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POLICY BRIEF

Strengthening Resilience among Small-Scale Fishers in Coastal Communities in Davao Region

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ABSTRACT

Small-scale fisheries are vital to food security and livelihoods in coastal communities, yet fishing households face multiple environmental, institutional, and livelihood-related risks. This study analyzes vulnerability levels and resilience capacities of fishers across selected municipalities in the Davao Gulf. Fieldwork interviews were conducted using indicators that measure the vulnerability and resilience of coastal communities. Vulnerability was low in Samal (0.15), Sta. Cruz (0), Carmen (0.1) and St. Maria (0.33). This indicates that they are not directly affected by climate hazards and other stressors, whereas other municipalities experienced moderate vulnerability. Resilience is low in Mabini (0), Pantukan (0.5), and Samal (0.15) due to age and health issues and the lack of alternative livelihoods, which require intervention from the government and other concerned agencies. Governor Generoso (0.73) and Sta. Maria (1.01) is a municipality with the highest level of resilience. It emphasizes that livelihood diversification, adaptive capacity and effective enforcement are present in the area. In contrast, others show moderate resilience. The findings highlight the need for integrated policies that address environmental management, institutional support, livelihood diversification, and nutrition to strengthen the resilience of coastal fishing communities.

Keywords: *Climate risk, Fisheries governance, Livelihoods, Resilience index, Vulnerability index*

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INTRODUCTION

Coastal fisheries are vital to food security, nutrition, and livelihoods in the Philippines, particularly for small-scale fishing communities (Nieman et al., 2021). Small-scale fisheries contribute around 26.6 % of total fisheries production and support an estimated 2.19 million municipal fishers (BFAR, 2021), providing both income and a primary source of protein (FAO, 2023). However, climate variability, environmental degradation, and weak governance threaten these communities by reducing fish stocks, limiting income opportunities, and increasing vulnerability to hazards (Allison et al., 2009; Cheung et al., 2013; Béné et al., 2018). These stressors can lead to reduced dietary diversity, food insecurity, and uneven resilience, particularly in areas with limited livelihood options. Understanding these dynamics is crucial for supporting households' ability to maintain food security and livelihoods, contributing to SDG 2: Zero Hunger, SDG 13: Climate Action, and SDG 14: Life Below Water. This study assesses vulnerability, resilience, and food security across municipalities in the Davao Region to inform more sustainable and equitable fisheries management. The Bureau of Fisheries and Aquatic Resources (BFAR, 2021) reports that small-scale fisheries contribute approximately 26.6% of the country's total fisheries production and provide livelihoods for an estimated 2.19 million municipal fishers, highlighting their importance to both the national economy and household food systems. Similarly, the Food and Agriculture Organization (FAO, 2023) emphasizes that fisheries remain a major source of animal protein for Filipino households, especially in coastal and rural areas, and that the sector is increasingly threatened by climate variability, environmental degradation, and governance challenges. Despite their central role in food production, fishing households continue to experience nutritional gaps, livelihood vulnerability, and uneven resilience capacities. This policy brief emanates from fieldwork conducted in October 2025 in 10 study sites in Davao Gulf, through one-on-one interviews with 30 fishermen from each municipality with more than 5 years of experience.

This policy brief presents an integrated analysis of fishers' vulnerability levels and resilience across selected municipalities, aimed at reducing vulnerability and strengthening the resilience of coastal fishing communities in the Davao region through policy interventions. Using the 13 indicators adapted from (Chen et al., 2014).

We compute the resilience and vulnerability using the following formula:

$$\text{Vulnerability} = M_{a_i} = \frac{M_{a_{actual}} - M_{a_{min}}}{M_{a_{max}} - M_{a_{min}}} \qquad \text{Resilience} = RI - 1 - \frac{VI - VI_{min}}{VI_{max} - VI_{min}}$$

Figure 1. Data gathering and in different study sites. Showing food availability in the area (A), fishing boats (B), fisherfolk interviewed (C,D)

Vulnerability of fishing communities

The findings of this study demonstrate significant variation in both vulnerability and resilience across coastal fishing communities in the Davao Region, directly addressing the study's objective of identifying factors that influence adaptive capacity. Municipalities such as Mabini and Pantukan, which exhibit moderate vulnerability but low resilience, highlight areas where limited institutional and community coping mechanisms compound exposure to environmental hazards (Allison et al., 2009). In contrast, Governor Generoso and Sta. Maria demonstrates high resilience despite moderate vulnerability, suggesting that strong institutional support, organized fisherfolk networks, and livelihood diversification enhance the capacity to respond to and recover from shocks (Macusi et al., 2023).

Table 1. Level of vulnerability and resilience.

