undip.ac.id

most severely damaged by abrasion and rob are Bedono village where more than 300 hectares over the last 5 years have inundated during high tides. In the village of Bedono, two hamlets have now been drowned by the tidal namely Senik Hamlet and Tambaksari Hamlet, following Pandansari Hamlet threatened to sink (Bappeda Demak, 2014). This damage resulted in a decreased function of the existing land in the coastal of Bedono village. Due to reclamation on the Marina beach Semarang, excessive ground water extraction, the absence of normalization baboon River, as well as local people who do excessive mangrove logging for timber on charcoal (Suara Merdeka, March 30, 2014). Abrasion and rob in the Bedono village cause damage to some facilities and infrastructure and loss of some hamlets were submerged. One of them is the Tambaksari Hamlet that now separate from the other hamlets that interfere with the accessibility and community activities, especially in economic terms, which it impact to declining incomes. This is the underlying problem of the declining quality of public housing in the coastal area of the Bedono village that affect many aspects such as health, environment, economy and aesthetics of the area. Bedono Village areas that should be addressed for the sake of the availability of resettlement convenient to support the population such as social activities (activities in the family, health, education, religion, recreation, etc.) and economic activity (activity in livelihood, how to consume, exchange of goods and services and so on). Therefore, the need for a concept that is capable of resolving the problems of coastal communities in the village settlements in a sustainable Bedono both from the aspect of social, economic and environmental..

The aim of this study is to identify the problems of coastal settlements in the village Bedono and then try to formulate a concept and strategies design in the coastal area of the Bedono village in order to create a comfortable environment and sustainable settlement. The research object studied is the coastal settlement area in the Bedono village including the issues of ecological, social, spiritual, and economy so as to formulate the concept of handling the problems of sustainable coastal settlements.

2. Methodes

The research method is descriptive qualitative with phenomenological approach. Researchers determine research problems based on phenomena occurring in the field so that more researchers set out to the fact that there was and is happening on the symptoms of the problem. In the study, the researchers produce output to the truth that existed at the time the research conducted thus not based on other people's thinking. Qualitative methods were used more leads to naturalistic and phenomenological stressed that the implementation of research occurs naturally, in a normal situation that is not manipulated circumstances and conditions, emphasis on natural and based on the description of the phenomenon exists. Qualitative methods were used beginning with the identification of the issue of coastal settlements in areas prone to abrasion rob, than the issue help to Formulated a concept and strategy in solving the problem of settlements in the Bedono village.

3. Result and Discussions

Bedono village is one of the coastal villages in Demak Regency The total area of the Bedono village reaches approximately 739 hectares and is the largest village in Sayung District. Bedono village consists of 6 RW, RT 23, and 7 hamlets namely Tonosari, Morosari, Pandansari, Tambaksari, Senik / Rejosari, Bedono and Mondoliko. Bedono village has administrative boundaries as follows:

- Nothern boundary : Timbulsloko Village and
- Southern boundary : Sriwulan Village
- Eastern boundary : Purwosari village and Sidogemah village
- Western boundary : Sea of Java

Bedono village is one of the villages worst affected by changes in sea level rise, most of its territory is now submerged by tidal water. According to data contained in the Central Bureau of Statistics Central Java, Villages Bedono has lost more than 300 hectares of its territory due to submerged by rising sea water.

Number of Bedono Villagers in 2010 was 2,949 people, a population consisting of 1,514 male and 1,435 female inhabitants. This number decreased sharply compared to previous years. To decrease the number of people registered in the year dropped 1,828 people (38.26%) .This is because the Bedono village is a disaster-prone areas. Therefore, some people feel uncomfortable settle and stay in the Bedono village because of the quality and safety unfavorable environment. For more details about the number of people can be seen in the following table:

Table. 1. Total Number Of Bedono Village Population in 2011 - 2014

Gender	2014	2013	2012	2011
Male	1514	2278	2339	2255
Female	1435	2499	2552	2590
Total	2949	4777	4891	4845

Source : *Sayung District in figures, 2014*

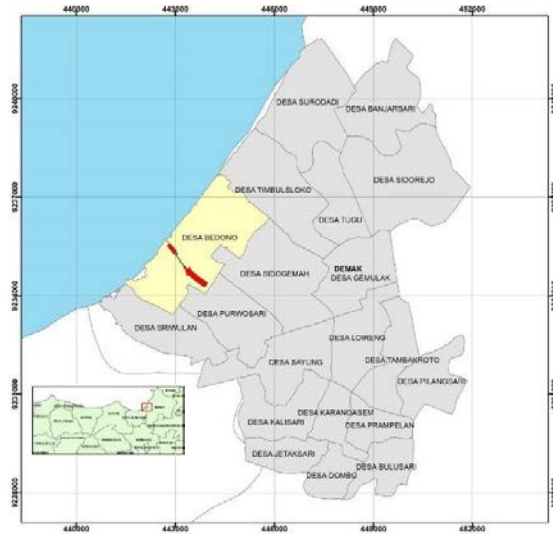


Fig.1 Administrative Map of Bedono Village
Source : *Bappeda Demak, 2014*



Fig. 2 Rob and Abrasion Phenomena of Bedono Village
Source: *Field Observation, 2014*

Availability of facilities in the Bedono village consists of educational facilities such as elementary school, the place of worship such as prayer rooms and health facilities in the form of a practice that environmental conditions, hygiene, medical supplies and their equipment is inadequate and medical personnel are lacking are not comparable with the citizens who come for a health check. Because of frequent flooding, educational facilities are always damaged and must be lifted floor. Access to these facilities is very difficult for especially those living in the hamlet that has been lost due to abrasion such as Tambaksari Hamlet and Senik Hamlet.



