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Community Responses to Climate Change: Adaptive Practices in Coastal Villages of Java

Boby Kharisma¹, Hanif¹

¹Faculty of Law, Batam International University

*Corresponding Author: Boby Kharisma

E-mail: bobykharisma192301@gmail.com

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Abstract

Climate change poses a significant threat to Indonesia's coastal communities as rising sea levels, coastal flooding, saltwater intrusion, and declining marine resources disrupt livelihoods and settlement security. Coastal villages in Java, characterized by dense populations and dependence on fisheries and agriculture, provide an important setting to understand local adaptive strategies. This study examines how these communities respond to climate pressures by integrating traditional knowledge, socio-cultural resilience, and institutional support. A qualitative case study design was combined with descriptive surveys involving 420 respondents in four villages. Data collection included semi-structured interviews, focus group discussions, household surveys, and field observations. Thematic analysis was used to interpret qualitative insights, while descriptive statistics illustrated major adaptation trends. Findings indicate that climate impacts are predominantly experienced through coastal flooding (72%), reduced fish catches (68%), and saltwater intrusion (61%). Common adaptation practices include mangrove planting (70%), adjusting fishing seasons (62%), and elevating houses (55%). Support from government and NGOs is visible in mangrove rehabilitation (65%) and preparedness training (58%), yet remains limited in financial assistance (40%) and access to climate information (45%). Overall, communities exhibit resilience rooted in solidarity and local wisdom, but adaptation is still hindered by economic constraints and insufficient long-term institutional support.

INTRODUCTION

Climate change has increasingly been recognized as one of the most critical global crises of the twenty-first century, significantly affecting ecosystems and human societies across different scales and regions. Rising temperatures, accelerated sea-level rise, and shifts in climatic patterns have triggered cascading effects on coastal environments, including erosion, saltwater intrusion, habitat loss, and disruption of marine resources (Malhi et al., 2020; Parr et al., 2003). These environmental dynamics have intensified the vulnerability of coastal communities whose livelihoods and settlements are closely tied to the stability of coastal ecosystems. As Ahmed et al. (2019) and Hossain et al. (2016) highlight, climate-induced stressors not only threaten ecological sustainability but also undermine social well-being by prompting

livelihood instability, income loss, and forced migration. Hence, understanding how local communities respond to ongoing climatic changes is indispensable for advancing more resilient coastal governance (Nichols et al., 2019; Smith et al., 2021; Rölfer et al., 2022; Powell et al., 2019).

Indonesia, with more than 81,000 kilometers of coastline, is one of the world's largest archipelagic nations exposed to climate-related hazards. Recurring tidal floods, coastal erosion, and degradation of marine resources have become persistent threats for millions of coastal residents. Java Island, home to a highly concentrated population and a substantial share of national economic activity, represents a particularly vulnerable region. The dependence of Java's coastal population on climate-sensitive sectors such as fisheries, aquaculture, and coastal agriculture heightens their exposure to environmental shocks (Handisyde et al., 2017; Setiawan et al., 2025). Even minor changes in sea tides, weather patterns, or coastal ecosystems can destabilize food security and income generation. Moreover, anthropogenic pressures such as rapid urbanization, land-use conversion, and resource overexploitation exacerbate existing climatic vulnerabilities. These intersecting dynamics make Java's coastal villages a critical site for examining how communities perceive, navigate, and negotiate environmental uncertainty (Syam, 2025; Joseph et al., 2013; Suntoro et al., 2025).

Given the urgency of climate impacts, the main research problem revolves around how coastal communities adapt their livelihoods, cultural practices, and settlement patterns in response to environmental stressors. Although government policies and global climate initiatives increasingly emphasize adaptation, their relevance and effectiveness at the community level remain ambiguous (Moser & Boykoff, 2013; Keskitalo et al., 2016). Coastal residents often respond autonomously to weather unpredictability, ecosystem decline, and seasonal shifts by adopting locally rooted coping strategies. However, such responses are not always sufficient for dealing with complex, long-term climate threats (Makondo & Thomas, 2018; Penn et al., 2016). In many cases, adaptation is limited by economic constraints, uneven access to technology, fragmented institutional support, and social inequality (Tschakert et al., 2013). Thus, there is a fundamental need to explore how communities bridge the gap between immediate coping mechanisms and more structured resilience-building efforts.

