Statistical Analysis on Coastal Tourism for Sustainable Development - A Case Study at Gunung Sewu Global Geopark in Gunungkidul Regency, Indonesia -

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Abstract

A coastal tourism is one of the important local development items in Indonesia, and expected to contribute to the revitalization of local economic conditions. The objectives of this study are, 1) to identify the influential dimensions as a predictor for a sustainable coastal tourism development, 2) to identify some important variables in each dimension, and, 3) to reveal the influence of proximity from residential location to the coastline on the perception of local residents about the sustainable coastal tourism development.

This study set the research field on the coastal area of Gunung Sewu Global Geopark in Gunungkidul Regency, and conducted a questionnaire survey and a statistical analysis. The analysis revealed that the most influential dimension for the sustainable coastal tourism development is the Institutional dimension, and other dimensions, Economic, Environmental, and Social dimensions, are follows this dimension. Meanwhile, Community Communication was the most influential variables in the Institutional dimension. Also, the variable of Local Income was the most influential in Economic dimension, Local Norms was in Environmental dimension, and Cultural Exchange was in Social dimension. The proximity of residential location from the coastline affected some local resident's opinions in the dimension of Institutional, Economic, Social and overall sustainability conditions, though there were no influences in Environmental dimension.

Keywords: Coastal, Tourism, Sustainable development, Gunung Sewu, Gunungkidul

1. INTRODUCTION

A coastal tourism is one of the important local development items in Indonesia, and is expected to contribute 15% of Gross Domestic Product in 2019[1)]. This economic contribution is supposed to revitalize many local economics. On the other hand, the coastal tourism also leads some problems such as an environmental degradation, economic dependence, and other social problems[2)].

The development of the sustainable coastal tourism has become a worldwide concern in recent years, and many researches relate to this topic have been carried out. However, there only few researches that deal with the important destinations and variables that influence the sustainable coastal tourism development based on the local resident's perceptions.

Based on the above background, this study set three objectives. The first objective is to identify the important dimensions as a predictor for the sustainable coastal tourism development. The second objective is to identify the influential variables in each dimension. The third objective is to reveal the influence of the proximity from residential location to the coastline on the perception of local residents about the sustainable coastal tourism development.

This study tries to show some important predictors for the sustainable coastal tourism development. These predictors are important for a local government in making a policy for the sustainable coastal tourism development.

2. STUDY AREA

This study set a research field on the coastal area of Gunung Sewu Global Geopark in Gunungkidul Regency. Gunungkidul Regency, as shown in Figure 1, located in the southern part of D.I. Yogyakarta, and it is one of the rapidly growing tourist destinations.

Figure 1. Study site on the coastal area of Gunung Sewu Global Geopark in Gunungkidul

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The total number of visitors in Gunungkidul Regency was 3,246,996 in 2017, and 86.95% of them visited the coastal areas[3]. Furthermore, it is reported that the number of visitors is increasing in the following years. The area, shown in Figure 2, is a conservation zone known as Gunung Sewu which has a large classic tropical karst landscape on Java Island. In 2015, UNESCO authorized Gunung Sewu as one of the global geological conservation area under the support of the Global Geopark Network.

Figure 2. Coastal area of Gunungkidul Regency

3. RESEARCH METHODS

3.1 Primary data collection

Questionnaire-based research was conducted to obtain the primary data including demographic attributes and resident opinions. The first part consists of demographic attributes of the respondents, such as gender, age, village and district name, education level, residence period, and type of livelihood.

The second part consists of 35 questions. The answers were measured by 5-point Likert scale from 1 to 5, where 1 means “strongly disagree” and 5 means “strongly agree” [4]. Questions from Q1 to Q8 asked economic items, from Q9 to Q17 asked social items, from Q18 to Q24 asked environmental items and from Q25 to Q32 asked institutional items[4]. Meanwhile, Q33 asked an overall sustainability perception in accordance with the current condition of tourism development[4]. Then, Q34 also asked a sense of inequality in receiving benefits from coastal tourism development in each region. Finally, Q35 asked a community benefit obtained from the status of Gunung Sewu as a member of UNESCO Global Geopark.

