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1 **The environment, socio-economic, and stakeholder partnership**

2 **analysis as integrated coastal management in Semarang City**

3 **Abstract**

4 Land conversion is the main factor that may increase ecological vulnerability in

5 coastal areas in Semarang City, Indonesia. The restoration needs a holistic strategy based

6 on the ecosystem, social and economic condition, and integration among stakeholders. This

7 research was aimed to arrange and develop integrated coastal area management based on

8 the environmental and socio-economic conditions to support sustainable coastal

9 rehabilitation. A descriptive observational study collecting data using observation and

10 interview; was conducted in Mangkang Kulon and Tugurejo Sub-district, Tugu District,

11 Semarang City. The collected data included ecological conditions was analyzed using

12 image analysis aerial photographs, and environmental and geophysical analysis. The

13 social-community condition was diagnosed using socio-economic assessment. The result

14 showed that coastline changes occur due to vanished some mangrove area turned into

15 buildings that indented close to the ocean. The condition changes water current and

16 damages the research location. But the socio-economic index showed a medium to a high

17 score, which means high opportunities for the local community to develop their livelihood.

18 The initial programs increasing community resilience have been arranged by the

19 government, academicians, private sectors, NGOs, and the community.

20 **Keywords**: coastal area, integrated coastal management, Semarang, sustainable

21 development.

22 **Resumo**

23 A conversão de terras é um fator principal que pode aumentar a vulnerabilidade ecológica

24 nas áreas costeiras da cidade de Semarang, na Indonésia. A restauração precisa de uma

25 estratégia baseada na condição ecossistêmica, social e econômica, juntamente com a

integração entre as partes interessadas. Esta pesquisa teve como objetivo organizar e desenvolver uma gestão integrada de áreas costeiras com base na condição ambiental e socioeconômica para apoiar a reabilitação costeira sustentável. Um estudo observacional explicativo que coleta dados por meio de observação e entrevista; foi conduzido em Mangkang Kulon e no subdistrito de Tugurejo, distrito de Tugu, cidade de Semarang. Os dados coletados incluíram a condição ecológica e foram analisados por meio de análises de imagens aéreas, fotografias aéreas e análises ecológicas e geofísicas. A condição sócio-comunitária foi analisada por meio de avaliação socioeconômica. O resultado mostrou que ocorrem mudanças no litoral devido ao desaparecimento de algumas áreas de manguezais transformadas em edifícios que recuaram próximo ao oceano. A condição altera a corrente da água e danifica o local da pesquisa. Mas o índice socioeconômico apresentou pontuação média a alta, o que significa grandes oportunidades para a comunidade local desenvolver seu sustento. Além disso, os programas iniciais de aumento da resiliência da comunidade foram organizados pelo governo, acadêmicos, setores privados, ONGs e comunidade.

Palavras-chave: área costeira, gestão costeira integrada, Semarang, desenvolvimento
    sustentável

INTRODUCTION

Semarang City is the capital of Central Java Province, Indonesia. It lies in the northern coastline and directly adjacent to the Java Sea, which turns it into a strategic location for industrial, commercial, and trading. In the current decade, massive destruction of coastal areas in Semarang City and its ecosystem was caused by land conversion into residential (Wijaya *et al*., 2018), industrial (Sariffuddin *et al*., 2017), fish

and shrimp ponds. On the other side, land conversion and mangrove destruction, compounded by climate change, had been a shift in the coastline of 49.54 m to the mainland within 12 years and escalation environmental loss (Mehvar *et al*., 2018). Based on data from the Semarang City Fisheries Office (2015), coastal destruction caused by sea level rises to cause economic losses amounted to 729 million per year, and 110 million from damaged 2,889 ha of pond areas. Sea level rises also resulted in erosion, which affected 10,425 houses and damaged coastal infrastructure (Maimunah *et al*., 2011).

The coastal area provides mangrove forest as protection against climate change (Blankespoor *et al*., 2017), is a primary source for economic income (Chang, 2018; Wahyudin *et al*., 2018), and cultural development (Syakir, 2019). The destruction of coastal areas threatens community life and city resilience from natural disasters (Komugabe-Dixson *et al*., 2019). In the last decade, so many parties have been involved in coastal rehabilitation, such as mangrove planting by national and private sectors and community empowerment from university and non-government organizations (NGOs). But because of the lack of synergy in program implementation, the result is not sustainable. It is needed and integration from all stakeholders to take action in coastal rehabilitation from physical and community life (Dentoni *et al*., 2018; Gerkensmeier & Ratter, 2018; Martuti *et al*., 2020). The integrated program to improve ecological and social life and how stakeholders collaborate should be prepared well and based on the current conditions to increase coastal area resilience. Regarding those issues, this research aimed to arrange and develop integrated coastal area management based on the environmental and socio-economic conditions to support sustainable coastal rehabilitation in Semarang City.

72   **MATERIALS AND METHODS**

73   This study was qualitative research: explanatory observational design, conducted

74   in coastal areas of Tugurejo and Mangkang Kulon Subdistrict, Tugu District, Semarang

75   City (Figure 1), from June to July 2019. The research loci were selected based on the

76   inclusion criteria: 1) high mangrove coverage areas; 2) the primary location for mangrove

77   rehabilitation program; 3) one of the sites for the acceleration of economic development,

78   and 4) well-developed community;

79
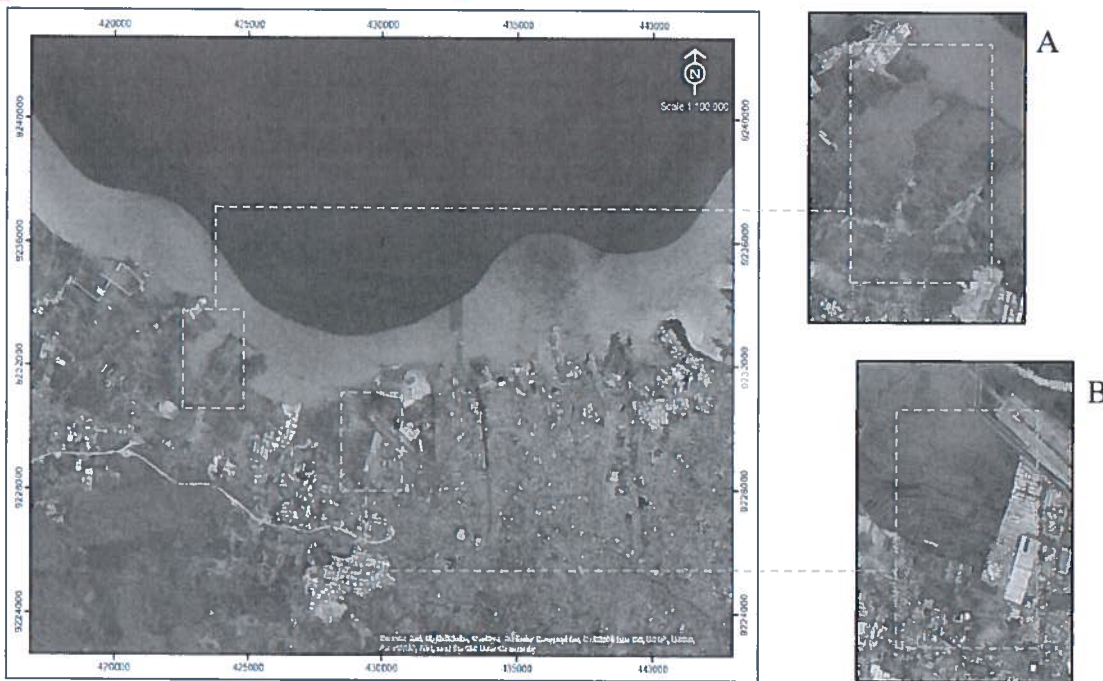
80   Figure 1. Location of data collection on the coast of Semarang City. A) Mangkang

81   Kulon subdistrict and B) Tugurejo Subdistrict.

82

83   ***Land-conversion of Mangrove Ecosystem***

84   Ecological data was arranged using Digital Globe High-Resolution Imagery. To

85   maintain the quality, all of the ecosystem condition maps were collected in July each year,

86   where it has entered the dry season, so that the cloud cover has begun to decrease and the

87   image looks clearer. A land conversion was also confirmed with field observation,

88   community statement, government document of city spatial plan, mangrove conversion,

89   and rehabilitation.

90   Primary data collection was carried out to support digital data by field observation

91   to listing the mangrove ecosystem's damage level. The satellite imagery data was

92   recorded in the time series format for the last five years. The interpretation was carried

93   out by comparing the Digital Globe satellite imagery data and determining the spatial

94   distribution of mangrove density in the two villages. The land use data were also analyzed

95   to determine the area of opened land, originally a mangrove ecosystem, but converted

96   into productive lands, such as fish and prawn ponds).

97

98   *Socio-Economic of the Local Community*

99   Socio-economic data was compiled from 63 respondents in two sub-districts

100   randomly. Resilience was collected using a survey and confirmed using in-depth

101   interviews and focus group discussions. The data was analyzed using a developed

102   instrument based on the sustainable livelihood framework (SLF) to understand socio-

103   economic assets that support community welfare. In this research, five aspects were then

104   further mentioned as socio-economic assets (Serrat, 2017). The SLF indicators included

105   human resources, natural, social, financial, and physic capital (Hahn *et al.*, 2009; Huong

106   *et al.*, 2019; Koirala, 2015; Sujakhu *et al.*, 2019; Williams *et al.*, 2020) were inversed into

107   a positive statement to develop resilience index. The socio-economic assets instrument

108   was then divided into 12 components, and these components were further sub-divided

109   into 38 socio-economic indicators (Table 1).

110

111   *Data analysis*

112   Most of the indicators were calculated and expressed on different units or scales;

113 thus, each indicator's data were standardized using equation index. The standardized

114 index then was averaged and calculated to estimate the socio-economic assets indices and

115 determined as the final resilience index score for the community (1) (Hahn *et al*., 2009;

116 Huong *et al*., 2019; Koirala, 2015; Sujakhu *et al*., 2019; Williams *et al*., 2020). We used

117 a formula and scale from 0 (least resilience) to 1 (most resilience) in this research.

118       $\text{index} = \frac{\text{Observed value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$ (1)
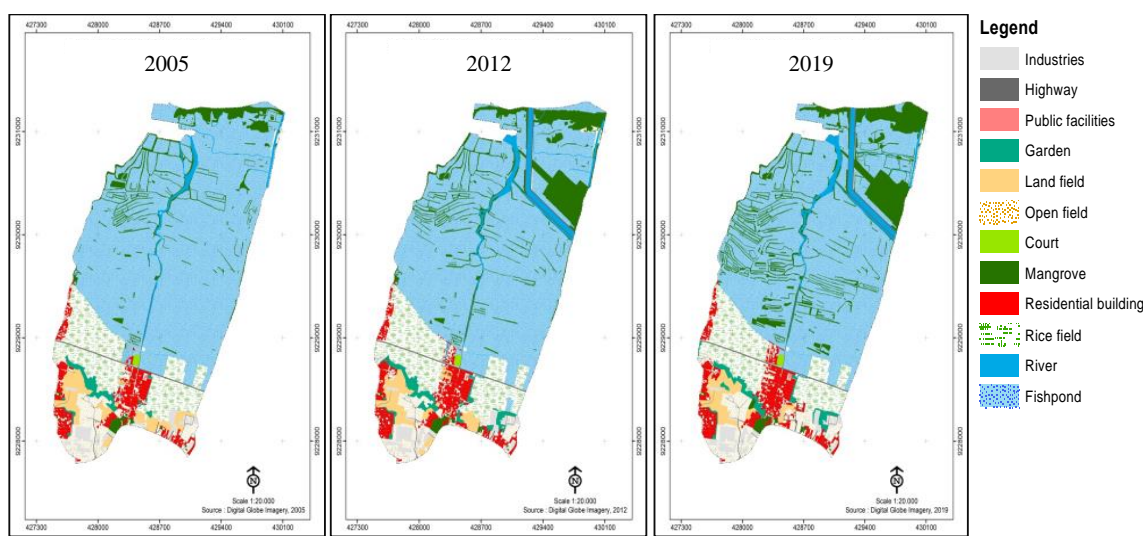
119

120 **RESULTS**

121 *The identification of land use and coastal ecological destruction*
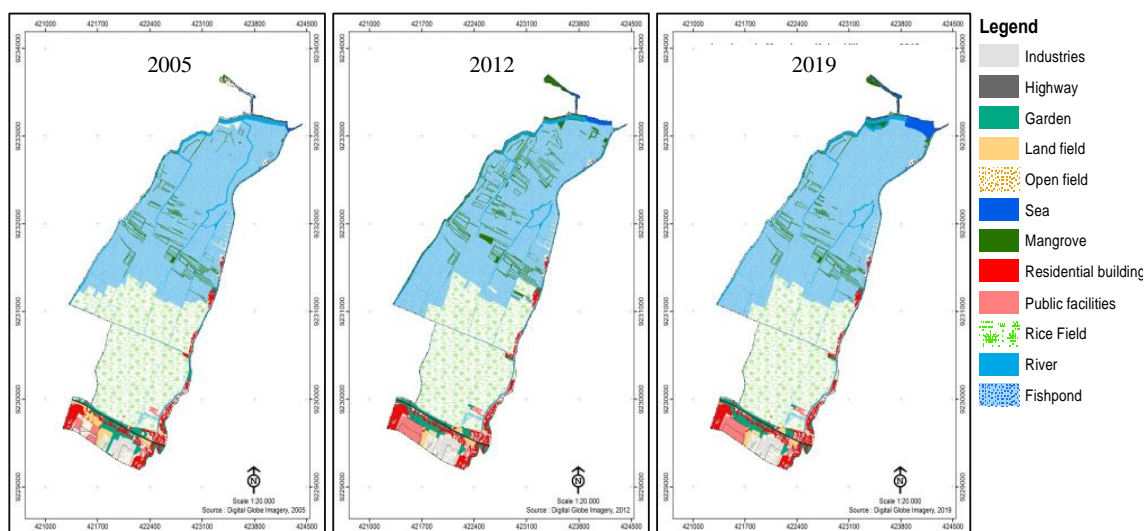
122   Coastline changing in Tugurejo is still relatively minor, compared to Mangkang

123 Kulon. Furthermore, The stable condition in Tugurejo may cause by a massive mangrove

124 ecosystem that moderately increases in the past ten years. It can be seen from the extent

125 and spatial distribution of mangroves increasing each year (Figure 2). The mangrove

126 ecosystem has around 49.41 ha with an elongated pattern on the agricultural field and

127 pond dams.

128   In Mangkang Kulon, about more than 50% of the total areas were converted into

129 fishponds. However, it was then destroyed and vanished due to high seawater rises due

130 to climate changes. Then, the mangrove ecosystem in the Mangkang Kulon increase from

131 2005 to 2012 (Table 2). caused by mangrove replanting activities carried out by

132 government agencies, the private sector, universities, and the local community. Even

133 though the mangrove ecosystem has significantly decreased, in 2019 caused a massive

134 abrasion of the fishpond embankments.

135   The mangroves species of the two areas are dominated by *Rhizophora apiculata, R.*

136   *mucronata,* and *Avicennia alba, A. marina* species, and some additional *R. stylosa* and

137   *Sonneratia alba*. But, high mangrove planting activities in Tugurejo may affect the

138   agricultural field areas that have decreased in 2019. The farm field is an irrigated field

139   with paddies as the main commodity and harvested twice a year. It may cause by the

140   massive mangrove plantation that changing land coverage from the open area to be
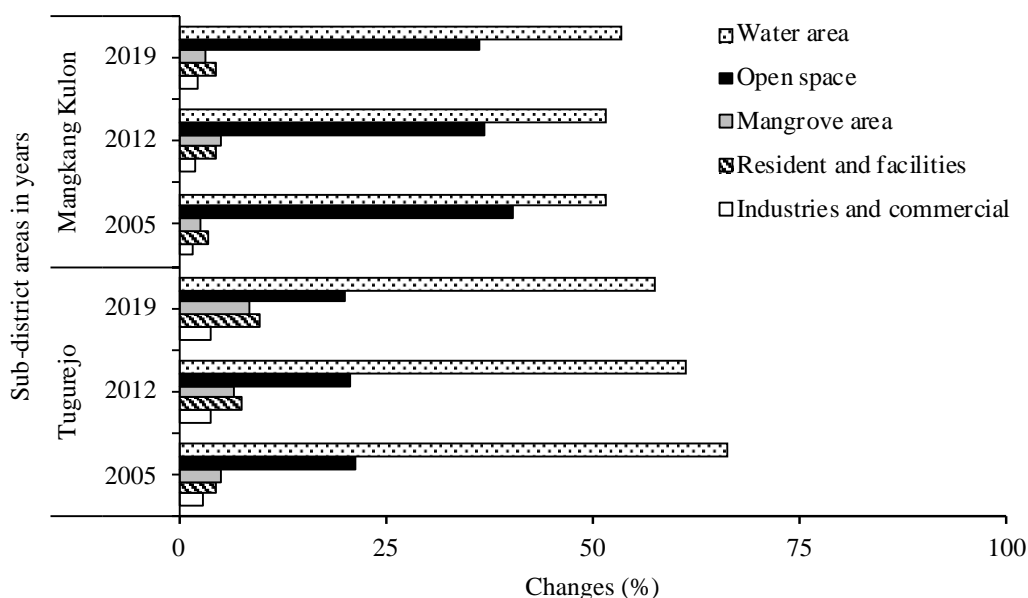
141   estuarine.

142

143   Figure 2. The land-use changes from years 2005, 2012, and 2019 in Tugurejo (A) and

144   Mangkang Kulon (B) Sub-district.

145   In both areas, the mangrove areas extend the river embankment to the coastline and

146   those with a sizeable swarming pattern. The monoculture and planting types are arranged

147   at a constant distance, indicating growth unnaturally as a rehabilitation effort through

148   planting. On the other hand, the agricultural field in Mangkang Kulan, directly exposed

149   to the sea, make it vulnerable by the water rises. The effect of seawater rises has been

150   proven by decreasing open space area alongside increasing water area (Figure 3).

151

152   Figure 3. The percentage changes of the land-use in Tugurejo and Mangkang Sub-district

153   in 2005, 2012, and 2019.

154

155   *The socio-economic calculation*

156   In this study, human capital was assessed from the variables of knowledge and

157   skill: education, experience, knowledge, or business skills, that supporting livelihood

158   productivity. On the other side, health care was also considered a driven factor and

159   managed as one of the Indonesian government priority programs (Dini & Fauzan, 2020;

160   Sumarto, 2017). We found that coastal communities in Tugurejo have a higher score or

161   more resilience than the Mangkang Kulon. The quality of humans needs to be

162   continuously improved so that asset management is efficient and sustainable.

