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Livelihood Sustainability and Gendered Dimensions in The Fishery Sector: A Case Study in Giao Thuy District, Nam Dinh Province

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Abstract: *This study investigates livelihood sustainability and gender dimensions in the fishery sector of Giao Thuy district, northern Vietnam, using the Sustainable Livelihoods Framework (SLF) with a gender-sensitive approach. Based on household surveys and in-depth interviews, a Sustainable Livelihood Capital Index (SLCI) was developed to evaluate disparities across five livelihood capitals. Findings show that while physical capital remains stable, natural and financial capitals are increasingly constrained by resource depletion and restricted access to formal credit. Social capital plays a dual role: it strengthens adaptive capacity through women's networks and microcredit groups but also reinforces gendered inequalities in professional associations and decision-making. Women contribute significantly to trading, processing, and household reproduction, yet their roles remain undervalued compared to men's dominance in capture fisheries and governance. The study argues that livelihood sustainability must consider gender-equitable access to resources and participation. Policy recommendations highlight gender-responsive credit, recognition of women's contributions, and institutional reforms for inclusive coastal livelihoods.*

Keywords*: sustainable livelihoods, gender, fisheries, SLCI, Nam Dinh.*

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Introduction

Fisheries-based livelihoods play an essential role in global food security while providing income and employment for millions of coastal fishers (FAO, 2022). However, their sustainability is increasingly threatened by resource depletion, climate change, pressures from international market integration, and accompanying social inequalities (Allison & Ellis, 2001; Béné et al., 2010; Marschke & Armitage, 2013). In this context, livelihood sustainability does not solely depend on catch volume but is also shaped by households' access to and use of the five livelihood capitals-human, natural, physical, financial, and social-as well as the distribution of opportunities across social groups. One critical factor influencing livelihood sustainability is the gender dimension. In many coastal communities, men are typically

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engaged in offshore fishing-work that demands physical strength and carries high risks-while women tend to participate in trading, processing, microcredit, and household reproduction (Kleiber et al., 2015; Harper et al., 2013). Despite their increasing contributions to the fishery value chain, women's roles often remain undervalued in official statistics and overlooked in policy frameworks (Bennett, 2005; Weeratunge et al., 2010). This raises important questions about equity in resource allocation and the adaptive capacity of fishing households.

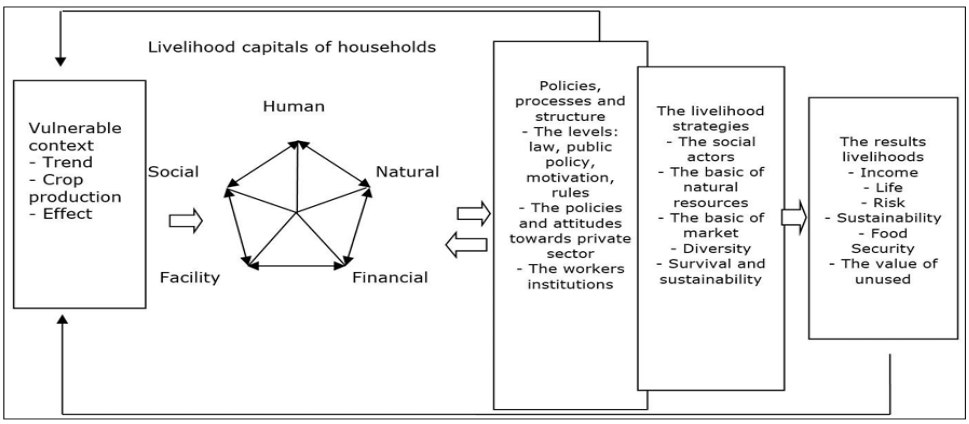
In Vietnam, most fisheries research has focused on yield, technology, and economic efficiency, while studies that integrate livelihood sustainability with gender relations remain limited, particularly in northern coastal provinces. Giao Thuy district (Nam Dinh) represents a typical case where household livelihoods are interwoven across capture fisheries, aquaculture, trade, and services, while simultaneously reflecting gendered divisions, informality, and livelihood precarity. Building on this gap, the present study pursues three objectives: (i) to evaluate the livelihood sustainability of fishing households through the five capitals framework; (ii) to analyze the gendered dimensions of access to and use of these capitals; and (iii) to propose policy directions for promoting gender-sensitive, sustainable, and adaptive livelihoods in contemporary coastal contexts.

