Model of Coastline Dynamic and Community Adaptation Based on Local Wisdom in Sungai Pinang Village, West Sumatra, Indonesia

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Keywords: Shoreline Dynamic, Abrasion, Akresion, Equilibrium State and Adaptation, Local Wisdom.

Abstract: Climate change-induced seasonal shifts often result in environmental problems that impact environmental change. Seasonal changes cause environmental problems, including biotic and abiotic ecological impacts from coastal dynamics. This work aims to create a geographical model of shoreline dynamics from 2013 to 2023 and a community adaptation model based on local knowledge. The methodology used in this study is quantitative and includes a spatial approach and field survey. The results showed shoreline dynamics related to equilibrium, accretion, and abrasion in the study area. The dynamics of the coastline that occurred from 2013–2023 in abrasion caused the coastline to retreat between 15 m and 18.50 m, and accretion caused the land to increase by 6.7 m to 10.10 m. The community adaptation model is based on dominant local wisdom in cultural aspects, where strong local wisdom and religious values can cause the community to adjust when coastline dynamics occur. Thus, it is necessary to develop local wisdom values to reduce losses due to coastline dynamics.

1 INTRODUCTION

Climate change lately has often impacted the global environment, especially the problem of natural disasters (Zeng et al., 2021; Zhang et al., 2023). Climate change also impacts changes in coastlines, where changes in coastlines are often caused by changes in weather in a place that are often called seasonal changes. This seasonal change is much influenced by the sun's apparent motion around the earth, so that it will cause differences in air pressure in both the northern and southern hemispheres. This difference in air pressure will cause wind movement on the earth's surface, where the wind moves from areas with high air pressure to areas with low air pressure (Zhang et al., 2023; Zacharias et al., 2022).

The problem of seasonal changes will also impact changes in coastlines, especially in the tropics. The tropics have two seasons: the rainy and dry seasons (Yu et al., 2019; Valois et al., 2023). Climate change is a major factor in the issue of coastal change, specifically about seasonal variations. This seasonal shift will influence the height of waves near the coast and wind direction and intensity variations. High waves heading near the coast will affect how the coastline changes (Ullah et al., 2021; Tang et al., 2023). One of the problems caused by this southern season is the problem of abrasion or changes in the coastline, which has much impact on damage to settlements, facilities, and infrastructure close to the coast.

One tropical area that often experiences abrasion problems or changes in coastline, especially in the southern season, is the Pinang River area, located about 100 km south of Padang City. This Pinang River area is a village in the southern Pesisir Regency, which is included in one of the Koto XI Tarusan District villages. The problem of shoreline dynamics in this area often causes damage to the collapse of trees around the coast, while damage to settlements, facilities, and infrastructure only occurs so much. This situation is suspected because the people who live in this area have local wisdom they have believed in since ancient times and inherited from their ancestors. This local wisdom, they believe, can reduce losses due to seasonal changes that impact coastline changes in the form of abrasion, accretion, and equilibrium states.

Many previous researchers have researched coastline changes (Zhang et al., 2023; Tang et al., 2023; Ntim-Amo et al., 2022), but have but have yet to discuss community adaptation much, especially using local wisdom values. Here, the author focuses

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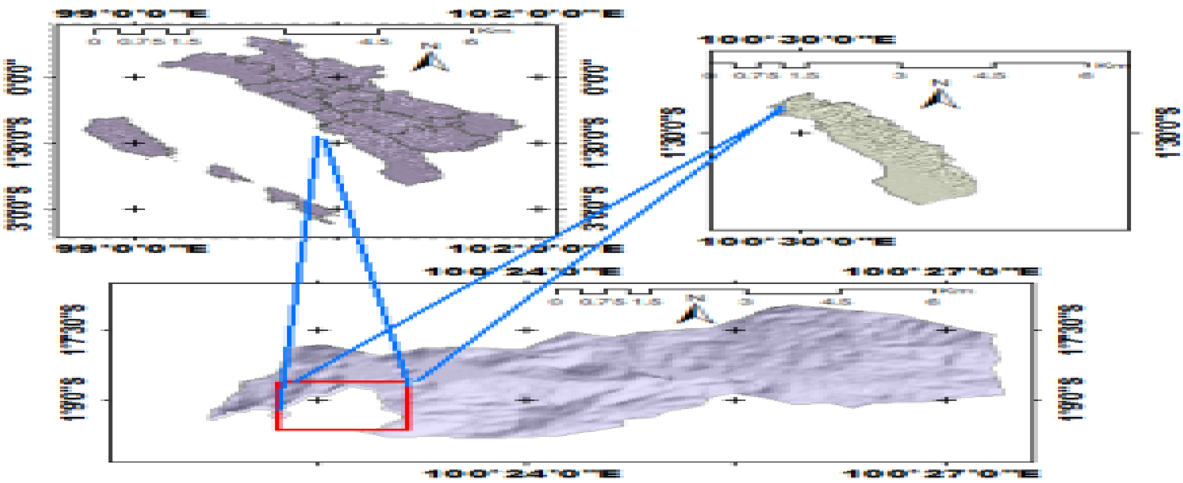

Figure 1: Research Area.

Table 1: Required Data.