Municipality	Vulnerability	Interpretation	Resilience	Interpretation
Mabini	0.53	Moderate	0	Low
Pantukan	0.5	Moderate	0.15	Low
Samal	0.15	Low	0.23	Low
Sta. Cruz	0	Low	0.48	Moderate
Carmen	0.1	Low	0.5	Moderate
Mati City	0.43	Moderate	0.51	Moderate
Malita	0.42	Moderate	0.57	Moderate
Don Marcelino	0.41	Moderate	0.6	Moderate
Governor Generoso	0.39	Moderate	0.73	High
Sta. Maria	0.33	Low	1.01	High

Note: Low 0.00-0.33, Moderate 0.34-0.66, High 0.67-1.00)

The contrast between low- and high-resilience municipalities underscores the interconnected nature of vulnerability drivers, environmental risks, governance constraints, and livelihood limitations. It demonstrates the importance of a multi-dimensional approach to resilience assessment municipalities with moderate resilience, including Mati City, Malita, Don Marcelino, Carmen, and Sta. Cruz reveals partial adaptive capacity, suggesting that moderate exposure can be managed when supported by effective local governance and community organization, but gaps remain that may limit long-term coping.

By integrating findings on vulnerability and resilience, this study provides an evidence-based framework for identifying municipality-specific drivers of risk and capacity (Macusi et al., 2023). The results highlight that resilience is not solely determined by exposure but also by communities' ability to mobilize social, institutional, and livelihood resources. This integrative analysis aligns with the study objectives by clarifying which municipalities are most at risk, which factors underpin their resilience levels, and how interventions can be targeted to strengthen adaptive capacity in a context-sensitive manner.

Resilience and adaptive capacity

Despite similar levels of vulnerability, resilience varies substantially across municipalities. Governor Generoso and Sta. Maria demonstrate high resilience, indicating strong adaptive capacity despite moderate vulnerability. This suggests that local conditions, such as institutional support, livelihood strategies, and social networks, may enhance coping and recovery mechanisms (Macusi et al., 2023). In contrast, Samal, Mabini and Pantukan exhibit low resilience despite moderate vulnerability, revealing limited capacity to adapt to environmental and economic pressures. This mismatch indicates that exposure to risk is compounded by weak institutional support, heavy dependence on fishing, and limited livelihood diversification (Cheung et al., 2013). Municipalities with moderate resilience, including Mati City, Carmen, Malita, and Don Marcelino, can partially absorb shocks but remain vulnerable to long-term stressors.

CONCLUSION

Small-scale fishing communities remain vital to coastal food security but face persistent nutritional gaps, environmental risks, and governance challenges. Addressing these issues requires integrated, place-based policies that strengthen nutrition, environmental sustainability, institutional support, and livelihood diversification. Targeted and coordinated action can reduce vulnerability and build resilient coastal fishing communities.

Policy implications and recommendations

1. Local government units (LGU's) in Mabini and Pantukan should promote livelihood diversification by supporting small-scale aquaculture (milkfish, grouper, and lobster culture), establishing fish processing cooperatives (dried fish and boneless products), and developing coastal tourism activities (island hopping, snorkeling services, and beach-related employment). These initiatives should be supported through skills training programs, microcredit access, and shared hatchery and fish processing facilities.
2. LGU's in Samal should implement programs that strengthen sustainable aquaculture systems (milkfish cages, grouper culture, and seaweed farming), develop community-based fish processing enterprises, and promote coastal tourism services such as boat operations, snorkeling guides, and homestay programs, supported by capacity building, cooperative management, and access to small enterprise financing. LGU's in Mati City, Malita, Don Marcelino, Carmen, and
3. Sta. Cruz should strengthen fisherfolk associations and cooperatives, enforce community-based fisheries resource management, and expand alternative livelihood opportunities including aquaculture (milkfish ponds and seaweed farming), post-harvest fish processing (drying and smoking), and improved market access and value chains.
4. Governor Generoso and Sta. Maria, which demonstrate higher resilience, should be supported as model municipalities by sustaining diversified livelihoods such as coconut farming, livestock production, vegetable cultivation, and small-scale aquaculture, and by facilitating knowledge-sharing and replication of best practices to neighboring coastal municipalities.
5. Across all municipalities, LGU's and relevant agencies should implement community-based climate and environmental management programs, including mangrove rehabilitation, coral reef restoration, seasonal fishing regulations, coastal clean-up initiatives, and disaster preparedness systems to strengthen the adaptive capacity and long-term sustainability of coastal fishing communities.

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AUTHOR CONTRIBUTIONS

J. E. J, E. D. M., and A. O. L: Conceptualized the study prepared the draft, and wrote the primary text. E. S. M., and M. I. B: Prepared the figures of the study. All of the authors reviewed the policy brief and answered the comments.

DECLARATION

Informed consent statement

Formal approval was secured from the Municipal Mayor, Barangay Captain, and the Provincial Environment and Natural Resources Office (PENRO), along with other concerned agencies in the earlier research on which this policy brief is based. We adhered to established ethical standards in research involving human participants. Informed consent was obtained from all respondents after explaining the objectives, procedures, and potential implications of the study. Participation was entirely voluntary, and respondents were informed of their right to withdraw at any point without penalty. Strict confidentiality and anonymity were observed, and all data collected were used exclusively for academic purpose

Conflict of interest

The authors declare no conflict of interest.

AI Desclosure

The authors declare that no Artificial Intelligence (AI) or AI-assisted technologies were used in the preparatin of this manuscript.

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