

Enhancing livelihood resilience: strategies and challenges among labor fishermen's households

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Abstract. This study examines the livelihood strategies and family resilience of labor fishermen's households in Jember Regency, East Java, Indonesia. Fishing households are highly vulnerable to environmental uncertainty, seasonal fluctuations, and income instability, requiring them to adopt various adaptive strategies to sustain their livelihoods and well-being. A qualitative research approach was employed, with data collected through in-depth interviews, participant observation, and document analysis. Informants were purposively selected based on their involvement in fishing-related livelihoods. Data credibility was ensured through triangulation techniques. The findings reveal that labor fishermen's households employ several livelihood strategies to cope with economic vulnerability, including: (1) livelihood intensification and extensification through the optimization of fishing activities and the expansion of fishing areas; (2) livelihood diversification through engagement in non-fishing occupations and the active participation of family members in income-generating activities; and (3) temporary migration to access alternative employment opportunities. The study further identifies four major forms of livelihood capital that support these strategies: natural capital, financial capital, human capital, and social capital. These assets play a critical role in enhancing households' adaptive capacity and strengthening family resilience. The study concludes that the integration of multiple livelihood strategies and the effective utilization of livelihood assets enable labor fishermen's households to maintain their livelihoods, meet basic family needs, and improve their resilience in the face of socioeconomic and environmental challenges. The findings contribute to a more comprehensive understanding of the relationship between livelihood strategies and family resilience in vulnerable coastal communities.

Keywords: family resilience, labor fishermen, livelihood assets, livelihood diversification, livelihood strategies, sustainable livelihood framework.

Introduction. The livelihoods of small-scale fishermen are highly dependent on the availability and sustainability of fishery resources. However, these communities are often vulnerable to various external factors, including environmental changes, government policies, and socio-economic shocks (Siguan et al., 2022). Nevertheless, many small-scale fishermen face limited access to productive assets and financial resources, which constrains their adaptive capacity and increases their vulnerability during times of crisis (Erreull et al., 2021). These environmental pressures contribute to declining catches, reduced productivity, and increased uncertainty for small-scale fishing communities (Muhala et al., 2021). Consequently, strengthening the resilience of small-scale fishermen requires a comprehensive understanding of both economic and environmental dimensions that influence their livelihood sustainability.

Puger Kulon Village, located in Jember Regency, East Java, Indonesia, is an area with substantial marine fisheries potential. The majority of local residents depend on the marine capture fisheries sector for their livelihoods, working either as fishing vessel owners or as labor fishermen. In addition, employment opportunities in coastal areas remain limited, with alternative livelihoods largely confined to fish processing activities and employment in fish-processing industries. As a result, many fishermen's wives engage in

small-scale trading or fish marketing to supplement household income (Magfiroh & Sofia, 2020). The inherent uncertainty associated with fishing activities requires fishermen to develop adaptive strategies to ensure their survival, including livelihood diversification and the utilization of social support networks provided by communities and government institutions (Chuenpagdee & Song, 2012).

The dynamics of fishermen's livelihoods can be better understood through the concept of livelihood strategies. These strategies play a significant role in shaping employment opportunities, economic status, household welfare, adaptation capacity, food security, and the sustainability of natural resource utilization (Widodo, 2011). The selection of an appropriate livelihood strategy depends on the specific socioeconomic conditions and resource availability of each fisherman. When income sources are limited, fishing households often develop diverse livelihood patterns to fulfill household needs and strengthen family resilience (Hasriyanti & Hendra, 2021).

In many traditional fishing communities, livelihood practices remain largely subsistence-oriented, with catches primarily intended to meet household consumption needs (Metalisa et al., 2022). Nevertheless, fishermen increasingly employ a variety of adaptive strategies, including occupational diversification, the utilization of local resources, and adjustments to environmental and economic changes (Zamzami et al., 2023). These adaptive responses are essential for maintaining household stability amid the uncertainties associated with fisheries-dependent livelihoods.

The livelihood strategies adopted by fishermen's households are closely linked to family resilience (Novikarumsari et al., 2020). Family resilience refers to a family's capacity to cope with, adapt to, and recover from challenges and adversities encountered throughout the family life cycle (Anggraini, 2018). A resilient family is characterized by its ability to optimize available resources and effectively mobilize its internal strengths to overcome difficulties. According to Musfiroh et al. (2019), family resilience reflects the capacity of a family system to adapt, reorganize, and maintain stability following disturbances caused by economic, social, or environmental pressures. This perspective emphasizes the family's inherent potential to strengthen its resilience and successfully navigate life challenges.

Family resilience can be enhanced through various livelihood maintenance and income-generating strategies that improve a household's capacity to meet its physical and psychosocial needs (Anshar et al., 2021). In Indonesia, family resilience is conceptualized under Law No. 52 of 2009 as a multidimensional construct encompassing physical resources, family management processes, coping mechanisms, and the fulfillment of physical, social, and psychological needs.

From a theoretical perspective, livelihood strategies and family resilience are closely interconnected. The sustainable livelihood framework (SLF) emphasizes that households utilize a combination of livelihood assets, capabilities, and adaptive strategies to cope with vulnerabilities and sustain their well-being under changing socioeconomic and environmental conditions. At the same time, family resilience theory highlights the ability of families to adapt, recover, and maintain functional stability when confronted with adversity. In fishing communities, particularly among labor fishermen, livelihood insecurity resulting from fluctuating catches, unstable incomes, and limited access to productive assets can directly affect family resilience. Consequently, understanding how livelihood strategies contribute to strengthening family resilience is essential for developing policies and interventions that support the sustainability of fishing households.