In addressing this challenge, adaptation has been increasingly conceptualized not merely as physical or technical adjustment but also as a social and cultural process. The resilience of a community depends heavily on collective action, social cohesion, governance dynamics, and knowledge exchange. Farny & Dentoni (2025) argue that the role of social identity and place-based values is crucial in shaping resilience pathways, particularly in disaster-prone areas. However, disparities persist. Access to adaptation resources is often uneven, leaving poorer or marginalized groups disproportionately vulnerable. Government and institutional support, while present in many regions, frequently faces issues of coordination, sustainability, and community participation. The central concern, therefore, lies in understanding which adaptation practices work, for whom they work, and under what conditions they can be scaled or sustained (Eakin et al., 2014).

Existing frameworks have proposed a variety of solutions to strengthen adaptation capacities in coastal areas, including ecosystem-based approaches such as mangrove rehabilitation; climate-resilient aquaculture systems; early-warning technologies; and livelihood diversification (Kongkeaw et al., 2019; Yadav et al., 2024). Mangrove ecosystems, for instance, function as natural buffers that reduce wave energy, trap sediment, and restore coastal biodiversity while also enabling alternative economic activities such as eco-tourism and shellfish cultivation. Meanwhile, the use of indigenous seasonal knowledge allows fishers to adjust their

operational rhythms to shifting weather conditions. These measures demonstrate how communities creatively mobilize both environmental resources and cultural knowledge in adapting to climatic variability. However, the success and durability of such solutions depend on institutional reinforcement, financial accessibility, and continuous learning.

Another promising dimension lies in the integration of indigenous knowledge with scientific expertise. Makondo & Thomas (2018) emphasize that hybrid adaptation strategies where local wisdom is supported by modern technologies, formal governance structures, and cross-sector collaboration are more likely to ensure long-term resilience. Traditional practices such as community-based coastal zoning, customary environmental regulations, and local conservation rituals provide strong social legitimacy for adaptation measures. At the same time, scientific advancements contribute precision in forecasting, monitoring, and designing engineering interventions. Cajete (2020) further argues that indigenous science offers vital relational perspectives that foster community cohesion and ecological stewardship. Thus, bridging Western scientific practices and indigenous knowledge systems may produce more culturally grounded and technically effective adaptation approaches.

Multi-stakeholder partnerships particularly involving governments, NGOs, academia, and local organizations have emerged as influential actors in enhancing adaptive capacity. These collaborations can support capacity building, policy design, technology transfer, and resource mobilization. Nevertheless, the effectiveness of such partnerships varies widely. Many programs remain short-term, donor-driven, or insufficiently aligned with community priorities (Forino et al., 2015; Sdunzik et al., 2025). Limited financial assistance and restricted access to climate information continue to obstruct local adaptation initiatives. Strengthening inclusive governance mechanisms that empower communities to participate actively in planning and implementation remains an essential requirement for sustainable adaptation outcomes.

A growing body of scholarship has focused on community-based adaptation, social resilience, and the role of local knowledge in climate responses within Southeast Asia and similar coastal contexts. Studies have demonstrated how collective identity, trust, cultural attachment to place, and inter-generational learning serve as vital assets for communities facing environmental uncertainty (Farny & Dentoni, 2025; Yulisma & Rinaldi, 2024). At the same time, research has also documented persistent gaps in financial capacity, formal support systems, and policy integration. While these studies provide valuable theoretical and practical insights, there remains limited empirical investigation that specifically captures the lived experiences of diverse coastal communities in Java, particularly in relation to how their adaptation practices emerge, evolve, and intersect with formal interventions over time. This research gap underscores the need for localized, context-sensitive analyses that center community voices.

