Multidisciplinary Output Research For Actual and International Issue (MORFAI Journal) ISSN (e): 2808-6635
Volume 6 No. 6 (2026)

# COASTAL COMMUNITY RESILIENCE IN FACING THE IMPACT OF CLIMATE CHANGE IN AMPENAN DISTRICT, MATARAM CITY

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| Received | : 01 July 2026 | Accepted | : 20 October 2026 |
| Revised | : 06 Aug 2026 | Published | : 08 November 2026 |

**Abstract**

Coastal communities face environmental pressures that may disrupt settlement safety and livelihood continuity. This study identifies hazards and adaptation responses and examines community resilience in Ampenan District, Mataram City. A quantitative descriptive approach was applied through structured interviews with 90 respondents in Bintaro, Ampenan Tengah, Banjar, and Ampenan Selatan during June–July 2025, supported by observation and a focus group discussion. The analysis covered psychological, economic, and social and institutional capacities, together with perceived environmental threats. Achievement percentages were calculated against each dimension's maximum score. Environmental threat scores were interpreted separately because their directions differed from that of capacity scores. Social and institutional capacity reached 69.73%, psychological capacity 67.78%, and economic capacity 43.70%, while perceived environmental threats reached 73.54%. Social networks were a prominent capacity indicator, whereas access to financial capital recorded the lowest mean within the economic dimension. Adaptation responses included housing and coastal protection, drainage maintenance, boat protection, and preparedness activities. The findings indicate an imbalance between social resources and the economic capacity required to address coastal pressures. Resilience strengthening should connect local institutions with livelihood diversification, access to productive resources, and context-sensitive environmental protection. This multidimensional profile provides a basis for prioritizing economic and institutional strengthening in connection with local coastal protection needs.

**Keywords:** Climate Change Adaptation; Coastal Communities; Community Resilience; Fishing Livelihoods; Ammenan.

## INTRODUCTION

Climate change exacerbates the challenges of coastal management because its impacts impact population safety, sustainable livelihoods, and the availability of basic services. Sea-level rise and changes in coastal hazards interact with development patterns, ecosystem conditions, and communities' ability to adapt. Risk assessments therefore need to consider the relationship between hazards, exposure, and vulnerability, including the limited resources available for adaptation (Intergovernmental Panel on Climate Change [IPCC], 2022). In fishing communities, these disturbances can manifest as uncertainty about when to go out to sea, the need to protect boats, or increased concern about the safety of homes near the coast. Resilience provides a framework for understanding how communities maintain life functions, organize responses, and develop capacities to cope with disturbances. This concept extends beyond the presence of protective structures or individual resilience. Norris et al. (2008) link community resilience to economic resources, social capital, information and communication, and community competencies. Meanwhile, Cinner et al. (2018) emphasize assets, flexibility, social organization, learning, and the ability to act as components of the adaptive capacity of coastal communities. Both approaches focus on communities' ability to utilize resources in the face of change.

The livelihoods of fishers constitute a crucial context for this assessment. Occupational choice, asset ownership, and access to economic institutions influence the scope of action available to households. A sustainable livelihoods approach positions fishing activities as part of a broader array of income sources and livelihood strategies, so that analysis goes beyond simply calculating catch production (Allison & Ellis, 2001). In the Indonesian context, Ulfa (2018) discusses the link between climate change and the socioeconomic conditions of fishers. This study demonstrates the relevance of examining experiences with environmental disturbances alongside their ability to maintain livelihoods. The coastal area of Ampenan District in Mataram City is a relevant location for examining this

relationship. Previous research in Ampenan has documented adaptation to tidal flooding through the practice of moving boats and adapting house structures, known as Mindah Sampan and Ngerombak Bale (Agustina, 2018). Wilandari et al. (2020) also prioritize regional potential and fisheries business issues in local capture fisheries development. This local literature demonstrates that community responses have taken concrete forms, but assessing the capacities supporting these responses remains necessary to determine strengthening priorities.