Although previous studies have extensively examined livelihood strategies in fishing communities and family resilience in vulnerable households, research integrating these two dimensions remains limited. Most existing studies have focused either on the economic adaptation of fishermen or on the social and psychological aspects of family resilience, with little attention given to the interaction between the two. Furthermore, labor fishermen represent one of the most economically vulnerable groups within coastal communities due to their dependence on fishing vessel owners, limited asset ownership, and restricted livelihood alternatives. Despite their vulnerability, empirical evidence regarding how labor fishermen's households develop livelihood strategies to strengthen family resilience

remains scarce. Addressing this gap is important for advancing the understanding of livelihood sustainability and resilience among coastal households.

This study contributes to the existing literature by integrating livelihood strategy and family resilience perspectives within a single analytical framework using a qualitative approach. Unlike previous studies that have examined these concepts separately, this research investigates how livelihood strategies adopted by labor fishermen's households contribute to the development and maintenance of family resilience. By focusing specifically on labor fishermen in a coastal community, this study offers empirical insights into the adaptive mechanisms employed by vulnerable fishing households in responding to economic and environmental uncertainties. Therefore, this study aims to explore the livelihood strategies adopted by labor fishermen's households and to examine how these strategies contribute to strengthening family resilience, particularly during periods of low fishing productivity and seasonal uncertainty.

Material and Method

Site study. This study was conducted in Puger Kulon Village, Puger District, Jember Regency, East Java, Indonesia. The research site was purposively selected because it has the largest fishing population in Jember Regency and represents one of the most important marine fisheries centers in the region. Covering an area of approximately 5.41 km², Puger Kulon Village possesses substantial marine and fisheries resources and is characterized by a high dependence on capture fisheries as the primary livelihood source for local households.



Figure 1. Research location.

Geographically, the village is bordered by Mojosari Village to the west, Puger Wetan Village to the east, Grenden Village to the north, and the Indian Ocean to the south. The coastal location and strong reliance on marine resources make Puger Kulon Village an appropriate setting for examining livelihood strategies and family resilience among labor fishermen's households.

Informant selection. This study used a qualitative research approach to gain an in-depth understanding of the livelihood strategies and family resilience of labor fishermen's households. Informants were selected using purposive sampling, which enables researchers to identify participants who possess relevant knowledge and experience related to the research objectives (Sugiyono, 2017). The selection criteria included: (1) labor fishermen who served as heads of households, and (2) the wives of labor fishermen. These informants were considered capable of providing comprehensive information regarding household livelihood strategies, income-generating activities, adaptation mechanisms, and family resilience in response to economic and environmental uncertainties.

Data collection. Data were collected through multiple qualitative techniques, including in-depth interviews, participant observation, and documentation review. In-depth interviews were conducted to explore informants' experiences, perceptions, and adaptive strategies in maintaining household livelihoods and resilience. Observations were undertaken to obtain contextual information regarding daily livelihood activities and social interactions within the fishing community. Documentation, including village profiles, statistical records, and other relevant documents, was used to complement and verify information obtained from the interviews and observations.

This study employed an integrated analytical framework combining the SLF and family resilience theory. The SLF provided a lens for understanding how labor fishermen's households mobilize and combine various livelihood assets, including human, social, financial, physical, and natural capital, to cope with vulnerabilities and maintain livelihood sustainability. Furthermore, the framework facilitated the examination of livelihood diversification and adaptation strategies implemented during periods of economic hardship and seasonal fluctuations.

Family resilience was analyzed using the multidimensional perspective of family resilience as articulated in Indonesian Law No. 52 of 2009. This framework emphasizes the capacity of families to manage resources, adapt to challenges, fulfill physical and psychosocial needs, and maintain family functioning under adverse conditions. By integrating these two frameworks, this study examined not only how livelihood strategies are developed by labor fishermen's households but also how such strategies contribute to enhancing family resilience. The combined framework served as the basis for designing interview protocols, guiding data collection, and interpreting the empirical findings.

Data analysis and trustworthiness. Data were analyzed using the interactive model developed by Miles and Huberman (2014), which consists of four interconnected stages: data collection, data reduction, data display, and conclusion drawing and verification. These stages were conducted iteratively throughout the research process to facilitate continuous reflection and interpretation of the findings.

To enhance the credibility and trustworthiness of the study, triangulation techniques were employed (Sugiyono, 2017). Triangulation was conducted by comparing and cross-checking information obtained from different data sources and collection methods, including interviews, observations, and document analysis. This process enabled the researchers to validate findings and ensure the consistency and reliability of the data.

Results and Discussion

Patron-client relations in fishing communities. Based on the Puger Kulon Village Profile (2021), the village has a total population of 16,201 residents. Fishing activities constitute one of the primary livelihood sources for local households, particularly those living in coastal areas. Within this socio-economic setting, patron-client relationships have long been embedded in the fishing community and have gradually evolved into an institutionalized social practice among local fishermen.

The patron-client system primarily emerges from fishermen's need for accessible financial capital. Given the high level of uncertainty associated with fishing activities, including fluctuating catches, unstable market prices, and unpredictable weather conditions, many fishermen experience difficulties in obtaining formal credit. Consequently, they rely on patrons (juragan) who provide capital loans, operational support, and economic assistance. However, these financial arrangements often create long-term dependency relationships that restrict fishermen's autonomy and bargaining power (Rusydi et al., 2021).