No	Data	Source	information
1	Landsat 8 OLI imagery data in 2013, 2018, and 2023	USGS	Shoreline dynamic
2	DEMNAS	Geospatial Information Agency	Hillshade
3	Wind Speed Data	USGS	Determining the direction of the wind
4	Field data	Field surveys	Local wisdom

mainly on modelling coastline changes using DSAS analysis and adaptation models of communities occupying coastal areas using local wisdom analysis. This research is expected to contribute to the development of science, especially on the problem of coastline change and adaptation, as information for the community, especially about coastal land use, and a basis for policymakers, especially in overcoming climate change problems. The study aims to model and analyze shoreline dynamics and the influence of local wisdom values on community adaptation when facing shoreline dynamic problems.

2 MATERIAL AND METHODS

2.1 Research Area

This study is being conducted in the community of Sungai Pinang. This region is part of one of the Koto XI Tarusan District villages and is likewise rural in the southern Pesisir Regency. The Painan area, the capital of the South Pesisir district, is about 80 km north of the Pinang River area, which is situated in the southern portion of Padang. The following image provides more information:

2.2 Material and Research Setting

To carry out dynamic shoreline modelling, both primary and secondary data are needed, where secondary data is obtained from related institutions and primary data is obtained directly in the field. The secondary data needed in this study is Landsat 8 OLI satellite images from 2013, 2018, and 2023. This data was obtained from USGS earth explorers, LC 20130609, 20180103, and 20230112. The primary data needed in the field is structured interviews about community adaptation based on local wisdom conducted by people living in Sungai Pinang village during the shoreline dynamic. Shoreline data for 2013, 2018, and 2023 are required to more comprehensively examine shoreline changes in the research region over ten years.

The pre-field, field, and post-field phases of this study were conducted in multiple stages, which are described below: Pre-field stage, The activities carried out at this stage include collecting references in the form of relevant journals and downloading Landsat 8 OLI image data from the USGS website to obtain Landsat 8 OLI images for 2013, 2018, and 2023, as well as DEM data obtained from DEMNAS, the Indonesian geospatial information agency. After the satellite image data is obtained, the activities are to make radiometric corrections to improve the image of aerosol scattering in the air and perform flash (Yu et al., 2019; Attaran et al., 2024). After the satellite imagery is corrected, the activities carried out are digitizing onscreen to obtain the coastline of the research area in 2013, 2018, and 2023. The 2013, 2018, and 2023 coastlines are used as the basis for dynamic shoreline analysis and modelling using DSAS tools in ArcGIS software. The results of this shoreline dynamic modeling and analysis are spatial models. Making questionnaires, which were structured lists of inquiries regarding how the local population in the study region adjusted to shoreline change, was another of the pre-field stage duties. To ensure the final version of this questionnaire is effective, it must be evaluated before being given to field responders.

At this stage of the activity, the field stage is to distribute questionnaires to respondents, which are selected based on purposeful sampling, namely samples taken based on specific objectives. The response samples were heads of families and community leaders who knew about shoreline dynamics and community adaptation. Based on local wisdom and at this stage, the author also asked respondents about shoreline dynamics due to abrasion and accretion.

Following field activities, the steps of gathering respondent interview results (Duijndam et al., 2023; Parven et al., 2022), tabulating data, confirming the validity of data, and performing statistical analysis are carried out in order to ascertain the impact of each variable on the dynamics of the coastline and to enhance the outcomes of the coastline dynamics modeling with actual conditions in the field. The next activity is the preparation of reports and journals. More details can be seen in the following framework:

2.3 Methodology

The geographical model of shoreline changes was determined using Landsat 8 OLI satellite images, and it is necessary to make radiometric corrections to improve the quality of satellite images (Ntim-Amo et al., 2022; Roy et al., 2022), especially from thin cloud cover and aerosol scattering in the air. The formulas used for radiometric correction are as follows:

$$L_\lambda = M_L\, Q_{Cal} + A_L - 0_i \qquad (1)$$

Where L_λ is top atmospheric (TOA), spectral radians in W/(m^2. S_r.μm), M_L is a specific band of multivariate rescaling factor from metadata, AL is additive rescaling, Q_{cal} is standard product pixel value (DN) calibration, and 0_i is calibrated from Landsat.

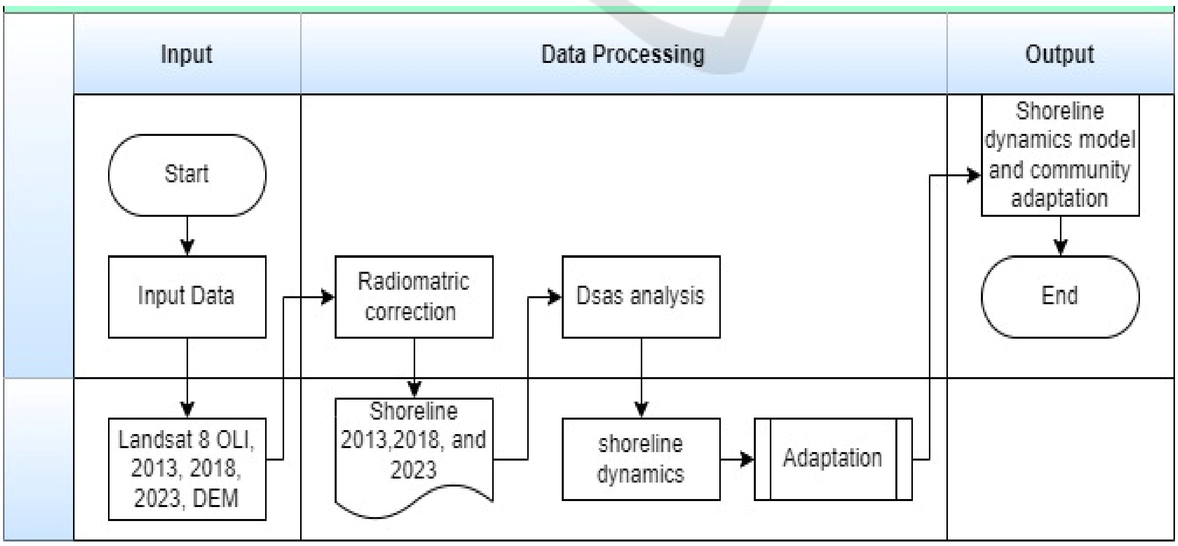

Figure 2: Research framework.