Research on resilience in Lombok also provides a conceptual basis for comparison. Markum et al. (2002) used psychological, economic, social, and institutional assessments in communities surrounding the Sesaot forest area. This multidimensional approach is useful for assessing differences in community strengths and limitations. Its application to coastal areas requires adjustments due to different livelihood patterns, hazards, and environmental pressures. Furthermore, capacity indicators must be distinguished from threat indicators to ensure consistent interpretation of results. While local studies have described forms of adaptation, this study examines the resource profiles that support or limit their implementation in four coastal villages. The focus is on differences in social, psychological, and economic capacity attainment and their conceptual links to perceived environmental pressures. Social relationships can facilitate collective action, but their benefits are also related to access to institutions and resources outside the community (Adger, 2003). Multidimensional assessments allow for strengthening priorities based on components requiring attention. The study aims to identify coastal hazards, describe adaptation and disaster risk reduction responses, and analyze psychological, economic, social, and institutional capacity along with perceptions of environmental threats. The article's contribution lies in presenting a multidimensional profile of four coastal sub-districts in Ampenan and explaining its implications for intervention priorities. The analysis aims to provide a basis for planning that meets the needs of respondents, while still distinguishing between survey findings, theoretical interpretations, and policy recommendations.

## METHOD

### Research design and location

The study used a quantitative descriptive approach supported by information from observations and focus group discussions (FGDs). Field data collection was conducted from June to July 2025 in four coastal villages in Ampenan District: Bintaro, Central Ampenan, Banjar, and South Ampenan. The locations were selected due to their association with fishing activities and the community's experience of dealing with coastal disturbances. Respondents were residents living within a range of 0–500 meters from the coastline. The unit of observation was the individual, while information on livelihoods and adaptation responses was read within the context of their families and communities.

### Respondents and sample distribution

The sample requirement calculation framework used 800 heads of fishing families holding Marine and Fisheries Business Actor Cards in 2025. Calculations using the Slovin formula at a 10% error tolerance yielded approximately 88.89, then the number of respondents was set at 90 people. Respondent selection was explained using random selection in each sub-district with the criteria of residential location. The actual distribution of respondents is presented in Table 1. The composition does not fully follow the proportion of heads of fishing families, so the analysis does not use the claim of proportional representation for the entire coastal population of Mataram City.

**Table 1 Distribution of the framework of heads of fishing families and research respondents**

| Ward | Head of a fishing family | Respondents | Sample proportion (%) |
|---|---|---|---|
| Bintaro | 499 | 60 | 66.67 |
| Central Ampenan | 70 | 6 | 6.67 |
| Banjar | 85 | 8 | 8.89 |
| South Ampenan | 146 | 16 | 17.78 |
| **Amount** | **800** | **90** | **100.00** |

Source: research data. Detailed percentages are rounded to two decimal places.


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The framework of heads of fishing households was used as the basis for determining the sample size, while the survey included members of coastal communities with varying activity backgrounds. Livelihood tabulation categorized respondents into primary fishers, fishers with secondary occupations, and non-fishers. This discrepancy between the calculation framework and respondent coverage should be taken into account when interpreting the results. Percentages in the article reflect the composition of the 90 respondents interviewed, not estimates of the total population in the four sub-districts.

**Data collection**

Primary data were obtained through structured interviews using questionnaires, direct observation, and field documentation. Interviews covered respondent characteristics, experiences facing threats, forms of adaptation responses, and assessments of resilience indicators. Observations were used to enrich the context of settlements, facilities, and the coastal environment. Following the interviews and tabulation, a focus group discussion (FGD) was conducted with 46 participants representing the study area to deepen information on adaptation and community capacity to cope with disturbances. Respondent participation was based on their willingness to participate in the study.

Narrative information from interviews, observations, and focus group discussions (FGDs) is presented according to themes relevant to the quantitative results. Its use serves to explain the context and variation in responses, without transforming participant statements into technical measures of effectiveness. A literature search complements the discussion of concepts and previous research.

**Dimensions and measurements**

The assessment distinguishes three dimensions of positive capacity and one dimension of environmental threat. The psychological dimension includes emotional regulation, impulse control, optimism, empathy, problem analysis, self-efficacy, and enhancement of positive aspects. The economic dimension includes livelihood diversity, savings or assets, cooperative membership, and access to capital loans. The social and institutional dimensions include institutional structures, social networks, access to information, and participation in decision-making. The psychological framework and multidimensional assessment are related to the approach used by Markum et al. (2025), with the coastal context as its application area.