2. Theoretical framework and research methods

2.1. Analytical framework

This study adopts the Sustainable Livelihoods Framework (SLF) (DFID, 1999) in combination with the Harvard Analytical Framework (Overholt et al., 1985) to analyze fisheries-based livelihoods. The SLF examines five livelihood capitals: human, natural, financial, physical, and social within contexts of vulnerability driven by environmental, economic, and institutional factors. To quantify the assessment of livelihood sustainability, the study develops a set of indicators for each type of capital and integrates them into the Sustainable Livelihood Capital Index (SLCI). All indicators are standardized and assigned equal weights, with the weighting factor determined by the number of sub-components within each capital. This approach ensures methodological consistency and enables a transparent comparison of the strengths and vulnerabilities of livelihood capitals across household groups. Fishing households are viewed as mobilizing and combining these capitals to pursue diverse strategies: capture, aquaculture, trade, processing, and wage labor; toward sustainable livelihood outcomes.

Figure 1. Sustainable livelihood framework (DFID 1999; Neefjes 2000)



Sustainable Livelihood Capital Index - SLCI

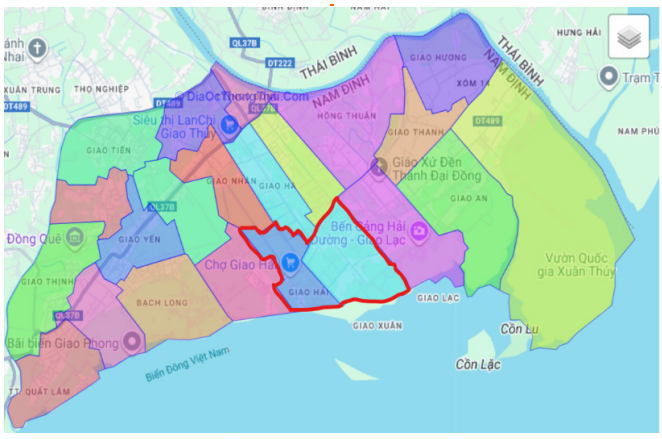
$$SLCI = \frac{\sum_{i=1}^{n} W_{Mi} \times M_{di}}{\sum_{i=1}^{n} W_{Mi}}$$

where WMi is the weighting factor, in this study, determined by the number of components or subcomponents used to mea sure different capitals. The SLCI values, therefore, range from 0 to 1, representing the least to the most sustainable. According to Kamaruddin & Samsudin (2014), household's composite index of SLC from 0.5 and above is considered as a household being sustainable capacity.

2.2. Research site

Nam Dinh province has a 72-kilometer coastline spanning three coastal districts-Nghia Hung, Giao Thuy, and Hai Hau-with 19 communes and towns bordering the sea. The province holds strong potential for developing its maritime economy, especially in capture fisheries, aquaculture, and seafood processing. Among these areas, Giao Thuy district covers about 231 km² with a population of over 190,000 (GSO, 2022) and a coastline of more than 30 kilometers. Key coastal communes such as Giao Xuan, Giao Hai, Giao Lac, and Quat Lam are major centers for fishing, aquaculture, and seafood processing. The fisheries sector employs over 30% of the district's labor force (Giao Thuy People's Committee, 2021). Giao Thuy is also home to Xuan Thuy National Park, Vietnam's first Ramsar site, reflecting the close links between local livelihoods and coastal conservation.

Figure 2. Map of the Giao Thuy district highlighted the surveyed study sites



Giao Hai, Giao Xuan - Giao Thuy

Giao Hai and Giao Xuan were selected as the main research sites. Giao Hai is characterized by its active fishing fleet and central market, which receives landings from both local and neighboring provinces. The market serves as a key economic hub and social space connecting boat owners, traders, fishers, and hired laborers. In contrast, Giao Xuan combines aquaculture-especially clam farming-with nearshore fishing and eco-friendly activities due to its proximity to Xuan Thuy National Park. Together, these two sites illustrate the diversity of coastal livelihoods and highlight gendered divisions of labor, roles, and access to resources within the local fisheries sector.