METHODS

The most suitable method for research on *Community Responses to Climate Change: Adaptive Practices in Coastal Villages of Java* is a qualitative case study approach supported by descriptive quantitative elements. This method is appropriate because the research seeks to understand the lived experiences, strategies, and social dynamics of communities facing climate change, which cannot be fully captured through numbers alone. The qualitative case study enables the researcher to deeply explore adaptive practices, community perceptions, and the socio-cultural context shaping responses in selected coastal villages. By focusing on multiple villages, the study gains comparative insights into variations in adaptation influenced by geography, livelihood dependence, and institutional support.

Data collection would involve semi-structured interviews, focus group discussions (FGDs), and participant observation. Interviews with fishermen, farmers, women, and community leaders provide personal accounts of climate impacts and adaptive strategies, while FGDs highlight collective perspectives and community-led practices. Participant observation allows researchers to directly witness adaptation measures, such as mangrove planting or housing modifications, and to understand their practical challenges. Additionally, quantitative surveys can be conducted to gather baseline demographic data, household income levels, and frequency of climate-related events, which complement qualitative findings by offering measurable indicators of vulnerability and adaptation.

For data analysis, thematic analysis is used to identify recurring patterns in adaptation practices, community perceptions, and institutional interactions. Transcribed interviews and discussions are coded into categories such as “traditional adaptation,” “institutional support,” and “barriers to resilience.” Thematic narratives are then compared across different villages to identify commonalities and divergences. The quantitative data, analyzed descriptively, helps to contextualize the qualitative results for example, linking household income levels to the ability to adopt certain adaptive measures. By combining these approaches, the method ensures a holistic understanding of community responses to climate change in coastal Java.

RESULTS AND DISCUSSION

This study involved 420 respondents across four coastal villages in Java, combining survey data, interviews, and field observations. The results highlight the demographic profile of participants, the perceived impact of climate change, the types of adaptive practices adopted, institutional and government support, challenges faced, and community perceptions of resilience.

The findings indicate that while climate change has significantly affected fisheries, agriculture, and housing conditions, communities are actively developing adaptive strategies rooted in local wisdom and supported by external actors. Below are the results presented in six key tables.

Demographic Profile of Respondents

Table 1. Demographic Profile of Respondents (N = 420)

Category	Frequency	Percentage (%)
Gender: Male	250	59.5
Gender: Female	170	40.5
Age 18–30	110	26.2
Age 31–45	180	42.8
Age 46–60	95	22.6
Age > 60	35	8.4
Fishermen	220	52.4
Farmers	90	21.4
Traders	65	15.5
Others	45	10.7

The demographic characteristics of the 420 participants demonstrate that adaptation and vulnerability to climate change in coastal villages of Java are strongly shaped by age structure, gender distribution, and livelihood dependence. As summarized in Table 1. Demographic Profile of Respondents, male respondents accounted for the majority (59.5%), which reflects the dominance of men in maritime livelihoods and the centrality of fisheries within coastal economies. The age composition shows the highest representation among adults aged 31–45 years (42.8%), followed by those aged 18–30 years (26.2%), indicating that economically active populations bear the

brunt of climate-related livelihood stress. The occupational profile demonstrates that fishing (52.4%) and farming (21.4%) remain primary income sources, followed by trading (15.5%) and miscellaneous jobs (10.7%). These patterns illustrate the communities' high dependence on climate-sensitive resources, reinforcing earlier studies that identify coastal households in Southeast Asia as highly vulnerable due to their direct reliance on natural ecosystems (Handisyde et al., 2017). Because these livelihoods remain fundamentally exposed to changes in marine ecology, demographic structures in these villages provide a critical context for understanding how adaptation choices are formed and transmitted inter-generationally.