Primary data were collected from July to August in 2018 and March in 2019 at 9 villages shown in Figure 1. The villages are on the coastal area, and have a potential to be a coastal tourism destination. Table 1 shows the current population of research area[5]. Total population from 20 years old to 64 years was 34,358. The number of samples, n=226 in this study, was determined based on the "Tables for Statistics"[5]. The respondents were selected by the proportional random sampling method. The number of respondents in each village was determined by the "Multi-Stage Sampling" method based on the weight of the population as shown in Table 1[4, 6]. The survey was conducted on site, and had a 100% response rate.

Table 1. Determination of the number of sample[6]

Age Group	Kc. Tanjungsari			Kc. Tepus			Kc. Girisubo			TOTAL
	Kmd	Bjr	Ngr	Sdj	Tps	Pwd	Jpt	Blg	Sby	
20 to 24	466	334	373	436	627	597	252	285	248	3,618
25 to 29	494	386	310	393	615	478	267	262	201	3,406
30 to 34	445	342	381	403	632	471	265	231	202	3,372
35 to 39	545	442	481	521	741	507	287	260	215	3,999
40 to 44	464	428	494	557	725	525	344	272	223	4,032
45 to 49	641	521	518	600	833	709	406	365	327	4,920
50 to 54	516	426	378	499	667	581	326	305	280	3,978
55 to 59	476	388	396	495	661	571	327	242	276	3,832
60 to 64	385	371	345	372	520	453	266	229	260	3,201
Population	4,432	3,638	3,676	4,276	6,021	4,892	2,740	2,451	2,232	34,358
Weight	0.13	0.11	0.11	0.12	0.18	0.14	0.08	0.07	0.06	1.00
Sample Size	30	24	24	28	40	32	18	16	14	226

Note : Name of the location in Table 1.
Kmd = Kemadang; **Bjr** = Banjarejo; **Ngr** = Ngestirejo; **Sdj** = Sidoharjo; **Tps** = Tepus; **Pwd** = Purwodadi; **Blg** = Balong; **Jpt** = Jepitu; **Sby** = Songbanyu.

3.2 Data analysis

The primary data were analyzed using an open source application, R version 3.5.2. Firstly, the data were analyzed by descriptive statistical method to identify the respondents' characteristics and data distribution. The variables in each dimension were analyzed to determine the mean value and standard deviation. The data from the second part of the questionnaire, which is ordinal data in the form of local people's opinion, were analyzed for its validity and reliability.

Secondly, valid variables were analyzed using the Principal Component Analysis, PCA, to measure the loading factor of each variable, and this study obtained the factor scores for the next analysis. The influential variables in each dimension for sustainable coastal tourism development were determined based on the loading factor of each variable.

Thirdly, the factor scores generated from PCA were analyzed with using Generalized Linear Models, GLM, analysis to identify the effect of each dimension on overall sustainability condition. Finally, Kruskal-Wallis test was applied to reveal the influence of the proximity from residential location to the coastline on the perceptions of local residents about coastal tourism development.

4. DATA ANALYSIS AND RESULTS

4.1 Respondent attributes

The first part of the questionnaire was analyzed to obtain the demographic attributes of the respondents. 60.6% of the respondents was male, n=137, and 39.4% was female, n=89.

Table 1 shows the age distribution of respondents. The majority of respondents, 64.6%, was from 31 years to 60 years. For education level, 50% of the respondents, *n*=180, was below junior or middle school education, and 48.7%, *n*=43, was over high school education.

The majority of respondents, 75.6%, have been living in the study area more than 25 years. A half of the respondents, 50.0%, settled near the coastline, and 50.9% of the respondents had a job relates to a tourism.

4.2 Evaluation of dimensions

Table 2 shows the mean value of each question in economic dimension, from Q1 to Q8. Six variables, X1, X3, X8, X2, X5, and X6, were assessed positively in mean value higher than 3.5. Meanwhile, the two other variables, X4 and X7, showed relatively negative answers which were below 2.5.