Previous studies have shown that patron-client relationships in fishing communities are characterized by asymmetrical power relations that may reinforce economic dependency and social inequality (Hermawan et al., 2013). Although patrons frequently provide financial security and social protection during periods of hardship, these forms of assistance are often accompanied by implicit obligations that bind fishermen to particular patrons. As a result, labor fishermen frequently face limited opportunities to improve their

economic position or access alternative sources of livelihood. The persistence of patron-client relations therefore reflects both the vulnerability of fishing households and the absence of accessible institutional support systems.

Demographic characteristics and livelihood context. Regarding Badan Pusat Statistik Kabupaten Jember (2025), the productive age population plays an important role as the main actor in economic activities because it has relatively higher work ability and productivity compared to other age groups. The condition of pupulation presented in Figure 2 illustrates the distribution of population according to productive age groups in Puger Kulon Village.

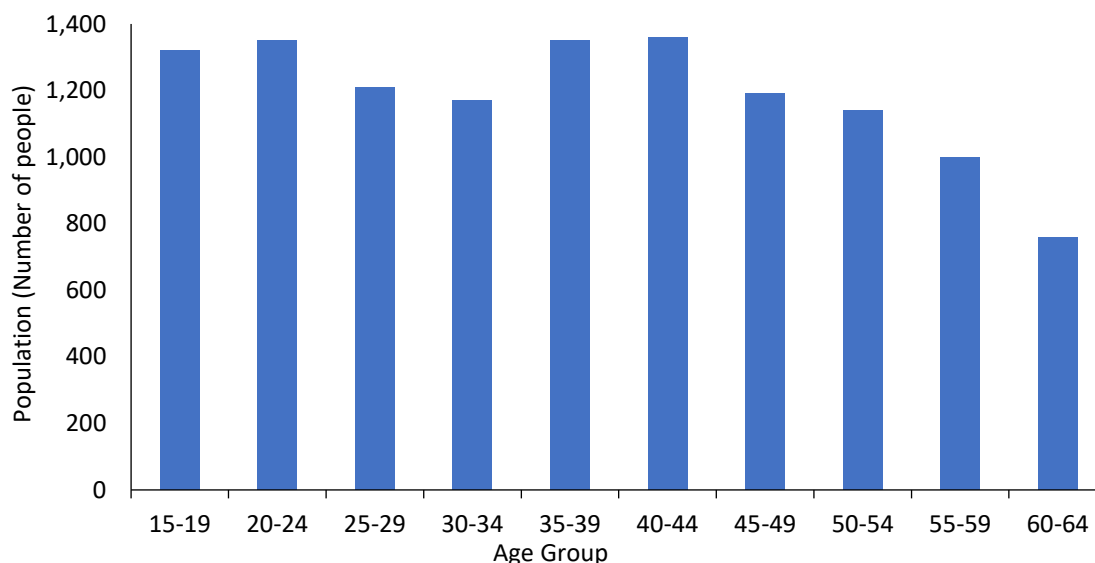


Figure 2. Population on productive age in 2021.

In Figure 2, the productive-age population ranges from 15 to 64 years. The relatively large proportion of residents within productive age groups represents an important human resource potential for local economic development. In fishing communities, productive-age individuals constitute the primary labor force engaged in fishing activities, fish processing, marketing, and other livelihood-related occupations. The availability of a productive workforce is particularly important for sustaining household income and supporting adaptive livelihood strategies in response to environmental and economic uncertainties.

However, productive age alone does not necessarily guarantee economic resilience. The capacity of households to maintain sustainable livelihoods depends on access to employment opportunities, productive assets, education, and social networks. Therefore, the demographic structure of Puger Kulon Village should be understood not only as a labor resource but also as a determinant of household adaptive capacity and family resilience.

The demographic profile of the village indicates the availability of a productive workforce and a moderate level of educational attainment. However, limited employment opportunities outside the fisheries sector and restricted access to financial resources continue to shape the livelihood choices of labor fishermen's households. These contextual conditions provide the foundation for understanding the livelihood strategies and resilience mechanisms identified in this study.

Employment structure and livelihood diversification. The pattern of work relations formed along with the social stratification formed in fishermen can generally be classified into patron-client patterns and exploitative patterns (Setyowati et al., 2020). The economic sector classification, presented in Figure 3, illustrates the distribution of the population according to economic sector classification.

The Figure 3 shows that the primary sector includes fisheries and agricultural labor, while the secondary and tertiary sectors encompass small-scale enterprises, trade, services, and public-sector employment.

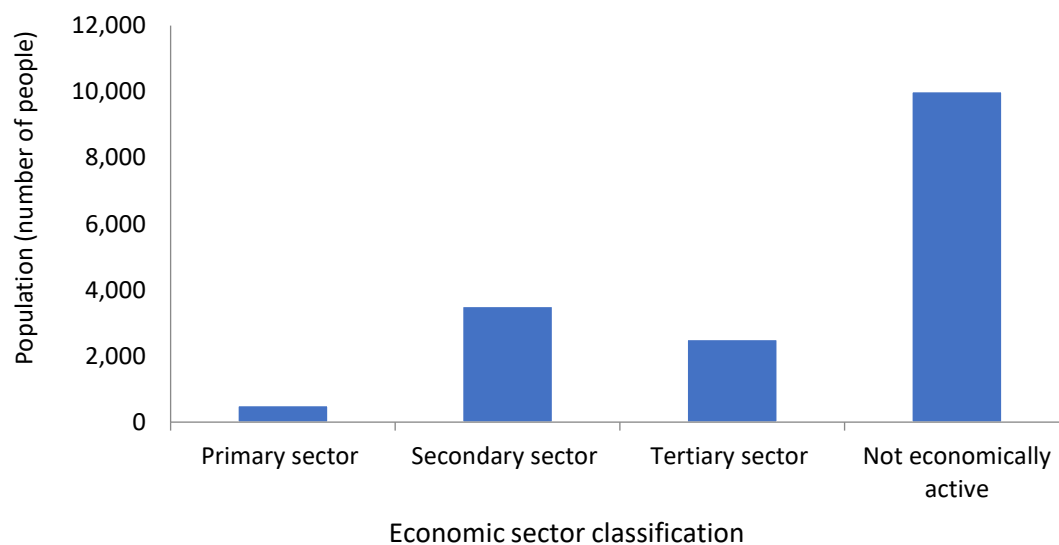


Figure 3. Population distribution based on economic sector.