To determine the magnitude of shoreline dynamics in the research area, (Attaran et al., 2024; Roy et al., 2022) the following formulation is used:

$$NSM_{i\,(i+1.J} = d_{ij-}d_{ij+1} \quad (2)$$

Where d_{ij} is the distance between the coastline and baseline in the vertical section, and the EPR value can be formulated as follows:

$$EPR_{i(j+1j)} = a_n \frac{NSM_{i.(j+1j)}}{T_{j+1}-T_j} \quad (3)$$

T_{j+1} is the time of shoreline at j + 1, while T_j is the time at j.

To determine the quality of the spatial modelling, it is necessary to carry out an accuracy test that is adjusted to field conditions, (Vajjarapu & Verma, 2021) an accuracy test is used using the kappa index with the following formulation:

$$Kappa = \frac{P_0-P_e}{1-P_e}\begin{pmatrix} K_{Histo}=\frac{P_{Max}-P_e}{1-P_e} \\ K_{Log}=\frac{P_0-P_e}{P_{Max}-P_e}\end{pmatrix} \quad (4)$$

$$Kappa = K_{Histo}\ x\,K_{Loc} \quad (5)$$

Where P_0 is the correct sample proportion, P_e is the accuracy level, P_{Max} is the number of samples taken in each class, K_{Histo} is a value that has a magnitude between 0 and 1, where the value 1 indicates the correct value, while 0 indicates the incorrect result, K_{Loc} is a value between -1 and 1, where the value -1 indicates the wrong location and the value 1 indicates the correct value. To identify the community adaption model based on local knowledge in the research area, (Tang et al., 2023; Parven et al., 2022) an interesting sample of respondents was used based on proportional random samples using the following formulation:

$$n = \frac{\text{n}}{1+N(e)^2} \quad (6)$$

Where n is the total number of homes, *e* is the 5% design margin of error, and n is the sample size. The following are the research variables that field respondents will complete:

Table 2: Variables used in the study.

No	Variable	Code	Score
1	Physical	P	
	Types of buildings	P_1	Permanent, 1; semi-permanent, 2; and non-permanent, 3
	Land selection	P_2	Own 1, rent, 2, customary land, 3
	Building materials	P_3	Concrete, 1, semi-concrete, 2, wood, 3
	Distance from beach	P_4	150 m, 1, 50-150m, 2, and < 50m, 3
2	Social	S	
	Gender	S_1	Female, one and male, 2
	Age	S_2	25-35.1, 35-50.2 and > 50.3
	Education	S_3	Elementary School-Junior High, 1, High School, 2, and College 3
	Family members	S_4	Two persons, 1, 2-4 persons, 2, > four persons, 3
	Kinship relationships	S_5	None, 1, only a few relatives; 2, almost all relatives; 3
	The role of community leaders	S_6	Never, 1, when there is abrasion, 2, often, 3
	People's attitude to abrasion	S_7	Unresponsive, 1, ordinary, 2, and perceptive, 3
3	Economics	E	
	Livelihood	E_1	Civil servant, 1, farmer, 2, fisherman, 3
	Income	E_2	3,000,000, 1, 1,500,000-3,000,000, 2, < 1,500,000, 3
	Side livelihood	E_3	Self-employed, 1, farmer, 2, and laborer, 3
	Distance from market	E_4	< 1 km, 1.1-2 km, 2, and > 3 km, 3
	Help family members	E_5	None, 1, rarely, 2, and routine, 3
4	Culture	C	
	Local knowledge for adaptation	C_1	None, 1, 2-3 local wisdom, 2, and > three local wisdom, 3
	Mutual aid	C_2	None, 1, periodic, 2, and routine, 3
	Religion	C_3	Other religions, 1, Christianity, 2, Islam, 3
	Customary deliberations	C_4	None, 1, rarely, 2, and routine, 3
	Migration/Migration	C_5	None, 1, only within the territory, 2, outside the territory, 3
5	Adaptation based on local wisdom		
	Source: Data analysis in 2024		

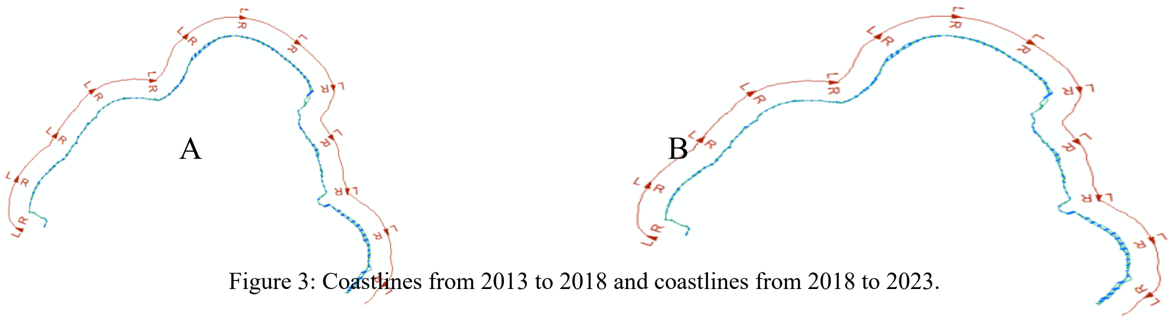

Figure 3: Coastlines from 2013 to 2018 and coastlines from 2018 to 2023.