163 Table 1. The score of resilience potent of Tugurejo and Mangkang Kulon Sub-district

Variables	Capital	Indicators	Unit	Data Sources	Score		Explanatory Notes
					Mangkang Kulon	Tugurejo	
Human Capital	Knowledge and Skills	Percentage of respondents who have been followed the 12 years compulsory education.	Percent	Survey	0.53	0.49	most of the community group's members have received empowering program from university, government, and private sector
		Percentage of respondents experienced in developing business	Percent	Survey	0.70	0.75	
		Percentage of respondents have taken any kind of vocational training	Percent	Survey	0.61	0.67	
		Percentage of respondents who skilled in business development	Percent	Survey	0.60	0.61	
		Average assessment score of the business understanding	Ratio	Survey	0.49	0.53	
	Health care	Average time needed to go to the nearest health facility	Minutes	Survey	0.72	0.80	the health parameter was developed based on the social safety net program from the
		Percentage of respondents with insurant	Percent	Survey	0.75	0.93	

Variables	Capital	Indicators	Unit	Data Sources	Score		Explanatory Notes
					Mangkang Kulon	Tugurejo	
		Percentage of respondents with no disease's issues	Percent	Survey	0.68	0.76	government by providing health services for vulnerable and underprivileged families
Natural Capital	Land	Percentage of respondents who are owning the land	Count	Survey	0.61	0.73	
		Percentage of utilized land	Meters	Survey	0.70	0.79	
		Average of land productivity index	Ratio	Survey	0.74	0.69	
	Water	An average score of water sources access	Meters	Survey	0.86	0.98	Clean-freshwater is the main
		An average score of water quality	Count	Survey	0.78	0.79	issue in Semarang coastal,
		Amount of water resources	Count	Survey	0.52	0.94	due to sea intrusion to the
		An average score of the environmental services	Ratio	Survey	0.39	0.68	soil-water and polluted surface-water
Financial Capital	Finance	Average of monthly income	Count	Survey	0.68	0.51	
		Percentage of respondents with a side job	Percent	Survey	0.45	0.52	

Variables	Capital	Indicators	Unit	Data Sources	Score		Explanatory Notes
					Mangkang Kulon	Tugurejo	
		Percentage of respondents with the bank account	Percent	Survey	0.63	0.65	
		An average score of bank deposit	Count	Survey	0.55	0.45	
		Average of additional expenses	Count	Survey	0.43	0.74	
	Assets	An average score of respondents' assets value	Count	Survey	0.68	0.69	
	Financial support	Percentage of respondents who are taking advantages of financial services	Percent	Survey	0.69	0.57	
		An average score of financial services type	Count	Survey	0.79	0.84	
		Percentage of financial support receiver	Percent	Survey	0.40	0.33	
Social Capital	Networking and relationship	Percentage of respondents with social-mutual cooperation	Ratio	Survey	0.85	0.93	the modification was conducted based on the observation of coastal
		Percentage of respondents who attend the religious activity in routine	Frequence	Survey	0.86	0.89	

Variables	Capital	Indicators	Unit	Data Sources	Score		Explanatory Notes
					Mangkang Kulon	Tugurejo	
		Percentage of respondents who has high neighborhood interaction	Percent	Survey	0.74	0.90	community culture in Semarang City
		Percentage of respondents who joined in social-organizations	Percent	Survey	0.74	0.91	
		Percentage of respondents who are receiving the donation from family or relatives	Percent	Survey	0.84	0.71	
		An average score of social networking	Count	Survey	0.80	0.73	
	Technology and Social media	Percentage of respondents who able to use the smartphone	Percent	Survey	0.70	0.80	
		Percentage of respondents who accessed social media	Percent	Survey	0.72	0.73	
Physical capital	Transportation	Percentage of respondents with private transportation	Percent	Survey	0.61	0.66	

| Variables | Capital | Indicators | Unit | Data Sources | Score | | Explanatory Notes |
					Mangkang Kulon	Tugurejo	
	House	Percentage of respondents who are owning the house	Percent	Survey	0.87	0.92	
		An average score of habitable permanent house	Count	Survey	0.86	0.99	
		An average score of proper sanitation	Count	Survey	0.87	0.97	
	Public services	Percentage of respondents with electricity power above 900 kWh	Percent	Survey	0.88	0.97	
		An average score of public facilities	Count	Survey	0.71	0.58	

164 [*)] The instrument was developed by following previous research (Hahn *et al*., 2009; Huong *et al*., 2019; Koirala, 2015; Sujakhu *et al*., 2019;

165 Williams *et al*., 2020)

166 [**)] The justification from the researcher is based on the current condition and adapted from the Indonesian government program.

167

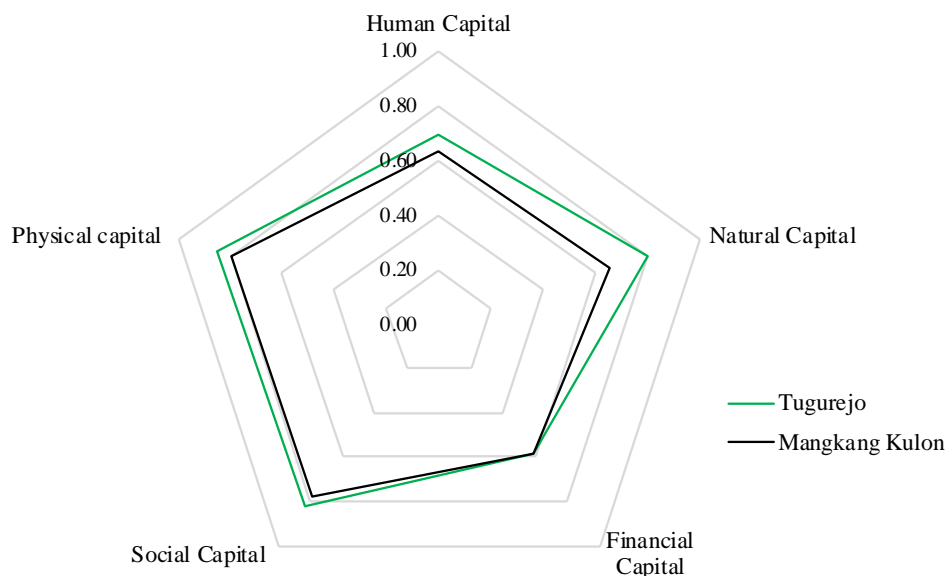168 Table 2. Time Series of Tugurejo Village Land Use (2005, 20012, 2019)

Land Use	Tugurejo						Mangkang Kulon					
	2005		2012		2019		2005		2012		2019	
	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha
Industries and commercial												
Industries	1.83	10.48	2.03	11.66	2.08	11.91	0.71	3.79	0.77	4.12	1.12	5.99
Highway	1.22	6.99	1.72	9.87	1.82	10.46	1.08	5.76	1.23	6.57	1.36	7.26
Resident and facilities												
Government office	0.02	0.13	0.02	0.13	0.03	0.17	0.00	-	-	-	-	-
Residential building	3.49	20.03	4.09	23.46	4.57	26.23	2.86	15.33	3.14	16.80	3.19	17.07
Public facilities	1.12	6.40	3.46	19.86	5.33	30.58	0.83	4.44	1.39	7.43	1.39	7.45
Open space												
Garden	1.17	6.72	1.84	10.54	1.50	8.61	2.02	10.80	2.06	11.01	2.03	10.87
Land field	3.01	17.29	2.65	15.19	2.20	12.63	1.00	5.37	0.54	2.89	0.53	2.81
Open field	4.98	28.56	4.70	26.97	5.57	31.97	4.11	22.00	3.00	16.03	3.40	18.19
Court	0.13	0.77	0.13	0.77	0.13	0.77	0.00	-	-	-	-	-
Rice field	11.91	68.29	11.29	64.77	10.58	60.68	33.11	177.18	31.27	167.36	30.21	161.66
Mangrove area												
Mangrove plantation	5.02	28.79	6.82	39.12	8.61	49.41	2.67	14.31	5.10	27.30	3.34	17.86

Water area

River	1.56	8.92	3.22	18.46	3.21	18.40	4.18	22.38	3.67	19.64	3.85	20.60
Fishpond	64.54	370.18	58.02	332.75	54.35	311.73	47.42	253.78	47.84	255.99	49.59	265.38
Total land		573.55		573.55		573.55		535.14		535.14		535.14

169   Source: Image Processing Results, 2019.

170   Based on the calculation, we found all socio-economic assets were higher in

171   Tugurejo compared to Mangkang Kulon, except financial capital. The financial assets are

172   the lowest capital owned by the community, along with human resources (Figure 4).

173

174   Figure 4. The capital value of socio-economic in Tugurejo and Mangkang Kulon Sub-

175   district.

176

177   Based on the data, low financial capital mains an obstacle for the community to

178   develop their business capacity. The respondent mostly said that they spend more money

179   to make their house and fishpond still safe from the inundation and flood. Then, they rely

180   on their financial capital for business development from empowerment programs from

181   the government or third parties. Most of the entrepreneur has an unwell education

182   background and unskilled in business development. Furthermore, the community has not

183   optimally utilized natural assets. The coastal area provides a mangrove area and its biota

184   that can be managed sustainably to increase the income.

185   Meanwhile, social and physical assets have the best value among other capital. In

186   the current condition, both in Tugurejo or Mangkang Kulon, the community's houses are

187   permanently habitable and relatively safe from the tidal flood. Then, all houses unit has

188   installed with electricity supporting their livelihood, and education. The city government

189   provides cheap shuttle or bus rapid transit and easily reached from the location for

190   transportation.

191   *Conducted programs and stakeholder mapping in Tugurejo and Mangkang Kulan*

192   *coastal areas*

193   We identify several programs conducted by many stakeholders and mostly focused

194   on Tugurejo, the reasons why high mangrove coverage areas and strong socio-economic

195   assets exist. However, we recognize that the programs were implemented in the

196   unintegrated plan in the last decade, thus resulting in slow and unsustainable output

197   achievement. The implementation mostly oriented on the short-time program's and have

198   to produce a product, but lack awareness on the community.

199   The knowledge and awareness about integrated management have changed the

200   stakeholder mindset, especially from the government and private sectors, to engage

201   academicians and NGOs to build up community resilience. We grouped the eight most

202   active and standard existing programs conducted in both sub-district from the last ten

203   years and found collaborative implementations (Table 3).

204   Table 3. Existing program in Tugurejo and Mangkang Kulon in term of environmental

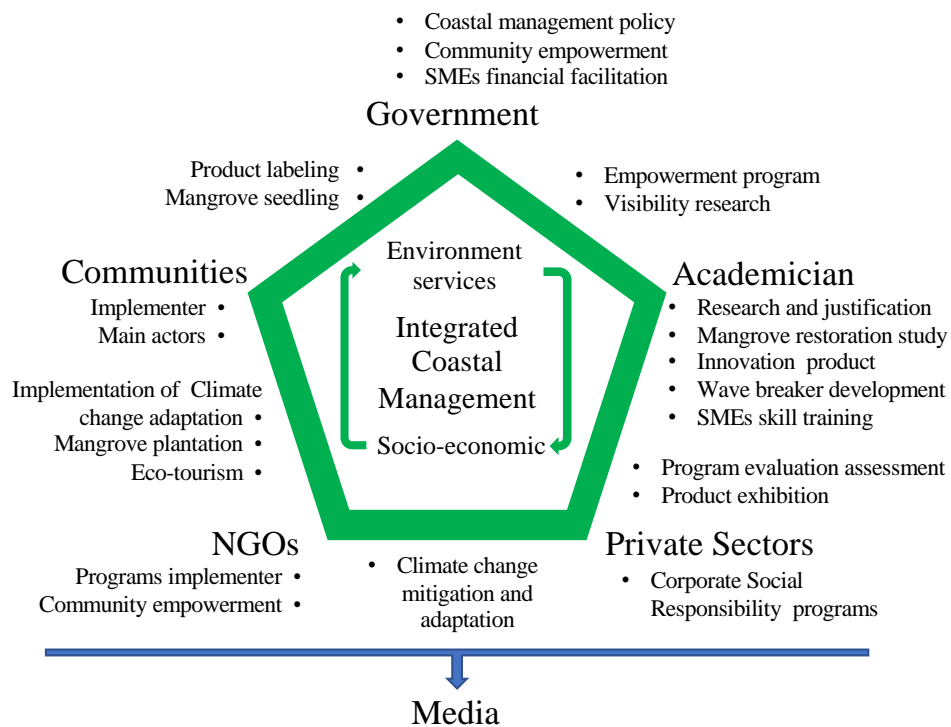205   rehabilitation and community empowerment

Programs	Tugurejo	Mangkang Kulon	Implementer

Counseling and training on mangrove rehabilitation	++++	++++	FFM, RCS
Supervision of activities that can damage the mangrove ecosystem;	++++	+++	FFM, NGOs
Coaching to encourage capacity building for Adaptation and Mitigation of the impact of climate change at the local level through the Climate Village Program (ProKlim)	+++++	+++	NGOs, Indonesia Power, Pertamina, MFD, AO, FFM, RCS, and companies through its CSR program
Providing mangrove seedlings and supervising mangrove forests, providing ecotourism packages, and shrimp/fish cultivation carried out in ponds around the coast. (ProKlim)	++++	+++	MF, MFD, AO, EB, CEA, Facilitated by the NGOs
Women of Coastal Area: Fish-based food production, mangrove-based processed foods, and batik coloring with mangrove patterns and natural dyes (ProKlim).	++++	++	MFD, FFM, RCS, and companies through its CSR program, NGOs
The increasing diversity of mangrove ecosystem types by planting and monitoring on an ongoing basis, build a beach belt;	++++	++	FFM, RCS, NGOs, MFD, CSR, AO for mangrove diversity. ME, MF, EB, RDPA for sea belt
Utilization of the community and fishers group management.	++++	++	FFM, RCS, MFD
Arrangement of Mangrove Damage Standard in Central Java	++++	++++	FFM, RCS, MFD

206 Note: plus mark (+) indicates how often/ intensity the programs are conducted in the research areas. Central

207 Government: ME = Indonesian Republic of Ministry of Environment; MF = Indonesian Republic of

208 Ministry of Marine and Fisheries; City Government: RDPA = Regional Development Planning Agency;

213   The collaborative management of the implementation of coastal rehabilitation and

214   community empowerment in Semarang City shows a pentagonal multi-stakeholder

215   partnership model, consist of academicians, private sectors, government, communities,

216   and NGOs (Figure 5). In the current condition, we identify several programs jointly

217   conducts by the multi-stakeholders (Table 4).

218

219   Figure 5. The Pentagonal partnership model for a rehabilitation effort for coastal areas

220   in Semarang was adopted from Halibas *et al*. (2017); Prabantarikso *et al*.

221   (2018).

222   The academicians and NGOs are mostly involved as implementers in implementing

223   the government's programs as a policymaker and private sector that is founding the

224   program. As the beneficiary target, the community is the success key, so the upgraded

225   skill, willingness, and motivation must be popped up to guaranty the program's

226   sustainability. The press media, both social media and mass media, play essential roles in

227   program scaling up/ dissemination successfulness, introducing the program, policy, and

228   activities, and providing a product marketing platform. The press media can also educate

229   people in Semarang City and others to keep the environment sustainable.

230   **DISCUSSION**

231   In 2019, there were 13 classes of existential land use in Tugurejo, where the most

232   extensive area was ponds (water area), about 311.73 ha for milkfish and shrimp ponds.

233   The ponds were partitioned with large mud and soil embankment for mangrove

234   cultivation. In Tugurejo, there was an abrasion of 1.76 m from 2005 to 2012 and accretion

235   from 2012-2019 of 1.32 m (Irsadi *et al*., 2019). The abrasion increases as an impact of

236   the profound change of land and mangrove forest into the cultivation pond, with only a

237   few young mangroves three in the pond's dam (Martuti *et al*., 2019)). It was increasing

238   cost production and decreasing fish productivity. It was also responsible for increases

239   water areas from year to year in Mangkang Kulon (Figure 2 & 3), which erodes the land

240   area and the destruction of mangrove ecosystems on the embankments (Nugraha *et al*.,

241   2018; Widyasamratri & Aswad, 2017).

242   In the past decade, the abrasion was increased may cause by the new airport runway

243   construction in the coastal. The structure makes current ocean turbulence on the west side

244   of the runway, deflect and increase the destructive energy and destroy the land. While the

245   accretion in 2012 - 2019 was caused by the sediment load from the rivers, which

246   eventually settles and hardens. Therefore, it expands the land area and can be the substrate

247   for the mangrove plant to grow (Ismanto *et al*., 2016). In Mangkang Kulon, the abrasion

248   lead by the wood industry's pier also makes turbulence and destroy the coastline. But we

249   found that in the Mangkang Kulon coastline, the turbulence is more robust due to the

250   dock's construction, which is slightly tilted to the east and sea currents originating from

251   the west (data not published). The physical structure is predicted as a main anthropogenic

252   factor changing the ocean currents both on the surface and underwater (Kim *et al*., 2018;

253   Surya *et al*., 2019).

254   Climate change also has a spatial effect on sea-level rises, storms, high rainfall, and

255   rising temperatures. The change impacts mangrove forests in a coastal area on a regional

256   scale (Ward *et al*., 2016). The lack of mangroves as front protectors may contribute to

257   seawater intrusion and destroy the agricultural field. But the increased population is

258   considered the main contributor to the reduced area of rice fields (Wijaya *et al*., 2018). In

259   Mangkang Kulon, low mangrove coverage has proved destructive coastline as a result of

260   the abrasion. It is a massive destructed area compared to Tugurejo.

261   The coastal communities, *e.g.,* fishers, fish cultivators, fish traders, *etc*., carry out

262   socio-economic activities related to resources in coastal areas and oceans (Freduah *et al*.,

263   2017). Thus, coastal communities have a high enough dependence on the potential and

264   conditions of coastal and marine resources that affect their quality of life (Husain *et al*.,

265   2019; Widyasamratri & Aswad, 2017). The land use and coastal ecosystem destruction

266   may decline that independence and make them vulnerable, but the communities have

267   socio-economic assets that contribute to their livelihood sustainability.

268

269   ***The Socio-Economic Assets of Coastal Community***

270   Climate change does affect not only the environment but also the social and

271   economy of the people of Tugurejo and Mangkang Kulon. Based on satellite analysis, it

272   shows that the Tugurejo and Mangkang Kulon coastlines have a high-level vulnerable

273   coastline against climate change (Husnayaen *et al*., 2018). It possibility decreasing the

274   carrying capacity of nature and physical capital for the socio-economic life of coastal

275   communities.

276   The reduced risk of vulnerability can be seen from physical aspects such as land

277   ownership status, where the community's lands are mostly sited in the inundated area.

278   Productive land, such as agricultural areas, is shrinking, resulting in a decrease in rice

279   productivity. In contrast, the shrinkage of fish ponds results in reducing milkfish

280   production as the pond's leading commodity. Also, reducing vulnerability needs to be

281   done by considering socio-economic aspects such as improving education quality, health,

282   and job availability (Sariffuddin *et al*., 2017).

283   Adaptation activities by raising and maintaining dams are continuously pursued

284   every year and require a large amount of money. To deal with this, planting mangroves

285   as a mitigation and adaptation effort has helped maintain the pond dam's shape while

286   increasing environmental services for local livelihoods. The construction of a wave

287   breaker made of used tires is also carried out along the fragmented coastlines in the

288   Tugurejo and Mangkang Kulon areas, as an effort to reduce wave energy and ocean

289   currents.

290   In general, Tugurejo and Mangkang Kulon communities have developed good

291   adaptive capacities by utilizing coastal natural resources as materials for making food,

292   coloring, and handicrafts. This becomes a side job or an alternative livelihood. However,

293   access to carrying capacities such as education and training in business development and

294   marketing, modernization of information flows, and financial support are homework to

295 increase coastal communities' resilience through improving economic aspects (Astuti &

296 Handayani, 2020). Health aspects such as the availability of health services and health

297 insurance are still considered trivial, even though the need for this is considered very large

298 considering that coastal areas are heavily affected by climate change. Besides,

299 assertiveness and holistic and integrated programming need to be considered by the

300 government as a policymaker (Suhelmi & Triwibowo, 2018).

301 ***Developed Multi-Stakeholder Partnership Strategy in Integrated Coastal Management***

302   The importance of integrated coastal management can be divide into five reasons,

303 1) empirically, there are ecological and functional relationships between coastal

304 ecosystem with mainland and community; 2) in a coastal area, there is usually more than

305 one type of natural resource, artificial resource, and environmental services that can be

306 developed for development purposes; 3) usually, there are more than one group, which

307 skilled in particular things; 4) both ecologically and economically, the use of a coastal

308 area in monoculture is very vulnerable to internal and external changes that lead to

309 business failure.

310   The development of collaborative works among stakeholders should be managed

311 in an integrated cooperative approach to gain profitable and sustainable coastal areas,

312 (Prabantarikso *et al*., 2018). The parties interested in utilizing natural resources in the

313 coastal area must prepare an integrated management plan that applies to whole

314 stakeholders, especially the government with the community (Sariffuddin *et al*., 2017).