Fig.3 Condition of Facilities in Bedono Village
 Source: Field Observation, 2014

The condition of accessibility in the Bedono village is damaged and bumpy. Access roads to Tambaksari Hamlet, Bedono Hamlet, Mondoliko Hamlet and Senik Hamlet has been disconnected. Currently only implemented the construction of roads to Tambaksari hamlet. The form talut of backfill soil earlier this path in the form of bamboo along the road 1 km and can harm people crossing the road. In addition, to meet the need for clean water, villagers use unclean water in Bedono. For residents who remained in the village Senik every day to fetch water to Pandansari Hamlet using his boat. Water conditions in the village Bedono already tasted salty and not as fresh as a result of the intrusion of sea water, it also causes the plants in addition to plants that can live in salt water can not grow. Waste management in the village Bedono carried out by its own people communally. There is already support from the Department of Marine Demak form of wheelie bins and bins that have been separated according to the type of waste but not used by the villagers Bedono due to environmental and public awareness is still lacking. There has not been a good drainage system is also not there is a drainage channel. There is only a river conditions are dirty and smelly. Village Community Bedono also take advantage of the river to look for fish, oysters and other marine animals for consumption or sale. In addition, the rivers in the hamlet Mondoliko and Bedono also used for public latrines. In addition there has been no drainage, Bedono village also does not have good sanitation. Household waste either solid or liquid directly discharged to the rear or side of the house that has been flooded rob. This can lead to an environment that is dirty and unhealthy. There is no proper sanitation so that the management of the waste is mixed with water puddles rob directly. Bedono throughout the Village area already covered by electricity, but sometimes the electrical load is not proportional to the electrical capacity of every home residents. For street lighting is still lacking thus endangering road users at night.

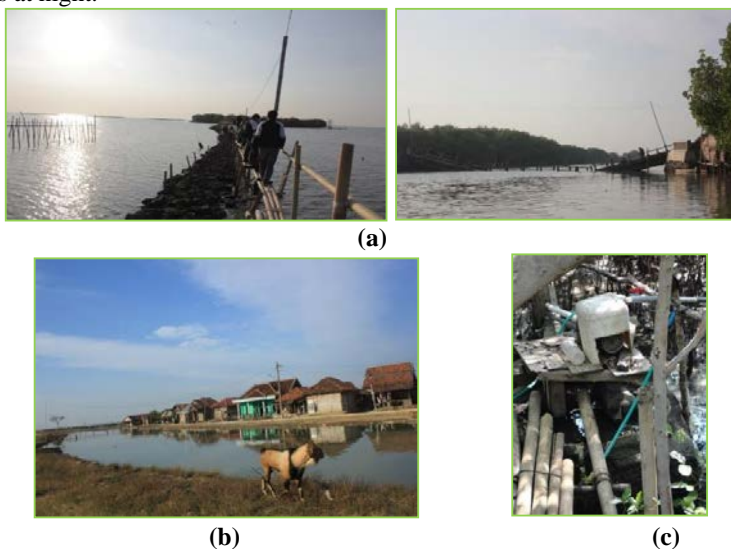


Fig.4 Infrastructure condition in Bedoni Village
 Source: Field Observation, 2014








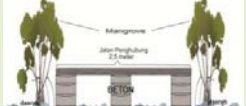


Notes:*(a) The accessibility and road network in Bedono Village**(b) The condition of overflowing river because rob and abrasion in Bedono Village**(c) The condition of clean water supply in Bedono Village*






Based on the results of field identification, then the problem about vulnerability of settlements in the coastal village of Bedono towards sustainability is as follows:

- **Unplanned settlement.** This parameter is used to see the development of the existing buildings in the area of design. At this area, the construction of settlements growing and approaching the shore because of the land that is exposed to the threat of floods and erosion in the coastal areas continue to expand even lost could reach tens of hectares. However, in the planning area as conservation, in fact there are a lot of people who survive and live there even in its development like housing building construction has increased so much that arise and are not organized or unplanned.
- **Lack of accessing services.** This parameter in terms of the level of public accessibility in reaching the facility / facilities and infrastructure to serve people in neighborhoods. The condition is far from the city center and the coastal areas farthest and closest to the beach plus abrasion and rob issues unresolved and the road access to the area is very narrow making it quite difficult to reach areas.
- **Located in the hazardous area.** Judging from residential areas in terms of vulnerability vulnerable to disasters and hazards such as abrasion, rob and floods and other disasters that can interfere with the safety and comfort of your stay. In the area of designing extremely high level of abrasion which causes a lot of land or farm land is lost so that the community activities disrupted and many people who lost their livelihoods due to land lost farm affected by abrasion.
- **High level of poverty and social inequality.** Judging from the social conditions of society, from poverty population in the area of design and high social inequality among the population. The poverty rate is seen from the average income, expenditure population, livelihood, and the physical condition of the building. This can be seen in the design of population density and low level of public education. Besides the economic capacity of the people in this income is also quite low.