The findings indicate that only a limited proportion of the population is directly engaged in primary-sector activities, including fisheries. Meanwhile, a considerable share of residents is employed in secondary and tertiary sectors, and a substantial proportion is categorized as economically inactive. This employment structure suggests that livelihood opportunities in Puger Kulon Village are becoming increasingly diversified.

Livelihood diversification is widely recognized as an important adaptive strategy among vulnerable households. For fishing families, dependence on fishing as the sole source of income exposes households to significant risks associated with weather variability, seasonal fluctuations, and market instability. Consequently, engagement in non-fishing activities provides an alternative income source that can reduce economic vulnerability and strengthen household resilience.

The existence of secondary and tertiary economic activities also contributes to social resilience by expanding employment opportunities and reducing dependence on marine resources. Diversified livelihood portfolios enable households to absorb shocks, adapt to changing conditions, and maintain economic stability during periods of reduced fishing productivity. Furthermore, the relatively large proportion of economically inactive residents represents potential human capital that could be mobilized through skills development, entrepreneurship programs, and livelihood-support initiatives. Strengthening human capital and expanding livelihood opportunities are therefore essential strategies for enhancing household resilience and promoting sustainable coastal development.

Educational profile and human capital development. Rahmawati et al. (2023), human capital consists of household labor, influenced by education, skills, and health. In line with this study, human capital, including the educational profile. The educational structure of Puger Kulon Village, presented in Figure 4, is dominated by residents with basic educational attainment, while the proportion of individuals with secondary education is moderate and participation in tertiary education remains relatively low.

Education constitutes a critical component of human capital and plays a significant role in determining livelihood opportunities, adaptive capacity, and household resilience. Individuals with higher levels of education generally possess greater access to information, broader employment opportunities, and stronger capacities to respond to economic and environmental changes. In fishing communities, education can facilitate the adoption of

innovative livelihood strategies, improve financial management skills, and enhance access to institutional support programs.

The relatively limited proportion of tertiary-educated residents may constrain the community's capacity to engage with emerging technologies, digital marketing platforms, and alternative livelihood opportunities. Furthermore, lower educational attainment may reduce fishermen's ability to access formal financial institutions, participate in training programs, and diversify income sources beyond fishing activities.

From a family resilience perspective, education strengthens households' ability to make informed decisions, manage risks, and adapt to changing socio-economic conditions. Therefore, investments in education, vocational training, and fisheries extension services are essential for enhancing human capital and improving the long-term resilience of labor fishermen's households. Strengthening educational opportunities can support livelihood diversification, reduce vulnerability, and contribute to the sustainable development of coastal communities.

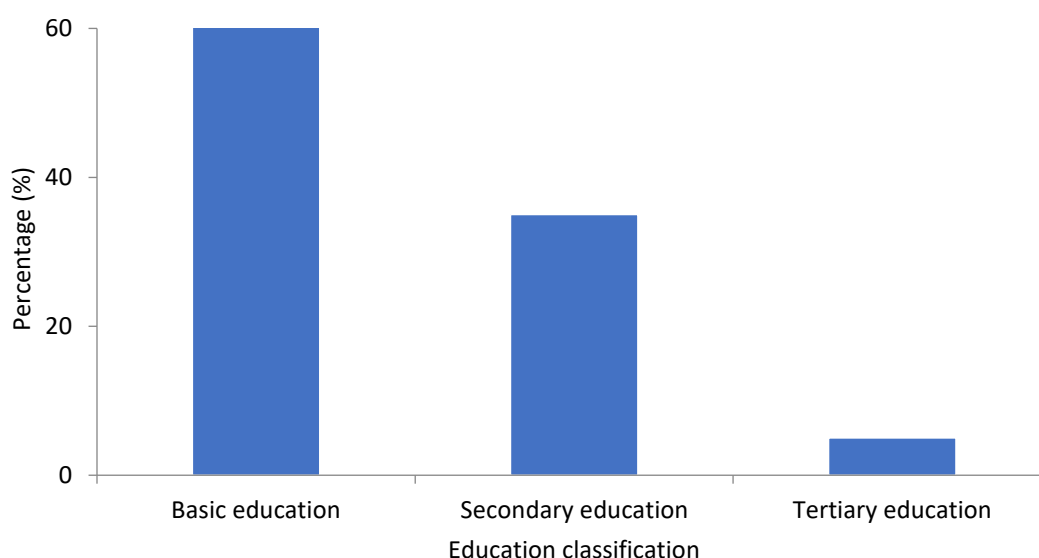


Figure 4. Distribution of education level (2021).