315 Since 2005, ecosystem rehabilitation and community empowering have been conducting

316 by many parties (Table 3). Hence, independently, the community in Tugurejo has made

317 nursery and mangrove planting, making water breaker from tires, and environmental

318 education through eco-tourism to increase ecological services and community resilience

319 from climate change disaster (Sari & Prayoga, 2018).

320   The interaction of multi-stakeholders made a pentagonal partnership that can be

321 defined as a coastal rehabilitation model to encourage the restoration and balance of the

322 coastal ecosystem through profitable collaboration and teamwork (Halibas *et al*., 2017).

323 The program approach with the multi-stakeholder partnership model increases the

324 legality and program success (Martuti *et al*., 2020; Soesilowati *et al*., 2017). On the other

325 hand, we found that mass media plays an essential role in making the program popular,

326 especially for community product marketing (Ahmad *et al*., 2016). In this research, Mass

327 media plays a role in introducing social change (agent of social) broader, disseminating

328 the program, and engaging other parties in collaborative works. It shows that the mass

329 media introduce modernization efforts (Ekanayake, 2016), stimulate the decision-making

330 process (Mukhtar, 2020), and accelerate the process of transitioning from a traditional

331 society to a modern one (Colbran, 2020; Narayana & Ahamad, 2017; Schrape, 2017).

332 **CONCLUSION**

333   This research is necessary for developing integrated coastal management based on

334 the environmental and socio-economic problems in Semarang City. The information of

335 the land use in coastal area changes in more than last decade are very dynamic, caused by

336 increased population, climate change and anthropogenic that increases residential area

337 and at the same time decreases the agricultural field. Increases in the water area that

338 threaten coastal resilience contribute to the reduced agricultural site and fishpond

339 productivity.

340   The community directly involves but simultaneously acts as target beneficiaries,

341 implicates in various activities in managing and rehabilitating coastal quality, including

342 building up the wave breaker, nurseries, and mangrove planting. But, most of the program

343 in the coastal area by various parties was conducted separately and overlapping. It is

344 needed a multi-stakeholder partnership approach to make integrated coastal management

345 and increase the program effectiveness. It is necessary to know the role of various

346 components of the community. We also suggest that the partnership between the

347 government, community, and private sector must continue to be encouraged to optimize

348 the ICM action plant. Cooperation in the management of facilities, infrastructure, and

349 infrastructure development is necessary to maximize the implementation of ICM

350

351 **CONTRIBUTIONS**

352 NKTM: research concept.; RP: enhance research concept.; NKTM: research

353 funding.: NKD, NKTM: instrumentation and administration.; WABNS, DPM: data

354 collection. NKTM, RP, DPM: analyzed the data.; WABNS: area mapping and

355 illustration.; NKTM, DPM: wrote the manuscript.; DPM, NKD: publication. All authors

356 read and approved the final version of the document.

357

363

364 **REFERENCES**

365 Ahmad, N.S.; Musa, R.; Harun, M.H.M. (2016) - The impact of social media content

366 marketing (SMCM) towards brand health. *Procedia Economics and Finance*,

367   37(16):331–336. DOI: 10.1016/S2212-5671(16)30133-2

368   Astuti, M.F.K.; Handayani, W. (2020) - Livelihood vulnerability in Tambak Lorok ,

369   Semarang: an assessment of mixed rural-urban neighborhood. *Review of Regional*

370   *Research*, 40(2):137-157. DOI: 10.1007/s10037-020-00142-7

371   Blankespoor, B.; Dasgupta, S.; Lange, G.M. (2017) - Mangroves as a protection from

372   storm surges in a changing climate. *Ambio*, 46(4):478–491. DOI: 10.1007/s13280-

373   016-0838-x

374   Chang, D. (2018) - Modeling and analysis of marine product trade on the coordinated

375   development of economy and resource in border and coastal area. *Journal of Coastal*

376   *Research*, 83(83):229–236. DOI: 10.2112/SI83-037.1

377   Colbran, M. P. (2020) - Policing, social media and the new media landscape: can the

378   police and the traditional media ever successfully bypass each other? *Policing and*

379   *Society*, 30(3):295–309. DOI: 10.1080/10439463.2018.1532426

380   Dentoni, D.; Bitzer, V.; Schouten, G. (2018) - Harnessing wicked problems in multi-

381   stakeholder partnerships. *Journal of Business Ethics*, 150(2):333–356. DOI:

382   10.1007/s10551-018-3858-6

383   Dini, S.K.; Fauzan, A. (2020) - Clustering provinces in indonesia based on community

384   welfare indicators. *EKSAKTA: Jurnal Ilmu-Ilmu MIPA*, 20(1):56–63. DOI:

385   10.20885/EKSAKTA.vol1.iss1.art9

386   Ekanayake, E.M.S. (2016) - Social stratification, modernization and restructuring of sri

387   lankan society. *International Journal of Arts and Commerce*, 5(2):96–107.

388   Available on-line at www.ijac.org.uk › Vol._5_No._2 › 9._96-107.pdf

389   Freduah, G.; Fidelman, P.; Smith, T.F. (2017) - The impacts of environmental and socio-

390   economic stressors on small scale fisheries and livelihoods of fishers in Ghana.

391   *Applied Geography*, 89(9):1–11. DOI: 10.1016/j.apgeog.2017.09.009

392 Gerkensmeier, B.; Ratter, B.M.W. (2018) - Governing coastal risks as a social process—
393   Facilitating integrative risk management by enhanced multi-stakeholder
394   collaboration. *Environmental Science and Policy*, 80(6):144–151. DOI:
395   10.1016/j.envsci.2017.11.011

396 Hahn, M.B.; Riederer, A.M.; Foster, S.O. (2009) - The Livelihood Vulnerability Index:
397   A pragmatic approach to assessing risks from climate variability and change-A case
398   study in Mozambique. *Global Environmental Change*, 19(1):74–88. DOI:
399   10.1016/j.gloenvcha.2008.11.002

400 Halibas, A.S.; Sibayan, R.O.; Maata, R.L.R. (2017) - The penta helix model of innovation
401   in Oman: An hei perspective. *Interdisciplinary Journal of Information, Knowledge,*
402   *and Management*, 12(1):159–172. DOI: 10.28945/3735

403 Huong, N.T.L.; Yao, S.; Fahad, S. (2019) - Assessing household livelihood vulnerability
404   to climate change: The case of Northwest Vietnam. *Human and Ecological Risk*
405   *Assessment*, *25*(5):1157–1175. DOI: 10.1080/10807039.2018.1460801

406 Husain, A.; Satria, A.; Kusmana, C.; Eriyatno. (2019) - Study on living environment and
407   quality of life of coastal community in Gorontalo City, Indonesia. *Advances in*
408   *Agriculture & Botanics*, 11(1):48–55. Available on-line at
409   http://www.aab.bioflux.com.ro/docs/2019.48-55.pdf

410 Husnayaen, Rimba, A.B.; Osawa, T.; Parwata, I.N.S.; As-syakur, A.R.; Kasim, F.;
411   Astarini, I.A. (2018) - Physical assessment of coastal vulnerability under enhanced
412   land subsidence in Semarang, Indonesia, using multi-sensor satellite data. *Advances*
413   *in Space Research*, 61(8):2159–2179. DOI: 10.1016/j.asr.2018.01.026

414 Irsadi, A.; Anggoro, S.; Soeprobowati, T.R.; Helmi, M.; Khair, A.S.E. (2019) - Shoreline
415   and mangrove analysis along semarang-demak, Indonesia for sustainable
416   environmental management. *Jurnal Pendidikan IPA Indonesia*, 8(1):1–11. DOI:

417   10.15294/jpii.v8i1.17892

418 Ismanto, A.; Zainuri, M.; Hutabarat, S.; Sugianto, D.N.; Widada, S.; Wirasatriya, A.

419   (2016) - Sediment transport model in Sayung District, Demak. *Journal of Physics:*

420   *Conference Series*, 755(1): DOI: 10.1088/1755-1315/55/1/012007/meta

421 Kim, M.J.; Kim, C.S.; Choi, B.J.; Lee, S.H. (2018) - Plume current change by seawall

422   construction for a harbor development in South Korea. *Journal of Coastal Research*,

423   85(85):126–130. DOI: 10.2112/SI85-026.1

424 Koirala, S. (2015) - *Livelihood vulnerability assessment to the impacts of socio-*

425   *environmental stressors in raksirang VDC of Makwanpur District Nepal.* 47p.,

426   Thesis. The Department of International Environment and Development Studies,

427   Norwegian University of Life Sciences, Noragric, Norwegia. Available on-line at

428   https://core.ac.uk/download/pdf/52112732.pdf

429 Komugabe-Dixson, A.F.; de Ville, N.S.E.; Trundle, A.; McEvoy, D. (2019) -

430   Environmental change, urbanisation, and socio-ecological resilience in the pacific:

431   community narratives from Port Vila, Vanuatu. *Ecosystem Services*, 39(7):100973.

432   DOI: 10.1016/j.ecoser.2019.100973

433 Maimunah, S.; Rosli, N.; Rafanoharana, S.; Sari, K.; Higashi, O. (2011) - Strengthening

434   community to prevent flood using participatory approach (a Case of the Semarang

435   City). *Journal of International Development and Cooperation*, 18(2):19–28. DOI:

436   10.15027/32463

437 Martuti, N.K.T.; Anggraito, Y.U.; Anggraini, S. (2019) - Vegetation stratification in

438   Semarang coastal area. *Biosaintifika:*, 11(1):139–147. DOI:

439   10.15294/biosaintifika.v11i1.18621

440 Martuti, N.K.T.; Pribadi, R.; Sidiq, W.A.B.N.; Mutiatari, D.P. (2020) - Community-based

441   integrated coastal management strategy in Tugurejo Subdistrict, Semarang.

Advances in Social Science, Education and Humanities Research, 390(ICRACOS 2019):73–80. DOI: 10.2991/icracos-19.2020.15

Mehvar, S.; Filatova, T.; Syukri, I.; Dastgheib, A.; Ranasinghe, R. (2018) - Developing a framework to quantify potential sea level rise-driven environmental losses: A case study in Semarang coastal area, Indonesia. *Environmental Science and Policy*, 89(2):216–230. DOI: 10.1016/j.envsci.2018.06.019

Mukhtar, M.U. (2020) - Building bridges: The relevance of mass media in community policing: study of Kano Metropolis. *International Journal of Development Strategies in Humanities, Management and Social Sciences*, 10(1):24–35. Available on-line   at http://www.internationalpolicybrief.org/images/2020/MARCH/IJDSHMSS/ARTI CLE3.pdf

Narayana, A.; Ahamad, T. (2017) - Role of media in women empowerment. *International Journal of Advanced Education and Research*, 2(5):50–53. Available on-line at https://www.researchgate.net/publication/303998838_Role_of_media_in_accele rating_women_empowerment

Nugraha, A.L.; Awaluddin, M.; Sasmito, B. (2018) - Modelling multi hazard mapping in Semarang City using GIS-Fuzzy method. *IOP Conference Series: Earth and Environmental Science*, 123(1). DOI: 10.1088/1755-1315/123/1/012002

Prabantarikso, M.; Fahmi, I.; Fauzi, A.M.; Nuryantono, N. (2018) - Strategic Collaborative Model of BGAC+ for Sustainable Housing Development in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 145(1). DOI: 10.1088/1755-1315/145/1/012128

Sari, A.D.; Prayoga, N. (2018) - Enhancing citizen engagement in the face of climate change risks: A case study of the flood early warning system and health information

467   system in Semarang city, Indonesia. In S. Hughes (Ed.), *Climate Changes in Cities:*

468   *Urban Book Series*, pp. 121–137. DOI: 10.1007/978-3-319-65003-6_7

469 Sariffuddin, Astuti, K.D.; Farhaeni, G.; Wahdah, L. (2017) - Vulnerability assessment:

470   the role of coastal informal settlement growth to social vulnerability in Genuk Sub-

471   District, Semarang City. *IOP Conference Series: Earth and Environmental Science*,

472   55(1):012047. DOI: 10.1088/1755-1315/55/1/012047

473 Schrape, J.F. (2017) - Reciprocal irritations: Social media, mass media and the public

474   sphere. In. Regine Paul, Marc Mölders, Alfons Bora, Peter Münte, Michael Huber.

475   *Society, Regulation and Governance: New Modes of Shaping Social Change?*,

476   pp.138–150. Edward Elgard Publishing, Cheltenham, United Kingdom. ISBN: 978-

477   1 78643 837 9 DOI: 10.4337/9781786438386.00016

478 Serrat, O. (2017) - *Knowledge Solutions: Tools, methods, and approaches to drive*

479   *organizational performance*, Asian Development Bank - Springer Nature. Manila,

480   Phylipine.https://library.oapen.org/bitstream/handle/20.500.12657/28041/1001955.

481   pdf?sequence=1

482 Soesilowati, E.; Kariada, N.; Margunani, M. (2017) - Model for empowering farmers at

483   dry land through quadruple helix approach. *Journal of Arts and Humanities*, 6(4),

484   01. DOI: 10.18533/journal.v6i4.1131

485 Suhelmi, I.R.; Triwibowo, H. (2018) - Coastal inundation adaptive strategy in Semarang

486   Coastal Area. *Forum Geografi*, *32*(2), 195–203. DOI: 10.23917/forgeo.v32i2.5672

487 Sujakhu, N.M.; Ranjitkar, S.; He, J.; Schmidt-Vogt, D.; Su, Y.; Xu, J. (2019) - Assessing

488   the livelihood vulnerability of rural indigenous households to climate changes in

489   Central   Nepal,   Himalaya.   *Sustainability*   *(Switzerland)*,   *11*(10).

490   DOI: **10.3390/su11102977**

491 Sumarto, M. (2017) - Welfare Regime Change in Developing Countries: Evidence from

Indonesia. *Social Policy and Administration*, *51*(6), 940–959. DOI: **10.1111/spol.12340**

Surya, M.Y.; He, Z.; Xia, Y.; Li, L. (2019) - Impacts of sea level rise and river discharge on the hydrodynamics characteristics of Jakarta Bay (Indonesia). *Water (Switzerland)*, 11(7):138- DOI: **10.3390/w11071384**

Syakir. (2019) - Semarang batik as an artistic representation of coastal and egalitarian communities. *Advances in Social Science, Education and Humanities Research*, 271(ICONARC 2018): 207–210. Avalaible on-line at: https://www.atlantis-press.com/proceedings/iconarc-18/125911198

Wahyudin, Y.; Kusumastanto, T.; Adrianto, L.; Wardiatno, Y. (2018) - A Social Ecological System of Recreational Fishing in the Seagrass Meadow Conservation Area on the East Coast of Bintan Island, Indonesia. *Ecological Economics*, 148(12), 22–35. DOI: 10.1016/j.ecolecon.2018.01.013

Ward, R.D.; Friess, D.A.; Day, R.H.; Mackenzie, R.A. (2016) - Impacts of climate change on mangrove ecosystems: a region by region overview. *Ecosystem Health and Sustainability*, *2*(4): e01211. DOI: **10.1002/ehs2.1211**

Widyasamratri, H.; Aswad, A. (2017) - A preliminary study: An agent-based spatial simulation of human-coastal environment interaction. *The Third International Conference on Coastal and Delta Areas*, 3:593–601. Semarang. Indonesia. Available on-line at: http://lppm-unissula.com/jurnal.unissula.ac.id/index.php/ICCDA/article/view/2044/1567

Wijaya, H.B.; Kurniawati, H.; Hutama, S.T.E.W. (2018) - Industrialization Impact on Worker Mobility and Land Use in Peri Urban Area (Case study of Semarang District, Indonesia). *IOP Conference Series: Earth and Environmental Science*, 123(1). DOI: 10.1088/1755-1315/123/1/012037

517   Williams, P.A.; Crespo, O.; Abu, M. (2020) - Assessing vulnerability of horticultural

518   smallholders' to climate variability in Ghana: applying the livelihood vulnerability

519   approach. *Environment, Development and Sustainability*, 22(3):2321–2342. DOI:

520   10.1007/s10668-018-0292-y

521

1 **The environment, socio-economic, and stakeholder partnership**

2 **analysis as integrated coastal management in Semarang City**

3   **Abstract**

4   Land conversion is the main factor that may increase ecological vulnerability in

5 coastal areas in Semarang City, Indonesia. The restoration needs a holistic strategy based

6 on the ecosystem, social and economic condition, and integration among stakeholders. This

7 research was aimed to arrange and develop integrated coastal area management based on

8 the environmental and socio-economic conditions to support sustainable coastal

9 rehabilitation. A descriptive observational study collecting data using observation and

10 interview was conducted in Mangkang Kulon and Tugurejo Sub-district, Tugu District,

11 Semarang City. The collected data included ecological conditions was analyzed using

12 image analysis aerial photographs, and environmental and geophysical analysis. The

13 social-community condition was diagnosed using socio-economic assessment. The result

14 showed that coastline changes occur due to vanished some mangrove area turned into

15 buildings that indented close to the ocean. The condition changes water current and

16 damages the research location. But the socio-economic index showed a medium to high

17 score, which means high opportunities for the local community to develop their livelihood.

18 The initial programs increasing community resilience have been arranged by the

19 government, academicians, private sectors, NGOs, and the community.

20 **Keywords**: coastal area, integrated coastal management, Semarang, sustainable

21   development.

22   **Resumo**

23 A conversão de terras é um fator principal que pode aumentar a vulnerabilidade ecológica

24 nas áreas costeiras da cidade de Semarang, na Indonésia. A restauração precisa de uma

25 estratégia baseada na condição ecossistêmica, social e econômica, juntamente com a

integração entre as partes interessadas. Esta pesquisa teve como objetivo organizar e desenvolver uma gestão integrada de áreas costeiras com base na condição ambiental e socioeconômica para apoiar a reabilitação costeira sustentável. Um estudo observacional explicativo que coleta dados por meio de observação e entrevistas foi conduzido em Mangkang Kulon e no subdistrito de Tugurejo, distrito de Tugu, cidade de Semarang. Os dados coletados incluíram a condição ecológica e foram analisados por meio de análises de imagens aéreas, fotografias aéreas e análises ecológicas e geofísicas. A condição sócio-comunitária foi analisada por meio de avaliação socioeconômica. O resultado mostrou que ocorrem mudanças no litoral devido ao desaparecimento de algumas áreas de manguezais transformadas em edifícios que recuaram próximo ao oceano. A condição altera as correntes da água e danifica o local da pesquisa. Mas o índice socioeconômico apresentou pontuação média a alta, o que significa grandes oportunidades para a comunidade local desenvolver seu sustento. Além disso, os programas iniciais de aumento da resiliência da comunidade foram organizados pelo governo, acadêmicos, setores privados, ONGs e comunidade.

Palavras-chave: área costeira, gestão costeira integrada, Semarang, desenvolvimento sustentável.

INTRODUCTION

Semarang City is the capital of Central Java Province, Indonesia. It lies in the northern coastline and directly adjacent to the Java Sea, which turns it into a strategic location for industrial, commercial, and trading. In the current decade, massive destruction of coastal areas in Semarang City and its ecosystems was caused by land conversion into residential (Wijaya *et al.*, 2018), industrial (Sariffuddin *et al.*, 2017), fish

49 and shrimp ponds. On the other side, land conversion and mangrove destruction,

50 compounded by climate change, had been a shift in the coastline of 49.54 m to the

51 mainland within 12 years and escalation environmental loss (Mehvar et al., 2018). Based

52 on data from the Semarang City Fisheries Office (2015), coastal destruction caused by

53 sea level rises to cause economic losses amounted to 729 million per year, and 110 million

54 from damaged 2,889 ha of pond areas. Sea level rises also resulted in erosion, which

55 affected 10,425 houses and damaged coastal infrastructure (Maimunah et al., 2011).

