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Research article

Sustainable Livelihood and Vulnerability Context: Evidence from Mainland and Coastal Villages

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ABSTRACT

This study offers an empirical assessment of the sustainable livelihood components among rural households in South Sumatra, contributing original insights into how different livelihood capitals interact with household well-being. The research aims to analyze the vulnerability context, evaluate the sustainability level of various livelihood assets, and examine the relationship between livelihood capitals and outcomes. Using a quantitative approach within the sustainable livelihood framework, data were collected from households in two villages: mainland and coastal areas. The findings indicate that the overall livelihood sustainability of rural households in both locations falls within the medium category. Physical and natural capitals were the most dominant assets, while financial capital was at a moderate level, and social and human capitals were considerably underdeveloped. The low levels of education among respondents were closely linked to the limited accumulation of human and social capital. Further analysis revealed that certain livelihood assets, particularly social and natural capital, had a significant association with household health status, reflecting a tangible impact on livelihood outcomes. These findings underscore the need for targeted policy interventions that prioritize human capital development and community-based social strengthening to enhance overall livelihood sustainability in rural areas.

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1. INTRODUCTION

A livelihood comprises the capabilities, assets (including both material and social resources), and activities required for living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Natarajan et al., 2022; and Pour et al., 2018). Feuerbacher et al. (2020); and & Komikouma et al. (2021) suggested that the seasonal nature of the agricultural sector and fluctuating commodity prices impact farm income, so that farmers will do additional non-farming work in their spare time.

The sustainable livelihood (SL) framework presents the main factors that affect people's livelihood. People-centered analysis will most likely begin with a simultaneous investigation of people's assets, their objectives (the livelihood outcomes they seek), and the livelihood strategies they adopt to achieve these objectives. A key component in the SL framework, the vulnerability context, refers to the shocks, trends, and seasonality that affect people's livelihoods. This is to improve our understanding of livelihoods, particularly the livelihoods of people with low incomes. Important feedback is likely between (a) transforming structures and process and the vulnerability context, and (b) livelihood outcomes and livelihood assets. Other feedback relationships affect livelihoods, which are not shown. For example, it has been shown that if people feel less vulnerable (Livelihood Outcome), they frequently choose to have fewer children. This has implications for

population trends, which might be an important part of the vulnerability context (Tabares et al., 2022). The consolidation strategy is a strategy for middle-income groups that focuses on the level of security and income stability (Feuerbacher et al., 2020). On the other hand, the choice of a consolidation strategy for sustainable livelihoods was in the form of additional side jobs carried out by farming households.

Deng et al. (2020) believed that livelihood bases, acceleration, and environments determine livelihood sustainability. It can be observed that livelihood capitals or assets are an important part of evaluating the sustainability of livelihoods. Livelihood capital or livelihood assets are an important part of assessing the sustainability of livelihoods. Livelihood capitals refer to the stocks of different types of capital that can be directly or indirectly used to make a living (Srijuntrapun, 2012). They are the basis and foundation for people to carry out various livelihood activities. All kinds of assets depend on the ability to pursue different livelihood strategies (Hua et al., 2017; and Pour et al., 2018). Thus, the attempt to make livelihoods more secure and sustainable has to build on the understanding of the assets people already have and how they are used (Ahmed et al., 2010; Manlosa et al., 2019; and Udoh et al., 2017).