Livelihood sources of labor fishermen's households. The ability of households to formulate and implement livelihood strategies is closely associated with their access to livelihood assets or capital. These assets serve as fundamental resources that support income generation, risk management, and adaptation to changing livelihood conditions. Households with greater access to livelihood capital generally possess a wider range of livelihood opportunities and a stronger capacity to respond to economic and environmental uncertainties (Gustika et al., 2023). According to Scoones (1998), livelihood capital comprises four key dimensions: natural capital, financial capital, human capital, and social capital. The availability and utilization of these forms of capital significantly influence household livelihood outcomes and long-term resilience.

Table 1 presents the livelihood assets owned by labor fishermen's households in Puger Kulon Village. Consistent with the SLF proposed by Scoones (1998), four major forms of livelihood capital were identified: natural capital, financial capital, human capital, and social capital. These assets constitute essential resources that support household livelihood strategies and influence the capacity of fishing families to cope with economic and environmental uncertainties.

Table 1

Source of livelihood capital

<i>Capital</i>	<i>Family assets</i>
Nature	. Utilize fish catches for family consumption and selling . Utilize the availability of water for family needs and selling
Financial	. Lack of assets . Insurance program from the government
Human	. Utilize the basic knowledge of fishermen . Utilize other skills of fishermen, laborers and wives
Social	. Utilize their abilities and health . Good relationships with neighbors . Harness trust . Utilize social networks

Natural capital. Natural capital represents the natural resources and environmental services that support livelihood activities, including land, water, air, marine resources, and ecological systems. For fishing households, natural capital is particularly important because their livelihoods are directly dependent on the availability and sustainability of marine resources. Previous studies have highlighted that natural resource assets play a crucial role in determining the welfare of fishing communities (Mustika et al., 2023).

The findings indicate that marine fisheries resources constitute the primary source of livelihood for labor fishermen in Puger Kulon Village. Fish availability directly affects fishing productivity and household income. Consequently, fluctuations in fish stocks, weather conditions, and environmental quality have significant implications for the economic well-being of fishing households. This finding supports Afridania et al. (2022), who argue that fishermen's income is largely determined by the availability of marine and fisheries resources, making natural capital a fundamental determinant of household livelihood sustainability.

Financial capital. Financial capital refers to the financial resources available to households for supporting livelihood activities, including savings, credit, productive assets, and government assistance programs. The study found that labor fishermen's households possess relatively limited financial capital and frequently experience financial constraints, particularly during the off-season when fishing activities decline and household income decreases.

To cope with these challenges, many households rely on informal borrowing arrangements, particularly loans obtained from neighbors, relatives, or patrons. In addition, fishermen in Puger Kulon Village benefit from government assistance programs targeting the capture fisheries sector. Access to such assistance generally depends on recommendations from local stakeholders and beneficiary selection processes established within the fishing community. Similar findings were reported by Patrescia and Rokhani (2023), and Suryadi and Sufi (2019), who noted that financial support and government assistance play an important role in strengthening the livelihood security of fishing households.

Human capital. Human capital encompasses the knowledge, skills, education, labor capacity, and health status of household members that contribute to livelihood activities. Human capital is widely recognized as a key determinant of livelihood diversification and adaptive capacity.

These findings reveal that most labor fishermen and their spouses have relatively low levels of formal education, with the majority completing only primary or junior secondary education. Nevertheless, several respondents had attained senior high school education. Educational attainment influences employment opportunities and the ability of household members to pursue alternative income-generating activities beyond the fisheries sector. Previous studies have emphasized that education contributes to the development of knowledge, skills, and adaptive behavior that enable individuals to respond more effectively to changing socioeconomic conditions (Yulianda et al., 2021).

In addition to education, gender roles also shape the utilization of human capital within fishing households. Women play an important role in supporting household livelihoods through various economic activities, although their contributions are often less visible within fisheries production systems (Conway et al., 1987; Yodanis, 2000). The active participation of fishermen's wives in income-generating activities enhances household adaptive capacity and contributes to livelihood sustainability.

Social capital. Social capital refers to the networks, relationships, norms, trust, and social institutions that facilitate cooperation and collective action among community members. Social capital functions as an important livelihood asset because it provides access to information, financial support, employment opportunities, and social assistance.

The findings indicate that social capital remains a strong and influential resource among fishing households in Puger Kulon Village. Social relationships based on kinship, neighborhood ties, and long-standing community values foster solidarity and mutual assistance among fishermen. These social networks enable households to access informal loans, exchange information, and obtain support during periods of economic hardship.

Furthermore, the fisheries economy in Puger Kulon Village is characterized by interactions among three interconnected actors: intermediary traders, vessel owners (juragan), and labor fishermen. The long-term agreements established between vessel owners and labor fishermen have created enduring social networks that extend beyond economic transactions. These relationships are reinforced by kinship ties, neighborhood connections, and shared cultural values, thereby strengthening social cohesion within the fishing community. Consistent with Mujaddid and Nugroho (2021) and Tanzil (2019), the findings demonstrate that trust, reciprocity, and social networks constitute important forms of social capital that support household livelihood strategies and enhance resilience in the face of livelihood uncertainties.

The findings reveal that labor fishermen's households in Puger Kulon Village rely on multiple livelihood sources to sustain their economic well-being. Although fishing remains the primary source of income, households generally do not depend exclusively on fishing activities due to the high level of uncertainty associated with weather conditions, seasonal fluctuations, and variations in fish catches. Consequently, labor fishermen and their family members engage in various income-generating activities to diversify household earnings and reduce economic vulnerability.