56 The coastal area provides mangrove forest as protection against climate change

57 (Blankespoor et al., 2017), is a primary source for economic income (Chang, 2018;

58 Wahyudin et al., 2018), and cultural development (Syakir, 2019). The destruction of

59 coastal areas threatens community life and city resilience from natural disasters

60 (Komugabe-Dixson et al., 2019). In the last decade, so many parties have been involved

61 in coastal rehabilitation, such as mangrove planting by national and private sectors and

62 community empowerment from university and non-government organizations (NGOs).

63 But because of the lack of synergy in program implementation, the result is not

64 sustainable. It is needed and integration from all stakeholders to take action in coastal

65 rehabilitation from physical and community life (Dentoni et al., 2018; Gerkensmeier &

66 Ratter, 2018; Martuti et al., 2020). The integrated program to improve ecological and

67 social life and how stakeholders collaborate should be prepared well and based on the

68 current conditions to increase coastal area resilience. Regarding those issues, this research

69 aimed to arrange and develop integrated coastal area management based on the

70 environmental and socio-economic conditions to support sustainable coastal

71 rehabilitation in Semarang City.

MATERIALS AND METHODS

This study was qualitative research: explanatory observational design, conducted in coastal areas of Tugurejo and Mangkang Kulon Subdistrict, Tugu District, Semarang City (Figure 1), from June to July 2019. The research loci were selected based on the inclusion criteria: 1) high mangrove coverage areas; 2) the primary location for mangrove rehabilitation program; 3) one of the sites for the acceleration of economic development, and 4) well-developed community.

Figure 1. Location of data collection on the coast of Semarang City. A) Mangkang Kulon subdistrict and B) Tugurejo Subdistrict.

Land-conversion of Mangrove Ecosystems

Ecological data was arranged using Digital Globe High-Resolution Imagery. To maintain the quality, all of the ecosystem condition maps were collected in July each year, where it has entered the dry season, so that the cloud cover has begun to decrease and the

87   image looks clearer. A land conversion was also confirmed with field observation,

88   community statement, government document of city spatial plan, mangrove conversion,

89   and rehabilitation.

90   Primary data collection was carried out to support digital data by field observation

91   to listing the mangrove ecosystem's damage level. The satellite imagery data was

92   recorded in the time series format for the last five years. The interpretation was carried

93   out by comparing the Digital Globe satellite imagery data and determining the spatial

94   distribution of mangrove density in the two villages. The land use data were also analyzed

95   to determine the area of opened land, originally a mangrove ecosystem, but converted

96   into productive lands, such as fish and prawn ponds.

97

98   *Socio-Economic of the Local Community*

99   Socio-economic data was compiled from 63 respondents in two sub-districts

100   randomly. Resilience was collected using a survey and confirmed using in-depth

101   interviews and focus group discussions. The data was analyzed using a developed

102   instrument based on the sustainable livelihood framework (SLF) to understand socio-

103   economic assets that support community welfare. In this research, five aspects were then

104   further mentioned as socio-economic assets (Serrat, 2017). The SLF indicators included

105   human resources, natural, social, financial and physic capital (Hahn *et al*., 2009; Huong

106   *et al*., 2019; Koirala, 2015; Sujakhu *et al*., 2019; Williams *et al*., 2020) were inversed into

107   a positive statement to develop resilience index. The socio-economic assets instrument

108   was then divided into 12 components, and these components were further sub-divided

109   into 38 socio-economic indicators (Table 1).

110

111   *Data analysis*

5

112   Most of the indicators were calculated and expressed on different units or scales;

113   thus, each indicator's data were standardized using equation index. The standardized

114   index then was averaged and calculated to estimate the socio-economic assets indices and

115   determined as the final resilience index score for the community (X) (Hahn et al., 2009;

116   Huong et al., 2019; Koirala, 2015; Sujakhu et al., 2019; Williams et al., 2020). We used

117   a formula and scale from 0 (least resilience) to 1 (most resilience) in this research.

118    $$index = \frac{Observed\ value - minimum\ value}{Maximum\ value - minimum\ value} \tag{1}$$

119

RESULTS

The identification of land use and coastal ecological destruction

122   Coastline changing in Tugurejo is still relatively minor, compared to Mangkang

123   Kulon. Furthermore, The stable condition in Tugurejo may cause by a massive mangrove

124   ecosystem that moderately increases in the past ten years. It can be seen from the extent

125   and spatial distribution of mangroves increasing each year (Figure 2). The mangrove

126   ecosystem has around 49.41 ha with an elongated pattern on the agricultural field and

127   pond dams.

128   In Mangkang Kulon, about more than 50% of the total areas were converted into

129   fishponds. However, it was then destroyed and vanished due to high seawater rises due

130   to climate changes. Then, the mangrove ecosystem in the Mangkang Kulon increase from

131   2005 to 2012 (Table 2), caused by mangrove replanting activities carried out by

132   government agencies, the private sector, universities, and the local community. Even

133   though the mangrove ecosystem has significantly decreased, in 2019 caused a massive

134   abrasion of the fishpond embankments.

6

135   The mangroves species of the two areas are dominated by *Rhizophora apiculata, R.*

136   *mucronata,* and *Avicennia alba, A. marina* species, and some additional *R. stylosa* and

137   *Sonneratia alba.* ~~But~~, However, high mangrove planting activities in Tugurejo may affect the

138   agricultural field areas that have decreased in 2019. The farm field is an irrigated field

139   with paddies as the main commodity and harvested twice a year. It may be cause by the

140   massive mangrove plantation that changed land coverage from the open area to be

141   estuarine.

A

B

142

143   Figure 2. The land-use changes from years 2005, 2012, and 2019 in Tugurejo (A) and

144   Mangkang Kulon (B) Sub-district.

145   In both areas, the mangrove areas extend the river embankment to the coastline and

146 those with a sizeable swarming pattern. The monoculture and planting types are arranged

147 at a constant distance, indicating growth unnaturally as a rehabilitation effort through

148 planting. On the other hand, the agricultural field in Mangkang Kulan, directly exposed

149 to the sea, make it vulnerable by the water rises. The effect of seawater rises has been

150 proven by decreasing open space area alongside increasing water area (Figure 3).

151

152   Figure 3. The percentage changes of the land-use in Tugurejo and Mangkang Sub-district

153   in 2005, 2012, and 2019.

154

155   *The socio-economic calculation*

156   In this study, human capital was assessed from the variables of knowledge and

157   skill: education, experience, knowledge, or business skills, that supporting livelihood

158   productivity. On the other side, health care was also considered a driven factor and

159   managed as one of the Indonesian government priority programs (Dini & Fauzan, 2020;

160   Sumarto, 2017). We found that coastal communities in Tugurejo have a higher score or

161   more resilience than the Mangkang Kulon. The quality of humans needs to be

162   continuously improved so that asset management is efficient and sustainable.

Table 1. The score of resilience potent of Tugurejo and Mangkang Kulon Sub-districts.

Variables	Capital	Indicators	Unit	Data Sources	Score		Explanatory Notes
					Mangkang Kulon	Tugurejo	
Human Capital	Knowledge and Skills	Percentage of respondents who have been followed the 12 years compulsory education.	Percent	Survey	0.53	0.49	most of the community group's members have received empowering program from university, government, and private sector
		Percentage of respondents experienced in developing business	Percent	Survey	0.70	0.75	
		Percentage of respondents have taken any kind of vocational training	Percent	Survey	0.61	0.67	
		Percentage of respondents who skilled in business development	Percent	Survey	0.60	0.61	
		Average assessment score of the business understanding	Ratio	Survey	0.49	0.53	
	Health care	Average time needed to go to the nearest health facility	Minutes	Survey	0.72	0.80	the health parameter was developed based on the social safety net program from the
		Percentage of respondents with insurant	Percent	Survey	0.75	0.93	

Variables	Capital	Indicators	Unit	Data Sources	Score Mangkang Kulon	Tugurejo	Explanatory Notes
		Percentage of respondents with no disease's issues	Percent	Survey	0.68	0.76	government by providing health services for vulnerable and underprivileged families
Natural Capital	Land	Percentage of respondents who are owning the land	Count	Survey	0.61	0.73	
		Percentage of utilized land	Meters	Survey	0.70	0.79	
		Average of land productivity index	Ratio	Survey	0.74	0.69	
	Water	An average score of water sources access	Meters	Survey	0.86	0.98	Clean-freshwater is the main issue in Semarang coastal, due to sea intrusion to the soil-water and polluted surface-water
		An average score of water quality	Count	Survey	0.78	0.79	
		Amount of water resources	Count	Survey	0.52	0.94	
		An average score of the environmental services	Ratio	Survey	0.39	0.68	
Financial Capital	Finance	Average of monthly income	Count	Survey	0.68	0.51	
		Percentage of respondents with a side job	Percent	Survey	0.45	0.52	

Variables	Capital	Indicators	Unit	Data Sources	Score Mangkang Kulon	Score Tugurejo	Explanatory Notes
		Percentage of respondents with the bank account	Percent	Survey	0.63	0.65	
		An average score of bank deposit	Count	Survey	0.55	0.45	
		Average of additional expenses	Count	Survey	0.43	0.74	
	Assets	An average score of respondents' assets value	Count	Survey	0.68	0.69	
	Financial support	Percentage of respondents who are taking advantages of financial services	Percent	Survey	0.69	0.57	
		An average score of financial services type	Count	Survey	0.79	0.84	
		Percentage of financial support receiver	Percent	Survey	0.40	0.33	
Social Capital	Networking and relationship	Percentage of respondents with social-mutual cooperation	Ratio	Survey	0.85	0.93	the modification was conducted based on the
		Percentage of respondents who attend the religious activity in routine	Frequence	Survey	0.86	0.89	observation of coastal

Variables	Capital	Indicators	Unit	Data Sources	Score		Explanatory Notes
					Mangkang Kulon	Tugurejo	
		Percentage of respondents who has high neighborhood interaction	Percent	Survey	0.74	0.90	community culture in Semarang City
		Percentage of respondents who joined in social-organizations	Percent	Survey	0.74	0.91	
		Percentage of respondents who are receiving the donation from family or relatives	Percent	Survey	0.84	0.71	
		An average score of social networking	Count	Survey	0.80	0.73	
	Technology and Social media	Percentage of respondents who able to use the smartphone	Percent	Survey	0.70	0.80	
		Percentage of respondents who accessed social media	Percent	Survey	0.72	0.73	
Physical capital	Transportation	Percentage of respondents with private transportation	Percent	Survey	0.61	0.66	

Variables	Capital	Indicators	Unit	Data Sources	Score		Explanatory Notes
					Mangkang Kulon	Tugurejo	
	House	Percentage of respondents who are owning the house	Percent	Survey	0.87	0.92	
		An average score of habitable permanent house	Count	Survey	0.86	0.99	
		An average score of proper sanitation	Count	Survey	0.87	0.97	
	Public services	Percentage of respondents with electricity power above 900 kWh	Percent	Survey	0.88	0.97	
		An average score of public facilities	Count	Survey	0.71	0.58	

164 *) The instrument was developed by following previous research (Hahn *et al.*, 2009; Huong *et al.*, 2019; Koirala, 2015; Sujakhu *et al.*, 2019;

165 Williams *et al.*, 2020)

166 **) The justification from the researcher is based on the current condition and adapted from the Indonesian government program.

167

168 Table 2. Time Series of Tugurejo Village Land Use (2005, 20012, 2019)

Land Use	Tugurejo						Mangkang Kulon					
	2005		2012		2019		2005		2012		2019	
	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha
Industries and commercial												
Industries	1.83	10.48	2.03	11.66	2.08	11.91	0.71	3.79	0.77	4.12	1.12	5.99
Highway	1.22	6.99	1.72	9.87	1.82	10.46	1.08	5.76	1.23	6.57	1.36	7.26
Resident and facilities												
Government office	0.02	0.13	0.02	0.13	0.03	0.17	0.00	-	-	-	-	-
Residential building	3.49	20.03	4.09	23.46	4.57	26.23	2.86	15.33	3.14	16.80	3.19	17.07
Public facilities	1.12	6.40	3.46	19.86	5.33	30.58	0.83	4.44	1.39	7.43	1.39	7.45
Open space												
Garden	1.17	6.72	1.84	10.54	1.50	8.61	2.02	10.80	2.06	11.01	2.03	10.87
Land field	3.01	17.29	2.65	15.19	2.20	12.63	1.00	5.37	0.54	2.89	0.53	2.81
Open field	4.98	28.56	4.70	26.97	5.57	31.97	4.11	22.00	3.00	16.03	3.40	18.19
Court	0.13	0.77	0.13	0.77	0.13	0.77	0.00	-	-	-	-	-
Rice field	11.91	68.29	11.29	64.77	10.58	60.68	33.11	177.18	31.27	167.36	30.21	161.66
Mangrove area												
Mangrove plantation	5.02	28.79	6.82	39.12	8.61	49.41	2.67	14.31	5.10	27.30	3.34	17.86

15

Water area

River	1.56	8.92	3.22	18.46	3.21	18.40	4.18	22.38	3.67	19.64	3.85	20.60
Fishpond	64.54	370.18	58.02	332.75	54.35	311.73	47.42	253.78	47.84	255.99	49.59	265.38
Total land		573.55		573.55		573.55		535.14		535.14		535.14

169   Source: Image Processing Results (2019)

170   Based on the calculation, we found all socio-economic assets were higher in

171   Tugurejo compared to Mangkang Kulon, except financial capital. The financial assets are

172   the lowest capital owned by the community, along with human resources (Figure 4).

173

174   Figure 4. The capital value of socio-economic in Tugurejo and Mangkang Kulon Sub-

175   district.

176

177   Based on the data, low financial capital mains an obstacle for the community to

178   develop their business capacity. The respondent mostly said that they spend more money

179   to make their house and fishpond still safe from the inundation and flood. Then, they rely

180   on their financial capital for business development from empowerment programs from

181   the government or third parties. Most of the entrepreneur has an unwell education

182   background and unskilled in business development. Furthermore, the community has not

183   optimally utilized natural assets. The coastal area provides a mangrove area and its biota

184   that can be managed sustainably to increase the income.

185 Meanwhile, social and physical assets have the best value among other capital. In

186 the current condition, both in Tugurejo or Mangkang Kulon, the community's houses are

187 permanently habitable and relatively safe from the tidal flood. Then, all houses unit has

188 installed with electricity, supporting their livelihood, and education. The city government

189 provides cheap shuttle or bus rapid transit and easily reached from the location for

190 transportation.

191 *Conducted programs and stakeholder mapping in Tugurejo and Mangkang Kulan*

192 *coastal areas*

193 We identify several programs conducted by many stakeholders and mostly focused

194 on Tugurejo, the reasons why high mangrove coverage areas and strong socio-economic

195 assets exist. However, we recognize that the programs were implemented in the

196 unintegrated plan in the last decade, thus resulting in slow and unsustainable output

197 achievement. The implementation mostly oriented on the short-time program's and have

198 to produce a product, but lack awareness on the community.

199 The knowledge and awareness about integrated management have changed the

200 stakeholder mindset, especially from the government and private sectors, to engage

201 academicians and NGOs to build up community resilience. We grouped the eight most

202 active and standard existing programs conducted in both sub-district from the last ten

203 years and found collaborative implementations (Table 3).

204 Table 3. Existing program in Tugurejo and Mangkang Kulon in term of environmental
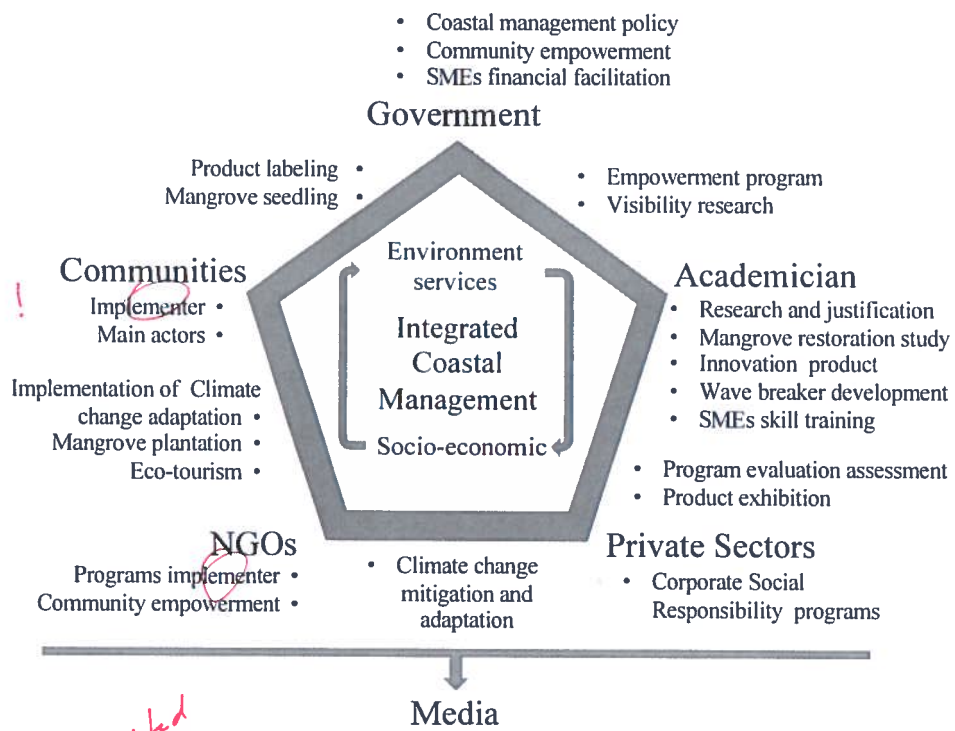
205 rehabilitation and community empowerment.

Programs	Tugurejo	Mangkang Kulon	Implementer

Counseling and training on mangrove rehabilitation	++++	++++	FFM, RCS
Supervision of activities that can damage the mangrove ecosystem	++++	+++	FFM, NGOs
Coaching to encourage capacity building for Adaptation and Mitigation of the impact of climate change at the local level through the Climate Village Program (ProKlim)	+++++	+++	NGOs, Indonesia Power, Pertamina, MFD, AO, FFM, RCS, and companies through its CSR program
Providing mangrove seedlings and supervising mangrove forests, providing ecotourism packages, and shrimp/fish cultivation carried out in ponds around the coast (ProKlim)	++++	+++	MF, MFD, AO, EB, CEA, Facilitated by the NGOs
Women of Coastal Area: Fish-based food production, mangrove-based processed foods, and batik coloring with mangrove patterns and natural dyes (ProKlim).	++++	++	MFD, FFM, RCS, and companies through its CSR program, NGOs
The increasing diversity of mangrove ecosystem types by planting and monitoring on an ongoing basis, build a beach belt	++++	++	FFM, RCS, NGOs, MFD, CSR, AO for mangrove diversity. ME, MF, EB, RDPA for sea belt
Utilization of the community and fishers group management.	++++	++	FFM, RCS, MFD
Arrangement of Mangrove Damage Standard in Central Java	++++	++++	FFM, RCS, MFD

206 Note: plus mark (+) indicates how often/ intensity the programs are conducted in the research areas. Central

207 Government: ME = Indonesian Republic of Ministry of Environment; MF = Indonesian Republic of

208 Ministry of Marine and Fisheries; City Government: RDPA = Regional Development Planning Agency;

209 EB = Environmental Bureau; MFD = Marine and Fisheries Department, AO = Agriculture Office; CEA =

210 Community Empowerment Agency; Academician: FFM = Faculty of Fisheries and Marine; Universitas

211 Diponegoro; RCS = Research and Community Services Institute of Universitas Negeri Semarang; Private

212 Sectors: CSR = Corporate Social Responsibility.

213   The collaborative management of the implementation of coastal rehabilitation and

214 community empowerment in Semarang City shows a pentagonal multi-stakeholder

215 partnership model, consist of academicians, private sectors, government, communities,

216 and NGOs (Figure 5). In the current condition, we identify several programs jointly

217 conducts by the multi-stakeholders (Table 4).