2.3. Data collection and analysis methods

This study is based on household survey data and qualitative interviews conducted in Giao Thuy district, Nam Dinh province, between March and June 2025.

The Yamane formula was applied to determine the sample size:

$$n = \frac{N}{1 + N \times e^2}$$

where *n* is the required sample size, *N* is the total number of households in the population, and *e* is the acceptable sampling error (set at 10%). The study surveyed 157 households-including 70 boat-owning and 87 non-boat households. The research sample was determined using proportional stratified random sampling, in which the number of boat-owning and non-boat households was allocated according to the actual proportion of each group within the local fishery population (approximately 44.6% and 55.4%, respectively). This distribution aligns with the occupational structure reported in the Giao Thuy District Socio-Economic Report 2024, which indicates that boat-owning fishing households account for around 45% of those engaged in fishery-related livelihoods, while the remainder consists mainly of trading, processing, and service-oriented households. A structured questionnaire gathered data on demographics, assets, labor, income-expenditure, credit access, and gender division of labor. In addition, 25 in-depth interviews, five focus group discussions, and participant observation in fishing and aquaculture sites were conducted with key stakeholders such as boat owners, traders, wage laborers, and female vendors.

Quantitative data were analyzed using descriptive and inferential statistics to assess the five livelihood capitals under the Sustainable Livelihood Framework (SLF). The Sustainable Livelihood Capital Index (SLCI) was computed using a five-strata Likert scale, enabling comparison between boat-owning and non-boat households. Qualitative data were thematically analyzed using MAXQDA, providing contextual insights and triangulation with quantitative findings.

3. Results

3.1. Socioeconomic characteristics

In the two surveyed communes, 70 households owned fishing vessels (44.6%), while 87 households were engaged in seafood trading and related activities (55.4%). Although some households engage in both capture fisheries and seafood trading, the two groups are distinguished based on their primary income source, as vessel ownership and trading activities represent two distinct livelihood models with different capital requirements, operational characteristics, levels of risk, and gender roles. By gender, women accounted for 57.3% of respondents, whereas men represented 43.7% but predominantly held the position of household head and were directly involved in capture fisheries. This reflects the gendered division of labor in the sector, as fishing requires both physical strength and specialized ecological knowledge. In terms of age, household heads were mainly middle-aged (40-55 years, with an average of 49), indicating a combination of physical capacity and accumulated fishing experience. On average, each household consisted of 4.04 members and 2.5 laborers, of which 90% of fishing activities were undertaken by men. House hold size and the gender the gender composition of members are important factors shaping gender roles and relations, as they influence labor allocation, dependency burdens, and the distribution of

decision-making power within fishing families. Notably, 56% of households employed hired labor-such as crew members, processing workers, and seasonal laborers-highlighting the labor-intensive nature of the fishery sector. Education, as a key component of human capital, strongly influences livelihood diversification capacity. The overall low educational attainment constrains households' ability to improve income, access new opportunities, and manage natural resources in a sustainable manner.

According to the Sustainable Livelihoods Framework (SLF), livelihood sustainability is reflected not only in income and improved welfare, but also in reduced vulnerability, enhanced food security, and more sustainable use of natural resources. In this study, household income is considered a key indicator for assessing the sustainability of rural livelihoods in the context of declining fishery resources.

Table 1. Respondents' profile

Indicator	Unit	Value
Gender		
- Male	%	57.3
- Female	%	43.7
Age	Year	49
Number of family employee	People	2.5
Hiring labour	%	56
Educational level		
- Secondary school	%	59

Source: Field survey, 2025.

Table 2. Livelihood diversity and income of households (N=157)

Livelihood activity	% of participation	Annual income per household (USD) (Mean ± SD)	% contribution to total income
Fishing and seafood trading	100.0	2588 ± 1352	49.0
Agricultural production (crop cultivation, livestock, aquaculture)	42.0	980 ± 410	15.6
Other trading and business activities	20.0	1100 ± 460	7.9
Industrial zone wage labour	18.0	1200 ± 430	9.1
Government employees/public officials	6.0	950 ± 280	3.2
Other wage labour (casual/seasonal)	15.0	880 ± 360	6.7
Others (e.g. handicrafts, services)	10.0	1180 ± 370	8.5
Total	–	5278 ± 2100	100

Source: Field survey, 2025.