Fishing activities constitute the principal livelihood source for most households. Labor fishermen typically work on fishing vessels owned by patrons or boat owners and receive a share of the catch based on locally established profit-sharing arrangements. However, income from fishing is highly unstable and largely dependent on environmental conditions. During periods of unfavorable weather, rough seas, or low fish availability, fishing activities may be suspended for several days or even weeks, significantly reducing household income.

To cope with these uncertainties, labor fishermen frequently engage in supplementary occupations outside the fisheries sector. Interview data indicate that many fishermen work as construction laborers, agricultural workers, transportation service providers, or casual daily laborers during the off-season. These alternative occupations serve as important sources of income when fishing activities decline and help households maintain their basic consumption needs.

The study also highlights the significant economic contribution of women within fishermen's households. Many fishermen's wives participate in income-generating activities such as fish processing, fish trading, small-scale retail businesses, food vending, and other informal economic activities. Their involvement not only supplements household income but also enhances financial stability during periods of low fishing productivity. This finding demonstrates that household livelihood strategies are not solely dependent on the labor of fishermen but are supported by the active participation of multiple family members.

In addition to wage-based and self-employment activities, some households benefit from social support networks, including financial assistance from relatives, neighbors, community organizations, and patrons. Although these sources do not constitute regular income, they function as important coping mechanisms during periods of economic

hardship. Such support reflects the importance of social capital in sustaining household livelihoods within coastal communities.

From the perspective of the SLF, the livelihood system of labor fishermen's households is characterized by a combination of natural, human, financial, and social capital. Fishing activities primarily depend on natural resources, while supplementary occupations and family-based enterprises utilize human capital and labor resources. Social networks provide access to financial assistance and livelihood opportunities, thereby strengthening household adaptive capacity. The diversification of livelihood sources observed among labor fishermen's households reflects a deliberate strategy to reduce vulnerability, enhance economic security, and improve family resilience in the face of environmental and economic uncertainties.

The resilience of labor fishermen's households is closely associated with their ability to mobilize livelihood assets and adapt to external pressures. Economic uncertainty, environmental variability, and seasonal fluctuations require households to continuously adjust their livelihood strategies in order to maintain household well-being. As argued by Sunesti et al. (2024), the capacity to adapt and respond to changing conditions is a key determinant of resilience among fishing households.

The findings suggest that resilience is shaped not only by economic resources but also by social and institutional factors. Participation in fishermen's groups, strong community networks, household labor availability, and accumulated fishing experience contribute to strengthening households' adaptive capacity and reducing vulnerability (Saksono et al., 2023). Moreover, involvement in social organizations facilitates access to information, mutual support, and collective action, enabling fishing communities to better withstand environmental and economic disturbances (Gustika et al., 2023).

To cope with livelihood uncertainty, households adopt a range of adaptive strategies, including income diversification, adjustment of fishing activities, and expenditure management. These strategies enhance households' ability to absorb shocks and maintain livelihood continuity during periods of economic stress. Therefore, family resilience should be understood as a multidimensional capacity that encompasses not only economic security but also the effective utilization of social capital, institutional support, and adaptive livelihood strategies. Such capacities are fundamental to sustaining household livelihoods and improving the long-term resilience of fishing families.

Livelihood strategies of labor fishermen's households. The livelihood strategies adopted by labor fishermen's households represent adaptive responses to the uncertainties associated with fisheries-dependent livelihoods. Fluctuating fish catches, seasonal variability, unstable incomes, and limited ownership of productive assets require households to continuously adjust their livelihood practices in order to sustain their well-being. Livelihood strategies encompass the ways in which households mobilize and combine available resources to secure income, reduce vulnerability, and cope with economic and environmental risks.

Consistent with the SLF, the livelihood strategies identified in this study can be categorized into three main forms: livelihood intensification and extensification, livelihood diversification, and migration. These strategies are implemented through the utilization of various livelihood assets, including natural capital, financial capital, human capital, and social capital. The choice of strategy depends on household circumstances, resource availability, access to livelihood opportunities, and the capacity of family members to adapt to changing conditions.

The findings demonstrate that labor fishermen's households rarely rely on a single livelihood source. Instead, they employ multiple adaptive strategies to maintain household income and ensure family survival. The utilization of livelihood assets through diversification, expansion of economic activities, and the strategic use of social networks reflects the households' efforts to strengthen their adaptive capacity and enhance family resilience under conditions of livelihood uncertainty (Table 2).

Table 2

Livelihood strategy of fishing laborer family

<i>Livelihood strategy</i>	<i>Livelihood strategies of fishing households</i>
Source of livelihood engineering	Intensification: Use of new technologies such as weather applications and optimization of working hours to increase catch and revenue
Dual livelihood pattern	Extensification: Expanding the fishing area Husband (head of household) has a side job, such as become a pedicab driver, motorcycle taxi driver, construction worker. Involve the wife in increasing income by selling fish, online selling pastries and shrimp paste. Involve children in increasing income by working as employees at store.
Migration	Migrated to other city e.g Bali to work as a construction worker during the famine season

The findings presented in Table 2 indicate that labor fishermen's households employ a variety of livelihood strategies to cope with economic uncertainty and seasonal fluctuations in fishing activities. These strategies include livelihood intensification and extensification, livelihood diversification, family labor participation, and temporary migration. The implementation of these strategies reflects households' efforts to maximize available livelihood assets and strengthen their resilience under conditions of vulnerability.

Livelihood intensification and extensification. Livelihood intensification among labor fishermen is primarily achieved through the optimization of fishing operations and the adoption of technology to improve fishing efficiency. Informants reported utilizing weather forecasting applications, such as Witsuki and Surf Forecast, to monitor sea conditions and determine suitable fishing periods. Access to weather information enables fishermen to reduce operational risks and improve decision-making regarding fishing activities.