Table 2. Evaluation of economic sustainability

	Question	Variable	Mean	S.Dev
X1	Tourism provides benefits in increasing people's income in this area.	Local Income	3.95	0.965
X3	Tourism creates better employment opportunities for people in this area.	Job Opportunity	3.90	0.949
X8	Tourism creates more and better marketing locations for local products in the region.	Market for Local Product	3.86	0.896
X2	Tourism creates diversity in the economic sector in this area.	Livelihood Diversification	3.85	0.951
X5	In general, the quality and quantity of goods and services in this area has improved since the development of tourism.	Goods and Services	3.79	0.922
X6	This area has better infrastructure (roads, power lines, water supply and transportation) due to tourism development.	Infrastructure	3.78	0.994
X4	The prices of goods and services (food, health, education, etc.) become more expensive due to the development of the tourism sector.*	Living Cost	2.66	1.080
X7	Tourism causes property prices (land and buildings) in this area to increase.*	Local Investment	2.03	0.904

Table 3. Evaluation of environmental sustainability

	Question	Variable	Mean	S.Dev
X18	Tourism development in this area makes the surrounding environment more interesting.	Destination Attractiveness	4.02	0.797
X23	Tourism development in this area raises public awareness of environmental protection and sustainability.	Environmental awareness	3.80	0.789
X20	Waste management in this area is getting better because of tourism development.	Waste management	3.42	1.031
X19	Tourism causes environmental pollution (water, land and air) in this area.*	Pollution	3.17	1.016
X24	Tourism causes karst environmental conditions in this area to be damaged.*	Geodiversity conservation	3.12	0.972
X21	The large number of tourists visiting this area disturbs the preservation of animals and plants.*	Biodiversity conservation	3.12	1.123
X22	Tourism activities lead to increased use of water and energy resources in this area.*	Resources utilization	2.31	0.849

Table 4. Evaluation of social sustainability

	Question	Variable	Mean	S.Dev
X13	The recreational facilities for the local community are becoming more due to the development of tourism.	Recreation facilities	3.89	0.946
X17	Local people have a broader knowledge insight because of the interaction that occurs in tourism activities.	Cultural exchange	3.86	0.756
X16	The lifestyle of people in this area has changed since the development of tourism.	Lifestyle	3.85	0.868
X15	Women get more opportunities (education, jobs, etc.) because of tourism development.	Gender equity	3.85	0.723
X12	The opportunity to obtain education / vocational training in this area increases due to the development of tourism.	Education level	3.72	0.947
X11	Local traditions are becoming less important because of the development of tourism in this area.*	Local culture/tradition	3.00	1.106
X14	The large number of people from outside the region who came to this area made the life of local people disturbed.*	Circular migration	2.99	1.091
X9	Tourism causes an increase in cases of criminality (alcoholism, vandalism, etc.) in this area.*	Local safety	2.97	1.241
X10	Tourism has negative effects on the norms and values of local wisdom in this area.*	Local norms	2.92	1.169

Table 5. Evaluation of institutional sustainability

	Question	Variable	Mean	S.Dev
X27	Local people must be relatively independent in tourism management in their area.	Independence of Management	3.76	0.873
X28	Local governments encourage local community participation in tourism development.	Community Participation	3.73	0.865
X32	Local governments recognize and protect local people to develop businesses in the tourism sector.	Legal Protection	3.68	0.945
X31	Local governments provide capital assistance and training to local communities in business development in the tourism sector.	Community Empowerment	3.66	0.945
X29	Local people can be involved in the decision-making process for tourism development in this area.	Decision Making	3.64	0.934
X30	Long-term planning by local governments can control the negative impacts of tourism on social, economic and environmental aspects.	Tourism planning	3.54	0.976
X25	Local people are more involved in managing (management) tourism in this area.	Local management	3.46	0.976
X26	There is good communication among the parties involved in the policy-making and decision-making process in this area.	Community Communication	3.42	0.950

Table 3 shows the mean value of each question in environmental dimension, from Q18 to Q24. The most of the variables in the environmental dimension were evaluated positively except X22 that had a mean value less than 2.5.

Table 4 shows the mean value of each question in social dimension, from Q9 to Q17. Five variables, X13, X17, X15, X16, and X12, were rated positively in mean

value, but four variables, X11, X14, X9, and X10, were scored slightly negative less than 3.0.

Table 5 shows the mean value of each question in institutional dimension, from Q25 to Q32. All variables in the institutional dimension were evaluated positively.

4.3 Overall sustainability condition

Figure 3 shows the answer distribution of Q33. 67.7% of the local population positively stated the coastal tourism. While 6.2% evaluated negatively, and the rest of 26.1% had neutral opinions. The similar result was seen in Table 6. The mean value exceeded 3.5, and the development for coastal tourism was understood positive by local residents.