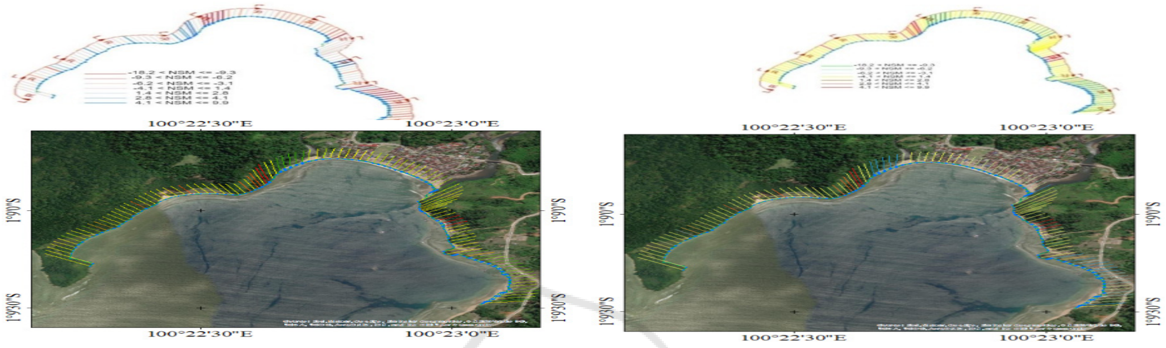

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Figure 4: Shoreline dynamics that occurred between 2013 and 2018 and shoreline dynamics that occurred between 2018 and 2023.

The next stage is taking field data using the head of the family as a sample of respondents. The results of the respondents' answers are processed using static linear regression to determine community adaptation models based on local wisdom values, which can be formalized as follows:

$$Y_{low-}Y_{effort\,i} = \beta_0 + \beta_1 L_{1i} + \beta_i L_{1i} + \varepsilon_i, i = 1 \dots, N \quad (7)$$

$$Y_{High-effort,i} = \beta_0 + \beta_i H_{1i} + \beta_k H_{ki} + \varepsilon_{i,}\ i = 1 \dots., N \quad (8)$$

L is the associated explanatory variable, and H is the related control variable. $y_{Low\text{-}effort}$ and $y_{High\text{-}effort}$ represent intentions to participate in low-effort and high-effort activities, respectively.

3 RESULTS AND DISCUSSION

3.1 Results of the Research

In order to observe the three elements of the spatial shoreline dynamics model for abrasion, accretion, and equilibrium state parameters, the coastal spatial abrasion model was constructed in 2013, 2018, and 2023. The shoreline did not shift between 2013 and 2018, however from 2018 and 2023, there was abrasion, accretion, and equilibrium state, as seen in the Figure 3.

The aforementioned image illustrates the shoreline dynamics that took place between 2013 and 2018 as well as between 2018 and 2023. Abrasion, accretion, and equilibrium states are examples of shoreline dynamics that have occurred in the studied area, or the coastline has remained unchanged. The figure 4 shows further information regarding the shoreline dynamics that take place in the study area.

The figure 4 shows that from 2013 to 2023, there has been a shoreline dynamic in the form of abrasion, which is between 4 m and 18 m, and accretion, which occurs between 1.4 m and 4.1 m. Only a tiny part of the coastline of the study area has a fixed coastline or equilibrium state. This is because most of the primary material in the study area is sand, either coarse sand or fine sand. This sand material is the material that experiences the most shoreline dynamics in the form of abrasion and beach accretion. In contrast, on the coastline, in the form of rocks and front of it, there are coral reefs that will experience a fixed coastline or equilibrium state because the presence of coral reefs in the front will cause waves to break before reaching the coastline, so that wave

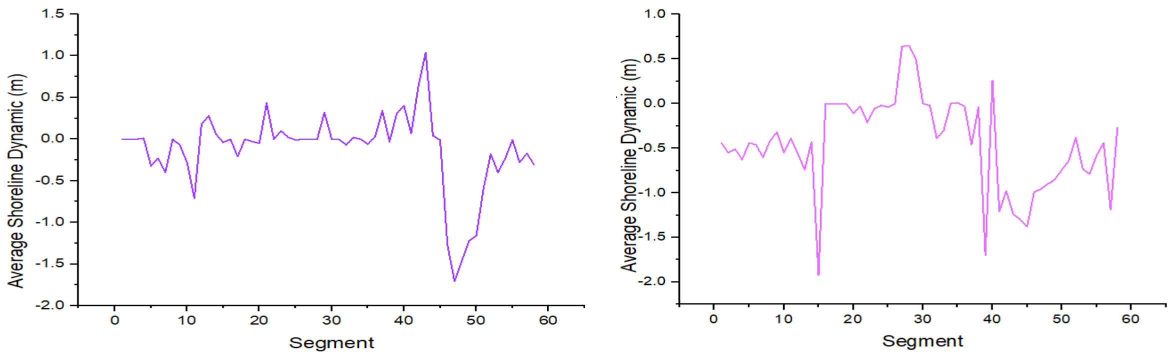

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Figure 5: Average shoreline dynamic, A 2013–2018 and B 2018–2023.