In addition to technological utilization, fishermen maximize their working time by extending fishing trips and optimizing labor inputs. Typically, fishermen depart in the morning or afternoon and return the following day, spending most of their available time at sea. Once they return from fishing, the limited time available on land is largely devoted to resting and preparing for subsequent fishing trips. This strategy reflects an effort to maximize labor productivity and increase catch volumes. Similar findings have been reported by Novikarumsari (2023), and Septiani and Nisa (2023), who found that labor optimization represents an important strategy for increasing household income among fishing communities.

Extensification strategies are implemented through the expansion of fishing grounds and increased fishing distances. Fishermen seek alternative fishing locations when catches decline in traditional fishing areas, thereby increasing the likelihood of obtaining higher catches. This finding is consistent with Halimah and Melani (2021), who argue that livelihood adaptation in fishing communities often involves expanding access to fishing resources. Likewise, Wahyuni et al. (2023) identified the expansion of fishing areas, increased labor utilization, longer fishing durations, and technological adoption as key strategies employed by economically vulnerable fishing households.

Livelihood diversification. *The study found that livelihood diversification constitutes one of the most important adaptive strategies among labor fishermen's households. Given the uncertainty associated with fisheries-dependent livelihoods, households rarely rely exclusively on fishing income. Instead, fishermen engage in various non-fishing occupations to supplement household earnings and reduce economic vulnerability.*

Diversification activities include construction work, agricultural labor, transportation services, small-scale trading, and other informal-sector employment. These alternative livelihood activities provide additional income, particularly during periods of low fish catches or unfavorable weather conditions. By diversifying income sources, households are able to spread economic risks and improve their capacity to withstand livelihood shocks.

This finding supports previous studies emphasizing diversification as a critical strategy for livelihood sustainability in vulnerable communities (Hasriyanti & Hendra, 2021; Sadilla, 2022; Novikarumsari, 2023). Diversification not only enhances household income but also increases adaptive capacity by reducing dependence on a single source of livelihood.

Family labor participation. Another important livelihood strategy identified in this study is the active involvement of family members in income-generating activities. The participation of wives and, in some cases, children contributes significantly to household economic security and livelihood sustainability.

The wives of labor fishermen are actively engaged in various economic activities, including fish processing, fish marketing, small-scale retail businesses, food vending, and other informal-sector enterprises. Their contribution provides an additional source of income that helps households cope with fluctuations in fishing earnings. Family labor participation therefore functions as an important mechanism for strengthening household resilience and maintaining economic stability.

These findings are consistent with previous studies conducted by Novikarumsari (2023), Yurike and Syafruddin (2022), and Wahyuni et al. (2023), which demonstrate that the involvement of wives and children plays a crucial role in supporting household livelihoods and improving family welfare in fishing communities.

Temporary migration as a livelihood adaptation strategy. Migration represents another strategy adopted by labor fishermen's households when local livelihood opportunities are insufficient to meet household needs. The findings indicate that labor fishermen in Puger Kulon Village engage primarily in temporary or seasonal migration rather than permanent relocation.

Temporary migration is generally undertaken during periods of low fishing productivity, when fishermen seek employment opportunities outside the fisheries sector. These activities may include construction work, factory employment, transportation services, and other forms of wage labor in nearby urban areas. Such migration enables households to access alternative income sources while maintaining their social and economic ties to the fishing community.

This finding is consistent with Magfiroh and Sofia (2020), who argue that migration often emerges when local resources are unable to provide adequate livelihood opportunities for fishing households. Furthermore, recent reports by the International Labour Organization (2026), highlight the growing importance of labor mobility within fisheries and seafood-related industries in Southeast Asia, while emphasizing the need to ensure decent work conditions for migrant and seasonal workers. In this context, temporary migration serves as an adaptive livelihood strategy that enhances household income, reduces vulnerability, and strengthens the resilience of labor fishermen's families.

Livelihood strategies and household resilience. The findings demonstrate that labor fishermen's households rarely depend on a single adaptive strategy. Instead, they combine intensification, diversification, family labor participation, and temporary migration to manage livelihood risks and sustain household well-being. The integration of these strategies reflects the dynamic nature of household adaptation within fishing communities and illustrates how families mobilize available livelihood assets to cope with environmental and economic uncertainty.

From the perspective of the SLF, these strategies represent practical mechanisms through which households transform livelihood assets into livelihood outcomes. More importantly, the adoption of multiple livelihood strategies contributes not only to income generation but also to the strengthening of family resilience by enhancing households' capacity to absorb shocks, adapt to change, and maintain their long-term well-being.

Family resilience among labor fishermen's households. The findings indicate that family resilience among labor fishermen's households in Puger Kulon Village can be understood through three interrelated dimensions: physical and economic resilience, social resilience, and psychological resilience. These dimensions collectively shape the capacity of households to withstand, adapt to, and recover from economic, environmental, and social challenges.

Physical and economic resilience refers to the ability of households to secure basic needs, manage financial resources, and maintain economic stability despite fluctuations in income. Given the seasonal nature of fishing activities and the uncertainty of fish catches, labor fishermen's households must carefully allocate and manage their limited financial resources.

Interview findings revealed that effective household financial management plays a crucial role in maintaining economic resilience. One informant explained: "*To manage income, part of it is allocated for the children's daily needs and snacks. Parents try to control unnecessary spending, while household expenses are prioritized. If the wife manages the money carefully, it is usually sufficient to meet the family's needs.*" (Informant 2, May 7, 2024)

This statement illustrates the importance of financial discipline and household budgeting in coping with income uncertainty. The findings suggest that families with stronger financial management practices are better able to meet their daily needs and maintain economic stability during periods of reduced fishing income.