USD 1 = VND 26.000 (2025).

Mean ± SD denotes for average value of 157 surveyed fishing household and its SD.

Household Livelihood Activities and Annual Income

The analysis indicates that income from capture fisheries and seafood trade accounts for nearly half of total household earnings (49%), underscoring the pivotal role of fisheries in sustaining coastal livelihoods in Giao Thuy. By contrast, agriculture contributes only about 16%, reflecting the contraction of traditional production and a shift of labor away from this sector. Notably, non-fishery activities are gaining importance: employment in industrial zones and wage labor together account for nearly 16% of income, highlighting the growing integration of local workers into non-agricultural production and service chains. Small-scale trade, handicrafts, and other services contribute around 8-9%, forming a diverse yet largely informal income network. This distribution reflects a strategy of livelihood diversification: households simultaneously maintain traditional occupations while gradually expanding into new sectors to spread risks and adapt to declining fishery resources and labor market fluctuations.

3.2. Human capital

Within the Sustainable Livelihoods Framework (SLF), human capital is essential for sustaining and diversifying livelihoods. Fishing households in Giao Thuy have abundant but low-quality labor, relying mainly on middle-aged workers whose long experience serves as "invisible capital" for community resilience (Allison & Ellis, 2001). Yet, their aging workforce raises concerns about declining health in a labor-intensive sector.

Education levels are low, limiting access to technology and policy support, while weak participation in training further reduces adaptability (FAO, 2022). A clear gendered division of labor persists: men handle offshore fishing, and women manage trading and processing (Lentisco & Lee, 2015). However, limited training and poor social protection expose both to precarious labor conditions (Standing, 2011).

Table 3. Human Capital of Households in Giao Thuy (N=157)

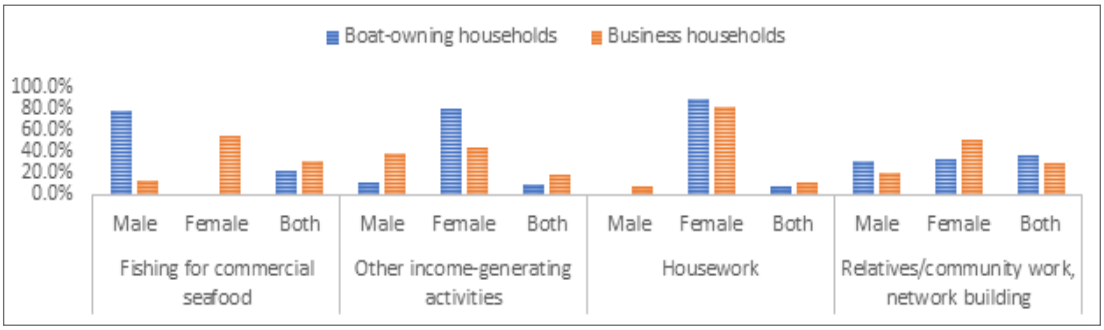
	Boat-owning households (n=70)	Trading households (n=87)	All households (n=157)
Average age of household head	44.1	53.2	49.2
Average years of education	2.11	2.01	2.06
Household size (persons)	4.39	3.77	4.04
Labour force (persons)	2.62	2.43	2.51
Fishing experience (years)	13.5	12.7	13.1
Male household head (%)	72.9	18.4	42.7
Training participation (%)	45.7	12.6	27.4
Hiring outside labour (%)	64.3	51.7	57.3

Source: Field survey, 2025.

In sum, human capital in Giao Thuy embodies both strengths-such as experiential knowledge and community embeddedness-and weaknesses, including low education levels, limited training opportunities, and the aging workforce. These characteristics not only affect livelihood capacity directly but also shape gendered differences in resource access and opportunity distribution.

Livelihood sustainability depends not only on natural and financial resources but also on gender roles that shape access, opportunities, and responsibilities. Men dominate offshore fishing due to its physical demands and risks, while women engage mainly in household work, trading, processing, and social networking. These roles are essential for resilience but remain undervalued and largely absent from official statistics. 80% of women in fishing households reported participating in supplementary income-generating activities (petty trade, wage labor, services), compared with only 10.9% of men.