To lead a sustainable life in a better future, people must have not only financial and physical capital but also human capital, social capital, and natural capital. If human capital is low, social capital is also low. With low education, they are less likely to establish communication with other communities outside their environment. Education is one of the most important means of reducing poverty and sustaining economic growth. The role of education is important to prepare the quality human capital needed to build a strong society and competitive economy. Education is positively correlated to productivity, labor earnings, and individual income (Adam & Negara, 2015). Unlike other kinds of production factors, labor migration is naturally followed by the migration of the owner of this particular factor of production. Therefore, the decision to migrate, including return migration and repeat migration, will be affected not only by economic factors but also by non-economic factors embedded in the owner of the factor of production. These non-economic factors might include social, political, and regulatory aspects (Campbell, 2019; and Rabbani et al., 2022). The empirical results confirm the importance of wage gaps and their changes as an important pull factor for driving outward mobility that can be persistent over time. Also, gaps in human capital emerged as a powerful determinant for explaining mobility into countries where returns on human capital are higher (Mara & Landesmann, 2021). The problem is more exacerbated if natural capital is also low. Even though this natural capital is necessary, fertile soil will give a positive signal to support a better life. Households that carry out the accumulation strategy can accumulate capital and utilize all their resources (Tran et al., 2021; and Wang et al., 2022).

The strategies and policies taken should focus on the five capitals above and accommodate the vulnerabilities surrounding low-income people. These assets are influenced by policies and institutions (rules, customs, habits, and organizations). Their access to these assets is strongly influenced by vulnerability, namely powerlessness in facing economic, political, technological, and natural disasters, rising prices, falling production, and job opportunities. Access is also influenced by the prevailing social, institutional, and political environment, affecting how people combine and use assets to achieve their goals. The SL framework shows the complexity of poverty, where if the right strategy is not set, those who are poor will not be able to improve their welfare. Suppose there is a shock (economic and or political). In that case, those who are poor will fall into severe poverty because it requires cooperation between the government and the private sector.

Study by Yuliana et al. (2017); and Yunisvita et al. (2017) confirms that the population living in the area is more prosperous because the area is an area through which the highway leads to the city, so the interconnection between the RUF area and the city is more intensive, and movement of development is faster and in turn, the results of development should be enjoyed more quickly. Their studies indicate that the location close to the city is not a factor directly related to increased welfare but depends on internal and external (humans and surrounding life). Livelihoods will be sustainable if they can cope with and improve themselves from stress and disaster, maintain or enhance skills and assets, provide sustainable livelihoods for the next generation, and contribute to other livelihoods at the local and global levels in the short and long term. Capital Assets in sustainable

livelihoods consist of (a) human capital, (b) natural capital, (c) social capital, (d) physical capital, and (e) financial capital. These assets need to be maintained and increased if these assets are numerically low. For example, education and health as human capital assets must be improved.

Several previous studies have reinforced the utility of the Sustainable Livelihood Approach (SLA) in evaluating rural poverty and development potential. Su et al. (2021), for example, introduced the Sustainable Livelihoods Index (SLI) as a more comprehensive tool for assessing the ability and preparedness of rural households in receiving entrepreneurial assistance. They emphasized that relying solely on income data overlooks key dimensions of poverty, such as resource access and institutional support. Gai et al. (2020) further demonstrated that social capital is a critical determinant of livelihood resilience, particularly in flood-prone areas like Surumana Village. In a related context, Gai et al. (2018) revealed that while human capital appeared relatively strong in coastal Surabaya, limited social networks and disproportionate input-output returns in fishing activities perpetuated household poverty.

Despite these important contributions, several gaps remain. Most existing studies focus heavily on measuring assets while neglecting the varying vulnerability contexts—such as environmental shocks, climate variability, or seasonal pressures—that affect livelihood sustainability across regions Zhao et al. (2019). Moreover, the dynamic relationship between vulnerability and resilience, particularly through the lens of adaptive capacity, has not been systematically incorporated into livelihood analyses Ye et al. (2022). There is also limited research disaggregating data by gender or socio-economic status to understand how different groups experience and respond to vulnerability Martinez-Baron et al. (2024). Additionally, dominant macro-quantitative approaches often fail to capture the nuanced, place-based realities and local coping strategies that shape livelihood sustainability (Rahman et al., 2024; and Sujakhu et al., 2018).

