



Livelihood Diversification and Household Resilience among Seaweed Farmers in South Sulawesi: Evidence from the Kuda Laut Farmer Group, Bulukumba

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Received : May 06, 2026

Revised : June 04, 2026

Accepted: June 23, 2026

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ABSTRACT

This study aims to identify the forms of livelihood strategies and household livelihood patterns of the Kuda Laut Farmer Group in Sapolohe Village, Bontobahari District, Bulukumba Regency. The study employed a qualitative approach with a snowball sampling technique involving 10 members of the farmer group as informants. Data were collected through in-depth interviews, observation, and documentation, and were analyzed through data reduction, data display, and conclusion drawing. The results show that seaweed-farming households apply multiple livelihood strategies consisting of on-farm, off-farm, and non-farm strategies. The on-farm strategy is carried out through seaweed cultivation as the main source of income and capture fishing as an additional occupation. The off-farm strategy includes collecting seaweed and providing transportation services for fishery products, while the non-farm strategy includes construction labor, grocery stalls, phone-credit kiosks, and BRI link services. The sustainability of these strategies is supported by livelihood assets consisting of natural, human, physical, social, and financial capital. Social capital in the form of mutual cooperation and human capital in the form of family labor are the most prominent supporting factors. Household livelihood patterns tend to take the form of multiple livelihoods strengthened by job diversification, the use of family labor, and the migration of family members. This study recommends strengthening group legality, access to capital, and post-harvest training to increase the added value of seaweed.

Keywords: Farmer group, Livelihood assets, Livelihood strategy, Multiple livelihoods, Seaweed

INTRODUCTION

The introduction includes the background, relevance of the research to the theoretical studies (State of the Art Seaweed is one of the coastal commodities with high economic value that has developed in tropical regions such as Indonesia. This commodity belongs to the macroalgae group, which consists of green algae, brown algae, and red algae. The species *Eucheuma cottonii* and *Kappaphycus alvarezii* are widely cultivated because their carrageenan content is valuable for the food, pharmaceutical, and cosmetic industries (Kadi et al., 2018; Fatonny et al., 2023). Seaweed cultivation is relatively environmentally friendly, does not require additional feed, uses relatively low capital, and has a short harvest period of around 30-45 days. These characteristics make seaweed an important source of income for coastal households (Fahmi, 2020).

At the national level, seaweed is one of the strategic marine aquaculture commodities. However, farmers still face structural problems such as limited post-harvest processing, dependence on middlemen, price fluctuations, and limited market access (Ministry of Marine Affairs and Fisheries, 2021; Mahsyura, 2022; Nurhalisah & Ambo, 2023). These conditions mean that farming households cannot rely solely on cultivation as their only source of income. From the sustainable livelihood perspective, households tend to combine various assets and economic activities to reduce vulnerability (Scoones, 1998; Ellis, 2000).

South Sulawesi is one of Indonesia's seaweed production centers, including Bulukumba Regency, which has extensive coastal areas and strong aquaculture potential. Sapolohe Village in Bontobahari District is one

coastal area where many residents depend on seaweed cultivation. The Kuda Laut Farmer Group is a cultivation group in this area that carries out simple production using the longline method, manual drying, and sales to local buyers. The group also has social practices in the form of cooperation and mutual assistance among members during production activities.

Weather uncertainty, price fluctuations, and limited capital and institutional capacity encourage seaweed-farming households to develop multiple livelihood strategies. These strategies may include on-farm, off-farm, and non-farm activities, the use of family labor, and migration by family members. Although livelihood diversification among seaweed farmers has been widely studied, the role of livelihood assets, particularly social capital, in supporting household livelihood sustainability remains underexplored. Therefore, this study examines livelihood strategies and livelihood assets of the Kuda Laut Farmer Group using the Sustainable Livelihood Framework. Therefore, this study aims to identify the forms of livelihood strategies and household livelihood patterns of the Kuda Laut Farmer Group in Sapolohe Village, Bontobahari District, Bulukumba Regency.

RESEARCH METHODS

This research was conducted in Sapolohe Village, Bontobahari District, Bulukumba Regency, from February to March 2026. The location was selected because it is a coastal area with strong seaweed cultivation activity and is the operating area of the Kuda Laut Farmer Group.

The study used a descriptive qualitative approach. The research informants were households belonging to the Kuda Laut Farmer Group. Informants were selected using snowball sampling, in which initial informants were identified and then expanded based on recommendations from previous informants until sufficient information was obtained (Sugiyono, 2018). The number of informants was determined based on the principle of data saturation. Interviews were conducted until no new information emerged regarding livelihood strategies, livelihood assets, and household adaptation mechanisms. Saturation was achieved after the tenth informant, as responses became repetitive and no additional themes were identified. The total number of informants in this study was 10 people. The number of informants was determined based on the principle of data saturation. Interviews were conducted until no new information emerged regarding livelihood strategies, livelihood assets, and household adaptation mechanisms. Saturation was achieved after the tenth informant, as responses became repetitive and no additional themes were identified.