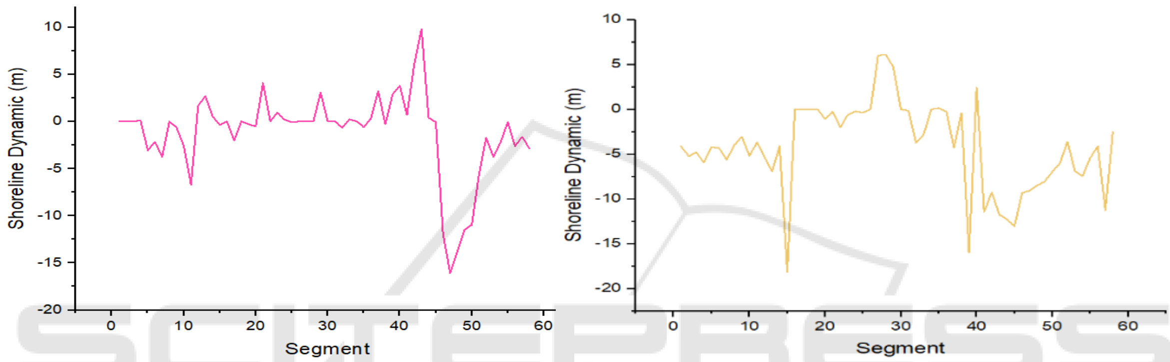

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Figure 6: Shoreline dynamics from 2013 to 2023.

energy has been reduced before reaching the coastline. Additional information is shown in the Figure 5.

The figure 5 shows that in the study area, shoreline dynamics occurred in both abrasion, accretion, and equilibrium states (fixed coastline) in 2013–2018 and 2018–2023. The average shoreline dynamic in the form of coastal abrasion in this area from 2013 to 2018 was 1.75 m, and from 2018 to 2023, the average abrasion occurred was 1.8 m. The average shoreline dynamic value accretion from 2013 to 2018 was 1.1 m, and from 2018 to 2023, the average accretion was 0.75 m. More details about the shoreline dynamics that occur in the research area can be seen in the Figure 6.

The figure 6 shows that in the study area, a shoreline dynamic occurred from 2013 to 2023. Whereas the shoreline dynamic value in the form of abrasion that occurred in 2013–2018 was the highest at 15 m and the highest accretion was 10.1 m, in 2018–2023, the highest shoreline dynamic value in the form of abrasion was 18.50 m, and the highest accretion was 6.7 m. For more details, the comparison of shoreline dynamic values that occurred in the research area from 2013 to 2023 can be seen in the following Figure 7.

The figure 7 compares shoreline dynamic values in the study area from 2013 to 2018 (bottom) and 2018 to 2023 (top). Shoreline dynamic that occurred from 2013 to 2018 (bottom image) showed that the study area had the highest value of shoreline dynamic in the form of coastal abrasion, which was 15 m, and beach accretion that occurred, which was 10.1 m, while shoreline dynamic in the form of coastal abrasion that occurred from 2018 to 2023 showed that the highest value of shoreline dynamic in the form of abrasion was 18.50 m and the highest accretion was 6.7 m. The results of the comparative analysis show that in 2018–2023, shoreline dynamics in the form of abrasion that occurred in the study area were more dominant when compared to accretion that occurred in 2013–2018. This was more influenced by

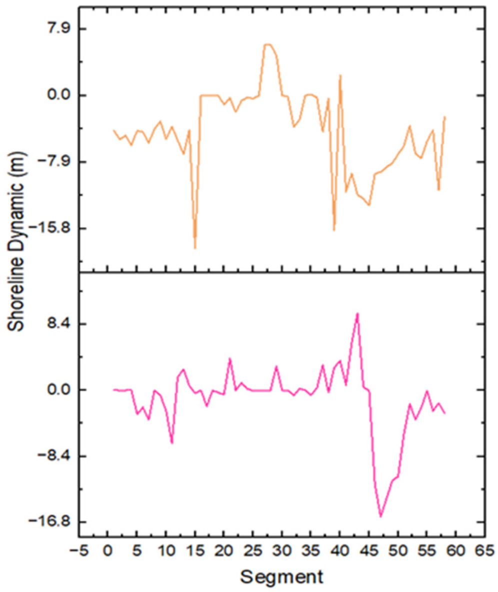

Figure 7: Comparison of coastal dynamics values from 2013 to 2018 and 2028 to 2023.

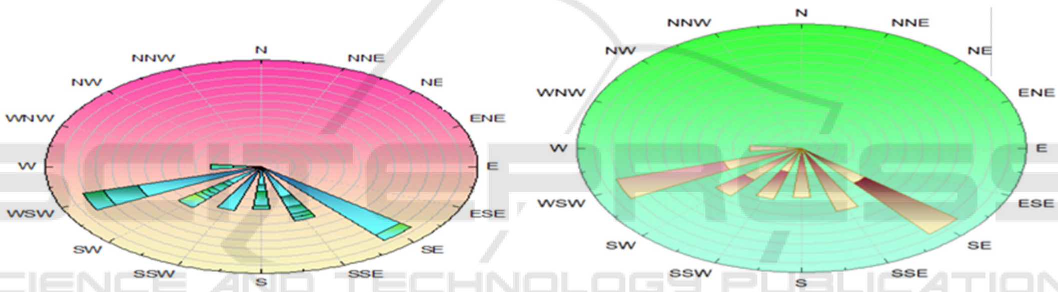

Figure 8: A Angle of Incidence of Shoreline Dynamic Causes of 2013–2018, Fig. B Angle of incidence of shoreline dynamic causes in 2028-2023

destructive energy coming from the sea in the form of the angle of arrival of waves and the anchoring force on the beach in the form of beach constituent materials. The results of the model acuuration rate show a Shoreline Dynamic validation value in 2023–2018 of 0.87 and 2028–2023 of 0.89, which shows that the Shoreline Dynamic model is acceptable. For more details on the direction of waves coming to the beach in the study area, see the following Figure 8:

3.2 Adaptation

Adaptation is an activity carried out consciously by people who inhabit an area based on their knowledge, usually in the form of local wisdom, to reduce losses caused by a natural disaster. For more details on adaptation models carried out by the community based on local wisdom in the research area, see the table 2.