Figure 3. Decision-making power over key household activities (%) (N=157)



Source: Field survey, 2025.

By contrast, in business households, the gender gap was narrower: women accounted for 43.3% and men 38.3%. This highlights women's crucial role in livelihood diversification and household risk reduction.

3.3. Natural capital

Table 4. Natural capital of surveyed households (N=157)

		Residential land (m^2)			Shop land (m^2)		
Type of household	n	Mean ± SD	Min-Max	(m^2/person)	Mean ± SD	Min -Max	% households owning
Total sample	157	315.4 ± 223.6	20-800	—	—	—	—
Boat-owning households	70	293.8 ± 190.3	20-650	67	—	—	0%
Trading households	87	332.9 ± 247.1	30-800	88	130.4 ± 485.4	0–1,680	37.9%

Source: Field survey, 2025.

Survey results show clear inequality in the distribution of natural capital among fishing households in Giao Thuy. When adjusted for household size, boat-owning households hold only 67 m^2 of residential land per capita, compared with 88 m^2 among trading households, with residential land ranging from 20-650 m^2 and 30-800 m^2, respectively. Inequality is even more pronounced in commercial land: only 37.9% of trading households possess shop land, and its size varies widely (0-1,680 m^2), producing a dual structure in which a small minority

control large, strategically located premises near markets while most operate from very small or temporary stalls.

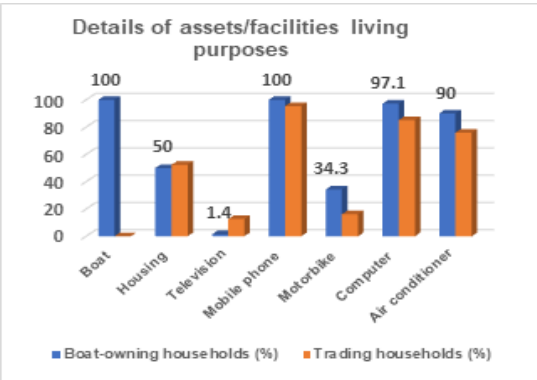
These patterns confirm that natural capital represents both opportunity and risk **(**Allison & Ellis, 2001). Unequal access to land and tidal flats limits adaptive capacity and reinforces socio-economic stratification (Béné, 2009; Nguyen et al., 2018). In Giao Thuy, natural capital functions as a stratified access regime shaping household livelihood trajectories and vulnerability.

Field data indicate heavy dependence on declining marine resources**.** Fishers in Giao Hai practice seasonal, opportunistic fishing, while Giao Xuan households increasingly shift to clam farming to stabilize income and reduce pressure on wild stocks. Yet access to aquaculture space remains unequal, deepening the divide between clam farmers and capture fishers. Overall, coastal ecosystems remain the foundation of livelihoods but also a major source of insecurity amid resource depletion and uneven acces.

3.4. Physical capital

To further clarify the differences in livelihood conditions between household groups, this study analyzes physical capital-one of the five core assets in the Sustainable Livelihoods Framework (DFID, 1999). Physical capital encompasses not only production means such as fishing vessels and gears, but also access to basic amenities and infrastructure, including housing, transportation, and information devices. The following table presents the ownership rates of key assets among boat-owning and trading households, together with statistical test results to identify whether significant differences exist between the two groups.

Figure 4. Physical capital of of surveyed households



Physical capital	Total (%)	χ^2	p-value
Boat	44.6	–	–
Housing	51.3	0.02	0.898
Television	7.6	5.41	0.020
Mobile phone	97.5	1.71	0.191
Motorbike	24.2	6.04	0.014
Computer	90.4	5.23	0.022
Air conditioner	82.2	4.37	0.037

Source: Field survey, 2025.

Findings show clear disparities in physical capital between household groups. All boat-owning households possess fishing vessels, underscoring their dual role as production assets and symbols of socio-economic status. However, differences in household amenities present a more complex picture: boat-owning households own more motorbikes, air conditioners, and computers, while trading households report higher television ownership-contrary to patterns observed in the Mekong Delta and Philippines (Tuyen & Phuong, 2016; Porter, 2012).