218

219 Figure 5. The Pentagonal partnership model for a rehabilitation effort for coastal areas

220   in Semarang was adopted from Halibas *et al.* (2017); Prabantarikso *et al.*

221   (2018).

222   The academicians and NGOs are mostly involved as implementers in implementing

223   the government's programs as a policymaker and private sector that is founding the

224   program. As the beneficiary target, the community is the success key, so the upgraded

225   skill, willingness, and motivation must be popped up to guaranty the program's

226   sustainability. The press media, both social media and mass media, play essential roles in

227   program scaling up/ dissemination successfulness, introducing the program, policy, and

228   activities, and providing a product marketing platform. The press media can also educate

229   people in Semarang City and others to keep the environment sustainable.

DISCUSSION

231   In 2019, there were 13 classes of existential land use in Tugurejo, where the most

232   extensive area was ponds (water area), about 311.73 ha for milkfish and shrimp ponds.

233   The ponds were partitioned with large mud and soil embankment for mangrove

234   cultivation. In Tugurejo, there was an abrasion of 1.76 m from 2005 to 2012 and accretion

235   from 2012-2019 of 1.32 m (Irsadi *et al*., 2019). The abrasion increases as an impact of

236   the profound change of land and mangrove forest into the cultivation pond, with only a

237   few young mangroves three in the pond's dam (Martuti *et al*., 2019)). It was increasing

238   cost production and decreasing fish productivity. It was also responsible for increases

239   water areas from year to year in Mangkang Kulon (Figure 2 & 3), which erodes the land

240   area and the destruction of mangrove ecosystems on the embankments (Nugraha *et al*.,

241   2018; Widyasamratri & Aswad, 2017).

242   In the past decade, the abrasion was increased may cause by the new airport runway

243   construction in the coastal. The structure makes current ocean turbulence on the west side

244   of the runway, deflect and increase the destructive energy and destroy the land. While the

245   accretion in 2012 / 2019 was caused by the sediment load from the rivers, which

246   eventually settles and hardens. Therefore, it expands the land area and can be the substrate

21

247 for the mangrove plant to grow (Ismanto *et al.*, 2016). In Mangkang Kulon, the abrasion

248 lead by the wood industry's pier also makes turbulence and destroy the coastline. But we

249 found that In the Mangkang Kulon coastline, the turbulence is more robust due to the

250 dock's construction, which is slightly tilted to the east and sea currents originating from

251 the west (data not published). The physical structure is predicted as a main anthropogenic

252 factor changing the ocean currents both on the surface and underwater (Kim *et al.*, 2018;

253 Surya *et al.*, 2019).

254   Climate change also has a spatial effect on sea-level rises, storms, high rainfall, and

255 rising temperatures. The change impacts mangrove forests in a coastal area on a regional

256 scale (Ward *et al.*, 2016). The lack of mangroves as front protectors may contribute to

257 seawater intrusion and destroy the agricultural field. But the increased population is

258 considered the main contributor to the reduced area of rice fields (Wijaya *et al.*, 2018). In

259 Mangkang Kulon, low mangrove coverage has proved destructive coastline as a result of

260 the abrasion. It is a massive destructed area compared to Tugurejo.

261   The coastal communities, *e.g.,* fishers, fish cultivators, fish traders, *etc.*, carry out

262 socio-economic activities related to resources in coastal areas and oceans (Freduah *et al.*,

263 2017). Thus, coastal communities have a high enough dependence on the potential and

264 conditions of coastal and marine resources that affect their quality of life (Husain *et al.*,

265 2019; Widyasamratri & Aswad, 2017). The land use and coastal ecosystem destruction

266 may decline that independence and make them vulnerable, but the communities have

267 socio-economic assets that contribute to their livelihood sustainability.

268

269 **The Socio-Economic Assets of Coastal Community**

270   Climate change does affect not only the environment but also the social and
271   economy of the people of Tugurejo and Mangkang Kulon. Based on satellite analysis, it
272   shows that the Tugurejo and Mangkang Kulon coastlines have a high-level vulnerable
273   coastline against climate change (Husnayaen *et al.*, 2018). It possibility decreasing the
274   carrying capacity of nature and physical capital for the socio-economic life of coastal
275   communities.

276   The reduced risk of vulnerability can be seen from physical aspects such as land
277   ownership status, where the community's lands are mostly sited in the inundated area.
278   Productive land, such as agricultural areas, is shrinking, resulting in a decrease in rice
279   productivity. In contrast, the shrinkage of fish ponds results in reducing milkfish
280   production as the pond's leading commodity. Also, reducing vulnerability needs to be
281   done by considering socio-economic aspects such as improving education quality, health,
282   and job availability (Sariffuddin *et al.*, 2017).

283   Adaptation activities by raising and maintaining dams are continuously pursued
284   every year and require a large amount of money. To deal with this, planting mangroves
285   as a mitigation and adaptation effort has helped maintain the pond dam's shape while
286   increasing environmental services for local livelihoods. The construction of a wave
287   breaker made of used tires is also carried out along the fragmented coastlines in the
288   Tugurejo and Mangkang Kulon areas, as an effort to reduce wave energy and ocean
289   currents.

290   In general, Tugurejo and Mangkang Kulon communities have developed good
291   adaptive capacities by utilizing coastal natural resources as materials for making food,
292   coloring, and handicrafts. This becomes a side job or an alternative livelihood. However,
293   access to carrying capacities such as education and training in business development and
294   marketing, modernization of information flows, and financial support are homework to

increase coastal communities' resilience through improving economic aspects (Astuti &

Handayani, 2020). Health aspects such as the availability of health services and health

insurance are still considered trivial, even though the need for this is considered very large

considering that coastal areas are heavily affected by climate change. Besides,

assertiveness and holistic and integrated programming need to be considered by the

government as a policymaker (Suhelmi & Triwibowo, 2018).

Developed Multi-Stakeholder Partnership Strategy in Integrated Coastal Management

The importance of integrated coastal management can be divide into five reasons,

1) empirically, there are ecological and functional relationships between coastal

ecosystem with mainland and community; 2) in a coastal area, there is usually more than

one type of natural resource, artificial resource, and environmental services that can be

developed for development purposes; 3) usually, there are more than one group, which

skilled in particular things; 4) both ecologically and economically, the use of a coastal

area in monoculture is very vulnerable to internal and external changes that lead to

business failure.

The development of collaborative works among stakeholders should be managed

in an integrated cooperative approach to gain profitable and sustainable coastal areas

(Prabantarikso *et al.*, 2018). The parties interested in utilizing natural resources in the

coastal area must prepare an integrated management plan that applies to whole

stakeholders, especially the government with the community (Sariffuddin *et al.*, 2017).

Since 2005, ecosystem rehabilitation and community empowering have been conducting

by many parties (Table 3). Hence, independently, the community in Tugurejo has made

nursery and mangrove planting, making water breaker from tires, and environmental

318   education through eco-tourism to increase ecological services and community resilience

319   from climate change disaster (Sari & Prayoga, 2018).

320   The interaction of multi-stakeholders made a pentagonal partnership that can be

321   defined as a coastal rehabilitation model to encourage the restoration and balance of the

322   coastal ecosystem through profitable collaboration and teamwork (Halibas *et al.*, 2017).

323   The program approach with the multi-stakeholder partnership model increases the

324   legality and program success (Martuti *et al.*, 2020; Soesilowati *et al.*, 2017). On the other

325   hand, we found that mass media plays an essential role in making the program popular,

326   especially for community product marketing (Ahmad *et al.*, 2016). In this research, Mass

327   media plays a role in introducing social change (agent of social) broader, disseminating

328   the program, and engaging other parties in collaborative works. It shows that the mass

329   media introduce modernization efforts (Ekanayake, 2016), stimulate the decision-making

330   process (Mukhtar, 2020), and accelerate the process of transitioning from a traditional

331   society to a modern one (Colbran, 2020; Narayana & Ahamad, 2017; Schrape, 2017).

332   **CONCLUSIONS**

333   This research is necessary for developing integrated coastal management based on

334   the environmental and socio-economic problems in Semarang City. The information of

335   the land use in coastal area changes in more than last decade are very dynamic, caused by

336   increased population, climate change and anthropogenic that increases residential area

337   and at the same time decreases the agricultural field. Increases in the water area that

338   threaten coastal resilience contribute to the reduced agricultural site and fishpond

339   productivity.

340   The community directly involves but simultaneously acts as target beneficiaries,

341   implicates in various activities in managing and rehabilitating coastal quality, including

25

342 building up the wave breaker, nurseries, and mangrove planting. But, most of the program

343 in the coastal area by various parties was conducted separately and overlapping. It is

344 needed a multi-stakeholder partnership approach to make integrated coastal management

345 and increase the program effectiveness. It is necessary to know the role of various

346 components of the community. We also suggest that the partnership between the

347 government, community, and private sector must continue to be encouraged to optimize

348 the ICM action plant. Cooperation in the management of facilities, infrastructure, and

349 infrastructure development is necessary to maximize the implementation of ICM

350

351 **CONTRIBUTIONS**

352 NKTM: research concept.; RP: enhance research concept.; NKTM: research

353 funding.: NKD, NKTM: instrumentation and administration.; WABNS, DPM: data

354 collection. NKTM, RP, DPM: analyzed the data.; WABNS: area mapping and

355 illustration.; NKTM, DPM: wrote the manuscript.; DPM, NKD: publication. All authors

356 read and approved the final version of the document.

357

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363

364 **REFERENCES**

365 Ahmad, N.S.; Musa, R.; Harun, M.H.M. (2016) - The impact of social media content

366 marketing (SMCM) towards brand health. *Procedia Economics and Finance*,

367   37(16):331–336. DOI: 10.1016/S2212-5671(16)30133-2

368   Astuti, M.F.K.; Handayani, W. (2020) - Livelihood vulnerability in Tambak Lorok ,

369   Semarang: an assessment of mixed rural-urban neighborhood. *Review of Regional*

370   *Research*, 40(2):137-157. DOI: 10.1007/s10037-020-00142-7

371   Blankespoor, B.; Dasgupta, S.; Lange, G.M. (2017) - Mangroves as a protection from

372   storm surges in a changing climate. *Ambio*, 46(4):478–491. DOI: 10.1007/s13280-

373   016-0838-x

374   Chang, D. (2018) - Modeling and analysis of marine product trade on the coordinated

375   development of economy and resource in border and coastal area. *Journal of Coastal*

376   *Research*, 83(83):229–236. DOI: 10.2112/SI83-037.1

377   Colbran, M. P. (2020) - Policing, social media and the new media landscape: can the

378   police and the traditional media ever successfully bypass each other? *Policing and*

379   *Society*, 30(3):295–309. DOI: 10.1080/10439463.2018.1532426

380   Dentoni, D.; Bitzer, V.; Schouten, G. (2018) - Harnessing wicked problems in multi-

381   stakeholder partnerships. *Journal of Business Ethics*, 150(2):333–356. DOI:

382   10.1007/s10551-018-3858-6

383   Dini, S.K.; Fauzan, A. (2020) - Clustering provinces in indonesia based on community

384   welfare indicators. *EKSAKTA: Jurnal Ilmu-Ilmu MIPA*, 20(1):56–63. DOI:

385   10.20885/EKSAKTA.vol1.iss1.art9

386   Ekanayake, E.M.S. (2016) - Social stratification, modernization and restructuring of sri

387   lankan society. *International Journal of Arts and Commerce*, 5(2):96–107.

388   Available on-line at www.ijac.org.uk › Vol._5_No._2 › 9._96-107.pdf

389   Freduah, G.; Fidelman, P.; Smith, T.F. (2017) - The impacts of environmental and socio-

390   economic stressors on small scale fisheries and livelihoods of fishers in Ghana.

391   *Applied Geography*, 89(9):1–11. DOI: 10.1016/j.apgeog.2017.09.009

392 Gerkensmeier, B.; Ratter, B.M.W. (2018) - Governing coastal risks as a social process—

393   Facilitating integrative risk management by enhanced multi-stakeholder

394   collaboration. *Environmental Science and Policy*, 80(6):144–151. DOI:

395   10.1016/j.envsci.2017.11.011

396 Hahn, M.B.; Riederer, A.M.; Foster, S.O. (2009) - The Livelihood Vulnerability Index:

397   A pragmatic approach to assessing risks from climate variability and change-A case

398   study in Mozambique. *Global Environmental Change*, 19(1):74–88. DOI:

399   10.1016/j.gloenvcha.2008.11.002

400 Halibas, A.S.; Sibayan, R.O.; Maata, R.L.R. (2017) - The penta helix model of innovation

401   in Oman: An hei perspective. *Interdisciplinary Journal of Information, Knowledge,*

402   *and Management*, 12(1):159–172. DOI: 10.28945/3735

403 Huong, N.T.L.; Yao, S.; Fahad, S. (2019) - Assessing household livelihood vulnerability

404   to climate change: The case of Northwest Vietnam. *Human and Ecological Risk*

405   *Assessment*, 25(5):1157–1175. DOI: 10.1080/10807039.2018.1460801

406 Husain, A.; Satria, A.; Kusmana, C.; Eriyatno. (2019) - Study on living environment and

407   quality of life of coastal community in Gorontalo City, Indonesia. *Advances in*

408   *Agriculture & Botanics*, 11(1):48–55. Available on-line at

409   http://www.aab.bioflux.com.ro/docs/2019.48-55.pdf

410 Husnayaen, Rimba, A.B.; Osawa, T.; Parwata, I.N.S.; As-syakur, A.R.; Kasim, F.;

411   Astarini, I.A. (2018) - Physical assessment of coastal vulnerability under enhanced

412   land subsidence in Semarang, Indonesia, using multi-sensor satellite data. *Advances*

413   *in Space Research*, 61(8):2159–2179. DOI: 10.1016/j.asr.2018.01.026

414 Irsadi, A.; Anggoro, S.; Soeprobowati, T.R.; Helmi, M.; Khair, A.S.E. (2019) - Shoreline

415   and mangrove analysis along semarang-demak, Indonesia for sustainable

416   environmental management. *Jurnal Pendidikan IPA Indonesia*, 8(1):1–11. DOI:

Does the title reflect the content of the manuscript?

Yes

Does the abstract present the main conclusions of the manuscript?

Yes

Are results and their interpretation (discussion and conclusions) acceptable?

Yes

Are illustrations adequate?

Yes

Are figure and table captions clear and concise?

Yes

Are references current and adequate?

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Comments to be transmitted to the authors

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Dear author,

Revisions have been requested from the platform. We kindly ask you to implement the peer-reviewers sugg

Best regards,

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On 2021-08-06 07:02, fpinto@fe.up.pt wrote:

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Dear author, Thank you very much. Cheers. Tiago

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dear editor,

please find attached revised manuscript, I've also uploaded in the online submission page.

thank you

Analysis of environment, socio-economic, and stakeholder partnership
for integrated coastal management in Semarang City, Indonesia

Abstract

Land transformation is the main factor that may increase ecological vulnerability
in coastal areas in Semarang City, Indonesia. Therefore, environmental damage in coastal
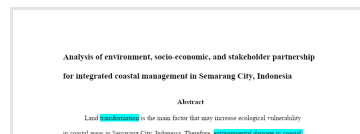
Analysis of environment, socio-economic, and stakeholder partnership for integrated coastal management in Semarang City, Indonesia

Abstract

Land transformation is the main factor that may increase ecological vulnerability in coastal areas in Semarang City, Indonesia. Therefore, environmental damage in coastal areas should be restored using an integrated management strategy based on the ecosystem, social and economic condition, as well as stakeholder partnership. This research aimed to measure the resilience score of environmental and socio-economic conditions and to identify stakeholder partnership in arranging integrated coastal area management in Semarang City. A descriptive observational study was conducted in Mangkang Kulon and Tugurejo Sub-district, Tugu District, Semarang City using in-depth interviews, field observations and survey-mapping. The ecological conditions data was collected using image analysis of aerial photographs following the concept of environmental and geophysical. Meanwhile, the social-community conditions data were diagnosed using a socio-economic assessment. The result showed that changes in the coastline occured due to the disappearance of some area of mangrove that were turned indented close to the ocean. However, the socio-economic index showed a medium to a high score, which means high opportunities for the local community to develop their livelihood. Therefore, various community empowerment programs initiated by government, academics, the private sectors, and non-government organizations have increased the resilience of the community.

Keywords: coastal area, integrated coastal management, Semarang, sustainable development.

Resumo

A transformatio de zonas costerias é um des principari fatoras que pode aumentar a vulnerabilidade ecológica da cidade de Semarang, na Indonésia. Os danos ambientais na

área costeira devem ser restaurados usando uma estratégia de gestão costeira integrada com base no ecossistemicas, nas condições socials e economicas e na parceria das partes interessadas. Portanto, esta pesquisa foi realizada para medir a pontuação de resiliência das condições ambientais e socioeconomicas e identificar a parceria das partes interessadas para organizar a gestão integrada da área costeira na cidade de Semarang. Um estudo observacional explicativo que coleta dados por meio de observação e entrevista foi conduzido em Mangkang Kulon no subdistrito de Tugurejo, distrito de Tugu, cidade de Semarang. Os dados coletados incluíram a condição ecológica e foram analisados por meio de imagens aérease, fotografias aéreas baseadas em análises ecológicos e geofísicos. A condição sócio-comunitária foi analisada por meio da avaliação socioeconomica. O resultado mostrou que ocorra mudanças no litoral devido ao desaparecimento de algumas áreas de manguezais transformadas em edifícios que recuaram próximo ao oceano. A condição alterando as correntes da água e danificando o local da pesquisa. Mas o índice socioeconomico mostrou uma pontuação média a alta, o que significa que existem oportunidades para a comunidade local desenvolver seu os meios de vida. Isso fez com que vários programas de empoderamento da comunidade iniciassem o governo, academicos, setores privados e ONGs a aumentar a resiliência da comunidade..

Palavras-chave: área costeira, gestão costeira integrada, Semarang, desenvolvimento
sustentável

1. INTRODUCTION

Semarang City is the capital of Central Java, Indonesia (6°50' – 7°10' S 109°35' – 110°50' E), located on the northern coastline directly adjacent to the Java Sea (Figure 1).

49   This makes it a strategic point for building commercial industrial, and trading.
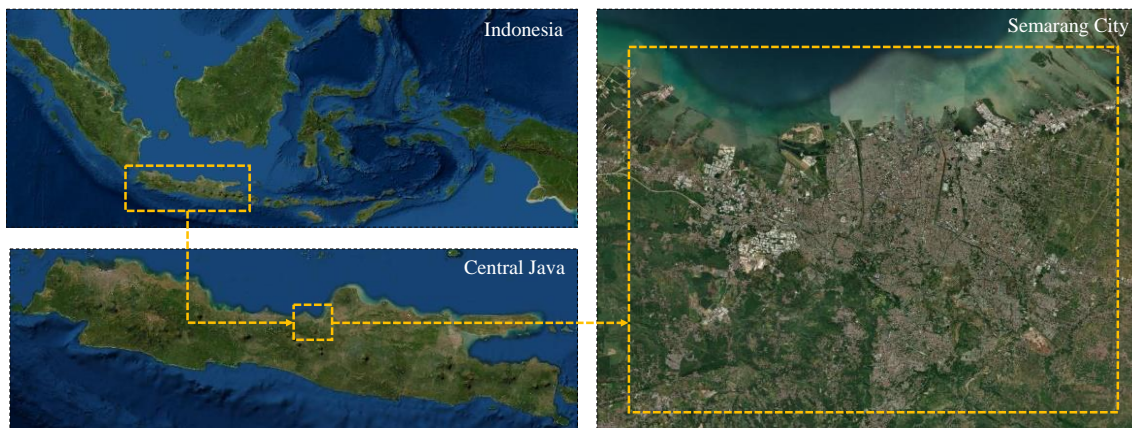
51   Figure 1. Location of Semarang City

52   In the current decade, massive destruction of coastal areas and their ecosystems

53   was caused by land conversion into residential (Wijaya *et al*., 2018) and industrial area

54   (Sariffuddin *et al*., 2017), as well as fish and shrimp ponds. On the other side, land

55   transformation and mangrove destruction due to climate change caused a shift in the

56   coastline of 49.54 m to the mainland that makes environmental loss (Mehvar *et al*., 2018).