**Table 2 Dimensions of measurement and direction of interpretation**

| Dimensions | Component (n) | Maximum score | The meaning of an increased score |
|---|---|---|---|
| Psychological | 7 | 140 | Stronger psychological capacity |
| Economy | 4 | 200 | Stronger economic resource support |
| Social and institutional | 4 | 80 | Stronger social and institutional capacity |
| Environmental threats | 4 | 80 | The environmental pressure felt is greater |

Source: Research instruments and tabulations. Economic indicators have score limits of 40, 40, 60, and 60; indicators in other dimensions each have score limits of 20.

The environmental dimension encompasses perceptions of sea level rise or tidal flooding, coastal erosion, plastic and marine debris, and seawater intrusion. These indicators are not considered direct measures of sea level change, shoreline retreat, water quality, or waste volume. The response scale ranges from 1 to 5. Component averages are displayed to interpret respondents' responses on the same scale, while dimension scores summarize weighted achievements based on the research results. Percentage achievement is obtained by dividing the dimension score by its maximum score and multiplying by 100.

**Analysis and interpretation limits**

The analysis used frequencies, percentages, indicator means, and descriptive comparisons between dimensions. Percentages were calculated from the dimension scores in the recapitulation and rounded to two decimal places. Comparisons were made against the maximum of each dimension due to the different weights and number of indicators. Environmental threat scores were not summed directly with capacity scores, as increasing threats have the opposite meaning to increasing resilience. Therefore, the main results are presented as a profile of environmental capacity and stress, without assigning a single aggregate resilience category.


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The analysis does not test for inter-variable interactions, inferential group differences, or the causal effectiveness of interventions. The term "adaptation" refers to adjustments to impacts, while "disaster risk reduction" refers to protection, preparedness, and response to hazards. These activities are distinguished from climate change mitigation, which focuses on reducing emissions or increasing greenhouse gas sinks. This distinction is necessary because many of the actions discussed by communities are oriented toward safety and livelihoods in coastal areas (IPCC, 2022).

## RESULTS AND DISCUSSION

### Respondent characteristics and livelihood context

A total of 47 respondents were male and 43 were female. Sixty respondents, or 66.67%, were in the 46–55 age group, representing the experiences of middle-aged people. Elementary school education was the largest category, representing 57 respondents, or 63.33%, while 14 respondents had never attended school. This situation calls for attention to accessible forms of information delivery and training. Formal education alone cannot be used to assess hazard recognition skills, as coastal knowledge can also be derived from everyday experiences.

**Table 3 Summary of characteristics of research respondents**

| Characteristics | Category | Amount | Percentage (%) |
|---|---|---|---|
| Gender | Man | 47 | 52.22 |
| | Woman | 43 | 47.78 |
| Age | 46–55 years | 60 | 66.67 |
| | Other age groups | 30 | 33.33 |
| Education | No school or elementary school | 71 | 78.89 |
| | Education above elementary school | 19 | 21.11 |
| Non-formal education in the last five years | Never followed | 48 | 53.33 |
| | Have you ever participated? | 41 | 45.56 |
| | Unknown or not filled in | 1 | 1.11 |
| Livelihood | Main fishermen | 78 | 86.67 |
| | Fisherman with side jobs | 8 | 8.89 |
| | Non-fishermen | 4 | 4.44 |
| Income per person per month | Less than Rp. 1 million | 4 | 4.44 |
| | Rp. 1–2 million | 48 | 53.33 |
| | Rp. 2–3 million | 16 | 17.78 |
| | More than Rp. 3 million | 22 | 24.44 |

Source: research data tabulation, n = 90. Age, education, and training categories are summarized from the initial distribution. Percentages are rounded to two decimal places.

Dependence on fishing activities was evident in the 78 respondents categorized as primary fishermen, while only eight respondents were categorized as fishermen with secondary jobs. This finding indicates limited diversity of income sources in the sample composition. However, the data do not explain the extent of each occupation's contribution to annual income. Occupational diversity is therefore read as an initial characteristic, not a complete measure of diversification success. A sustainable livelihoods approach requires attention to the quality and sustainability of income sources, in addition to the number of activities undertaken (Allison & Ellis, 2001).