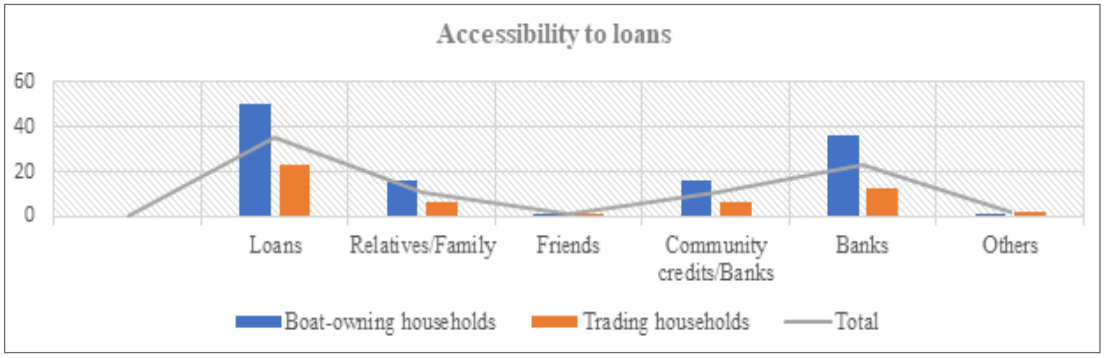
This reflects Giao Thuy's distinct context: income from fishing is high but unstable, leading to investment in durable or educational goods rather than leisure devices. In contrast, trading households, with steadier income, allocate more to social consumption. Hence, physical capital reflects not only productive capacity but also household consumption and investment strategies.

The results challenge earlier studies **(**Kusakabe & Kelkar, 2001**)** by showing that asset distribution is mediated by occupational risk, income stability, and gendered spending decisions**,** rather than by income alone.

3.5. Financial capital

Financial capital constitutes a foundational element in the livelihood strategies of coastal fishing households, as it shapes their capacity to invest in production, sustain consumption, and cope with risks. Within the Sustainable Livelihoods Framework (DFID, 1999), financial capital is derived from savings, formal credit, and informal community-based sources. For fishing households, capital demand is typically high due to costs of fuel, fishing gear, and hired labor, while their ability to accumulate savings remains limited.

Figure 5. Sources of household loans



Source: Field survey, 2025.

Access to credit formal and informal is a key indicator of both vulnerability and livelihood diversification potential. In Giao Thuy, differences in credit access stem from the interplay between social capital, institutional rules, and household livelihood strategies. Boat-owning households are more connected to formal lenders because fishing vessels or land certificates can serve as collateral, enabling easier access to bank and community loans. Their high capital needs for fuel, gear, and labor also reinforce regular interactions with formal credit systems. In contrast, trading households rely more on social capital, particularly kinship ties, neighborhood networks, and rotating credit groups because they lack collateral and face complex bank procedures. These informal networks provide small, flexible loans that match daily cash-flow needs. Thus, credit patterns reflect not only financial capacity but also the differentiated roles of social capital and institutional constraints across livelihood groups.

The survey data reveal a pronounced differentiation in credit access between the two household groups. Boat-owning households reported loan uptake at twice the rate of trading households (50% versus 23%), reflecting their higher capital requirements for fuel, fishing gear, and hired labor. Notably, this group relied heavily on formal credit sources (35.7%

borrowed from banks or community credit funds), whereas trading households depended more on informal sources from relatives and kinship networks (6.9%). This pattern aligns with previous studies showing that capture fishers often access bank loans through collateral, while trading households rely on social networks (Nguyen et al., 2020). As one fisherman in Giao Hai explained: *"Each trip to sea requires fuel, ice, and food-at least tens of millions of VND. My family has no savings, so we have to borrow from the bank. Without loans, going fishing would be impossible".* In contrast, a female fish trader in Giao Xuan noted: *"We usually borrow from relatives or friends in the village, because bank procedures are too complicated and we have no collateral. Borrowing this way allows us to repay gradually after selling fish, which is more flexible".*

The very low proportion of borrowing from external informal sources (1.9%) also highlights a difference from several coastal areas in Central Vietnam where informal "black credit" remains prevalent (Bailey & Jentoft, 1990). Thus, financial capital not only reflects households' capacity for accumulation but also reveals the structural logic of different livelihood groups, underscoring the need for targeted credit policies.