This study addresses these gaps by empirically assessing the sustainability of rural livelihoods across two ecologically distinct areas—mainland and coastal villages in South Sumatra—within the SLA framework. The novelty of this research lies in its integration of contextual vulnerability with multidimensional livelihood capital assessment to better understand variations in household outcomes such as food security and health. In doing so, the study contributes both conceptually and empirically to the refinement of sustainable livelihood analysis in diverse and vulnerable environments. The remainder of this article will detail the research methods in the second section, present and thoroughly discuss the findings in the third, and conclude in the fourth section with implications and policy recommendations.

2. RESEARCH METHODS

This study employed a random sampling technique to select household respondents from two ecologically distinct areas in South Sumatra Province: Pemulutan Village, representing the mainland agricultural area, and Sungsang Village, representing the coastal fishing area. The primary sampling criterion was that the head of the household must be actively engaged in farming or fishing activities. A total of 150 households were surveyed, consisting of 77 households from Pemulutan and 73 households from Sungsang. Data collection was conducted through structured interviews using a standardized questionnaire administered directly to the heads of households.

The analytical approach applied in this study is based on the Sustainable Livelihood Index framework, which reflects the multidimensional nature of rural livelihoods. The concept of sustainable livelihood encompasses several interrelated components, including livelihood assets, livelihood strategies, livelihood outcomes, institutional support, and the vulnerability context. The SLI method, as adopted from the United Nations Development Programme (UNDP), was selected for its simplicity, transparency, and efficiency in synthesizing complex information. In this study, the SLI was constructed using five key livelihood capital indicators: human, physical, social, financial, and natural capital. Human capital was assessed through the highest level of education attained by the household head, representing knowledge and skill capacity. Physical capital was measured by the quality of housing and the availability of household furniture, indicating the physical standard of living. Social capital captured participation in community networks and access to informal support systems. Financial capital considered income sources, savings, and access to credit, while natural

capital reflected access to and utilization of land, water, and other environmental resources. Each capital was measured using composite indicators, standardized into index values, and then aggregated to produce the overall Sustainable Livelihood Index score for each household. These scores were used to compare the livelihood sustainability and vulnerability patterns between the mainland and coastal communities.

Included in social capital are networks, groups, trust, and access to institutions. This is the most difficult aspect to measure in terms of livelihood. In this study, the frequency of attending meetings in the village was used as an indicator. Meanwhile, financial capital includes savings, loans, remittances, and other assets in cash. Usually, this is a measure of well-being. The indicators used are vehicle ownership, gold, and income. These indicators reflect the availability of investment in assets that can improve livelihood options. Finally, natural capital refers to biological and environmental products available to humans from forests, land, and waters. The index built follows Su et al. (2021); and Paul et al. (2020). This research was conducted in rural areas of the mainland (Pemulutan Ulu Village, Pemulutan District, Ogan Ilir Regency) and coastal (Sungsang Village, Sungsang District, Banyuasin Regency). The population in this study are residents who live in poor land and coastal areas, based on their work status: Farmers and Fishermen. We use sampling techniques: (a) using random sampling to get the number of samples (b) purposive sampling to get respondents with characteristics related to occupational strata.

Assuming X_{ijk} and SLI_{ijk} are the values of the i_{th} variable, the j_{th} component of the k_{th} state, and the index for the i_{th} variable represent the j_{th} component of the SLI of the k_{th} state, respectively. The SLI formula is presented in Equation (1) as follows.

$$SLI = \frac{X_{ij} - \min X_{ij}}{max\ X_{ij} - \min X_{ij}} \quad (1)$$

where, $i = 1,2,3 \ldots . n; j = 1,2,3, \ldots n$

Simple arithmetic means are computed at two stages to arrive at the final value of the SLI. In the first stage, the simple arithmetic mean is computed to find the value of the various components of the SLI. In the second stage, the arithmetic mean of various components is computed to capture the value of the SLI. The value of the SLI lies between 0 and 1, where values close to 0 indicate low sustainability and those near 1 mean high sustainability. The condition of the livelihood asset is depicted in a pentagon diagram. To analysis the relationship between livelihood assets and livelihood outcomes, the Cramer Coefficient Correlation Test is used. This is intended to test the relationship between two variables with nominal data. What is done is to look at the level of significance of Phi, Cramer's V, and Contingency Coefficient.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Sustainable Livelihood Index

