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Socio-Economic and Sanitation Issues at Coastal Sedati, East Java Based on Geographic Information System

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ABSTRACT

Main issues of coastal communities at Sedati Sub-district Sidoarjo district is lack of sanitation facilities and poor socio-economic conditions. This study aims to determine the socio-economic and sanitation conditions of coastal communities at Sedati Sub-district Sidoarjo district. Analysis method is descriptive qualitative with stratified random sampling technique by spreading questionnaires and interviewing respondents through a social survey. Geographic Information Systems (GIS) is used to map the socio-economic conditions and sanitation based on the percentage of primary data. The results showed that most residents of the coastal zone were low or medium income as indicated by poverty with poor sanitation. These conditions were influenced by the culture of coastal communities which tend to have low attention to the importance of sanitation. Most of the coastal communities have habit to defecate into sea or ponds. Coastal communities should be prioritized in a better access to sanitation services.

Keywords: Socio-economic, Sanitation, GIS, Coastal Areas.

INTRODUCTION

Integrated and sustainable coastal resource management has become a major agenda in Indonesia. Marine and coastal resources have a number of potential that can be relied upon by the people. The potential has not been supported by the current socio economic condition. Since 1994, the world population was estimated of 33.5% lived in 100 meters from seashore, and 15.6% of population inhabited less than 100 m above sea level. People generally live at an altitude of 194 m above sea level [1]. Sidoarjo Regency located in a coastal line along about 27 km, which crosses Sedati District, Sidoarjo, Porong and Jabon [2]. This research area was Sedati focused on 5 coastal villages. There were Kalanganyar, Tambak Cemandi, Gisik Cemandi, Banjar Kemuning and Segorotambak. Geographically Sedati is on the next north-eastern tip of Sidoarjo with a distance of 14 kilometers from the center of Sidoarjo. Based on the position of astronomy, Sedati was located at 7 ° 23 '47.76 "(7.3966 °) south latitude, 112 ° 47' 24" (112.79 °) East longitude. Table 1 is a population of density Sedati on 5 coastal villages.

Table 1. Population of Density Sedati Sub-district

Name of Village	Population (person)	Area (km^2)	Population of Density (Person/km^2)
1. Segorotambak	1647	10.16	162.1
2. Gisik Cemandi	2916	1.13	2581
3. Tambak Cemandi	2148	7.41	289.9
4. Kalanganyar	5151	33.35	154.5
5. Banjar Kemuning	1781	5.89	302.4

Source: BPS Sidoarjo District, 2010

Yua et al. [3] stated that the sustainable development in coastal zones not only should meet the needs of economic, but also protect the ecological and environmental conditions, without reducing access to future generations about the security of economic access. The research of Tukahirwa et al. [4], regarding sanitation in Uganda explained that the lack of public access to sanitation services had an impact on human health and the environment. These conditions occured in coastal zones and faced by the poor community. Bengen [5] stated that issues concerning overfishing, environmental degradation, pollution and poverty were still prevalent among the fishermen. One of causes of poverty was lack of access to socio-economic which affect on the limited of access in sanitation. The Millennium Development Goals (MDGs) in 2015 stated that the government should be able to reduce 50% of the community who have limited access to adequate sanitation [6]. In order to achieve these goals, satisfactory sanitation facilities have been provided each day for 460,000 people in the world [7].

Based on achievements of the MDG targets, coastal communities in Sedati District Sidoarjo have some problems included: (1) low-economic accesses caused by an informal employment, such as fishermen and labour-fisherman. Income levels are divided on three strata, strata 1 is a high income levels between IDR.1 million or over/month, strata 2 is a medium income levels between IDR. 500,000 (USD 50) to IDR.1

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million/month and strata 3 is a low-income levels of less than Rp. 500,000 (USD 50)/month. (2) inadequate access to sanitation, especially water supply and latrine facilities. The purpose of this study to describe the socio-economic and sanitation conditions in coastal communities Sedati Districts. Therefore, this research was conducted as preliminary to support the following research.