57   The data obtained from Semarang City Fisheries Office (2015) showed that coastal

58   destruction due to an increase in sea level caused economic losses in the amount of 729

59   million per year, and 110 million from damaged 2,889 ha of pond areas. Sea level rise

60   results in erosion 10,425 houses and damaged coastal infrastructure (Maimunah *et al*.,

61   2011).

62   The coastal area provides mangrove forests as a protection against climate change

63   (Blankespoor *et al*., 2017), and it is the primary source of economic income (Chang, 2018;

64   Wahyudin *et al*., 2018), and cultural development (Syakir, 2019). Furthermore, the

65   destruction of coastal areas threatens community life and city resilience from natural

66   disasters (Komugabe-Dixson *et al*., 2019). Many parties have been involved in coastal

67   restoration over the past decade. These include planting mangroves by the national and

68 private sectors and empowering community through university and non-governmental

69 organizations (NGOs). However, due to the lack of synergies in the implementation of

70 the programs, the result is not sustainable. An integration from all stakeholders is needed

71 to take action in coastal rehabilitation from physical and community life (Dentoni *et al.*,

72 2018; Gerkensmeier & Ratter, 2018; Martuti *et al.*, 2020). The integrated program for

73 improving ecological and social life as well as the cooperation of actors should be well

74 prepared based on the current conditions to increase the resilience of the coastal area.

75 Concerning these issues, this study aimed to measure the environmental, socio-economic

76 conditions score and identify stakeholder partnership to arrange integrated coastal area

77 management and support sustainable rehabilitation in Semarang City.

78 **2.   MATERIALS AND METHODS**

79   This qualitative study is based on an explanatory observation conducted in coastal

80 areas of Tugurejo and Mangkang Kulon Sub-district, Tugu District, Semarang City

81 (Figure 2), from June to July 2019. The research loci were selected based on the following

82 inclusion criteria: 1) high mangrove coverage areas; 2) the primary location for the

83 rehabilitation program; 3) one of the sites for the acceleration of economic development,

84 and 4) a well-developed community.

85
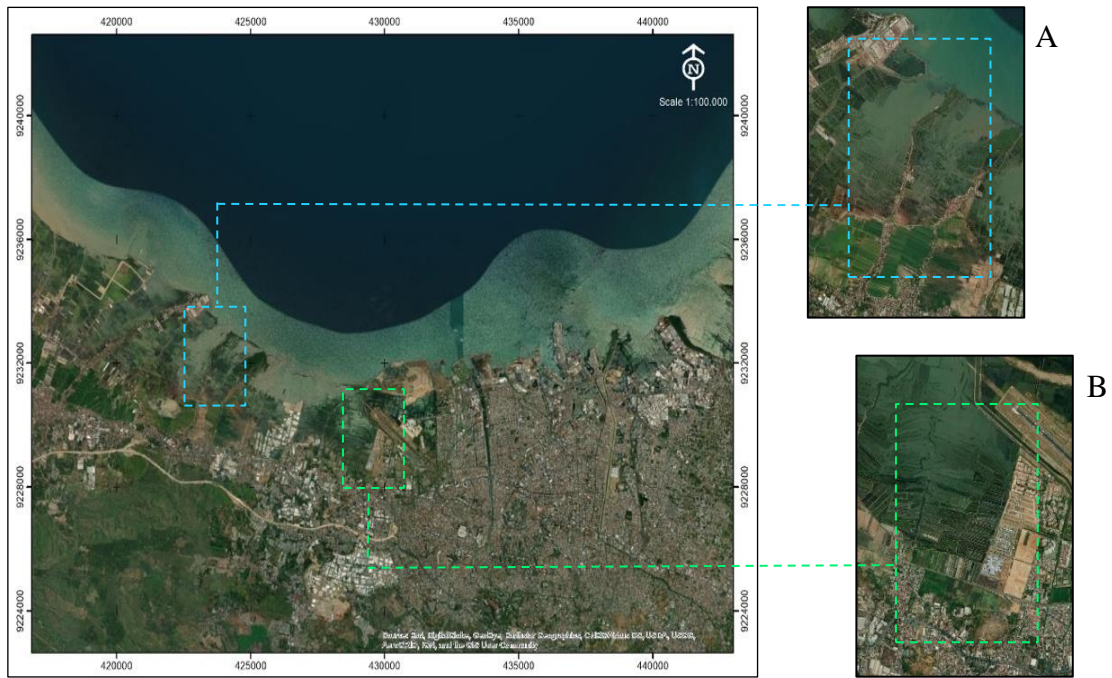
Figure 2. Location of data collection on the coast of Semarang City. A) Mangkang
Kulon subdistrict and B) Tugurejo Subdistrict.

2.1. Land-Conversion of Mangrove Ecosystems

Ecological data was arranged using Digital Globe High-Resolution Imagery. All
ecosystem condition maps were collected in July of each year to obtain high-quality
resolution at the beginning of the dry season. During this time the cloud cover is decrease,
and the images are clearer. Furthermore, a land conversion was also confirmed with field
observation, community statements, government documents from the city spatial plan,
mangrove conversion, and rehabilitation.

Primary data collection was conducted ut to support digital data by field observation
and verify the mangrove ecosystem's damage level. The satellite imagery data was
recorded in the time series format for the last five years. Furthermore, the interpretation
was conducted by comparing the Digital Globe satellite imagery data and determining the

spatial distribution of mangrove density in the two villages. The land use data were also analyzed to determine the destructed land areas, which was originally a mangrove ecosystem. However, it was converted into productive lands, such as fish and prawn ponds.

2.2. Socio-Economic of the Local Community

A total of 105 members from six groups were determined as the research population, then the number of the respondent was calculated following Slovin's formula (1960). From the calculation, several respondents rejected to be involved. Finally, socio-economic data was compiled from 63 respondents from local community groups in two sub-districts randomly (Table 1).

Table 1. Origin of the respondent.

Community groups	Business Field	Members		Samples (person)		
		Σ (a)	% (c)	Proposed (b*c)	Unwilling	Involved
Tugurejo Subdistrict						
Putra Samudra	Fisherman	12	11.43	10	2	8
KWT Sumber Hasil	Urban farming	20	19.05	16	4	12
Subur Makmur	Fish processing	43	40.95	34	13	21
Putri Tirang	Fish processing	5	4.76	4	-	4
Mangkang Subdistrict						
Bank Sampah Melati	Waste management and urban farming	25	23.81	20	2	18

Total	105	84	21	63
Slovin's calculation (b)	83			

The data on community resilience were collected using a survey then confirmed using in-depth interviews and focus group discussions. The analysis was performed through a developed instrument based on the sustainable livelihood framework (SLF) to understand socio-economic assets that support community welfare. Five aspects were then further mentioned as socio-economic assets (Serrat, 2017), and the SLF indicators of human resources, natural, social, financial, and physic capital were arranged into positive statements to develop resilience index (Hahn *et al*., 2009; Huong *et al*., 2019; Koirala, 2015; Sujakhu *et al*., 2019; Williams *et al*., 2020). The socio-economic assets instrument was divided into 12 components, and was sub-divided into 38 indicators (Table 2).

Table 2. Variables and indicator for socio-economic assets instrument

Capitals	Components	Indicator Issues
Human Resources	Knowledge and Skills	Five issues including formal education, business experience, vocational training, business development skill, and business understanding
	Health care	Three issues including health facility access, health insurant, and chronic or acute disease issue
Natural Resources	Land	Three issues including land ownership, utilized land, and land productivity.
	Water	Three issues including: clean water access, water quality, environmental service on water availability.

Capitals	Components	Indicator Issues
Financial	Finance	Four issues including monthly income, jobs, bank account, and additional expenses.
	Assets	Assets value issue
	Financial support	Three issues about financial service, type, and number of the receiver.
Social	Networking and relationship	Six issues including social-mutual cooperation, religious activity, neighbourhood interaction, social organization, donation, and social networking.
	Technology and Social media	Two issues including technology skill and social media access.
Physical	Transportation	Private vehicle ownership
	House	Three issues including house ownership, habitable permanent house, and sanitation.
	Public services	Two issues including electricity power and public facilities.

124 Note: the indicator was developed from a Hahn et al., (2009); Huong et al., (2019); Koirala, (2015); Sujakhu

125 et al., (2019); and Williams et al., (2020).

126

127 ## *2.3. Data analysis*

128 Most of the indicators were calculated and expressed on different units or scales,

129 then standardized using equation index. The standardized index was calculated to

130 estimate the socio-economic assets indices and determined as the final resilience index

131 score for the community through Equation (1) (Hahn *et al.*, 2009; Huong *et al.*, 2019;

132 Koirala, 2015; Sujakhu *et al.*, 2019; Williams *et al.*, 2020).

133 $$\text{Index} = \frac{\text{Observed value} - \text{Minimum value}}{\text{Maximum value} - \text{Minimum value}} \quad (1)$$

134   The scoring index was performed for all aspects and presented in scale points from

135   0.00 to 1.00. In addition, the average score per capital aspect represented the capital value

136   and expressed by following criteria:

137   Table 3. Resilience criteria of capital value

Score	Resilience Criteria
≥ 0.75	High
0.50 – 0.75	Moderate
≤ 0.50	Low

138

139

140   **3.   RESULTS**

141   ***3.1.   The Identification of Land Use and Coastal Ecological Destruction***

142   The coastline changing at Tugurejo is still relatively small compared to Mangkang

143   Kulon. Furthermore, the stable condition in Tugurejo may be caused by a massive

144   mangrove ecosystem that moderately increases in the past ten years. This can be seen in

145   the annual increase in the size and spatial distribution of mangroves (Figure 3). The

146   mangrove ecosystem has around 49.41 ha with an elongated pattern on the agricultural

147   fields and pond embankments.
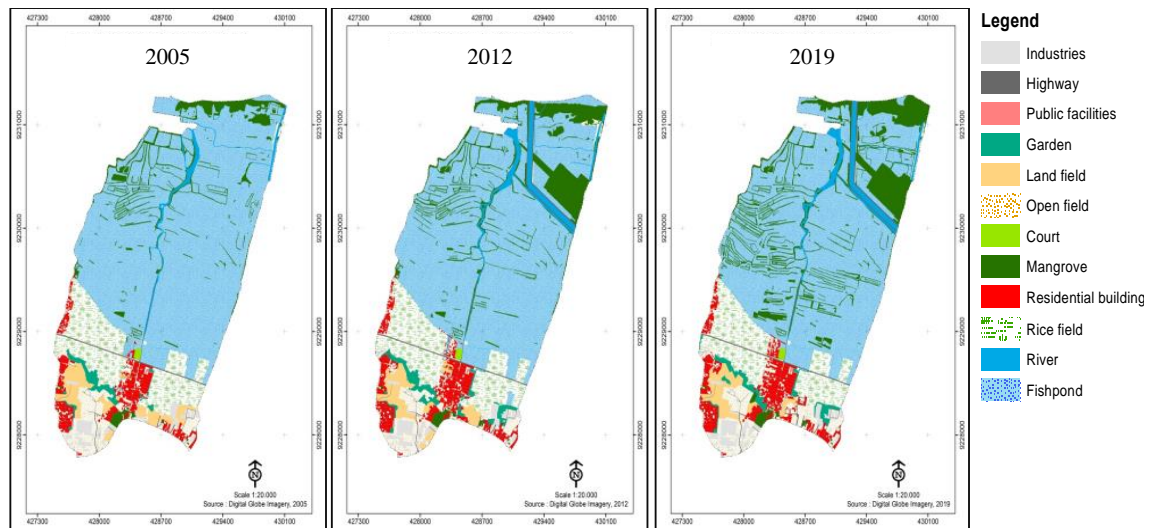
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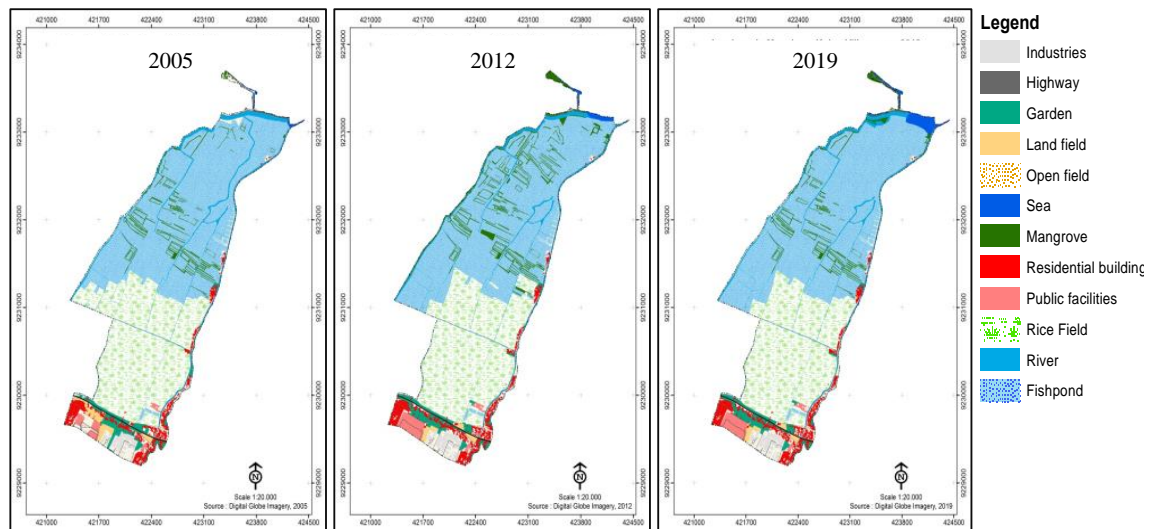
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149 Figure 3. Land-use changes from 2005, to 2019 in Tugurejo (A) and Mangkang Kulon

150   (B) Sub-district.

151

152   In Mangkang Kulon, more than 50% of the total area was converted into fishponds.

153 However, it was then destroyed and vanished due to high seawater levels associated with

154 climate change. Subsequently, the mangrove ecosystem in the Mangkang Kulon

155 increased from 2005 to 2012 (Table 2; Figure 4), due to mangrove replantation activities

156 carried out by government agencies, the private sector, universities, and the local

157 community. However, the mangrove ecosystem has shrunk considerably in 2019, and it

158 resulted in significant loss of the fishpond.
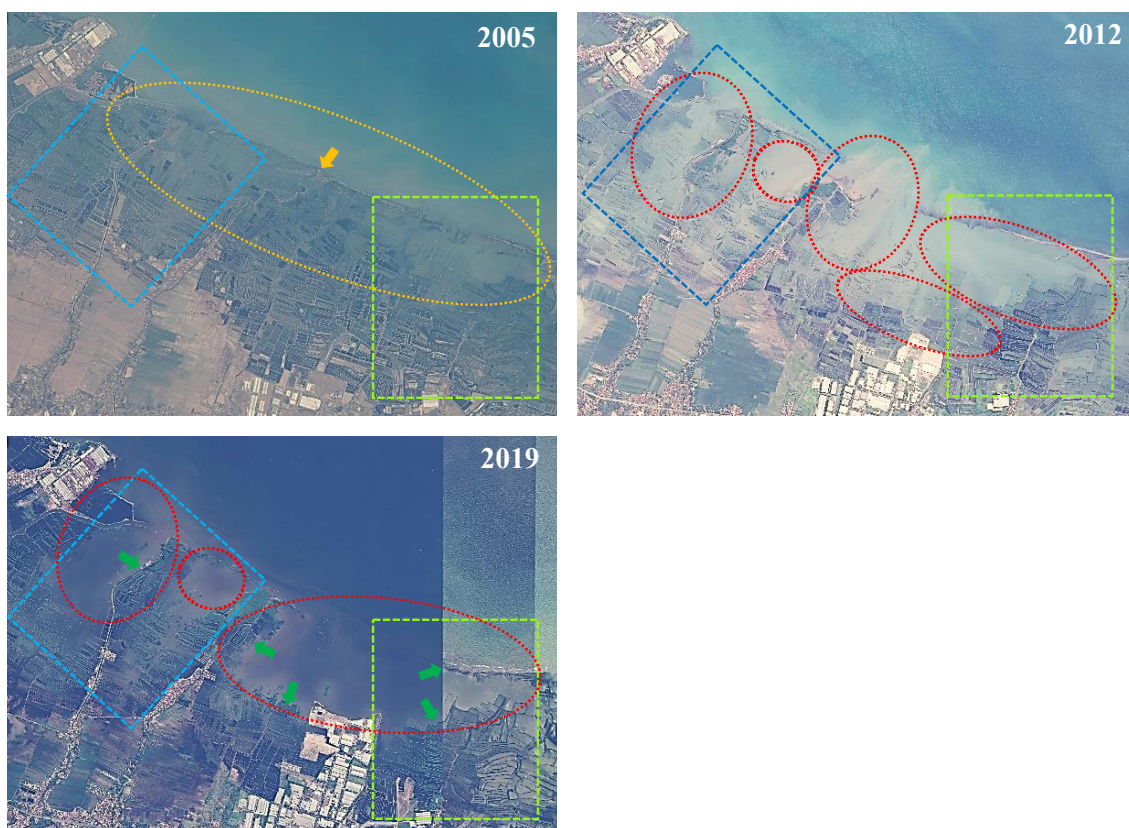
160 Figure 4. Coastal areas condition in Tugurejo (green square) and Mangkang Kulon (blue

161   square) sub-district in 2005, 2012 and 2019. Yellow line representing existed

162   mangrove forest; red ellipse indicating coastline destruction; green arrow

163   representing mangrove replanting.

164

165   The mangroves species of the two areas are dominated by *Rhizophora apiculata, R.*

166 *mucronata,* and *Avicennia alba, A. marina* species, and some additional *R. stylosa* and

167 *Sonneratia alba*. However, high mangrove planting activities in Tugurejo may affect the

168 agricultural field areas that have decreased in 2019. The massive mangrove plantation

169 changes land coverage from the open areas to estuarine green-belt. The mangrove forests

170 protect irrigated rice fields, therefore, they can be harvested twice a year and used as the

171 main product of community income.

172   In both sites, the mangrove areas extend from the river bank to the coastline and

173 those with a sizeable swarming pattern. The green-line and square block on the maps

174 showing in the constant distance indicates unnatural mangrove growth as a rehabilitation

175 effortIn contrast, the agricultural field in Mangkang Kulon, directly exposed to the sea,

176 makes it vulnerable to sea water rises. The effect of seawater rises has been proven by

177 decreasing open space area alongside increasing the water bodies (Figure 5).
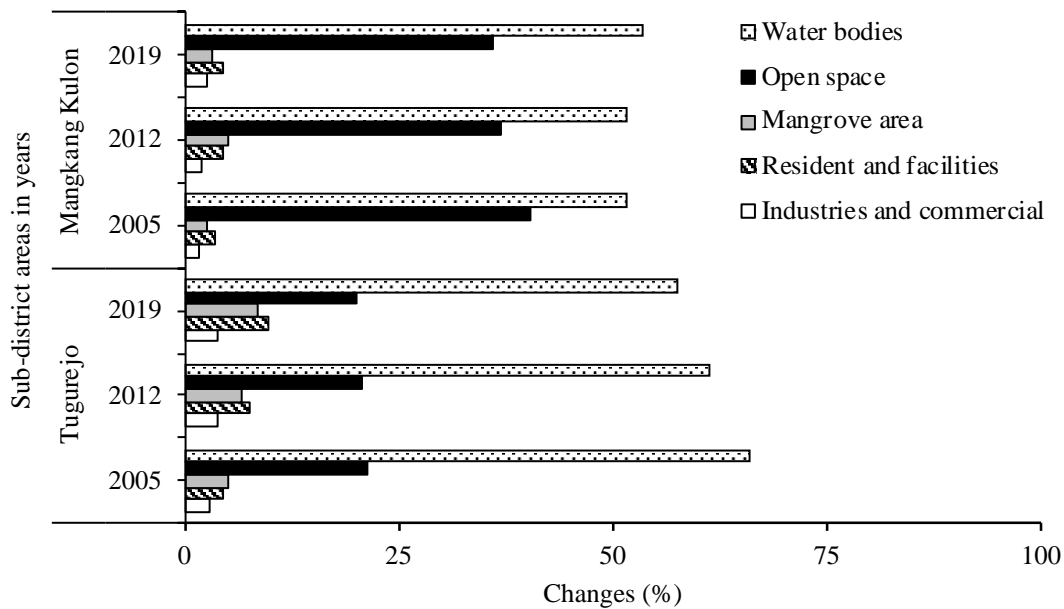
178

179 Figure 5. Percentage changes of the land-use in Tugurejo and Mangkang Sub-district in

180   2005, 2012 and 2019.