The data consisted of primary and secondary data. Primary data were obtained through in-depth interviews, observation of cultivation activities, and field documentation. Secondary data were obtained from documents, books, journals, and other written sources relevant to coastal household livelihood strategies. Data were analyzed interactively through data reduction, data display, conclusion drawing, and verification. Data validity was strengthened through triangulation among interview, observation, and documentation results.

RESULT AND DISCUSSION

The characteristics of the informants show that members of the Kuda Laut Farmer Group have diverse socioeconomic backgrounds. Informants were 30-75 years old, with education levels dominated by senior high school and junior high school. The number of family dependents ranged from two to five people, while seaweed farming experience ranged from one year to more than 10 years. This condition shows that seaweed cultivation is carried out by households that combine productive labor and relatively long local experience.

Table 1. Characteristics of Kuda Laut Farmer Group Informants

Characteristic	Category	Number (people)	Percentage (%)
Age	30-39 years	4	40
Age	40-49 years	2	20
Age	50-75 years	4	40
Education	Elementary school	1	10
Education	Junior high school	4	40
Education	Senior high school	5	50
Business experience	1-5 years	3	30
Business experience	6-10 years	4	40
Business experience	>10 years	3	30

Source: Primary data processed, 2026.

The household livelihood strategies of the Kuda Laut Farmer Group can be classified into three forms: on-farm, off-farm, and non-farm. The on-farm strategy is an economic activity that directly relies on natural resources, especially seaweed cultivation. Cultivation is the main source of livelihood because it is carried out routinely through the stages of rope installation, seedling tying, maintenance, harvesting, and drying. Some informants also engage in capture fishing when cultivation activity decreases or while waiting for harvest. This shows that households do not fully depend on a single activity, but instead use marine resources more broadly. The reliance on both seaweed cultivation and capture fishing indicates that households adopt a risk-reduction strategy rather than depending on a single source of income. When seaweed production is affected by unfavorable weather conditions or declining market prices, fishing activities provide an alternative source of income. This finding supports Ellis (2000), who argues that livelihood diversification is a strategy to reduce household vulnerability and improve resilience.

The off-farm strategy is carried out through activities that are still related to the seaweed and fisheries business chain but are not directly involved in the main production process. The activities found include becoming seaweed collectors and providing transportation services for fishery products. Informants who own vehicles use them to transport seaweed or fish to markets and companies. This involvement shows that households act not only as producers but also participate in distribution and marketing activities. This finding is consistent with the concept of livelihood diversification, which explains that rural households can expand income sources within the same sector or across sectors (Ellis, 2000; Haggblade et al., 2010). Participation in collection and transportation activities enables households to capture additional value within the seaweed supply chain. Rather than functioning solely as producers, some households expand their economic roles into distribution and marketing activities. This diversification strengthens household resilience by creating multiple income streams within the same commodity sector.

The non-farm strategy is carried out through jobs outside the fisheries and agricultural sectors. The activities found include construction labor, grocery stalls, phone-credit kiosks, and BRILink services. This strategy is flexible and is usually carried out when cultivation activities cannot run optimally due to weather conditions or when income from seaweed is insufficient to meet household needs. The non-farm strategy serves as an economic buffer because it provides additional income that is relatively more regular than cultivation, which is strongly influenced by seasons and market prices. Non-farm activities function as an economic buffer during periods when seaweed farming cannot operate optimally due to adverse weather conditions or production constraints. Unlike seaweed cultivation, which is highly dependent on environmental conditions, non-farm activities provide relatively more stable and predictable income. Therefore, these activities play an important role in maintaining household consumption and financial stability.

Table 2. Forms of Household Livelihood Strategies of the Kuda Laut Farmer Group

Strategy form	Main activities	Economic function
On farm	Seaweed cultivation and capture fishing	Main and additional income sources based on marine resources
Off farm	Seaweed collection and transportation services for fishery products	Expands income within the commodity value chain
Non farm	Construction labor, grocery stalls, phone-credit kiosks, and BRILink	Income buffer when cultivation is disrupted

Source: Primary data processed, 2026.

Livelihood assets form the basis that determines households' ability to carry out livelihood strategies. In the Sustainable Livelihood Framework, livelihood assets consist of natural, human, physical, social, and financial capital (DFID, 1999; Scoones, 1998). For households in the Kuda Laut Farmer Group, natural capital in the form of access to the sea and coastal areas is the main resource for seaweed cultivation. Water quality, currents, and seasons strongly determine production success. Dependence on the sea indicates that changes in the marine environment can directly affect household income (Rahim et al., 2021).

Human capital is reflected in skills, experience, and family labor. Seaweed cultivation is still mostly carried out manually, so the involvement of wives and children is very important in seedling tying, rope installation, harvesting, and drying. The use of family labor helps reduce the cost of external labor and accelerates work. In addition, business experience is an important asset in determining planting time, selecting seedlings, reading sea conditions, and responding to production risks.