Those with an income of IDR 1–2 million per person per month constituted the largest category, at 53.33%. Fifty-three percent of respondents also reported never having attended non-formal education in the form of courses or training in the past five years. These two findings demonstrate the relevance of expanding the reach of capacity


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building and economic access. Material selection can be directed toward job-related skills, financial management, and preparedness, with delivery tailored to participants' experiences.

**Coastal threats faced by communities**

The research identified flooding, tidal flooding, high or extreme waves, extreme weather, and abrasion as threats discussed by the community. Flooding and tidal flooding need to be distinguished based on their sources and inundation mechanisms, although both can interact in coastal areas. High waves are related to the safety of marine activities, the security of anchorages, and the protection of coastal structures. Abrasion is a concern because changes in coastal space can affect residences and economic activities. These descriptions reflect respondents' experiences and concerns regarding coastal disturbances.

This study did not utilize oceanographic time series measurements or climate attribution. Therefore, experience with tidal flooding or abrasion was not used to calculate local sea-level change rates. Nicholls and Cazenave (2010) explain the importance of sea-level rise for coastal areas, but assessment of a location still requires consideration of physical processes and social conditions. In the context of Ampenan, perceptual information serves as input for determining aspects requiring further research and management, not a substitute for measurements of elevation, wave action, sediment transport, and shoreline change.

The threats experienced also have different consequences for each activity. Home protection relates to safety and repair costs, while boat security relates to the sustainability of productive assets. Disruptions to fishing can limit income-earning opportunities for certain periods, but the extent of these losses was not quantified in this survey. Resilience assessments need to maintain this distinction so that adaptation strategies can be directed to specific needs. Needs for weather information, berthing space, and alternative income sources cannot always be met through a single intervention.

**Adaptation response and risk reduction**

Interview and discussion data demonstrate community recognition of the benefits of embankments or breakwaters in reducing direct impacts on residential areas. This perception demonstrates the importance of a sense of security in residents' assessment of coastal protection. Discussions regarding houses also emphasized raising foundations and using structures and materials considered stronger. Variations in house conditions demonstrate the need for technical assistance that takes into account the owner's capabilities and the type of hazards at the site.

Drainage maintenance is discussed as an activity involving officers and community cooperation. This response has two interrelated elements: maintaining the channel's function and organizing collaborative work. Information on coastal vegetation in Bintaro also highlights experiences with casuarina planting and the presence of hibiscus as part of the coastal environment. This information is important for understanding community knowledge about changes in spatial function. Vegetation maintenance needs to be part of spatial planning that takes into account environmental functions and community needs.

**Table 4 Forms of response discussed and follow-up needs**

| Response group | The form discussed | Follow-up needs |
|---|---|---|
| Settlement protection | Embankments, breakwaters, house elevation and strengthening | Inspection of design, building condition, and maintenance |
| Services and environment | Drainage, piped water, coastal vegetation | Examination of service functions and ecological suitability of the site |
| Protection of fishermen's assets | Moving or arranging the boat's mooring place | Agreement on safe mooring space and fishermen's access |
| Preparedness | Signs, evacuation routes, early warning, drills | Testing the accessibility of information and action procedures |
| Livelihood and institutions | Additional work, training, local groups | Assessment of business feasibility, market access, and participation |

Source: Descriptive synthesis of interviews and research discussion. The table does not show the frequency of adoption or the results of testing the effectiveness of each strategy.


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Securing boats is a response that connects asset safety with the need to maintain employment. Agustina's (2018) study described moving boats as a form of adaptation by the Ampenan community to tidal flooding. In this article, this practice provides context for discussing safe mooring arrangements. Providing alternative locations requires attention to distance, access, the needs of other users, and management coordination. Without such arrangements, moving boats can reduce risk in one location while increasing operational difficulties elsewhere.

Preparedness includes discussion of signs, evacuation routes, warning information, and disaster drills. These tools and activities serve different purposes and cannot be solely assessed by their presence. Warnings must be readily received and understood, while evacuation routes must be usable by groups with varying mobility abilities. Tsunami preparedness is placed within multi-hazard risk reduction, as tsunamis are not treated as a consequence of climate change. The differences in hazard sources need to be explained to ensure public understanding and maintain appropriate response procedures.