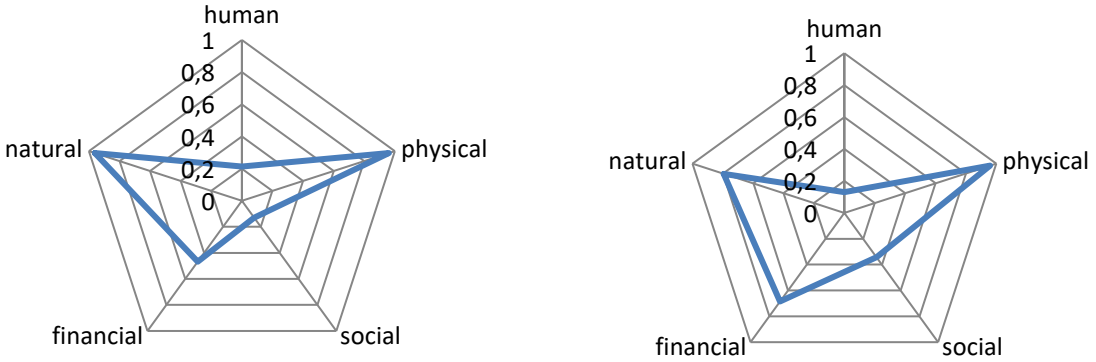
Indicators are identified, and it is assumed that each indicator has the same weight for each group of livelihood assets and outcomes. The condition of the livelihood asset groups in the two villages can be seen in Figure 1. The closeness degree was ranked and graded using the following classifications: grade 1 (0 - 0.2), grade 2 (0.2 - 0.4), grade 3 (0.4 - 0.6), grade 4 (0.6 - 0.8), and grade 5 (0.8 - 1.0); these represented the livelihood sustainability index from low to high.

As shown in Table 1, the lowest score of the Pemulutan village in social capital was 0.124; the highest score in physical and natural capital was 0.961. In Sungsang village, the lowest score was the human capital indicator (0.130), but similar to the Pemulutan village, the highest score also occurs in the physical capital indicator (0.958). An average of 0.546 and 0.582 indicates that the overall livelihood sustainability of rural households in the mainland and coastal areas was at a medium level.

Table 1. Index Weights of The Evaluation Indicator System

Dimension	Criteria	Index	
		Pemulutan	Sungsang
Livelihood assets	Human Capital	0.214	0.130
	Physical Capital	0.961	0.958
	Social Capital	0.129	0.342
	Financial Capital	0.468	0.684
	Natural capital	0.961	0.795

The weighted average of the five types of livelihood capital was calculated according to the weights and scores of indicators. Physical and natural capital (0.959 and 0.878) were relatively high, followed by financial capital (0.576); social capital (0.236) and human capital (0.172) were relatively low (Figure 1).



(a) **Pemulutan Village** (b) **Sungsang Village**

Figure 1. Livelihood Asset in Pemulutan and Sungsang Village

Figure 1 reports livelihood asset in Pemulutan and Sungsang villages, the two villages have livelihood assets in the form of physical assets that are not much different. Pemulutan Village is higher regarding natural assets, but Sungsang Village still needs to improve because the value is quite good (more than 0.5). The only asset in Sungsang village that is very low compared to other assets is human assets, which is even lower than in Pemulutan village. The rest of the livelihood asset component of this village is higher than Pemulutan village. On average, Pemulutan village received a low index of less than 0.5 for the human, social, and financial assets. Likewise, Sungsang village also showed a low asset index found in the human and social. Almost all respondents in the two villages received a high index on Physical and Natural assets, namely between 0.794 and 0.961. This indicates that respondents have low incomes, but basic needs, such as ownership of a house, furniture, and furniture, as well a vehicle, are fulfilled. However, this is the case with fertile soil conditions and waters with lots of fish that have yet to be fully utilized.