MATERIALS AND METHODS

Data on family revenue and sanitation conditions were collected through a social survey. The respondents were determined using stratified random sampling technique [8]. This sampling technique was performed on three economical strata of the population i.e : high, medium, and low income level. Sampling was performed sanitation conditions is randomly of households high, medium, and low income level. Data on the strata is conducted percentage in order to describe the socio-economic and sanitation conditions. Descriptive analysis was performed on the collected data, followed by the application of overlay method, in accordance to geographic information systems (GIS) technique. The three economic strata obtained from 323 households in 5 coastal villages. Strata 1, 2, and 3 is 121, 153, and 49 households, respectively.

Main indicator of socio-economic condition was the income level per capita. Other sanitation indicators were residential facilities and settlement areas, i.e : (1) Housing type; consists of permanent, semi-permanent and non-permanent houses. (2) Latrine facilities; involve private toilets, cemplung (directly defecate into sea), and public toilets. (3) Water supply resources; involve of wells, tap water with/without piping channels (retail purchased). (4) Solid waste and drainage systems; solid waste managements consists of the availability of landfill, the waste thrown into the sea and burned. Drainage system; consists of an open duct system, closed duct system and non-channel system.

RESULTS AND DISCUSSION

Housing Type

Most types of existing houses in the coastal are were permanent, non-permanent and semi-permanent. Type of permanent houses in Segorotambak village amounting to 72.6% and 69% Gisik Cemandi Village. This type of semi-permanent houses in Kalanganyar Village by 45% Banjar Kemuning Village of 42.1%, while the non-permanent type of housing most in Tambak Cemandi village of 21.4%. Only Gisik Cemandi Village has permanent houses, but land used as a place to house building was not private, but is leased from Enterprise.

Latrine / toilet

Availability of defecate facilities may reflect socio-economic conditions of households. Coastal villages in this study almost half the people paying less attention to the existence of defecate facilities. Defecate culture in the sea or pond is a culture that is rooted in their lives every day. When socio-economic conditions in their present good, but not necessarily a desire for them to have their own toilet/latrine. That is because the habit of defecating in the sea or pond is not a problem for them, and these conditions were influenced by the culture of coastal communities which tend to have low attention to the importance of sanitation, for example; majority of the population defecated directly into sea or ponds with the percentage of 55% in the Gisik Cemandi village, 85% Tambak Cemandi Village, 75.7% Kalanganyar Village, 43.1% Banjar Kemuning Village and 27.3% Segoro Tambak Village.

Water supply facility

Coastal areas generally received less attention from the government when viewed from sanitation facilities and other settlement infrastructure. Coastal villages are to be observed, access to clean water depends on the taps. Channel taps with a piping system is only found in some households, most of the population are only able to buy clean water taps with retail systems every day as needed. Village of the highest level of water consumption by purchasing the retail system of water taps are Gisik Cemandi Village at 93.7% and Segorotambak Village 28.2%.

Solid Waste and Drainage System

Research location shows that the majority of the population dispose of solid waste directly into rivers or ponds. The village that most widely dispose solid waste into the river is Kalanganyar village by 87.5%, while the people who dispose solid waste by burning is Segorotambak village by 40%.

Impact of the community that throw trash out of place, causing environmental degradation exhibited by contamination of surface and ground water through leachate, soil contamination through direct contact or leachate waste, air pollution by burning solid waste, the spread of diseases with different vectors like birds, insects and rodents, or other out of control methane. Besides the issue of waste disposal, drainage problems became important to note because up to 50% the drainage channels in the study area are an open channels. The table 2a, 2b, 2c resulted percentage data of socio-economic sanitation conditions in the study area. Figur 1 is the results of spatial maps with geographic information systems technology (GIS).