Livelihood diversification and training emerged as a strengthening strategy related to economic constraints. The availability of additional employment options can expand the scope for action when fishing activities are disrupted. Assessing the feasibility of additional activities is a crucial step to ensure these options align with skills and market conditions. A study by Cinner et al. (2018) provides a basis for linking livelihood flexibility to assets, learning, organization, and community capacity to determine action.

**Environmental capacity and threat profiles**

The summary of the results shows differences in achievement across dimensions, as shown in Table 5. Social and institutional capacity achieved 69.73% of the maximum score, followed by psychological capacity at 67.78% and economic capacity at 43.70%. The environmental score of 73.54% has a different meaning because it reflects perceived threats. Therefore, this score cannot be interpreted as better environmental capacity than economic or social capacity. Separating the indicators' directions helps maintain consistency in the assessment and prevents greater threats from being recorded as increased resilience.

**Table 5 Profile of resilience capacity and environmental threat perception**

| Dimensions | Score achieved | Maximum | Percentage (%) | Types of assessment |
|---|---|---|---|---|
| Psychological | 94.89 | 140 | 67.78 | Capacity |
| Economy | 87.39 | 200 | 43.70 | Capacity |
| Social and institutional | 55.78 | 80 | 69.73 | Capacity |
| Environment | 58.83 | 80 | 73.54 | Threat |

Source: recapitulation of research results. Percentages are calculated against the maximum score using the dimension scores in the recapitulation and rounded to two decimal places. Capacity and threat are not summed to form an overall index.

Economic outcomes lag behind social and institutional outcomes by 26.03 percentage points, and psychological outcomes by 24.08 points. This descriptive difference from the maximum score highlights the priority of strengthening material resources. Relatively greater social capacity can support collaborative work, while economic capacity determines the scope for costly action. Within the framework of community resilience, different resources need to be understood as complementary, but not necessarily interchangeable, elements (Norris et al., 2008). Therefore, strengthening community networks needs to be linked to support for protecting homes, boats, and work tools.

**Psychological capacity and ability to act**

The average psychological indicators ranged from 3.60 to 3.86, as shown in Table 6. Empathy had the highest average, while self-efficacy had the lowest. The relatively close range indicates that no single indicator fell significantly behind in the mean tabulation.


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**Table 6 Average psychological and economic indicators**

| Dimensions | Indicator | Average scale 1–5 |
|---|---|---|
| Psychological | Emotional regulation | 3.70 |
| | Impulse control | 3.69 |
| | Optimism | 3.72 |
| | Empathy | 3.86 |
| | Problem cause analysis | 3.70 |
| | Self-efficacy | 3.60 |
| | Improvement of positive aspects | 3.71 |
| Economy | Variety of livelihoods | 2.70 |
| | Savings or assets | 2.82 |
| | Membership of a cooperative or similar group | 2.93 |
| | Access to capital loans | 2.54 |

Source: research indicator tabulation, n = 90. The mean shows the level of assessment of the indicator, not the percentage of respondents who have a particular characteristic.

Relatively prominent empathy can be interpreted as concern for the well-being of other community members. This is relevant to the need for mutual assistance when coastal disturbances affect homes or jobs. However, concern does not yet demonstrate the ability to resolve issues that require authority and investment beyond the reach of individuals. Discussions on social capital and resilience position relationships between residents as a resource for responding to disturbances, without dismissing the need for material and institutional resources (Aldrich & Meyer, 2015). Therefore, social support needs to be linked to access to tangible assistance.

Self-efficacy, with an average of 3.60, indicates room for strengthening confidence to take action. Mentoring can be designed through exercises related to actual problems, such as reading weather information, developing a simple business plan, or understanding asset security procedures. Capacity changes can be monitored before and after activities, while assessing effectiveness requires an evaluation design that differentiates the program's influence from other factors. Developing capacity to act must take into account available resources so that adaptation demands are not solely placed on the individual.