3.1.2 Correlation Analysis of Livelihood Assets with Livelihood Outcomes

The relationship between the livelihood assets and the livelihood outcomes is elaborated by the Cramer coefficient correlation test, as shown in Table 2. The table only shows the results of the correlation test between livelihood assets and livelihood outcomes with significant results. The correlation between livelihood assets and livelihood outcomes was examined using the Cramer's V coefficient. As shown in Table 2, only a few significant relationships were found. Income showed a statistically significant correlation at the 10 percent level with business outcomes, indicating that income remains a relevant factor influencing livelihood results. More notably, both the social index and natural index showed a statistically significant correlation with health status at the 5 percent level.

Table 2. Correlation test for Livelihood Assets and Livelihood Outcomes

Livelihood Asset Indicator	Livelihood Outcomes Indicators	Significance		
		Phi	Cramer's V	Contingency Coefficient
Income	Company results	0.081	0.081	0.081
Social Index	Health Status	0.008	0.008	0.008
Natural Index		0.034	0.034	0.034

These results imply that households with better access to social support systems or stronger natural capital—such as access to land or marine resources—tended to report better health conditions over the past year. This highlights the important role of environmental and social dimensions in supporting household well-being, particularly in vulnerable rural settings.

3.2. Discussion

The findings of this study offer valuable insights into the dynamics of livelihood sustainability in two contrasting ecological settings—Pemulutan, representing mainland agricultural households, and Sungsang, representing coastal fishing communities. Although both villages exhibit a moderate level of livelihood sustainability, as indicated by Sustainable Livelihood Index scores of 0.546 and 0.582, respectively, a closer examination reveals notable disparities in the composition and quality of their livelihood capitals. The strengths of both areas lie primarily in physical and natural capital, suggesting that access to infrastructure, housing, fertile land in Pemulutan, and marine resources in Sungsang is relatively adequate. However, these advantages are significantly offset by serious deficiencies in human and social capital, which remain critically low in both locations.

The deficiency in human capital, particularly acute in Sungsang, is reflected in the low educational attainment of household heads, the majority of whom have only completed elementary school. This educational limitation impedes access to relevant information, restricts the ability to adopt new technology or improved practices, and limits participation in higher-value livelihood strategies. It also undermines the household's adaptive capacity to respond effectively to shocks, leaving them vulnerable to ongoing poverty cycles. This challenge is compounded by the weakness in social capital. Many respondents report limited participation in community meetings or collective decision-making processes, often citing a lack of confidence or awareness. As a result, opportunities for collaboration, knowledge sharing, and institutional access are reduced, further weakening the community's ability to build collective resilience. These patterns are consistent with the findings of Mulyasari et al. (2023), who identified human and social capital as the most vulnerable dimensions of rural livelihoods in Indonesia. The present study reinforces this conclusion, emphasizing the need for targeted interventions—such as adult education programs, skill enhancement workshops, and community engagement initiatives—that can strengthen both individual capacity and social networks. Strengthening these areas is not only a matter of individual empowerment but also a prerequisite for more effective and inclusive rural development.

Furthermore, the correlation analysis offers deeper insight into how these livelihood capitals translate into outcomes. As expected, financial capital—proxied by income—shows a significant association with business outcomes, underscoring its direct influence on livelihood performance. More importantly, natural and social capital are significantly correlated with household health status, suggesting that access to natural resources and strong social networks play a vital role in maintaining well-being. These findings highlight the multidimensional nature of livelihood resilience, where economic, environmental, and social factors interact in shaping sustainable outcomes. The differences between Pemulutan and Sungsang also reveal how available resources are being utilized—or underutilized. While Pemulutan possesses high natural capital in the form of fertile land, agricultural productivity remains suboptimal, potentially due to limited access to knowledge, inputs, or investment capital. Meanwhile, in Sungsang, although the fisheries potential is high, inadequate infrastructure, such as cold storage, gear, and transportation, restricts post-harvest efficiency and income diversification. This situation supports the findings of Guo et al. (2023), who describe many rural households as “asset-rich but capability-poor,” with underutilized resources resulting from institutional and skill-based limitations.