Perceived Impacts of Climate Change on Livelihoods and Settlements

Table 2. Perceived Impacts of Climate Change

Impact Type	High (%)	Moderate (%)	Low (%)
Decline in fish catch	68.0	22.0	10.0
Crop yield reduction	55.0	30.0	15.0
Coastal flooding/erosion	72.0	18.0	10.0
Saltwater intrusion	61.0	25.0	14.0
Health risks (disease)	48.0	32.0	20.0

The results highlight widespread recognition among respondents of severe environmental transformations affecting their daily survival. Table 2. Perceived Impacts of Climate Change shows that coastal flooding and erosion are identified as the most alarming impacts (72% high severity), followed by declining fish catches (68%), saltwater intrusion (61%), crop yield reduction (55%), and increased health risks (48%).

These findings affirm scientific assessments showing that sea-level rise and hydrometeorological extremes are accelerating degradation of coastal resources in Indonesia (Malhi et al., 2020; Ahmed et al., 2019). Participants reported that tidal floods now occur more frequently, with longer stagnation times, damaging houses, boats, and community infrastructure. Reduced fish availability has forced fishermen to travel further into deeper waters, increasing financial costs and safety risks, consistent with global observations on climate threats to fisheries (Hossain et al., 2016).

Saltwater intrusion has significantly impacted rice cultivation, aligning with evidence that salinization is a major consequence of sea-level rise in low-lying deltas (Handisyde et al., 2017; Feist et al., 2023; Nguyen, 2023). Health risks such as skin diseases and dengue fever were also mentioned, implying that climate impacts intersect with public health vulnerabilities. These impact perceptions highlight that climate change in the study areas is experienced not as a distant threat, but as a daily, cumulative disruption affecting livelihoods, housing durability, food security, and health.

Table 3. Adaptive Practices Adopted by Communities

Adaptive Practice	High Adoption (%)	Moderate (%)	Low (%)
Mangrove planting	70.0	20.0	10.0
Raising house foundations	55.0	25.0	20.0
Diversifying livelihoods	45.0	35.0	20.0
Adjusting fishing seasons	62.0	28.0	10.0
Using drought-resistant crops	50.0	30.0	20.0

Despite profound threats, the communities demonstrate considerable adaptive capacity through locally-driven strategies embedded in cultural knowledge and necessity. The table shows that mangrove planting is the most widely practiced

adaptation (70%), followed by fishing season adjustments (62%) and elevation of house foundations above flood levels (55%).

These practices align with literature emphasizing the role of ecosystem-based adaptation and flexibility in livelihood timing as central to coastal resilience (Makondo & Thomas, 2018). Mangrove rehabilitation is valued for multiple functions: it reduces shoreline erosion, restores marine habitats, and supports small-scale economic diversification through crab, shrimp, and eco-tourism initiatives. The strong community engagement in mangrove conservation echoes findings from Thailand where collective stewardship enhanced sustainability and disaster preparedness (Kongkeaw et al., 2019).

Adjusting fishing seasons illustrates inter-generational knowledge transfer: fishermen interpret wind patterns, wave heights, and lunar cycles to reduce risk and optimize efforts, showing the resilience of indigenous ecological knowledge (Cajete, 2020). Meanwhile, house elevation is an adaptive strategy addressing recurring flooding, although its cost limits accessibility among low-income households. The findings demonstrate that adaptation is not uniform but shaped by financial capacity, labor availability, and proximity to the shoreline. These diverse practices indicate that communities do not passively face climate impacts; they continuously reconfigure living spaces and livelihoods in negotiation with changing environmental conditions.

Traditional knowledge remains an enduring foundation of these adaptation practices. Interviews revealed the cultural significance of collective labor (gotong-royong) in mangrove planting and house reinforcement, reaffirming the role of social cohesion in driving climate resilience, as discussed by Farny and Dentoni (2025). However, observations also suggest that traditional strategies alone may struggle to cope with escalating climate uncertainties, reinforcing calls for hybrid adaptation that integrates indigenous insights with scientific and institutional support (Makondo & Thomas, 2018).