Social resilience is reflected in the quality of relationships among family members and the broader social networks available to households. The study found that harmonious relationships between husbands and wives, strong kinship ties, and active engagement with neighbors contribute significantly to household resilience.

Informants reported that family matters are generally prioritized over individual interests and that household heads actively devote time to family interactions despite the demanding nature of fishing work. In addition, social relationships within the community provide access to mutual assistance, information sharing, and informal support during periods of economic hardship. These findings highlight the importance of social capital in strengthening the adaptive capacity of fishing households. The strong sense of solidarity within the fishing community also facilitates collective responses to challenges, thereby enhancing households' ability to cope with livelihood disruptions and external shocks.

Psychological resilience refers to the ability of family members to manage stress, maintain emotional stability, and cope effectively with adversity. The findings indicate that labor fishermen's households generally demonstrate positive coping mechanisms when facing family or economic problems.

Informants emphasized the importance of open communication, mutual understanding, and emotional self-control in maintaining family harmony. Household members reported discussing problems collectively, seeking mutually acceptable solutions, and avoiding prolonged conflicts. These adaptive behaviors contribute to emotional stability and strengthen family cohesion during periods of uncertainty. The findings suggest that psychological resilience serves as an important foundation for household adaptation, enabling family members to remain optimistic and maintain functional relationships despite livelihood challenges.

Strategies for strengthening family resilience. The study further identified several strategies that contribute to strengthening family resilience among labor fishermen's households. These include optimizing family and community support networks, adapting fishing practices to changing environmental conditions, improving knowledge and skills through learning and experience, and expanding access to markets and livelihood opportunities.

Strong family relationships and social networks provide emotional and material support during times of hardship. Meanwhile, adaptive fishing practices, including the use

of weather information and adjustments to fishing operations, enable fishermen to respond more effectively to environmental variability. Capacity development through education, training, and accumulated fishing experience further enhances households' ability to make informed decisions and diversify livelihood opportunities. Improved access to markets and supply chains also contributes to greater income stability and reduced economic vulnerability.

Consistent with Rahadiati et al. (2025), measuring resilience remains challenging because resilience is context-specific and multidimensional. Rather than relying solely on quantitative indicators, resilience should be understood as a dynamic process shaped by the interaction of economic resources, social relationships, institutional support, and psychological capacities. In the context of labor fishermen's households, resilience emerges from the ability of families to mobilize these resources and adapt effectively to changing livelihood conditions.

Conclusions. This study demonstrates that labor fishermen's households in Puger Kulon Village employ a range of livelihood strategies to cope with economic uncertainty and seasonal fluctuations in fishing activities. The main livelihood strategies identified include livelihood intensification and extensification, livelihood diversification through engagement in non-fishing occupations, family labor participation, and temporary migration. These strategies enable households to reduce dependence on fishing income and enhance their capacity to adapt to environmental and economic challenges.

The findings further reveal that family resilience among labor fishermen's households is reflected in their ability to maintain physical and economic well-being, sustain positive social relationships, and develop psychological coping capacities despite livelihood vulnerabilities. Although household incomes are often unstable, most families remain capable of meeting their basic needs, including food, housing, clothing, education, and healthcare, through the strategic utilization of available livelihood assets and social support networks.

From the perspective of the SLF, natural, financial, human, and social capital play important roles in shaping livelihood strategies and strengthening household resilience. Among these assets, human capital emerges as a critical factor in improving long-term livelihood sustainability. Education, skills development, and knowledge enhancement increase households' adaptive capacity and expand opportunities for income diversification beyond the fisheries sector.

The study also highlights the importance of strengthening the productive capacities of fishing households through value-added economic activities. Greater utilization of marine resources through processing, marketing, and other fisheries-based enterprises has the potential to increase household income and improve family welfare. Therefore, policies aimed at enhancing family resilience among labor fishermen should prioritize human capital development, livelihood diversification programs, capacity-building initiatives, and improved access to markets and institutional support. Such interventions are essential for promoting sustainable livelihoods and strengthening the long-term resilience of coastal fishing communities.

This study contributes to the growing body of literature on coastal livelihoods by demonstrating how the integration of livelihood strategies and family resilience perspectives provides a more comprehensive understanding of household adaptation among labor fishermen in vulnerable coastal communities.

Recommendations. This study was limited to labor fishermen's households in a single coastal village, which may restrict the generalizability of the findings to other fishing communities with different socioeconomic and environmental contexts. Therefore, future research should expand the scope of analysis by incorporating multiple study sites and comparing livelihood strategies and family resilience across different coastal regions.

Further studies are also recommended to examine the relationship between livelihood resilience and key household characteristics, such as ownership of productive assets, access to fishing resources, land ownership, and the scale and type of fishing operations. Such analyses would provide a more comprehensive understanding of the

factors shaping household resilience and adaptive capacity within fishing communities. In addition, longitudinal studies could offer valuable insights into how livelihood strategies and family resilience evolve over time in response to environmental, economic, and policy changes.

Future studies should further investigate how differences in livelihood asset ownership, particularly natural, financial, and human capital, shape the resilience trajectories of labor fishermen's households. Comparative studies involving different categories of fishermen (labor fishermen, owner-operators, and commercial-scale fishermen) would contribute to a more comprehensive understanding of livelihood resilience within coastal socio-ecological systems.

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