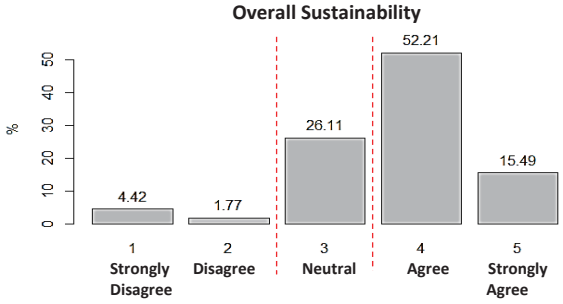

Figure 3. Frequency of overall sustainability opinion

Table 6. Mean score for overall sustainability

	Question	Mean	S.Dev
Y1	At present, overall development of tourism in this area is positive and sustainable.	3.73	.902

4.4 Disparity of tourism benefits

Q34 showed the disparity of benefits from the coastal tourism development. Table 7 shows the mean value of Q34. The mean value of Y2 was 2.96, and the people feel some problem in tourism benefits.

Figure 4 shows the answer distribution of Q34, and it seems like a normal distribution. 28.3% of local people felt the benefit inequality, and 30.5% had the opposite answer. Meantime, 41.2% of the respondents had the neutral opinion.

Table 7. Mean score for overall sustainability

	Question	Mean	S.Dev
Y2	The benefits of tourism development only perceived by some community groups.*	2.96	1.021

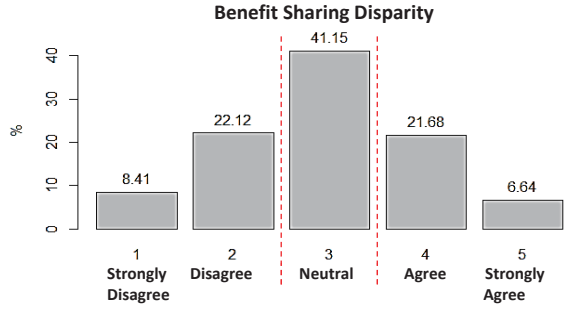

Figure 4. Frequency of disparity of tourism benefits

From the cross analysis between Q33 and Q34, 67.7% of positive response in Q33 dropped to 28.3% when the respondents consider the equality in receiving benefits from coastal tourism development. On the other hand, negative response in Q33 increased from 6.2% to 30.5% by considering the equality of benefits. This means that sustainable tourism development strongly relates to the equality of benefits obtained from the development.

4.5 Determination of sustainability predictor

Due to the validity test, variables X4, X7, and X22 were excluded in the subsequent analysis. The reliability test for thirty-three valid variables produced a Cronbach's α coefficient higher than 0.8. It means that the instrument used for data collection in this study was classified as a good reliable instrument.

Based on the calculation of Communalities Extraction Value, CEV, in the first phase of PCA, variables X8, X20, and X30 were excluded from the analysis because their CEV score was lower than 0.4.

From above processes, twenty-six variables were analyzed to identify their effects on four dimensions. As shown in Table 8, each variable was categorized by choosing higher score of loading factor.

Table 8. Rotated component matrix of PCA

Code	Variable	DECO	DENV	DINS	DSOC
X1	Local income	**0.813**	0.126	0.216	0.035
X2	Livelihood diversification	**0.775**	-0.059	0.304	0.005
X3	Job opportunity	**0.792**	0.082	0.180	0.031
X5	Goods and services	**0.590**	-0.218	0.195	0.273
X6	Infrastructure	**0.667**	-0.051	0.302	0.034
X9	Local safety	-0.014	**0.841**	-0.062	0.040
X10	Local norms	-0.176	**0.852**	-0.017	-0.085
X11	Local culture/tradition	-0.227	**0.776**	0.047	-0.203
X12	Education level	0.425	-0.148	0.321	**0.513**
X13	Recreation facilities	**0.530**	-0.062	0.173	0.446
X14	Circular migration	-0.195	**0.685**	0.026	-0.235
X15	Gender equity	**0.541**	-0.100	0.089	0.472
X16	Lifestyle	-0.069	-0.282	0.302	**0.614**
X17	Cultural exchange	-0.017	-0.182	0.209	**0.641**
X18	Destination Attractiveness	0.267	0.074	0.090	**0.599**
X19	Pollution	0.142	**0.671**	-0.170	0.005
X21	Biodiversity conservation	0.202	**0.750**	-0.305	0.106
X23	Environmental awareness	0.042	0.237	0.093	**0.608**
X24	Geodiversity conservation	0.064	**0.569**	-0.107	0.403
X25	Local management	0.086	-0.004	**0.674**	0.171
X26	Community Communication	0.226	-0.029	**0.770**	0.022
X27	Independence of Management	0.419	-0.121	**0.548**	0.020
X28	Community Participation	0.437	-0.061	**0.616**	0.230
X29	Decision Making	0.261	-0.214	**0.639**	0.139
X31	Community Empowerment	0.174	-0.083	**0.597**	0.288
X32	Legal Protection	0.353	-0.090	**0.595**	0.215