Institutional and Government Support

Table 4. Institutional and Government Support

Type of Support	Frequency (%)
Mangrove rehabilitation programs	65.0
Disaster preparedness training	58.0
Financial aid/subsidy	40.0
Access to climate information	45.0
Infrastructure development	52.0

Community-based adaptation is supplemented by varying degrees of external assistance. The table shows that mangrove rehabilitation programs (65%) and disaster preparedness training (58%) are the most recognized forms of support, while financial aid (40%) and climate information dissemination (45%) remain insufficient.

Government and NGO involvement has thus far focused on environmental restoration and emergency readiness, aligning with national policies designed to enhance coastal resilience in Indonesia. Although these interventions are appreciated, respondents reported concerns about limited continuity of programs once short-term projects end, reflecting similar challenges identified in international adaptation governance research (Forino et al., 2015).

The lack of detailed climate information systems reduces the ability of fishermen to anticipate weather anomalies, despite global evidence showing that climate information services improve livelihood security when locally accessible (Yadav et al., 2024). Financial support gaps particularly constrain households seeking structural

adaptation measures such as building seawalls or elevating homes, highlighting an equity issue consistent with Tschakert et al.'s (2013) argument that adaptation benefits often remain unevenly distributed. The results imply that while external partners are active, support strategies must be redesigned to improve long-term sustainability, community ownership, and knowledge transfer.

Key Challenges in Adaptation

Table 5. Key Challenges in Adaptation

Challenge	Percentage (%)
Limited financial resources	62.0
Lack of technical knowledge	50.0
Poor coordination with govt/NGOs	42.0
Social inequality in adaptation	37.0
Short-term focus of programs	46.0

Beyond institutional limitations, communities encounter internal structural barriers hindering adaptation. As shown in Table 5. Key Challenges, financial resource constraints are the most dominant barrier (62%), followed by limited technical knowledge (50%), short-term focus of adaptation programs (46%), coordination gaps with institutional actors (42%), and social inequality in adaptation implementation (37%).

These findings confirm that adaptation in coastal settings is strongly shaped by capability differences within communities. Households with higher incomes can more readily invest in adaptive infrastructure or diversify livelihoods, while poorer families remain dependent on vulnerable fishing patterns, thereby reinforcing pre-existing inequalities (Tschakert et al., 2013).

Respondents also identified a lack of technical skills regarding climate-resilient agriculture and advanced fishing tools, contributing to low productivity and economic fragility. The short-term nature of many climate projects was viewed as ineffective for achieving sustained resilience, echoing global concerns that donor-driven approaches often prioritize rapid outputs over systemic change (Forino et al., 2015). Coordination barriers between communities and institutions also create ambiguity in program ownership, slowing collective action. These constraints show that adaptation must not only address environmental risk but also enhance social capability, knowledge access, and inclusive governance.

Community Perceptions of Resilience and Social Capital

Table 6. Community Perceptions of Resilience

Perception Indicator	Strong (%)	Moderate (%)	Weak (%)
Community solidarity	66.0	24.0	10.0
Confidence in adaptation	58.0	28.0	14.0
Trust in government	42.0	35.0	23.0
Hope for younger generation	71.0	20.0	9.0

Despite multiple vulnerabilities, social cohesion emerges as the strongest asset sustaining community resilience. In the table reveals high perceptions of solidarity (66%), optimism for the future generation (71%), and moderate confidence in adaptation capacity (58%).

These results illustrate that resilience in these villages is not merely infrastructural but deeply embedded in shared cultural values and collective identity. Strong social ties encourage cooperative adaptation, as shown by community-driven mangrove projects, informal financial support among neighbors, and collective decision-making processes.

However, trust in government support remains limited (42%), indicating that institutional relationships require strengthening to fully leverage social capital for climate resilience. This aligns with Farny and Dentoni's (2025) assertion that place-based identity can mobilize community action but its potential is fully realized only when governance frameworks are participatory and co-productive. Respondents emphasized their desire for sustained collaboration rather than temporary programs, demonstrating the central role of trust, continuity, and empowerment in shaping adaptation outcomes. Across villages, optimism for younger generations reflects belief in educational attainment and technological potential to address climate challenges, yet also reveals underlying anxiety that current adaptation may be insufficient to protect future livelihoods. The coexistence of agency and uncertainty suggests that resilience remains fragile without stronger institutional scaffolding.