Physical capital consists of longline ropes, floats, boats, vehicles, and simple drying equipment. These production facilities determine the smoothness of cultivation, business scale, and distribution efficiency. Limited

physical capital can hinder business expansion, while vehicle ownership creates additional income opportunities through transportation services. Financial capital comes from personal funds, savings, and family loans. Limited access to formal financing makes social networks an important source of informal financing. Limited access to formal financial institutions remains a challenge for many seaweed-farming households. As a result, households often rely on personal savings and family loans to finance cultivation activities. This condition indicates the importance of improving access to affordable credit schemes to support the sustainability and expansion of seaweed farming businesses.

Social capital is the most prominent asset. Mutual cooperation is seen in rope installation and harvesting activities, where farmers help each other in turns without direct compensation. Trust, solidarity, and relationships among group members strengthen production efficiency and act as a social protection mechanism. The findings suggest that social capital functions as an informal institutional mechanism that compensates for limited financial and organizational resources. Trust and mutual cooperation reduce transaction costs, facilitate labor sharing, and strengthen collective action among group members. In this context, social capital is not merely a supporting asset but a key factor sustaining household livelihood strategies. This condition is in line with the concept of social capital, which emphasizes the role of networks, norms, and trust in facilitating coordination and cooperation (Putnam, 1993; Wardiat, 2016; Maisaroh & Novikarumsari, 2024).

Table 3. Livelihood Assets and Their Use in Seaweed-Farming Households

Livelihood asset	Form of asset	Use in livelihood strategy
Natural capital	Sea, coastal waters, seasons, and seedlings	Basis for seaweed cultivation and capture fishing
Human capital	Experience, skills, labor of wives and children	Reduces production costs and improves work efficiency
Physical capital	Ropes, floats, boats, vehicles, drying equipment	Supports production, harvesting, drying, and distribution
Social capital	Mutual cooperation, trust, group networks	Accelerates work and strengthens support among farmers
Financial capital	Savings, personal capital, family loans	Finances seedlings, equipment, and operational costs

Source: Primary data processed, 2026.

The livelihood pattern of Kuda Laut Farmer Group households tends to take the form of multiple livelihoods. This pattern emerges because households combine seaweed cultivation with other jobs such as capture fishing, collecting, transportation services, construction labor, and household micro-enterprises. Job diversification is the main strategy for maintaining economic stability when cultivation income declines. Households with more than one source of income tend to be more adaptive in facing economic vulnerability (Barrett et al., 2001; Campbell et al., 2021).

In addition to job diversification, the use of family labor is also an important part of the livelihood pattern. Wives and children help in production and post-harvest activities, and some wives also run household businesses such as grocery stalls and BRILink services. This shows that livelihood strategies are not carried out only by the head of the household, but are the result of collective work by all household members. Women's involvement in coastal economic activities contributes to income stability and household needs management (Nurhayati, 2020).

Spatial engineering or migration was found in the form of family members working outside the region, for example in East Kalimantan, and sending part of their income back to the family in Sapolohe. Migration is not the main strategy for all informants, but it is one way for households to obtain additional income when local livelihood sources are insufficient. Remittances from migrant family members serve as a buffer for consumption and household needs.

CONCLUSION

Households of the Kuda Laut Farmer Group in Sapolohe Village apply multiple livelihood strategies to maintain family economic sustainability. These strategies include on-farm activities through seaweed cultivation and capture fishing, off-farm activities through collecting and transportation services for fishery products, and non-farm activities through construction labor, grocery businesses, phone-credit kiosks, and BRILink services. These strategies are supported by five livelihood assets: natural, human, physical, social, and financial capital. Social capital in the form of mutual cooperation and human capital in the form of family labor are the main strengths because they reduce costs, accelerate work, and strengthen solidarity among farmers. Household

livelihood patterns take the form of multiple livelihoods marked by job diversification, the use of family labor, and the migration of family members. Strengthening group legality, access to capital, production facilities, and post-harvest processing training is needed so that seaweed-farming households do not only depend on selling raw materials, but are also able to obtain greater added value. The findings imply that local governments and related agencies should strengthen support for seaweed-farming households through improved access to affordable financing, post-harvest processing training, and institutional strengthening of farmer groups. Such interventions are important to enhance household resilience and increase the added value of seaweed products. Future studies are encouraged to examine livelihood strategies across different coastal communities and compare the role of livelihood assets in shaping household resilience under varying socio-economic and environmental conditions.

ACKNOWLEDGEMENT

The author expresses gratitude to the Agribusiness Study Program, Faculty of Agriculture, Universitas Muhammadiyah Makassar, the research supervisors, the government and community of Sapolohe Village, and all members of the Kuda Laut Farmer Group for their information and support during the research process.

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