Addressing these disparities requires a set of well-designed, context-sensitive policy interventions. Strengthening human capital must be prioritized through non-formal education, vocational training, and targeted support for women and youth in economic activities. This can help rural families engage more effectively in higher-value sectors and improve their ability to adapt to environmental and economic challenges. Simultaneously, the development of social capital should be facilitated through inclusive village governance, participatory planning, and support for rural cooperatives that can strengthen collective resilience and bargaining power. Additionaly, natural capital must be transformed into long-term economic benefits through better resource management and institutional support. In Pemulutan, strategies such as crop diversification, land-use planning, and sustainable farming practices should be encouraged. In Sungsang, small-scale fishers need support through access to credit, equipment upgrades, improved post-harvest facilities, and market access to move up the value chain. As Li et al. (2020) emphasize, income diversification is a critical element of livelihood resilience. When rural households can rely on multiple income sources, they become less vulnerable to shocks and better positioned to improve their overall well-being. Equally important is the adoption of an integrated livelihood development model that does not focus on a single asset type but addresses the interconnection among human, financial, physical, social, and natural capitals. For instance, providing physical infrastructure like irrigation systems or fishing docks should be complemented by capacity-building, access to inputs, market linkages, and institutional support. Moreover, environmental assets must be seen not only as economic inputs but also as enablers of public health and sustainability. The observed correlation between natural capital and health outcomes in this study reinforces the importance of environmental stewardship, clean water access, and food security in achieving broader development goals.

4. CONCLUSIONS

This study has assessed the sustainability of rural livelihoods in two ecologically distinct settings in South Sumatra—Pemulutan (mainland) and Sungsang (coastal)—through the Sustainable Livelihood Index framework. The results reveal that both villages fall into the category of moderate livelihood sustainability. Physical and natural capitals are the most dominant assets in both areas, reflecting relatively good access to infrastructure and environmental resources. However, human and social capital are critically low, indicating a serious limitation in education, skills, institutional participation, and social cohesion. Financial capital is moderate in Sungsang but remains low in Pemulutan, reflecting geographic differences in income-generating opportunities. The correlation analysis further highlights that income is significantly associated with livelihood outcomes related to business performance, while natural and social capital are significantly correlated with health status. These findings emphasize that sustainable livelihoods depend not only on economic strength but also on environmental and social conditions that support household well-being.

Policy perspective side, these findings carry several important implications. First, the consistently low human capital calls for targeted interventions to improve education and skills, particularly through adult education, vocational training, and technical extension services relevant to local livelihoods. Second, the low level of social capital suggests the need for programs that promote community participation and strengthen local institutions—such as the formation of cooperatives or self-help groups. Third, natural capital, although abundant, remains underutilized; therefore, its potential should be unlocked through improved access to tools, technology, and market linkages, especially in the agriculture and fisheries sectors. Moreover, policy strategies should be integrated and multi-dimensional. Programs that provide physical infrastructure must also consider accompanying components such as financial literacy, training, and social inclusion mechanisms. In Pemulutan, policy attention should focus on improving land use efficiency and farm productivity, while in Sungsang, the priority lies in enhancing fisheries value chains and post-harvest processing capacity. This study reaffirms that the sustainability of rural livelihoods is not determined by asset availability alone, but by the ability of households to transform assets into productive outcomes. Effective policy interventions must therefore address structural deficiencies in human and social capital while strengthening institutional frameworks that enable the full use of physical, financial, and natural resources for long-term rural resilience and well-being.

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Authors Contribution: Y. Y., N. T. M., and H. H. jointly conceived and designed the research framework. Y. Y. conducted the field survey and organized the data collection process. Y. Y. and H. H. performed the data analysis and interpretation. N. T. M. contributed to the methodological refinement and provided critical revisions to the manuscript. Y. Y. wrote the initial draft of the paper, and all authors reviewed and approved the final version of the manuscript.

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