The table 2 shows the distribution of community adaptation data based on local awareness in the study area in dealing with shoreline dynamics, abrasion, accretion, and equilibrium state. The table 2 shows the minimum score value of 1 and the highest score of 3 from respondents' answers, with the highest deviation standard of 0.76. For more details, the distribution of community adaptation data based on local wisdom values can be seen in the following Figure 9.

The Figure 9 shows that the distribution of community adaptation data based on local wisdom in dealing with shoreline dynamics, both abrasion, accretion, and equilibrium state, is spread commonly. Thus, this data can be continued in modelling. For more details on the adaptation model of society in the research area in facing shoreline dynamics, both abrasion, accretion, and equilibrium state can be seen in the table 3.

Table 2: Descriptive statistical analysis.

Var	N	Min	Max	Mean	Std. Error	sd	Var	N	Min	Max	Mean	Std. Error	sd
P_1	43	1.00	3.00	2.48	.107	.70	E_1	43	3.00	3.00	3.00	.00	.00
P_2	43	1.00	3.00	2.86	.07	.51	E_2	43	1.00	3.00	2.60	.08	.54
P_3	43	1.00	3.00	2.65	.104	.68	E_3	43	1.00	3.00	2.69	.07	.51
P_4	43	1.00	3.00	2.65	.104	.68	E_4	43	1.00	3.00	2.44	.12	.76
S_1	43	1.00	2.00	1.93	.039	.25	E_5	43	1.00	3.00	2.58	.11	.73
S_2	43	1.00	2.00	1.93	.039	.25	C_1	43	1.00	3.00	2.76	.07	.48
S_3	43	1.00	3.00	2.02	.062	.41	C_2	43	1.00	3.00	2.72	.09	.63
S_4	43	1.00	3.00	1.95	.046	.31	C_3	43	1.00	3.00	2.74	.08	.54
S_5	43	2.00	3.00	2.69	.070	.46	C_4	43	2.00	3.00	2.74	.06	.44
S_6	43	1.00	3.00	2.83	.065	.43	C_5	43	1.00	3.00	2.60	.10	.66
S_7	43	2.00	3.00	2.88	.049	.32	Adp	43	45.00	59.00	53.81	.43	2.80

Source: Data analysis in 2024

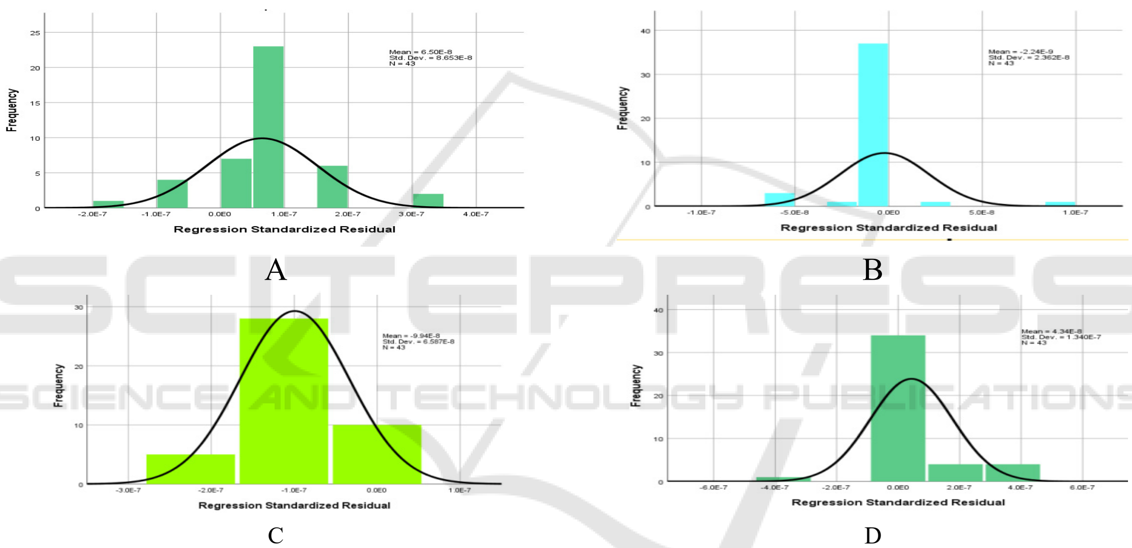

Figure 9: Local wisdom-based distribution of adaptation model data A stands for the physical aspect, B for the social aspect, C for the economic aspect, and D for the cultural aspect.

Table 3: Coeffients model of adaptations.