Table 2a. Percentage of Primary Data Socio-Economic and Housing Type (%)

Name Village	Income Rate (%)			Housing Type (%)		
	< Rp.500.000 (USD 50)	Rp.500.000-Rp.1000.000	>Rp.1000.000	Permanent	Semi Permanent	Non Permanent
Segorotambak	2,9	24,2	72,9	72,6	21,4	2,4
Gisik Cemandi	35	50	15	69	28,6	2,4
Tambak Cemandi	5,5	50,9	43,6	44,6	34	21,4
Kalanganyar	14	55,8	30,2	55	45	0
Banjarkemuning	16,7	50	33,3	36,8	42,1	2,1

Table 2b. Percentage of Primary Data Latrine Type and Water Resource (%)

Name Village	Latrine Type (%)			Water Resources (%)		
	Private Latrine	Defecate to Sea or Ponds	Public Latrine	Wells	Tap Water without piping channel(retail purchased)	Tap Water with piping channel
Segorotambak	72,7	27,3	0	1,4	28,2	70,4
Gisik Cemandi	15	55	30	0	93,7	6,3
Tambak Cemandi	15	85	0	3,8	20,8	75,4
Kalanganyar	16,2	75,7	8,1	9,8	14,6	75,6
Banjarkemuning	27,5	43,1	29,4	2,4	14,3	83,3

Table 2c. Percentage of Primary Data Drainage System and Type Waste (%)

Name Village	Drainage System (%)			Type Waste (%)		
	Open	Closed	Non Channel	Landfill	Thrown into the Sea	Burned
Segorotambak	42,8	42,8	14,2	35,6	24,4	40
Gisik Cemandi	44,4	44,4	1,2	27,3	72,7	0
Tambak Cemandi	97,7	2,3	0	6,5	87	6,5
Kalanganyar	82,9	12,2	4,9	12,5	87,5	0
Banjarkemuning	92,3	7,7	0	25,5	72,5	2

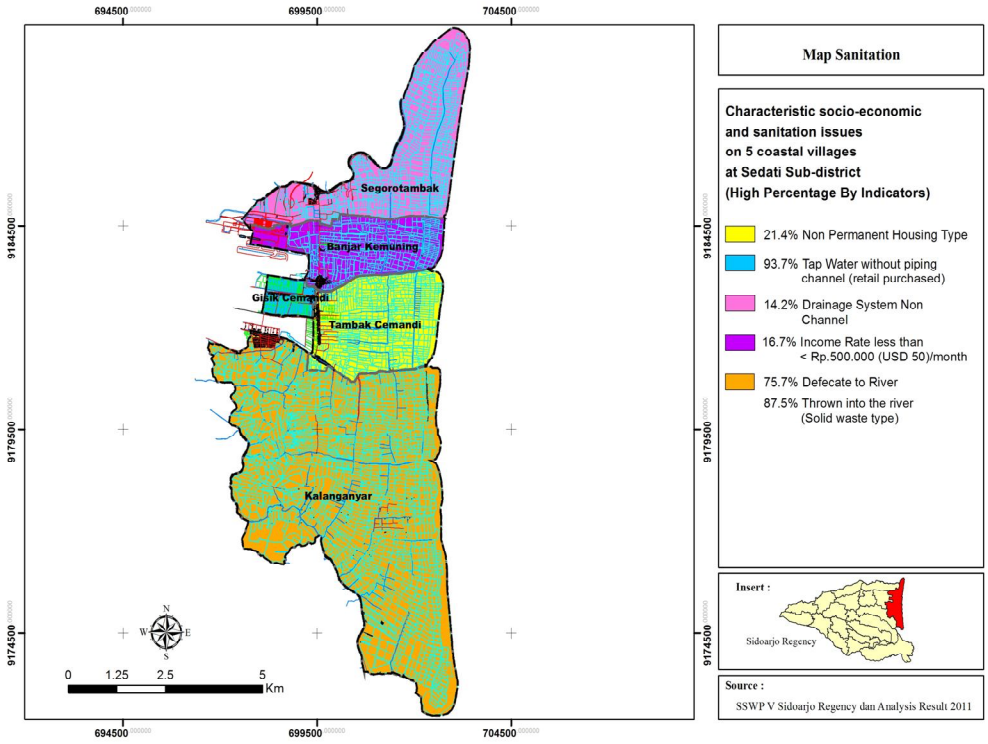

Figure 1. Map Arc-GIS the Socio-Economic and Sanitation Condition of Coastal Communities At Sedati Sub-District Sidoarjo District

Results tabulation and figure 1 can be explain the socio-economic and sanitation conditions in the study area is:

Economical Condition of Population

In developing a country, the income level directly relates to the sanitation conditions, and directly affect to the quality of the environment in which people live [9]. The existing coastal villages in Sedati are Kalanganyar, Tambak cemadi, Gisik Cemandi, Segorotambak, and Banjar kemuning. The villages area are 47.16 ha with population of 13,643. The average density of population in five villages was 2.34 [10]. The primary occupations are fishermen and fishpond. Level of welfare of the population in five villages showed pre-prosperous family category by the number of households more than 50 households in each village. The results showed that majority of the population income level of less than IDR. 500,000 (USD 50) / month by 35%. Percentage of income levels between IDR. 500,000 (USD 50) to Rp. 1 million/ month is the highest at Kalanganyar Village by 55.8%, The Village's most populated high income levels between IDR. 1 million and over is Segorotambak Village by 72.9%. In real terms the percentage of income levels in each village did not indicate the quality of condition sanitation, which are almost half the coastal communities in the study area do not have improved sanitation.

Sanitation Condition

Mangkoedihardjo [11] stated that environmental sanitation is an intervention cut the chain cycle of disease in humans. By tradition, way of cutting the chain cycle of disease intervention was implemented through the disposal and processing of human waste, garbage and waste water, controlling disease vectors, and provision of facilities for personal hygiene and domestic. Environmental sanitation is part of the criteria regarding the conditions of slum infrastructure and facilities, such as the condition of roads, drainage, water supply, wastewater/latrine (MCK) and solid waste. Environmental sanitation are not well characterized by the number of houses unfit for habitation, many sewerage jams, very dense population / building, many people do not defecate in the toilet, and usually located in marginal areas [12]. Soedjono, et al. [13] stated that the sanitation problems especially clean water in the rural East Java have to decision-making in depth not only from the top-down but bottom-up.

Quality and ownership of housing is an important component of vulnerability [14]. Clean water is the basic sanitation needs are very important for the health, growth, and development and survival life for humans. But the basic requirement is still considered a luxury for many poor people in the world. More than 1.1 billion of our fellow citizens do not use drinking water from clean water sources, while the world's 2.6 billion people still lack basic sanitation [15]. Coastal areas generally received less attention from the government when viewed from sanitation facilities and other settlement infrastructure.

Conditions mentioned above indicate that the water shortages caused by poverty due by coastal communities inaccessibility, is as stated by Feitelson and Chenoweth [16] is a situation in which a nation or region can not afford the fee for a sustainable water supply that can used by all people at all times. In Asian countries, solid waste is a problem faced in a city. Most low-income countries, waste is not dumped in place and less controllable. Waste disposal that is not in place will create environmental problems and will affect human health and other living creatures, even in economic losses [17]. The results of this study is similar to a study by Bowen and Riley [18] that for an integrated coastal area management needs to be integration between social and economic indicators in order to improve the condition of the coastal environment with local, regional and national levels to coastal natural resources potential and its sustainability can be maintained. Research Feoli and Fedra [19] entitled GIS technology and spatial analysis in coastal zone management concluded that the integrated coastal area management requires a comprehensive support ranging from environmental impact analysis, risk assessment, policy analysis, zoning and site selection. This support is conducted in an open and participatory to the development of coastal communities in the coastal area management. In his research has not entered aspects of basic sanitation and economic conditions specific to coastal communities.

CONCLUSION

Based on the percentage analysis using GIS on 5 coastal villages in Sedati Sub-District, most of the population incomes level is between IDR. 500,000 (USD 50) to IDR. 1,000,000/month. Village with the highest level of water consumption by purchasing through water vendors are Gisik Cemandi Village at 93.7%, Segorotambak Village 28.2%, Tambak Cemandi 20.8%, Kalanganyar 14.6% and Banjar Kemuning Village 14.3%. Majority of the population defecated directly into sea or ponds with the percentage of 55% in the Gisik Cemandi village, 85% Tambak Cemandi Village, 75.7% Kalanganyar Village, 43.1% Banjar Kemuning Village and 27.3% Segoro Tambak Village. Lack of access to sanitation will have an impact on their lives in a sustainable manner, therefore the government must prioritize sanitation services to coastal communities as the target of the MDGs by 2015.

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