These findings indicate that the differentiation in credit access is not merely a numerical disparity but reflects a fundamental divergence in livelihood logics between boat-owning fishing households and trading households.

3.6. Social capital

Within the Sustainable Livelihoods Framework, social capital is viewed as the "glue" that binds communities together and facilitates household access to information, credit, and mutual assistance in times of risk (DFID, 1999). Survey results from Giao Thuy demonstrate that participation in organizations and credit channels clearly reflects social and gender stratification. Women are overwhelmingly represented in the Women's Union and microcredit groups, whereas men are more frequently engaged in production teams and occupational associations.

Table 5. Gendered Participation in Organizations (Chi-square test results)

Organization	Male (n)	Female (n)	Total	χ^2	df	p-value
Women's Union	4	76	80	94.64	1	.000*
Farmers' Union	27	55	82	6.67	1	.010*
Credit Group	6	20	26	4.89	1	.027*
Cooperative	4	3	7	0.63	1	0.429
Production Team/Group	8	3	11	4.37	1	.037*
Elderly Association	4	9	13	0.82	1	0.365
Veterans' Association	10	0	10	14.35	1	.000*
Occupational Groups/Unions	20	9	29	10.05	1	.002*

**Note: indicates significance at the 5% level ($p < 0.05$).*

Source: Field survey, 2025.

Men dominated formal information channels such as mass media (41.8% vs. 20.2%, $p = .003$) and local officials (26.9% vs. 11.2%, $p = .012$), reflecting their direct role in capture fisheries and participation in community spaces. In contrast, women were concentrated in the Women's Union (84.4% vs. 6.0%, $p < .001$) and microcredit groups (22.2% vs. 9.0%, $p = .027$), indicating that social organizations and microfinance schemes serve as critical "gateways" to information for them. These differences highlight an important reality: social capital is not evenly distributed but closely tied to gender roles and occupational types. As one woman in Giao Xuan explained: *"Most of the information I get comes from the Women's Union or the credit group; I rarely attend professional meetings."* Conversely, a male fisher in Giao Hai emphasized: *"Meetings with officials or discussions about fishing grounds are for men. Women handle the money and join the Women's Union".*

Table 6. Sustainable livelihood capital indexes (SLCI)

Capitals/ component	Sub-components	SLCI (mean ± SD)
1. Human	1.1 Gender (male = 1, female = 0)	0.427 ± 0.496
	1.2 Education (normalized)	0.353 ± 0.218
	1.3 Household size (normalized)	0.338 ± 0.155
	1.4 Number of laborers (normalized)	0.378 ± 0.243
	1.5 Fishing experience (normalized)	0.274 ± 0.215
	1.6 Hired labor (original)	0.523 ± 0.525
2. Natural	2.1 Residential land	0.164 ± 0.143
	2.2 Shop area	0.039 ± 0.133
3. Physical	3.1 Boat type	0.413 ± 0.247
	3.2 Household amenities (TV)	0.487 ± 0.501
	3.3 Vehicles-transportation	0.975 ± 0.158
	3.4 Information access device: Computer	0.242 ± 0.430
4. Financial	4.1 Loan participation (overall)	0.350 ± 0.478
	4.2 Access to loans from relatives/family	0.108 ± 0.312
	4.3 Access to loans from friends	0.013 ± 0.115
	4.4 Access to loans from community credits/banks	0.108 ± 0.312
	4.5 Access to loans from formal banks	0.229 ± 0.420
5. Social	5.1 Membership in social associations	0.183 ± 0.103
	5.2 Leadership role in associations	0.089 ± 0.286

Source: Field survey, 2025.