**Economic limitations as a strengthening priority**

Economic capacity is a positive dimension with the lowest percentage. The average access to capital loans, at 2.54, is below livelihood diversity (2.70), savings or assets (2.82), and cooperative membership (2.93). At the aggregate level, assessments of access to loans are lower than assessments of cooperative membership. This pattern draws attention to the benefits of organizations for access to productive resources. Further exploration should differentiate between barriers to requirements, knowledge, service availability, and respondent preferences.

The dominance of fishing activities and limited secondary employment reinforce the relevance of developing livelihood options. However, diversification should not be measured solely by the number of jobs. Additional activities need to consider market demand, skills, operational costs, and available time. Fishery-based businesses may also remain dependent on raw material supplies affected by fishing activities. Therefore, a feasibility assessment needs to ensure that additional activities truly expand options in the event of disruptions. A livelihoods approach helps to position diversification within the relationship between household assets and strategies (Allison & Ellis, 2001).

Strengthening access to financing needs to go hand-in-hand with business management assistance and understanding repayment obligations. Support options should align with recipients' needs and financial capabilities. For households with uncertain income streams, savings support, asset protection, or improved market access may be relevant considerations. Priorities derived from the data include the need to more specifically examine economic barriers and link programs to recipients' needs and capabilities.


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**Social networks and institutional participation**

The social and institutional dimensions had the highest relative performance among the three capacity dimensions. The average social network and social capital score reached 4.09, followed by access to information and resources at 3.91, local institutional structures at 3.61, and community participation at 3.54. This difference suggests that relationships between citizens and involvement in decision-making need to be interpreted as distinct components. The strength of social relationships does not yet provide evidence that all groups have equal opportunities to influence development decisions.

**Table 7 Average of institutional social indicators and environmental threats**

| Dimensions | Indicator | Average scale 1–5 |
|---|---|---|
| Social and institutional | Local institutional structure | 3.61 |
| | Social networks and social capital | 4.09 |
| | Access to information and resources | 3.91 |
| | Participation in decision making | 3.54 |
| Environmental threats | Sea level rise or tidal flooding | 4.19 |
| | Coastal erosion | 4.08 |
| | Plastic waste and marine debris | 4.18 |
| | Seawater intrusion | 3.32 |

Source: research indicator tabulation, n = 90. Increasing social mean indicates greater capacity; increasing environmental mean indicates greater perceived threat.

Adger (2003) places collective action and social relationships in discussions of climate change adaptation. In the Ampenan context, existing networks can be utilized to communicate needs, disseminate information, and organize joint activities. The role of networks can be strengthened through relationships with service providers and decision-making forums. Mapping internal and external community relationships will help identify parties who can support the implementation of shared needs.

Strengthening participation can be directed at mechanisms that ensure citizen suggestions are recorded, discussed, and followed up. Fishermen's groups, local organizations, and women's representatives can be involved based on their needs and roles. Scheduling activities should take into account work hours, family responsibilities, and accessibility. Institutional quality should be assessed through access to benefits, transparency of processes, and follow-up on decisions. Thus, attention to social capacity shifts from the number of groups formed to the organization's ability to contribute to collective problem-solving.

**Environmental threat perception and adaptation suitability**

Perceptions of sea level rise or tidal flooding averaged 4.19, plastic waste or marine debris 4.18, followed by coastal erosion 4.08, and seawater intrusion 3.32. These scores indicate strong concern for several environmental pressures. However, similarly high ratings do not necessarily imply that all pressures have the same cause. Waste, for example, is related to waste management and land use and cannot be automatically attributed to climate change. Analysis needs to differentiate between climate factors, coastal processes, and pressures arising from human activities.

Responding to environmental threats requires information relevant to the problem's mechanisms. Tidal flooding and erosion require monitoring of coastal conditions, while seawater intrusion requires examination of water quality and sources. Waste management requires identification of sources, collection services, and disposal practices. Perception surveys help identify community concerns but do not determine the extent of each factor's contribution. Therefore, field priorities need to be established through joint assessments between the community and technically competent parties, without assuming all problems can be resolved through a single form of physical development.

Vegetation-based protection must reflect the ecological characteristics of the site. Alongi (2008) discussed the resilience of mangrove forests and their role in coastal protection, but these findings cannot be applied uniformly to all coastal features. Mangrove planting needs to consider habitat suitability and water dynamics. In different


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locations, maintaining appropriate coastal vegetation may be a more relevant option. Residents' experiences with casuarinas and hibiscus provide initial input for site assessment, not proof that these species are always most effective.