181

182 *3.2. The Socio-Economic Calculation*

183   This study analyzed human capital as a function of community access to wealth

184   variables, including education and health care system. The variables were selected

185   following the main priority programs of Indonesian government in increasing community

186   welfare (Dini & Fauzan, 2020; Sumarto, 2017). The calculation showed that coastal

187   communities in Tugurejo have a higher score or are more resilient than the Mangkang

188   Kulon (Table 3). This is a good value for the human capital of Tugurejo to improve the

189   quality of life in the communities and manage the capital asset more efficiently and

190   sustainably.

Table 2 Time series of Tugurejo sub-district land use (2005, 20012, 2019)

Land Use	Tugurejo						Mangkang Kulon					
	2005		2012		2019		2005		2012		2019	
	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha
Industries and commercial												
Industries	1.83	10.48	2.03	11.66	2.08	11.91	0.71	3.79	0.77	4.12	1.12	5.99
Highway	1.22	6.99	1.72	9.87	1.82	10.46	1.08	5.76	1.23	6.57	1.36	7.26
Resident and facilities												
Government office	0.02	0.13	0.02	0.13	0.03	0.17	0.00	-	-	-	-	-
Residential building	3.49	20.03	4.09	23.46	4.57	26.23	2.86	15.33	3.14	16.80	3.19	17.07
Public facilities	1.12	6.40	3.46	19.86	5.33	30.58	0.83	4.44	1.39	7.43	1.39	7.45
Open space												
Garden	1.17	6.72	1.84	10.54	1.50	8.61	2.02	10.80	2.06	11.01	2.03	10.87
Land field	3.01	17.29	2.65	15.19	2.20	12.63	1.00	5.37	0.54	2.89	0.53	2.81
Open field	4.98	28.56	4.70	26.97	5.57	31.97	4.11	22.00	3.00	16.03	3.40	18.19
Court	0.13	0.77	0.13	0.77	0.13	0.77	0.00	-	-	-	-	-
Rice field	11.91	68.29	11.29	64.77	10.58	60.68	33.11	177.18	31.27	167.36	30.21	161.66
Mangrove area												
Mangrove plantation	5.02	28.79	6.82	39.12	8.61	49.41	2.67	14.31	5.10	27.30	3.34	17.86

Water bodies											
River	1.56	8.92	3.22	18.46	3.21	18.40	4.18	22.38	3.67	19.64	3.85	20.60
Fishpond	64.54	370.18	58.02	332.75	54.35	311.73	47.42	253.78	47.84	255.99	49.59	265.38
Total land		573.55		573.55		573.55		535.14		535.14		535.14

192   Source: Image Processing Results, (2019)

193

194   Table 3. The score of resilience potent of Tugurejo and Mangkang Kulon Sub-district

Variables	Capital	Indicators	Unit	Data Sources	Score index (point)		Explanatory Notes
					Mangkang Kulon	Tugurejo	
Human Capital	Knowledge and Skills	Respondents who finishing the 12 years compulsory education.	Percent	Survey	0.53	0.49	most of the community group's members have received empowering programs from university, government, and private sector
		Respondents experienced in developing business	Percent	Survey	0.70	0.75	
		Respondents have taken any kind of vocational training	Percent	Survey	0.61	0.67	

15

Variables	Capital	Indicators	Unit	Data Sources	Score index (point)		Explanatory Notes
					Mangkang Kulon	Tugurejo	
		Respondents who skilled in business development	Percent	Survey	0.60	0.61	
		Average assessment score of the business understanding	Ratio	Survey	0.49	0.53	
	Health care	Average time needed to go to the nearest health facility	Minutes	Survey	0.72	0.80	the health indicators was developed based on the social
		Respondents with insurant	Percent	Survey	0.75	0.93	safety net program from the
		Respondents with no disease's issues	Percent	Survey	0.68	0.76	government by providing health services for vulnerable and underprivileged families
		Capital score			0.64	0.69	
		Resilience criteria			Moderate	Moderate	
Natural Capital	Land	Respondents who are owning their land	Count	Survey	0.61	0.73	
		Utilized land	Meters	Survey	0.70	0.79	
		Average of land productivity index	Ratio	Survey	0.74	0.69	

Variables	Capital	Indicators	Unit	Data Sources	Score index (point)		Explanatory Notes
					Mangkang Kulon	Tugurejo	
	Water	Average score of water sources access	Meters	Survey	0.86	0.98	Clean, freshwater is the main
		Average score of water quality	Count	Survey	0.78	0.79	issue in Semarang coastal,
		Amount of water resources	Count	Survey	0.52	0.94	due to sea intrusion to the
		Average score of the environmental services	Ratio	Survey	0.39	0.68	soil-water and polluted
							surface-water
		Capital score			0.66	0.80	
		Resilience criteria			Moderate	High	
Financial Capital	Finance	Average of monthly income	Count	Survey	0.68	0.51	
		Respondents with a side job	Percent	Survey	0.45	0.52	
		Respondents with the bank account	Percent	Survey	0.63	0.65	
		Average score of bank deposit	Count	Survey	0.55	0.45	
		Average of additional expenses	Count	Survey	0.43	0.74	
	Assets	Average score of respondents' assets value	Count	Survey	0.68	0.69	
	Financial support	Respondents who are taking advantage of financial services	Percent	Survey	0.69	0.57	

Variables	Capital	Indicators	Unit	Data Sources	Score index (point)		Explanatory Notes
					Mangkang Kulon	**Tugurejo**	
		Average score of financial services type	Count	Survey	0.79	0.84	
		Financial support receiver	Percent	Survey	0.40	0.33	
		Capital score			0.59	0.59	
		Resilience criteria			Moderate	Moderate	
Social Capital	Networking and relationship	Respondents with social-mutual cooperation	Ratio	Survey	0.85	0.93	the modification was
		Respondents who attend the religious activity in routine	Frequence	Survey	0.86	0.89	conducted based on the observation of coastal
		Respondents who has high neighborhood interaction	Percent	Survey	0.74	0.90	community culture in
		Respondents who joined in social-organizations	Percent	Survey	0.74	0.91	Semarang City
		Respondents who are receiving the donation from family or relatives	Percent	Survey	0.84	0.71	
		An average score of social networking	Count	Survey	0.80	0.73	
		Respondents who able to use the smartphone	Percent	Survey	0.70	0.80	

Variables	Capital	Indicators	Unit	Data Sources	Score index (point)		Explanatory Notes
					Mangkang Kulon	Tugurejo	
	Technology and Social media	Respondents who accessed social media	Percent	Survey	0.72	0.73	
		Capital score			0.78	0.83	
		Resilience criteria			Moderate	High	
Physical capital	Transportation	Respondents with private transportation	Percent	Survey	0.61	0.66	
	House	Respondents who are owning the house	Percent	Survey	0.87	0.92	
		Average score of habitable permanent house	Count	Survey	0.86	0.99	
		Average score of proper sanitation	Count	Survey	0.87	0.97	
	Public services	Respondents with electricity power above 900 kWh	Percent	Survey	0.88	0.97	
		Average score of public facilities	Count	Survey	0.71	0.58	
		Capital score			0.80	0.85	
		Resilience criteria			High	High	

195   *) The instrument was developed by following previous research (Hahn *et al*., 2009; Huong *et al*., 2019; Koirala, 2015; Sujakhu *et al*., 2019;

196   Williams *et al*., 2020)

197   **) The justification from the researcher is based on the current condition and adapted from the Indonesian government program.

198   In addition, all socio-economic assets were higher in Tugurejo compared to

199   Mangkang Kulon, except financial capital. The assets are the lowest capital owned by the

200   community, along with human resources (Figure 6).
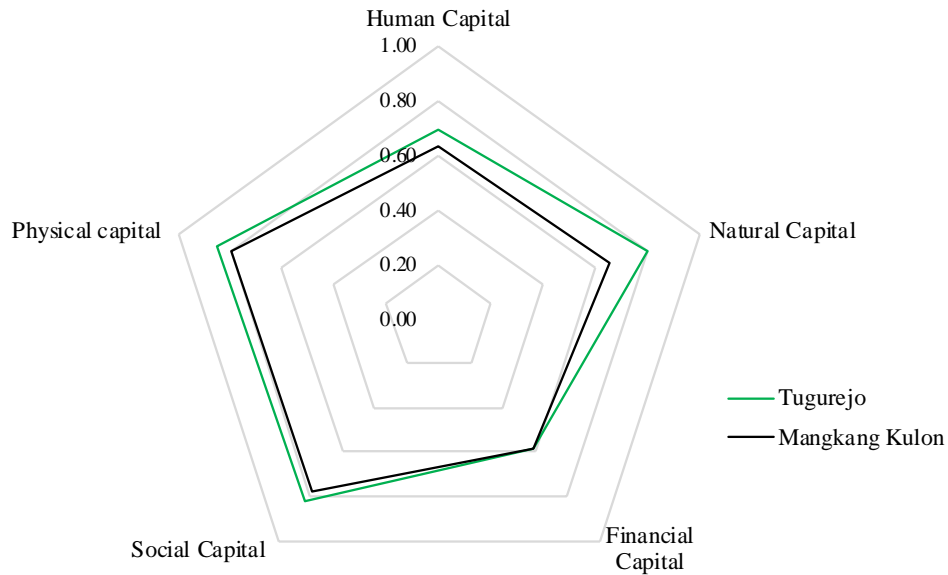
201

202   Figure 6. Capital value of socio-economic in Tugurejo and Mangkang Kulon Sub-district.

203

204   Low financial capital remains an obstacle for the community to develop their

205   business capacity. Most of the respondents stated that they spend more money to make

206   their house and fishpond still safe from the inundation and flood. Then, they rely on their

207   financial capital for the development of their business through government or external

208   empowerment programs. Most of the entrepreneur has an unwell education background

209   and unskilled in business development. Furthermore, the community has not optimally

210   utilized natural assets. The coastal area offers a mangrove forest and its biota that can be

211   managed sustainably to increase income.

212   Social and physical assets have the best value among other capital. In the current

213   condition of Tugurejo or Mangkang Kulon, the community's houses are permanently

214 habitable and relatively safe from tidal floods. Then, all houses unit have installed

215 electricity, supporting their livelihood, and education. The city administration offers

216 shuttles or inexpensive buses and is easily accessible from the place of transport.

217 *3.3.   Conducted Programs and Stakeholder Mapping*

218   Several programs conducted by many stakeholders mainly focused on Tugurejo

219 were identified as the reasons why high mangrove coverage areas and substantial socio-

220 economic assets exist. However, they were implemented in the unintegrated plan in the

221 last decade, therefore resulting in slow and unsustainable output achievement. The

222 implementation was mainly oriented on the short-time programs and has to produce a

223 product, but with lack of awareness on the community.

224   The knowledge and awareness about integrated management have changed the

225 stakeholder mindset, especially from the government and private sectors. In addition, it

226 engages academies and NGOs to build community resilience. The eight most active and

227 standard existing programs conducted in both sub-district from the last ten years were

228 grouped, and the collaborative implementations were found (Table 4).

229 Table 4. Existing program in Tugurejo and Mangkang Kulon in terms of environmental

230   rehabilitation and community empowerment

Programs	Tugurejo	Mangkang Kulon	Implementer
Counseling and training on mangrove rehabilitation.	++++	++++	FFM, RCS
Supervision of activities that can damage the mangrove ecosystem.	++++	+++	FFM, NGOs
Coaching to encourage capacity building for Adaptation and Mitigation of the impact of	+++++	+++	NGOs, Indonesia Power, Pertamina,

climate change at the local level through the Climate Village Program (ProKlim).			MFD, AO, FFM, RCS, and companies through its CSR program
Providing mangrove seedlings and supervising mangrove forests, providing ecotourism packages, and shrimp/fish cultivation carried out in ponds around the coast (ProKlim).	++++	+++	MF, MFD, AO, EB, CEA, Facilitated by the NGOs
Women of Coastal Area: Fish-based food production, mangrove-based processed foods, and batik coloring with mangrove patterns and natural dyes (ProKlim).	++++	++	MFD, FFM, RCS, and companies through its CSR program, NGOs
The increasing diversity of mangrove ecosystem types by planting and monitoring on an ongoing basis, build a beach belt.	++++	++	FFM, RCS, NGOs, MFD, CSR, AO for mangrove diversity. ME, MF, EB, RDPA for sea belt
Utilization of the community and fishers group management.	++++	++	FFM, RCS, MFD
Arrangement of Mangrove Damage Standard in Central Java.	++++	++++	FFM, RCS, MFD

231 Note: plus mark (+) indicates how often/ intensity the programs are conducted in the research areas. Central

232 Government: ME = Indonesian Republic of Ministry of Environment; MF = Indonesian Republic of

233 Ministry of Marine and Fisheries; City Government: RDPA = Regional Development Planning Agency;

234 EB = Environmental Bureau; MFD = Marine and Fisheries Department, AO = Agriculture Office; CEA =

235 Community Empowerment Agency; Academician: FFM = Faculty of Fisheries and Marine; Universitas

236 Diponegoro; RCS = Research and Community Services Institute of Universitas Negeri Semarang; Private

237 Sectors: CSR = Corporate Social Responsibility.

238 The collaborative management of the implementation of coastal rehabilitation and

239 community empowerment in Semarang City showed a pentagonal multi-stakeholder

240 partnership model. In this model, the key partnership is built up by equal cooperation

241 work among academies, private sectors, government, communities, and NGOs (Figure

242 7). Currently, several programs jointly conduct by the multi-stakeholders in the study site

243 were identified (Table 4).
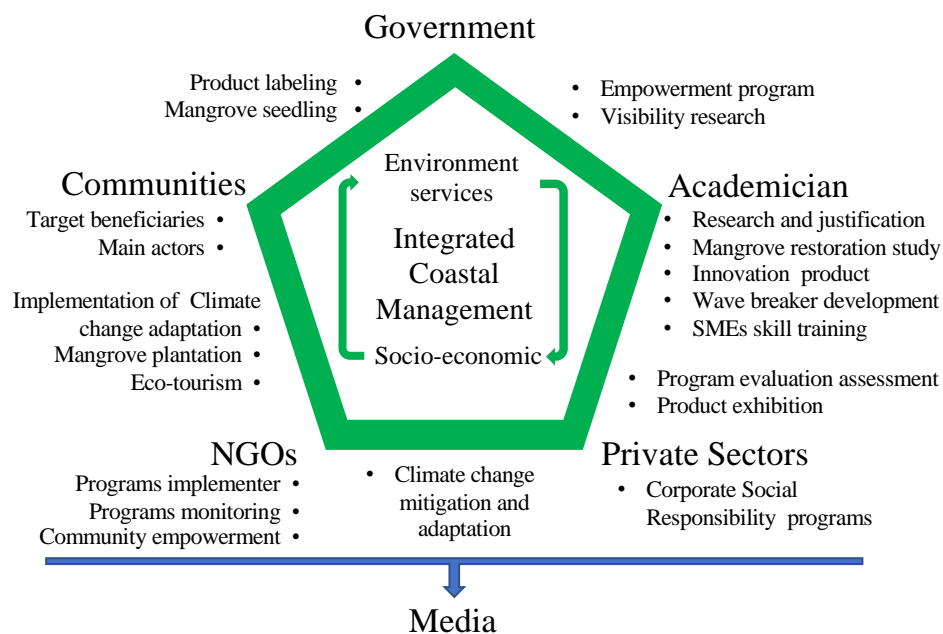
244

245 Figure 7. Adapted of pentagonal partnership model for a rehabilitation effort of coastal

246   areas in Semarang from Halibas *et al*. (2017); Prabantarikso *et al*. (2018).

247 The main programs were arranged by the city's government as the policymaker

248 executed by the academies and NGOs as the implementer and knowledge transfer. The

249 private sector was involved as the program founder through their CSR program. As the

250 beneficiary target, the community is the success key, therefore, the upgraded skill,

251 willingness, and motivation should pop up to guarantee the program's sustainability.

252 Social media and mass media play essential roles in program scaling up/ dissemination

253 successfulness, introducing the program, policy, and activities, and providing a product

254 marketing platform. The press media can also educate people in Semarang City and others

255 to keep the environment sustainable.

4. DISCUSSION

257 In 2019, there were 13 classes of land use in Tugurejo, and the most extensive area

258 were ponds (water bodies) of about 311.73 ha for milkfish and shrimp. The ponds were

259 partitioned with large mud and soil embankment for mangrove cultivation. In Tugurejo,

260 there was a 1.76 m abrasion from 2005 to 2012 and an increase of 1.32 m as an accretion

261 process from 2012 to 2019 (Irsadi *et al*., 2019). The coastal line abrasion increases as an

262 impact of the profound change of land and mangrove forest into the cultivation pond,

263 with only a few young mangroves trees in the embankment (Martuti *et al*., 2019). The

264 cost of production ponds increased, after which the productivity of the fish decreased. It

265 was also responsible for the annual increase in water masses in Mangkang Kulon (Figure

266 2 and 3), eroding the land surface and destroying mangrove ecosystems on the

267 embankment (Nugraha *et al*., 2018; Widyasamratri & Aswad, 2017).

268 In the past decade, the abrasion has increased as the result of the new airport runway

269 construction near the coast. The concrete structure of the runway makes current ocean

270 turbulence on the west side, deflects and increases the destructive energy, and destroys

271 the land. Meanwhile, the accretion between 2012 – 2019 was caused by the sediment load

272 from the rivers, which eventually settles and solidifies. Therefore, it enlarges the land

273 surface and can be the substrate for the growth of the mangrove plant (Ismanto *et al*.,

274 2016). In Mangkang Kulon, the erosion lead by the wood industry's pier also makes ocean

275 wave turbulence and destroys the coastline. The coastline is more robust due to the dock's

276 construction, which is slightly tilted to the east and sea currents originating from the west

277 (data not published). The physical structures including doc, water breakers and industrial

278   buildings are predicted as a main anthropogenic factor changing the ocean currents on the

279   surface and underwater (Kim *et al*., 2018; Surya *et al*., 2019).

280   Climate change also has a spatial effect on sea-level rise, storms, high rainfall, and

281   rising temperatures. The change affects mangrove forests in a coastal area at the local

282   level (Ward *et al*., 2016). This study found that the lack of mangroves forests as front

283   protectors may contribute to seawater intrusion and destroys the agricultural fields.

284   However, a previous study stated that increased housing development is considered the

285   main contributor to the reduced area of rice fields (Wijaya *et al*., 2018). In Mangkang

286   Kulon, low mangrove coverage has proved to be destructive for the coastline as a result

287   of abrasion, and it is a massive destructed area compared to Tugurejo.

288   The coastal communities, *e.g.,* fisherman, fish-growers, fish traders, *etc*., conduct

289   socio-economic activities related to resources in coastal areas and oceans (Freduah *et al*.,

290   2017). Therefore, coastal communities have a high dependence on the potential and

291   conditions of coastal and marine resources that affect their quality of life (Husain *et al*.,

292   2019; Widyasamratri & Aswad, 2017). Land use and destruction of the coastal ecosystem

293   can reduce independence and make it vulnerable, but communities have socio-economic

294   assets that contribute to their sustainability.