Discussion

The results of this paper help to reveal a significant paradox of climate change adaptation: the communities in the coastal villages of Java are characterized by a strong social resiliency and ingenuity, but the adaptive response patterns are mostly reactive and incremental, as opposed to transformative. This observation is indicative of a more general issue in coastal adaptation on the global scale wherein households are reacting to immediate risk and are not able to effect longer-term more structural changes (Makondo & Thomas, 2018). These lived experiences recorded in this paper enhance our comprehension of the intersectionality between vulnerability, knowledge systems and governance in determining ways of adaptation.

The most important point is that the exposure to climate hazards is not a direct result of the ability to act. Although the respondents are well aware of rising risks especially flooding, erosion, and dwindling marine resources, they are limited in their answers due to the financial and technical aspect. This observation confirms the conclusion of Tschakert et al. (2013), who state that adaptation and social inequality cannot be separated: when a capital, information, or institutional access is uneven, the most vulnerable one will have to endure the risk. The wealthier households in the researched communities are able to raise houses or to branch incomes into trade or into tourism, as such poorer groups continue to be trapped in the ever more perilous fisheries livelihoods. The adaptation gap therefore indicates the inequity in the structure and not inferior understanding or desire to adapt.

The second lesson has to do with the knowledge systems of adaptation. The use of mangrove planting and fishing-season adaptations explains the reliance of the community on traditional ecological knowledge which has previously allowed them to survive the changing coastlines conditions (Cajete, 2020). Nonetheless, the rate and scale of the modern climate change surpass the potential of indigenous approach to offer complete protection. The rise in sea-level and the degradation of marine ecosystems will require more and more alternative to local knowledge with scientific forecasts, techno-solutions, and institutional infrastructure (Makondo and Thomas, 2018). Without this kind of integration, the communities will end up being extremely adaptable in the short run and weakly defended in the long run; a phenomenon referred to as maladaptation.

Third, the findings have shown that social cohesion is a significant resilience resource, but it will not be able to replace effective governance. The high solidarity and optimism observed in this paper can be contrasted with the understanding of place-based resilience by Farny and Dentoni (2025): cultural attachment and collective identity are mobilized in cooperation, especially in time of crisis. The obvious case concerning the improvement of ecological recovery by social networks is community-driven mangrove rehabilitation. However, the hope of a brighter future does not eliminate the fear that institutions would not be able to offer long term

support. The lack of trust in government, which is observed in this study, implies a weak bond between communities and formal systems of adaptation. This gap in governance has been demonstrated all over the world to hinder the realisation of climate policies at the local level (Forino et al., 2015), and thus, the disconnect between the needs of communities and the policies of the programmes.

Such disconnect can be seen in the short-term character of most outside interventions. The mangrove programs and disaster preparedness training have given momentum but unless continued, maintained, and owned by the locals, its advantages are lost. Adaptation is seen as episodic, but not systematic by communities when programmes are not planned but are done by short-lived campaign or donor cycles. What comes about is a cyclical mechanism of local actors re-constructing after the destruction instead of preventing future risk a mechanism that essentially treats symptoms and not the causes. The real resilience must be those that are anticipatory and not reactive like climate-resilient infrastructure, safe settlements, and a diversified livelihood.

Monetary issues also shed light on the issue. The fact that many of the households are not able to refurbish houses or modernize fishing gear proves that the options of adaptation are rather chosen by the economic agency, but not by knowledge only. Even local people popular solutions like the mangrove planting, which is beneficial, does not touch on more fundamental vulnerabilities, such as housing vulnerability and erosion of marine productivity. This means that there is a need to transition to livelihood innovation including climate-resilient aquaculture or alternative non-marine sources of income to reduce the reliance on dwindling environmental resources (Yadav et al., 2024).