Embankment construction, drainage improvements, vegetation protection, and spatial planning must be assessed as interconnected options. Increasing protection in one location may impact access, spatial function, or maintenance needs in another. The IPCC (2022) cautions against adaptations that increase vulnerability. For Ampenan, the implication is to assess the benefits and consequences of each action before implementation and provide a mechanism for subsequent evaluation. This research provides an overview of social needs as one input into this process.

**Implications for strengthening community resilience**

Key findings demonstrate an imbalance between social and psychological capacity and economic capacity. Communities can engage in mutual support while facing limited resources to make costly adjustments. This interpretation is more accurate than concluding that solidarity has overcome economic vulnerability. The concept of adaptive capacity helps interpret these needs through the interconnectedness of assets, flexibility, organization, learning, and the ability to act (Cinner et al., 2018). In practice, capacity building requires linking community resources with support services and economic opportunities.

The first priority is livelihood strengthening based on a more detailed needs assessment. Programs can begin by mapping skills, existing supplementary activities, market access, and capital constraints. Community groups can be involved in selecting activities and monitoring their benefits. Success is not solely measured by the number of training participants; it also needs to be assessed through the sustainability of activities, income contributions, and the ability to maintain assets during disruptions. This baseline information is necessary to establish the types of interventions and monitorable targets.

The second priority is strengthening relationships between local organizations and service providers. Sub-districts, fishing groups, disaster agencies, water providers, and universities have roles that can be tailored to the issues being addressed. Working mechanisms need to clarify who receives information, makes decisions, implements actions, and follows up on complaints. The principle of adaptive governance links institutions to learning and the ability to respond to changes in social and ecological systems (Folke et al., 2005). Therefore, coordination meetings should produce decisions that can be audited for implementation.

The third priority is to combine the maintenance of coastal protection and basic services with operational preparedness. Inspections of evacuation routes, mooring conditions, drainage functions, and information accessibility are examples of activities that can be agreed upon based on local needs. Community involvement should consider groups with mobility or access to information constraints. The division of maintenance tasks should also consider community capacity and the responsibilities of service providers. Mutual cooperation should not be used as an excuse to shift the entire infrastructure burden to residents.

Monitoring can utilize indicators that can be regularly reviewed, such as the sustainability of additional income, access to economic services, follow-up on community proposals, facility functionality, and accessibility of warning information. These proposed indicators can be mutually agreed upon as the basis for program monitoring. Social monitoring should be supplemented with data on coastal conditions and services so that changes in perceptions can be compared with changes in actual conditions. This approach provides a clearer basis for evaluation than setting improvement targets based on aggregated indices with inconsistent indicator directions.

**Limitations and directions for further research**

The results describe 90 respondents in four coastal villages in Ampenan during a single observation period. The predominance of the Bintaro sample, the discrepancy between the fisherman household head framework and the respondent coverage, and the non-proportional distribution limit generalizability. The aggregate data also do not allow for assessment of variation across villages, income groups, or gender. The mean differences in the article are descriptive and not statistically significant. Further research should clarify the respondent framework and consider the sample distribution for comparison purposes.

Perception-based measurements limit the assessment of coastal physical conditions and technical protection outcomes. Furthermore, the use of different weights affects the contribution of each indicator to the dimension scores. The procedure for transforming responses into weighted scores needs to be documented in more detail and re-examined using individual data. Validity, reliability, and consistency of scoring direction are necessary before using


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a unified index. Psychological scores also cannot replace mental health assessment instruments. These limitations emphasize the need to tailor the strength of conclusions to the type of data collected.

Future research could incorporate repeated measurements, livelihood records, observations of facility conditions, and coastal physical data. In-depth interviews are needed to understand barriers to accessing finance, experiences with organizations, and reasons for choosing particular adaptation strategies. Pre- and post-program measurements can illustrate changes in capacity; impact assessments require designs that consider comparable factors. Such developments will help clarify whether social support translates into improved economic capacity and measurable reductions in exposure.