295

296   ***4.1.   The Socio-Economic Assets of Coastal Community***

297   Climate change affects the environment, society, and economy of the people of

298   Tugurejo and Mangkang Kulon. Satellite analysis showed that the Tugurejo and

299   Mangkang Kulon coastlines have a high-level of vulnerability against climate change

300   (Husnayaen *et al*., 2018). This will decrease the carrying capacity of nature and physical

301   capital for the socio-economic life of coastal communities.

302   The reduced risk of vulnerability can be seen from physical aspects such as land

303   ownership status, where the community's lands are primarily sited in the inundated area.

304   Furthermore, productive land, such as agricultural areas, is shrinking, resulting in a

305   decrease in rice productivity. In contrast, the shrinkage of fish ponds reduces milkfish

306   production as the pond's leading commodity. Vulnerability reduction needs to be done by

307   considering socio-economic aspects such as improving education quality, health, and job

308   availability (Sariffuddin *et al.*, 2017).

309   Adaptation activities by raising and maintaining fishpond embankment are

310   continuously pursued annually and require a lot of money. To deal with this, planting

311   mangroves as a mitigation and adaptation effort has helped keep the pond dam's shape

312   while increasing environmental services for local livelihoods. Furthermore, the

313   construction of a hybrid model of wave breaker is made from used tires and mangrove

314   wood and bamboos to increase the accession process. It is also built along the fragmented

315   coastlines in the Tugurejo and Mangkang Kulon areas to reduce wave energy and ocean

316   currents.

317   Generally, Tugurejo and Mangkang Kulon communities have developed good

318   adaptation capacities by utilizing coastal natural resources as materials for making food,

319   fabric dye, and handicrafts. This becomes a side job or an alternative livelihood.

320   However, access to carrying capacities such as education and training in business

321   development and marketing, modernization of information flows, and financial support

322   increase coastal communities' resilience through improved economic aspects (Astuti and

323   Handayani, 2020). Health aspects such as the availability of health services and health

324   insurance are still considered trivial, even though the need for this is considered very large

325   since coastal areas are heavily affected by climate change. Besides, the government as

the policymaker should to consider about an assertiveness, holistic and integrated programming for improving communities' resilience (Suhelmi and Triwibowo, 2018).

4.2. Developed Multi-Stakeholder Partnership Strategy in Integrated Coastal Management

The importance of integrated coastal management can be divided into five reasons, 1) empirically, there are ecological and functional relationships between coastal ecosystems with mainland and community; 2) in a coastal area, there is more than one type of natural resource, artificial resource, and environmental services that can be utilized for development purposes; 3) the communities group capable to run various business job; 4) both ecologically and economically, the use of a coastal area in monoculture is very vulnerable to internal and external changes that can lead to business failure.

The development of collaborative works among stakeholders should be managed in an integrated cooperative approach to gain profit and sustain coastal areas (Prabantarikso *et al*., 2018). The parties interested in using natural resources should prepare an integrated management plan that applies to all stakeholders, especially the government and the community (Sariffuddin *et al*., 2017). Since 2005, ecosystems rehabilitation and community empowerment have been conducted by several parties (Table 3). Hence, independently, the community in Tugurejo has made nursery and mangrove planting, making water breakers from tires, and environmental education through ecotourism. These increase ecological services and community resilience from climate change disasters (Sari & Prayoga, 2018).

The interaction of multi-stakeholders made a pentagonal partnership that can be defined as a coastal rehabilitation model. This can encourage the restoration and balance

of the ecosystem through profitable collaboration and teamwork (Halibas *et al*., 2017).
The program approach with the multi-stakeholder partnership model increases the
legality and program success (Martuti *et al*., 2020; Soesilowati *et al*., 2017). On the
contrary, mass media plays an essential role in making the program popular, especially
for community product marketing (Ahmad *et al*., 2016). It plays a role in introducing
social change (agent of social) broader, disseminating the program, and engaging other
parties in collaborative works. It shows that the mass media introduces modernization
efforts (Ekanayake, 2016), stimulate the decision-making process (Mukhtar, 2020), and
accelerates the process of transitioning from a traditional society to a modern one
(Colbran, 2020; Narayana and Ahamad, 2017; Schrape, 2017).

5.   CONCLUSIONS

This study showed that the capital aspect in Mangkang Kulon and Tugurejo had
moderate to high resilience. Meanwhile, the human resource and financial capital have
moderate capacity, and social and physical capital have a high capacity in supporting the
community resilience in both sub-districts. However, the natural capital in Tugurejo
performed high value because of the existing well-managed mangrove forest, compare to
Mangkang Kulon. The lack of mangrove forests and massive dock construction increase
the coastal erosion and seawater intrusion to agricultural fields. The financial capital is
the lowest value that indicates a low community income and support to develop their
business. Most of the economic income from fishing or food processing business spend
on adjusting houses, environment, and fishpond to avoid the destruction from sea level
rises.

The communities in directly involved in the empowerment program from the
government, private sector, academies, and NGO as the target beneficiaries. It gives
various activities for local people to be involved in managing and rehabilitating coastal

375   quality, including build the water-breaker, mangrove nurseries, and planting. However,

376   most of the programs in the coastal area were conducted separately and overlapping. A

377   multi-stakeholder partnership approach should be conducted to strengthen integrated

378   coastal management and increase program effectiveness. It is necessary to identify and

379   profile the role of each party to make a collaborative action plan. The government as a

380   policymaker can involve the academies and NGOs as the professional expert in arranging

381   annual regulation or short and long-term plans. Corridors should also be created for direct

382   empowerment programs, which should be then implemented by the private sector

383   together with academies and NGOs through CSR program. In addition, the media should

384   disseminate and educate the community about resiliency against climate change

385   catastrophes in coastal areas.

386

6.   CONTRIBUTIONS

388   NKTM: research concept.; RP: enhance research concept.; NKTM: research

389   funding.: NKD, NKTM: instrumentation and administration.; WABNS, DPM: data

390   collection. NKTM, RP, DPM: analyzed the data.; WABNS: area mapping and

391   illustration.; NKTM, DPM: wrote the manuscript.; DPM, NKD: publication. All authors

392   read and approved the final version of the document.

393

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399 **8.   REFERENCES**

400 Ahmad, N. S., Musa, R., and Harun, M. H. M. (2016). The Impact of Social Media

401   Content Marketing (SMCM) towards Brand Health. *Procedia Economics and*

402   *Finance*, *37*(16), 331–336. https://doi.org/10.1016/s2212-5671(16)30133-2

403 Astuti, M. F. K., and Handayani, W. (2020). Livelihood vulnerability in Tambak Lorok ,

404   Semarang : an assessment of mixed rural-urban neighborhood. *Review of Regional*

405   *Research*. https://doi.org/10.1007/s10037-020-00142-7

406 Blankespoor, B., Dasgupta, S., and Lange, G. M. (2017). Mangroves as a protection from

407   storm   surges   in   a   changing   climate.   *Ambio*,   *46*(4),   478–491.

408   https://doi.org/10.1007/s13280-016-0838-x

409 Chang, D. (2018). Modeling and Analysis of Marine Product Trade on the Coordinated

410   Development of Economy and Resource in Border and Coastal Area. *Journal of*

411   *Coastal Research*, *83*(83), 229–236. https://doi.org/10.2112/SI83-037.1

412 Colbran, M. P. (2020). Policing, social media and the new media landscape: can the police

413   and the traditional media ever successfully bypass each other? *Policing and Society*,

414   *30*(3), 295–309. https://doi.org/10.1080/10439463.2018.1532426

415 Dentoni, D., Bitzer, V., and Schouten, G. (2018). Harnessing Wicked Problems in Multi-

416   stakeholder   Partnerships.   *Journal   of   Business   Ethics*,   *150*(2),   333–356.

417   https://doi.org/10.1007/s10551-018-3858-6

418 Dini, S. K., and Fauzan, A. (2020). Clustering Provinces in Indonesia based on

419   Community Welfare Indicators. *EKSAKTA: Jurnal Ilmu-Ilmu MIPA*, *20*(1), 56–63.

420   https://doi.org/10.20885/eksakta.vol1.iss1.art9

421 Ekanayake, E. M. S. (2016). Social Stratification , Modernization and Restructuring of

422   Sri Lankan Society. *International Journal of Arts and Commerce*, *5*(2), 96–107.

423   www.ijac.org.uk

424   Freduah, G., Fidelman, P., and Smith, T. F. (2017). The impacts of environmental and

425   socio-economic stressors on small scale fisheries and livelihoods of fishers in

426   Ghana. *Applied Geography*, *89*(September), 1–11.

427   https://doi.org/10.1016/j.apgeog.2017.09.009

428   Gerkensmeier, B., and Ratter, B. M. W. (2018). Governing coastal risks as a social

429   process—Facilitating integrative risk management by enhanced multi-stakeholder

430   collaboration. *Environmental Science and Policy*, *80*(June 2017), 144–151.

431   https://doi.org/10.1016/j.envsci.2017.11.011

432   Hahn, M. B., Riederer, A. M., and Foster, S. O. (2009). The Livelihood Vulnerability

433   Index: A pragmatic approach to assessing risks from climate variability and change-

434   A case study in Mozambique. *Global Environmental Change*, *19*(1), 74–88.

435   https://doi.org/10.1016/j.gloenvcha.2008.11.002

436   Halibas, A. S., Sibayan, R. O., and Maata, R. L. R. (2017). The penta helix model of

437   innovation in Oman: An hei perspective. *Interdisciplinary Journal of Information,*

438   *Knowledge, and Management*, *12*, 159–172.

439   Huong, N. T. L., Yao, S., and Fahad, S. (2019). Assessing household livelihood

440   vulnerability to climate change: The case of Northwest Vietnam. *Human and*

441   *Ecological Risk Assessment*, *25*(5), 1157–1175.

442   https://doi.org/10.1080/10807039.2018.1460801

443   Husain, A., Satria, A., Kusmana, C., and Eriyatno. (2019). Study on living environment

444   and quality of life of coastal community in Gorontalo City, Indonesia. *Advances in*

445   *Agriculture and Botanics*, *11*(1), 48–55.

446   https://search.proquest.com/docview/2292893233?accountid=17242

447   Husnayaen, Rimba, A. B., Osawa, T., Parwata, I. N. S., As-syakur, A. R., Kasim, F., and

448   Astarini, I. A. (2018). Physical assessment of coastal vulnerability under enhanced

449   land subsidence in Semarang, Indonesia, using multi-sensor satellite data. *Advances*

450   *in Space Research*, *61*(8), 2159–2179. https://doi.org/10.1016/j.asr.2018.01.026

451   Irsadi, A., Anggoro, S., Soeprobowati, T. R., Helmi, M., and Khair, A. S. E. (2019).

452   Shoreline and mangrove analysis along semarang-demak, Indonesia for sustainable

453   environmental management. *Jurnal Pendidikan IPA Indonesia*, *8*(1), 1–11.

454   https://doi.org/10.15294/jpii.v8i1.17892

455   Ismanto, A., Zainuri, M., Hutabarat, S., Sugianto, D. N., Widada, S., and Wirasatriya, A.

456   (2016). Sediment Transport Model In Sayung District, Demak. *Journal of Physics:*

457   *Conference Series*, *755*(1). https://doi.org/10.1088/1742-6596/755/1/011001

458   Kim, M. J., Kim, C. S., Choi, B. J., and Lee, S. H. (2018). Plume Current Change by

459   Seawall Construction for a Harbor Development in South Korea. *Journal of Coastal*

460   *Research*, *85*(85), 126–130. https://doi.org/10.2112/SI85-026.1

461   Koirala, S. (2015). Livelihood Vulnerability Assessment to the Impacts of Socio-

462   Environmental Stressors in Raksirang VDC of Makwanpur District Nepal. *The*

463   *Department of International Environment and Development Studies, Noragric*.

464   https://doi.org/10.1177/1098214011411573

465   Komugabe-Dixson, A. F., de Ville, N. S. E., Trundle, A., and McEvoy, D. (2019).

466   Environmental change, urbanisation, and socio-ecological resilience in the Pacific:

467   Community narratives from Port Vila, Vanuatu. *Ecosystem Services*, *39*(July),

468   100973. https://doi.org/10.1016/j.ecoser.2019.100973

469   Maimunah, S., Rosli, N., Rafanoharana, S., Sari, K., and Higashi, O. (2011).

470   Strengthening Community To Prevent Flood Using Participatory Approach (a Case

471   of the Semarang City). *Journal of International Development and Cooperation*,

472   *18*(2), 19–28. https://doi.org/10.15027/32463

473   Martuti, N. K. T., Anggraito, Y. U., and Anggraini, S. (2019). Vegetation Stratification

474   in Semarang Coastal Area. *Biosaintifika:*, *11*(1), 139–147.

475   Martuti, N. K. T., Pribadi, R., Sidiq, W. A. B. N., and Mutiatari, D. P. (2020).

476   Community-Based Integrated Coastal Management Strategy in Tugurejo

477   Subdistrict, Semarang. *Advances in Social Science, Education and Humanities*

478   *Research*, *390*(ICRACOS 2019), 73–80. https://doi.org/10.2991/icracos-19.2020.15

479   Mehvar, S., Filatova, T., Syukri, I., Dastgheib, A., and Ranasinghe, R. (2018).

480   Developing a framework to quantify potential Sea level rise-driven environmental

481   losses: A case study in Semarang coastal area, Indonesia. *Environmental Science*

482   *and Policy*, *89*(February), 216–230. https://doi.org/10.1016/j.envsci.2018.06.019

483   Mukhtar, M. U. (2020). Building Bridges: The Relevance of Mass Media in Community

484   Policing: Study of Kano Metropolis. *International Journal of Development*

485   *Strategies in Humanities, Management and Social Sciences*, *10*, 24–35.

486   Narayana, A., and Ahamad, T. (2017). Role of media in women empowerment.

487   *International Journal of Advanced Education and Research*, *2*(5), 50–53.

488   Nugraha, A. L., Awaluddin, M., and Sasmito, B. (2018). Modelling Multi Hazard

489   Mapping in Semarang City Using GIS-Fuzzy Method. *IOP Conference Series:*

490   *Earth and Environmental Science*, *123*(1). https://doi.org/10.1088/1755-

491   1315/123/1/012002

492   Prabantarikso, M., Fahmi, I., Fauzi, A. M., and Nuryantono, N. (2018). Strategic

493   Collaborative Model of BGAC+ for Sustainable Housing Development in Indonesia.

494   *IOP Conference Series: Earth and Environmental Science*, *145*(1).

495   https://doi.org/10.1088/1755-1315/145/1/012128

496   Sari, A. D., and Prayoga, N. (2018). Enhancing citizen engagement in the face of climate

497   change risks: A case study of the flood early warning system and health information

498   system in Semarang city, Indonesia. In S. Hughes (Ed.), *Climate Changes in Cities:*

499   *Urban Book Series* (pp. 121–137). https://doi.org/10.1007/978-3-319-65003-6_7

500   Sariffuddin, Astuti, K. D., Farhaeni, G., and Wahdah, L. (2017). Vulnerability

501   Assessment: The Role of Coastal Informal Settlement Growth to Social

502   Vulnerability in Genuk Sub-District, Semarang City. *IOP Conference Series: Earth*

503   *and Environmental Science*, *55*(1). https://doi.org/10.1088/1755-1315/55/1/012047

504   Schrape, J. F. (2017). Reciprocal irritations: Social media, mass media and the public

505   sphere. *Society, Regulation and Governance: New Modes of Shaping Social*

506   *Change?*, 138–150. https://doi.org/10.4337/9781786438386.00016

507   Serrat, O. (2017). Knowledge Solutions: Tools, Methods, and Approaches to Drive

508   Organizational Performance. *Knowledge Solutions: Tools, Methods, and*

509   *Approaches to Drive Organizational Performance*, 1–1140.

510   https://doi.org/10.1007/978-981-10-0983-9

511   Slovin, E. (1960). Slovin's formula for sampling technique. *Retrieved on February*, *13*,

512   2013.

513   Soesilowati, E., Kariada, N., and Margunani, M. (2017). Model for Empowering Farmers

514   at Dry Land through Quadruple Helix Approach. *Journal of Arts and Humanities*,

515   *6*(4), 01. https://doi.org/10.18533/journal.v6i4.1131

516   Suhelmi, I. R., and Triwibowo, H. (2018). Coastal Inundation Adaptive Strategy in

517   Semarang Coastal Area. *Forum Geografi*, *32*(2), 195–203.

518   https://doi.org/10.23917/forgeo.v32i2.5672

519   Sujakhu, N. M., Ranjitkar, S., He, J., Schmidt-Vogt, D., Su, Y., and Xu, J. (2019).

520   Assessing the livelihood vulnerability of rural indigenous households to climate

521   changes in Central Nepal, Himalaya. *Sustainability (Switzerland)*, *11*(10).

522   https://doi.org/10.3390/su11102977

523   Sumarto, M. (2017). Welfare Regime Change in Developing Countries: Evidence from

524   Indonesia. *Social Policy and Administration*, *51*(6), 940–959.

525   https://doi.org/10.1111/spol.12340

526   Surya, M. Y., He, Z., Xia, Y., and Li, L. (2019). Impacts of sea level rise and river

527   discharge on the hydrodynamics characteristics of Jakarta Bay (Indonesia). *Water*

528   *(Switzerland)*, *11*(7). https://doi.org/10.3390/w11071384

529   Syakir. (2019). Semarang Batik as an Artistic Representation of Coastal and Egalitarian

530   Communities. *Advances in Social Science, Education and Humanities Research*,

531   *271*(ICONARC 2018), 207–210.

532   Wahyudin, Y., Kusumastanto, T., Adrianto, L., and Wardiatno, Y. (2018). A Social

533   Ecological System of Recreational Fishing in the Seagrass Meadow Conservation

534   Area on the East Coast of Bintan Island, Indonesia. *Ecological Economics*,

535   *148*(December 2017), 22–35. https://doi.org/10.1016/j.ecolecon.2018.01.013

536   Ward, R. D., Friess, D. A., Day, R. H., and Mackenzie, R. A. (2016). Impacts of climate

537   change on mangrove ecosystems: a region by region overview. *Ecosystem Health*

538   *and Sustainability*, *2*(4). https://doi.org/10.1002/ehs2.1211

539   Widyasamratri, H., and Aswad, A. (2017). A preliminary study: An agent-based spatial

540   simulation of human-coastal environment interaction. *The Third International*

541   *Conference on Coastal and Delta Areas*, *C*, 593–601.

542   Wijaya, H. B., Kurniawati, H., and Hutama, S. T. E. W. (2018). Industrialization Impact

543   on Worker Mobility and Land Use in Peri Urban Area (Case study of Semarang

544   District, Indonesia). *IOP Conference Series: Earth and Environmental Science*,

545   *123*(1). https://doi.org/10.1088/1755-1315/123/1/012037

546   Williams, P. A., Crespo, O., and Abu, M. (2020). Assessing vulnerability of horticultural

547   smallholders' to climate variability in Ghana: applying the livelihood vulnerability

548   approach. *Environment, Development and Sustainability*, *22*(3), 2321–2342.

549   https://doi.org/10.1007/s10668-018-0292-y

550

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kepada tferradosa

dear editor,

please find attached revised manuscript, I've also uploaded in the online submission page.

thank you

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Telusuri semua percakapan

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1 dari 1.125

5

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Kotak Masuk   19

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Buat atau temukan ruang

Nana Kariada TM <nanakariada@mail.unnes.ac.id>   11.24 (11 jam yang lalu)
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dear Editor

thank you for the accepted decision, and announced on September, 10th.
But, I am so sorry for the late response to the copyediting process
does it still in the copyediting process? and what should I do for the next step?

thank you

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tferradosa   20.05 (3 jam yang lalu)
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Dear Nana

We are currently editing files. For now you need to do nothing.

We will communicate soon.

Thank you.

Tiago