Therefore, to solving the problems of coastal settlements in the Bedono village that is SMART Eco-Village concepts. What is meant by SMART Eco-Village is SMART (S: Sustainable, M: Management, A: And, R: Redesign Settlement, T: Technology). While the Eco-Village is a concept that integrates ecological, social, spiritual, economic and sustainable manner. EcoVillages are urban or rural communities of people, who strive to integrate a supportive social environment with a low-impact way of life. To Achieve this, they integrate various aspects of ecological design, permaculture, ecological building, green production, alternative energy, community building practices, and much more. Application form of S.M.A.R.T. Eco-Village in settlement of Bedono Village can be seen in the following table:

Table. 2 Application form of S.M.A.R.T. Eco-Village in settlement of Bedono Village

spects	Principle	Application Form of Concepts S.M.A.R.T. Eco-Village	Detail Design
<p>1) Environment</p>	<ul style="list-style-type: none"> Repairs and conservation of natural ecosystems. 	<ul style="list-style-type: none"> Conservation of mangrove forests in the form of breeding and conservation of mangrove habitat such as crabs, fish, birds, etc. Tracking mangrove tourism to the provision of the tower beach view as end point of tracking mangrove 	 
	<ul style="list-style-type: none"> Housing with materials, methods and design of environmentally friendly building. 	<ul style="list-style-type: none"> Adaptive design for disaster settlement stilts. Planting mangroves around the settlement area of conservation function, sightseeing, breakwaters and retaining abrasion. 	
	<ul style="list-style-type: none"> To conduct the recycling of consumer goods 	<ul style="list-style-type: none"> Waste Management with 3R. 	
	<ul style="list-style-type: none"> Maximizing the utility efficiency of energy resources 	<ul style="list-style-type: none"> Provision of clean water supply system and water tank clean Improved accessibility betonisasi technology 	   
	<ul style="list-style-type: none"> Managing of waste and minimizing pollution 	<ul style="list-style-type: none"> Provision of drainage system Provision of WWTP (wastewater treatment plant) 	 

2) Social	<ul style="list-style-type: none"> ▪ Creating effective communications network 	<ul style="list-style-type: none"> ▪ Provision of public spaces such as parks and gazebo 	
	<ul style="list-style-type: none"> ▪ Emphasizing on prevention services facilities, good physical health, mental and spiritual. 	<ul style="list-style-type: none"> ▪ Improved health facilities, education and worship 	
3) Spiritual	<ul style="list-style-type: none"> ▪ heritage of art and culture to be maintained as a community identity ▪ Respect and support to spiritual aspects 	<ul style="list-style-type: none"> ▪ Improvements religious tourism of Mudzakir sheikh's tomb and the addition of the rest area around the gazebo in the form of religious tourism and visitor parking 	
4) Economy	<ul style="list-style-type: none"> ▪ Creating local economy with the creation and innovative products that use natural resources. 	<ul style="list-style-type: none"> ▪ The development of home industries such as chips of mangrove, mangrove leaf crafts and processing of marine products such as fish and brayo 	
	<ul style="list-style-type: none"> ▪ The development of economic activities by utilizing natural resources in the surrounding residential area. 	<ul style="list-style-type: none"> ▪ Development of fishing that utilizes farm tour. 	

Source: Analysis of researcher, 2014

4. Conclusions

Bedono villages including in vulnerable areas of abrasion and rob. This phenomenon causes various problems, namely the development settlement settlements closer to shore, limited access to services, are vulnerable to disasters, as well as poor economic conditions. Therefore, the need for a concept of sustainable coastal settlements in the village Bedono. Through the concept of S.M.A.R.T. Eco Village it is expected settlements in the village of Bedono capable of sustainable aspects, economic, social, environmental and spiritual. This is manifested in various areas of design concepts include:

- a) Environmental such as of mangrove conservation and tourism, adaptive settlements of the disaster, 3R waste management, improvement of water supply and accessibility, as well as the provision of wastewater and drainage.
- b) Social such as the provision of pubic space of the park and gazebo, as well as the improvement of health, education and other means.
- c) Economic such as to increase the local economic community with the development of home industry in the form of processing of mangroves, fish and brayo and tourist development of fishing ponds.

Spiritual such as the development of tourism potential in the form of tombs sheikh reliigi Mudzakir capable of developing the local economy.

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