The Economic dimension, DECO, consists of variables X1, X2, X3, X5, X6, X13, and X15. The Environmental dimension, DENV, also consists of variables X9, X10, X11, X14, X19, X21 and X24. The Institutional dimension, DINS, consists of variables

X25, X26, X27, X28, X29, X31, and X32, and the Social dimension, DSOC, also consists of X12, X16, X17, X18, and X23. The total variance explained by four factors was 57.4%.

Factor scores generated by PCA was employed as independent variables in the GLM analysis to identify the influential dimension for the sustainable coastal tourism development.

Table 9 shows the significance value obtained from GLM analysis. The value of all dimensions were less than 0.05. This means that the dimensions are statistically significant, and have a strong influence on the overall sustainability condition, Y1. β-value also says the influence of each dimension on the overall sustainability condition.

Table 9. Result of GLM analysis

Dimension	β-value	Std. Err	z value	Pr(>|z|)	Sig.
(Trshld)1|2	-4.090	0.418	--9.774	-	-
(Trshld)2|3	-3.566	0.349	-10.209	-	-
(Trshld)4|4	-0.955	0.168	-5.665	-	-
(Trshld)4|5	2.280	0.228	9.991	-	-
DECO	0.817	0.153	5.335	9.55e-08	***
DENV	0.777	0.150	5.181	2.21e-07	***
DINS	0.858	0.158	5.417	6.06e-08	***
DSOC	0.635	0.145	4.358	1.31e-05	***

Sig. codes: 0 '***'; 0.001 '**'; 0.01 '*'; 0.05 '.'; 0.1 ' '; 1

4.6 The influence of residential proximity

Table 10 shows the results of Kruskal-Wallis test. The p-value in DINS, DECO, DSOC, and Y1 is lower than 0.05, and this means that there are difference opinions depending on the residential proximity to the coastline. On the other hand, the p-value in DENV is higher than 0.05, and this means that people have a similar opinion.

Table 10. Result of Kruskall-Wallis test

	DINS	DECO	DENV	DSOC	Y1
Chi-Sqr	5.7013	5.3192	0.15501	6.3299	11.599
Df	1	1	1	1	1
p-value	0.01695	0.02109	0.6938	0.01187	0.00066

5. DISCUSSIONS

5.1 Priority of dimensions

This study implemented an analytical framework based on the Prism of Sustainability theory, PoS[7] to propose the tourism development priorities on the coastal area of Gunung Sewu Global Geopark. Figure 5 shows the priority of dimensions in sustainable tourism development.

The priority was determined based on the β-value as presented in Table 9. The higher β-value was chosen as a higher the priority level. This study identified that the institutional dimension was the strongest predictor of coastal tourism development at the study site. Second priority was the economic dimension, and the environmental dimension and the social dimension were listed in order.

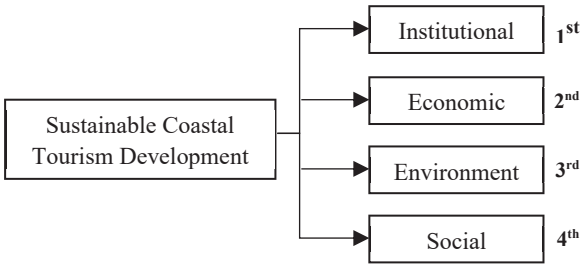

Figure 5. Development priority of dimensions

5.2 Detailed discussion in each dimension

The development priorities in each dimension are discussed in this subchapter. The priority of each variable was determined based on the loading factor of PCA as shown in Table 8. The higher loading factor becomes a higher the priority.

a) Institutional dimension

Institutional sustainability means a condition that all stakeholders actively participate in the process of decision-making and policy implementation[4]. Table 11 shows the coastal tourism development priorities in the Institutional dimension.