## CONCLUSION

Coastal communities in Ampenan District face threats from flooding, tidal flooding, high waves, extreme weather, and abrasion, with responses including building and coastal protection, service maintenance, securing fishermen's assets, and preparedness. The profile of 90 respondents showed social and institutional outcomes of 69.73%, psychological 67.78%, and economic 43.70%. Perception of environmental threats reached 73.54% and was interpreted separately because the assessment direction differs from the capacity dimension. The main finding is the imbalance between social resources and economic capacity to cope with coastal pressures.

Strengthening resilience requires leveraging existing social networks to expand access to productive resources, livelihood options, and decision-making processes. Environmental and infrastructure protection must be tailored to the characteristics of the location and accompanied by feasible maintenance and preparedness. These priorities are the implications of descriptive assessments, so the effectiveness of each intervention still needs to be tested. Further research needs to strengthen instruments, respondent representativeness, repeated measurements, and the linkage between perceptual information and physical conditions and community livelihoods.

## REFERENCES

Adger, W. N. (2003). Social capital, collective action, and adaptation to climate change. Economic Geography, 79(4), 387–404. https://doi.org/10.1111/j.1944-8287.2003.tb00220.x

Agustina, LE (2018). Adaptation strategies of coastal communities in Ampenan, Mataram City, to the dangers of tidal flooding [Master's thesis, Gadjah Mada University]. ETD, Gadjah Mada University. https://etd.repository.ugm.ac.id/penelitian/detail/166669

Aldrich, D. P., & Meyer, M. A. (2015). Social capital and community resilience. American Behavioral Scientist, 59(2), 254–269. https://doi.org/10.1177/0002764214550299

Allison, E. H., & Ellis, F. (2001). The livelihoods approach and management of small-scale fisheries. Marine Policy, 25(5), 377–388. https://doi.org/10.1016/S0308-597X(01)00023-9

Alongi, D. M. (2008). Mangrove forests: Resilience, protection from tsunamis, and responses to global climate change. Estuarine, Coastal and Shelf Science, 76(1), 1–13. https://doi.org/10.1016/j.ecss.2007.08.024

Cinner, J.E., Adger, W.N., Allison, E.H., Barnes, M.L., Brown, K., Cohen, P.J., Gelcich, S., Hicks, C.C., Hughes, T.P., Lau, J., Marshall, N.A., & Morrison, T.H. (2018). Building adaptive capacity to climate change in tropical coastal communities. Nature Climate Change, 8(2), 117–123. https://doi.org/10.1038/s41558-017-0065-x

Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. Annual Review of Environment and Resources, 30, 441–473. https://doi.org/10.1146/annurev.energy.30.050504.144511

Intergovernmental Panel on Climate Change. (2022). Climate change 2022: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (H.-O. Pörtner, DC Roberts, M. Tignor, ES Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, & B. Rama, Eds.). Cambridge University Press. https://doi.org/10.1017/9781009325844

Markum, M., Sjah, T., Idris, MH, Aji, IML, Fikry, MY, & Rahman, FA (2025). Agroforestry practices and community resilience to the impact of climate change in Sesaot Forest Area, Lombok, Indonesia. Journal of Science Education Research, 11(5), 849–859. https://doi.org/10.29303/jppipa.v11i5.11258

Nicholls, R. J., & Cazenave, A. (2010). Sea-level rise and its impact on coastal zones. Science, 328(5985), 1517–1520. https://doi.org/10.1126/science.1185782


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Norris, F.H., Stevens, S.P., Pfefferbaum, B., Wyche, K.F., & Pfefferbaum, R.L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. American Journal of Community Psychology, 41(1–2), 127–150. https://doi.org/10.1007/s10464-007-9156-6

Ulfa, M. (2018). Perceptions of fishing communities in facing climate change (reviewed from a socio-economic perspective). Journal of Geography Education, 23(1), 41–49. https://journal2.um.ac.id/index.php/jpg/article/view/2441

Wilandari, S., Sinaga, WH, & Nuraini, Y. (2020). Study of fishery resource potential in Ampenan District, Mataram City, West Nusa Tenggara Province. Journal of Fisheries and Marine Extension, 14(2), 107–120. https://doi.org/10.33378/jppik.v14i2.189


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