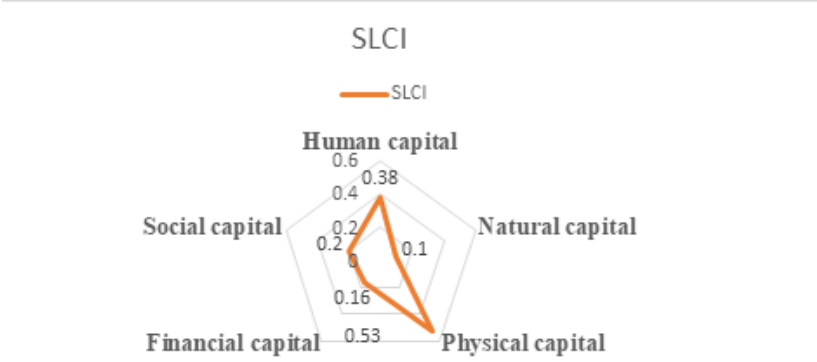
These differences illustrate that social capital is gendered-formal organizations remain "male spaces," while women rely on social and microfinance networks. Yet, informal family and friendship ties showed no gender gap, aligning with Weeratunge et al. (2010) on the egalitarian nature of community-based relations. In Giao Thuy, social capital thus both sustains livelihoods and mirrors gendered structures. Policies for sustainable fisheries should

build on women's existing networks, particularly the Women's Union and credit groups, to strengthen their voice and participation in governance.

The SLCI results indicate that the five livelihood capitals are interrelated rather than functioning independently. Households with stronger physical capital, such as boats and transportation assets, tend to access credit more easily, demonstrating the supportive role of physical assets in building financial capital. In contrast, households with limited natural capital rely more heavily on social networks and informal borrowing, showing how social capital compensates for shortages in natural resources. Low human capital, particularly limited education, further restricts access to formal credit and information channels, reinforcing dependence on social ties. These patterns suggest that livelihood sustainability in Giao Thuy depends on how households combine different capitals to cope with resource constraints and economic risks.

Analysis of the Sustainable Livelihood Capital Index (SLCI) shows clear imbalances among livelihood capitals. Physical capital ranks highest (0.53), reflecting improved infrastructure, while natural (0.10) and financial capital (0.16) remain critically low, indicating dependence on fragile marine resources-consistent with global warnings on overfishing (Pauly et al., 2002; FAO, 2020). Human capital (0.38) reveals strong experience but limited education and training, creating a "livelihood trap" that restricts mobility (Cinner et al., 2009; Blythe et al., 2014). Financial capital remains weakest, with low savings and reliance on informal credit, often leading to debt cycles (Islam & Herbeck, 2013). Social capital is fragile (0.136), maintained mainly through women's participation in the Women's Union and microcredit groups, while broader leadership and community linkages are weak (Pretty, 2003; Jentoft & Chuenpagdee, 2009).

Figure 6. The radar diagram of sustainable livelihood capital indexes presented by five capitals



Source: Field survey, 2025.

Overall, fishing households in Giao Thuy face unbalanced and unsustainable livelihoods, constrained by eroding natural resources and limited financial capacity. Addressing these challenges requires improved credit access, training, and inclusive, gender-sensitive governance, in line with FAO (2022) recommendations.

4. Conclusion and policy recommendations

This study reveals that fishing households in Giao Thuy rely on an uneven mix of livelihood capitals. While physical capital is relatively strong, natural and financial capitals remain weak, and human and social capitals are only moderately developed. Importantly, the findings show that these capitals interact rather than function independently. Strong social capital helps households diversify livelihoods, access informal credit, and share skills, thereby reinforcing both human and financial capitals and supporting collective actions that improve natural resource management. Limited human capital, in contrast, restricts households' ability to access formal finance and adapt to changing ecological or market conditions.

These inter-capital linkages explain why strong physical assets alone do not ensure sustainability. Livelihood sustainability depends on how households combine multiple capitals to cope with resource scarcity and risk. Policies should therefore focus on strengthening the softer capitals-human, social, and financial; while supporting ecological adaptation and inclusive access to credit.

Policy recommendations are therefore formulated based on the interconnected nature of livelihood capitals. Strengthening livelihood sustainability in Giao Thuy requires policies that simultaneously enhance financial, social, human, natural, and physical capitals, rather than targeting any single capital in isolation. The following recommendations reflect the key capital constraints identified in the study.

Gender-sensitive governance: Strengthen women's participation in fisheries co-management and cooperatives.

Inclusive finance: Expand microfinance, value chain–based credit, and fisheries insurance.

Ecological adaptation: Diversify livelihoods through aquaculture, eco-tourism, and mangrove restoration.

Capacity building: Improve training, financial literacy, and women's leadership to enhance social networks.

Value chain upgrading: Develop post-harvest infrastructure to reduce losses and improve market access for women and informal workers.

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