Based on the field observation, problems and conflicts in the tourism development sometimes occur due to the insufficient communication between stakeholders. The sufficient communications should be taken between stakeholders as the first priority in the tourism development.

Table 11. Priority in the Institutional dimension

Code	Variable	DINS	Priority
X26	Community Communication	0.770	1st
X25	Local Management	0.674	2nd
X29	Decision Making	0.639	3rd
X28	Community Participation	0.616	4th
X31	Community Empowerment	0.597	5th
X32	Legal Protection	0.595	6th
X27	Independence of Management	0.548	7th

b) Economic dimension

Economic dimension is the second priority in the sustainable coastal tourism development. This relates to some conditions such as the human welfare and the employments stability[4]. As shown in Table 12., the local income is the first propriety to gain economic benefits[9]. Tourism development is expected to increase the local incomes by expanding job opportunities as well as various employment options.

Table 12. Priority in the Economic dimension

Code	Variable	DECO	Priority
X1	Local Income	0.813	1st
X3	Job Opportunity	0.792	2nd
X2	Livelihood Diversification	0.775	3rd
X6	Infrastructure	0.667	4th
X5	Goods and Services	0.590	5th
X15	Gender Equity	0.541	6th
X13	Recreational Facilities	0.530	7th

c) Environmental dimension

Environmental dimension relates to pressures on preserving physical environments in the development area. This limits the utilization of natural resources to produce sustainable prosperity[4]. Environmental dimension also says the importance of sustainable development with local cultures[10].

Table 13 shows the coastal tourism development priorities in the environmental dimension. This study reinforced the importance of local culture such as local norms, local safety and local traditions. Furthermore, they are effective media to promote and develop coastal tourism sustainability.

Table 13. Priority in the Environmental dimension

Code	Variable	DENV	Priority
X10	Local Norms	0.852	1st
X9	Local Safety	0.841	2nd
X11	Local Traditions	0.776	3rd
X21	Biodiversity Conservation	0.750	4th
X14	Circular Migration	0.685	5th
X19	Pollution	0.671	6th
X24	Geodiversity Conservation	0.569	7th

d) Social dimension

Social dimension includes overall conditions associated with accessibility to resources and facilities in sustainable coastal tourism development[4]. Table 14 shows the list of higher priority variables. Cultural exchange is the first priority, and allows local communities to gain new knowledge to broaden their perspectives. This activity would increase the competitiveness of local communities to improve their welfare.

Table 14. Priority in the Social dimension

Code	Variable	DSOC	Priority
X17	Cultural Exchange	0.641	1st
X16	Lifestyle	0.614	2nd
X23	Environmental Awareness	0.608	3rd
X18	Destination Attractiveness	0.599	4th
X12	Educational Level	0.513	5th

5.3. Effect of residential proximity to the coastline on the opinion of local residents

There were some different opinions in each dimension except environmental dimension depending on the research area. People who live further from the coast tended to hesitate the coastal tourism development. This is due to the reason that people who live further from the coast tend to have less benefits of coastal tourism development than people who live near the coast. This difference may lead a dissatisfaction in the coastal tourism development among the local community.

Meanwhile, flimsy environmental opinions were observed common to all the research area. It seems to be related to the lack of a correct understanding of the environment. In hearing survey, local people tended to believe that the surrounding environment could be maintained fine as long as there is no negative impact on their economy.

6. CONCLUSIONS

This study investigated the important predictors for the sustainable coastal tourism development. Four important dimensions were identified in the order of priority as Institutional, Economic, Environmental and Social. In each dimension, this study also listed the important variables in order. For example, variables such as community communication, local management and decision making in Institutional dimension were the important factors in considering the sustainable coastal tourism development.

There are many factors involved in regional development in a complex way. The statistical method employed in this study could be one of the useful analytical tools to decide the effective approaches objectively in sustainable coastal tourism development.

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