Model	code	B	Std. Error	Beta	Sig	Model	code	B	Std. Error	Beta	Sig
1 Physic	P_1	1.000	.000	.388	.0013		S_7	1.000	.000	.324	.0033
	P_2	1.000	.000	.285	.0037	3 Economic	E_1	1.000	.000	.379	.0032
	P_3	1.000	.000	.379	.0026		E_2	1.000	.000	.360	.0025
	P_4	1.000	.000	.379	.0037		E_3	1.000	.000	.537	.0037
2 Social	S_1	2.000	.000	.383	.0036		E_4	1.000	.000	.513	.0035
	S_2	1.000	.000	.303	.0047	4 Culture	C_1	1.000	.000	.400	.0038
	S_3	1.000	.000	.226	.0039		C_2	1.000	.000	.525	.0014
	S_4	1.000	.000	.345	.0035		C_3	1.000	.000	.449	.0013
	S_5	1.000	.000	.321	.0045		C_4	1.000	.000	.368	.0016
	S_6	1.000	.000	.241	.0034		C_5	1.000	.000	.550	.0026

Source: Data analysis, 2024.

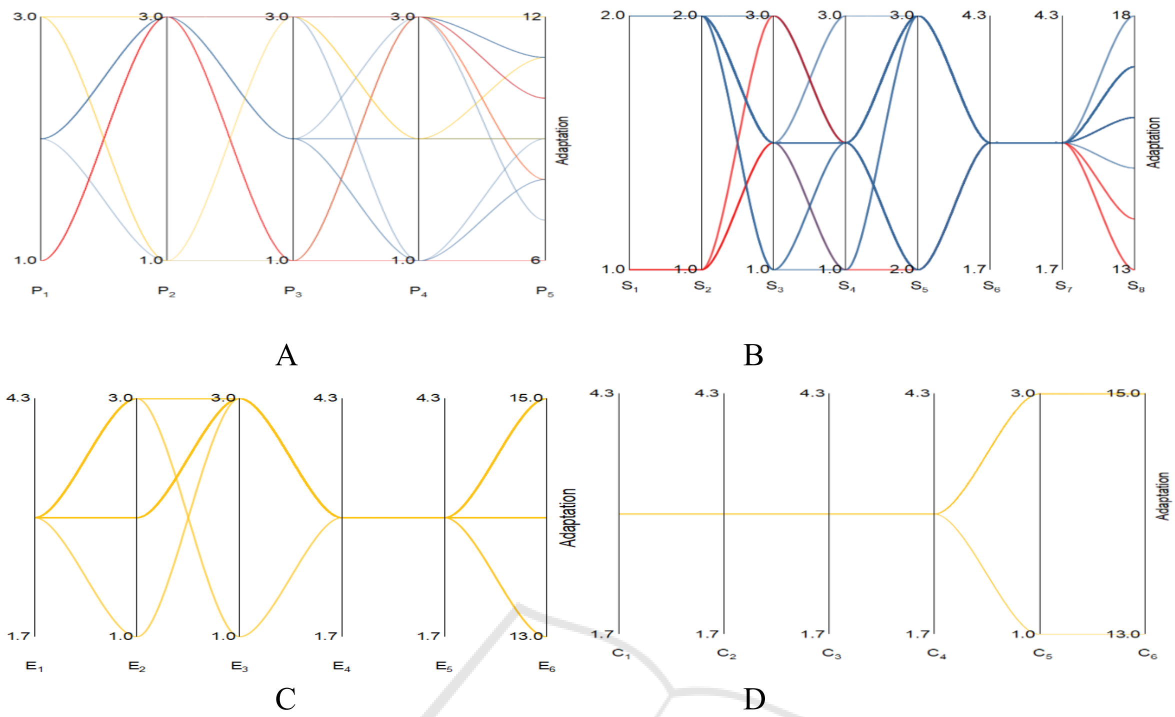

Figure 10. A. Variable of Physic, B. Social, C. Economic, and D. Culture to Community Adaptation.

The table 3 shows a significant influence between the independent and dependent variables, namely the community adaptation model based on local wisdom values in the research area, with a significance value of less than 0.005. For more details, the community adaptation model based on local wisdom values in the research area can be seen in the following Figure 10:

The Figure 10 illustrates that the community adaptation model is based on local wisdom values in the research area, including physical, social, economic, and cultural factors. Physical aspects that affect the adaptation model in the research area are the types of buildings around the shoreline, namely more dominant non-permanent buildings and building materials in wood. This phenomenon occurs because people prefer houses that have wood material. After all, this house can be moved when shoreline dynamics occur, incredibly abrasion. Social aspects that influence the adaptation model are the role of community leaders and community attitudes, where the role of community leaders and community attitudes is crucial in dealing with shoreline dynamics. Community leaders generally provide direction to the public about the weather conditions, especially about seasonal conditions that can cause shoreline dynamics, and the community will prepare themselves for the seasonal conditions. Generally, people do not go to sea to catch fish in certain seasons caused by high waves. The economic aspect that affects the adaptation model is livelihood, and in the study area, most have livelihoods in the form of fishermen who are very dependent on marine products. Cultural aspects influenced the adaptation model, namely the existence of local knowledge or values adopted by the community and passed down from the older generation to the younger ones in verbal form, namely, if they are afraid of large waves, do not establish settlements near the coast. This condition shows that the people are living near the coastline must be prepared for shoreline dynamics, such as abrasion, accretion, and equilibrium state. Religion is another cultural factor that influences the adaptation model from a cultural perspective. People living on the coast in the research area are predominantly muslim, so they believe that shoreline dynamics occur due to the will of The Almighty. For more details on the community adaptation model based on local wisdom values in the research area as a whole, see the following Figure 11:

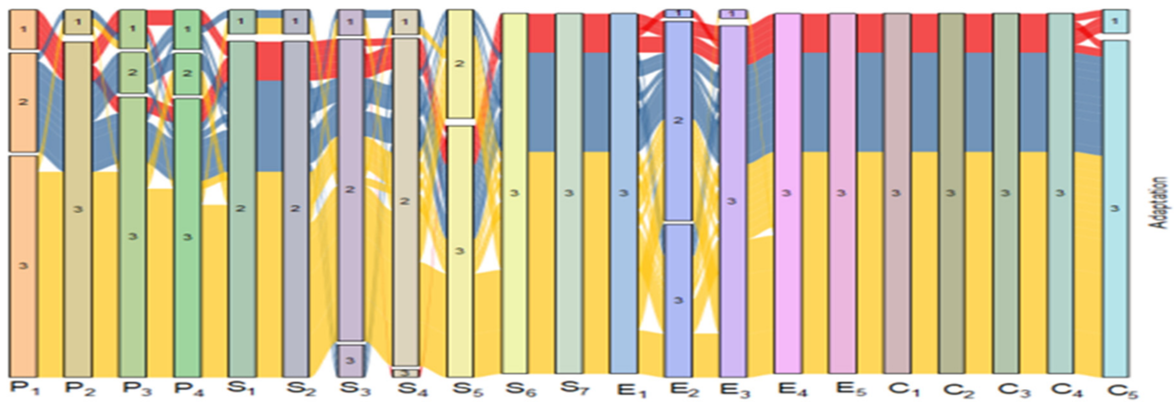

Figure 11: Adaptation model from physical, social, economic, and cultural aspects.

Overall, the Figure 11 demostrates the aspect that has a significant influence on the adaptation model of society based on local values to shoreline dynamics is the cultural aspect, where people in the study area have occupied this area from the past, especially from their ancestors. They have long had local knowledge of shoreline dynamics obtained from their grandmothers. Another aspect that influences the adaptation model of society based on local values is the economic aspect, which is in the form of livelihoods. The livelihood of people in this area is generally fishermen, who are very dependent on marine products, so they prefer to live near the coast because it is easier to go to sea.

3.3 Discussion

Shoreline dynamics in the study area can be separated into three categories based on the findings of earlier studies: abrasion, accretion, and equilibrium condition. Coastal dynamics are greatly influenced by seasonal elements, or more precisely, meteorological issues. The predominant coastline dynamic during the south wind season is abrasion. In contrast, in the north wind season, the shoreline dynamic occurs in accretion, and the season does not influence the equilibrium state. Equilibrium state coastlines generally occur in areas with rugged rocks, so these rocks are more resistant to destructive forces coming from the sea. Shoreline dynamics in the form of abrasion often cause problems for people who live near the coast, especially in areas that have sandy beaches that have not experienced the process of rock compaction. Rocks in this area will easily undergo an abrasion process that causes the coastline to retreat and impact community settlement buildings (Parven et al., 2022; Roy et al., 2022). The shoreline dynamic in the form of abrasion in the study area from 2013 to 2023 is 15 m to 18.50 m, thus impacting community settlements. Shoreline dynamics in accretion generally do not cause problems for the community because the land in the coastal area increases, causing the land to become more expansive (Mercado et al., 2020; Mavhura et al., 2021). Shoreline dynamics in accretion occurred in the study area between 6.7 m and 10.10 m. The community in the research area often refers to the addition of land around the coast as growing land that individuals cannot own. This land is owned by a tribe or tribe inhabiting the area, so the use of this land is regulated based on customary law that applies to the research area and is thoroughly utilized by the tribe or tribe that owns the growing land. The damage caused to the research area due to shoreline dynamics could be better because the people who live there have reasonably good adaptability to facing shoreline dynamic problems in abrasion, accretion, and equilibrium states.

The results of modelling community adaptation based on local wisdom values in the research area in physical, social, economic, and cultural aspects show that the more dominant cultural aspects affect community adaptation, especially the local knowledge of the community, which states that if they are afraid of big waves, do not live near the beach. This principle shows that people in the study area are already aware of the impending dangers of seasonal changes, especially if they erect residential buildings near the coast. Another cultural aspect that influences community adaptation based on the values of local wisdom in the research area is religion, where the people who inhabit the majority of research areas are Muslims, who are often referred to as Muslims (Attaran et al., 2024; Lai et al., 2023). The strong public belief in religion causes people to be more confident in facing the shoreline dynamic. Another aspect that affects community adaptation in this research area is the physical aspect, namely the type of building material used in buildings close to the beach (Attaran et al., 2024; Anik et al., 2021; Scherzer et al., 2019), namely wood and stilt houses so that the building of this house can be moved to a safer area when abrasion comes. The transfer

of residential buildings was carried out mutually cooperatively by the people who inhabit the research area under the direction of community leaders.

4 CONCLUSION

In the study field, shoreline dynamics can be broken down into three categories: equilibrium state, accretion, and abrasion. Shoreline dynamics in abrasion cause the coastline to retreat, while shoreline dynamics in accretion cause the land around the coast to become more expansive, often referred to by the community in the study area as growing land. This growing land is owned by a tribe or tribe occupying the research area whose use is regulated by customary law and may not be traded and fully utilized by the tribe and passed on to future generations according to the mother's lineage. The model of community adaptation in the research area that is very influential is the cultural aspect, where with the maritime cultural aspect, the community will still choose to live around the coast. The strong adaptation of the community to the research area causes the community to adjust when there is a shoreline dynamic problem. Thus, the community adaptation model based on local wisdom values can be applied to coastal areas. The firm values of local wisdom cause the community to be able to overcome the problem of coastline changes that occur in their area.

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