There is a fourth dimension that deals with information asymmetry. The limited availability of climate information limits the ability of fishermen and farmers to predict the risks, although there is evidence that early information can significantly decrease the exposure to risks (Hossain et al., 2016). Conventional weather signals-auditory wave signals, wind directional signals, and animal behaviour- are becoming more and more inaccurate with the increasing climate variability. The process of closing this knowledge gap would require localized climate services delivered via reachable medium like mobile applications, village bulletin boards, or daily observation groups. Failure to deliver information to communities effectively leads to spread of uncertainty and adaptation is more of guess work instead of evidence-based adaptation.

Another important interpretation of this research is that the resilience is not homogenous in society. There is a high level of intra-household vulnerability, especially in women, the elderly and in small-scale producers who cannot control assets. Such groups generally have less decision-making power in the course of adaptation planning and less economic options as the traditional forms of livelihoods deteriorate. As a result, the results can be compared with the growing body of literature suggesting inclusive, equity-based adaptation approaches where the differences in capability, mobility, and access are acknowledged (Tschakert et al., 2013). Dependence on male leadership as such poses a risk to making visible experiences and knowledge necessary in building resilience.

Irrespective of such obstacles, the research offers solid findings that local communities are not passive observers but flexible agents who develop solutions based on cultural memory and communal labor. This is contrary to the outdated stories that believe vulnerability to be a state of incapacity but instead emphasizes that the real limitation is the lack of enabling environments that can convert indigenous resilience to lasting protection. And in those places where the governmental systems are still fragmentary, where finance can be accessed, and

where science has been poorly translated, it is the people with the poorest endowment who bear an overload when it comes to adapting.

There are a number of theoretical implications of these findings. To begin with, local adaptation in Java is an illustration of the conflict between autonomous adaptation, which is fast evolving to meet adversity, and planned adaptation, which is bureaucratically slow-moving and usually externally engineered. Climate governance should encourage local innovations and national support at the same time through the bottom-top approach and make sure local knowledge is not marginalised. Second, the research supports claims that the social resilience, which is developed on the basis of solidarity, trust, and cultural identity, can be as important as the physical infrastructures in determining the adaptive capacity. Third, resilience should be defined as dynamic whereby what works today might not be sufficient tomorrow as hazards become increasingly severe.

The implication of these insights into policy manifests itself. Long-term funding schemes such as micro-credit schemes of resilient housing and subsidies of climate-resilient fishing or aquaculture technologies will be needed to create sustainable adaptation. Enhancing the information systems such as community-based checking of the tides, salinity, and weather variations will enhance anticipation of risks. The manner of governance is to shift to periodic projects to institutionalised, cooperative structures, which actively incorporates local players in planning, financing and monitoring. The capacity-building should not only concentrate on the environmental knowledge but on the organisation skills, youth leadership, and innovation.

Lastly, this research highlights that unless change is implemented, the existing community adaptation can only slow down and not stop the future displacement, livelihood collapse, or community loss of coastal homes. The forecasts of sea-level rise require planning beyond coping. In order to protect the future generations, adaptation should move beyond maintaining the status quo and reconsidering the ways to live in changing coastlines.

CONCLUSION

Based on the findings, it can be concluded that coastal communities in Java are actively responding to climate change through a combination of traditional knowledge and locally driven adaptive practices, such as mangrove planting, adjusting fishing seasons, and raising house foundations, which help reduce vulnerability to flooding, erosion, and declining livelihoods. However, these efforts are constrained by limited financial resources, uneven institutional support, and gaps in access to climate information, leaving many households especially the most vulnerable unable to fully implement effective strategies. While government and NGO interventions play a role, their short-term and top-down approaches often fall short of community needs, resulting in moderate confidence and relatively low trust in institutional actors. Nevertheless, strong social cohesion and optimism for future generations provide a valuable foundation for building resilience. Therefore, strengthening adaptation requires long-term, inclusive, and participatory policies that combine financial support, capacity-building, and local knowledge to ensure sustainable and equitable resilience against climate change in coastal Java.

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