Tarjih: Agribusiness Development Journal. Volume 04 Number 02 December (2024) Page: 197-208
DOI: https://doi.org/10.47030/tadj.v4i02.875

e-ISSN: 2798 - 0782
Tarjih: Agribusiness Development Journal
Journal Homepage: https://jurnal-umsi.ac.id/index.php/agribisnis

Natural Resource Capital for Sustainable Livelihoods in Social Forestry Areas: A Case Study from Enrekang Regency

Putra Astaman[1,*], Aulia Nurul Hikmah[2,*], Muhammad Dassir[3], St Nadirah[4]
[1]Faculty of Agriculture, Muhammadiyah University of Sinjai, Sinjai Regency, Indonesia
[2]Agribusiness Study Program, Institute Technology and Business Muhammadiyah Polewali Mandar, Polewali Mandar Regency, Indonesia
[3]Faculty of Forestry, Hasanuddin University, Makassar City, Indonesia
[4]Faculty of Agriculture, West Indonesia University, Makassar City, Indonesia
utthaastaman@gmail.com, aulianurulhikmah@gmail.com

Received : December 12, 2024
Revised : December 30, 2024
Published: December 31, 2024

Corresponding Author: Putra Astaman, Muhammadiyah University of Sinjai, Email: utthaastaman@gmail.com; Aulia Nurul Hikmah, Institute Technology and Business Muhammadiyah Polewali Mandar, Email: aulianurulhikmah@gmail.com

ABSTRACT

The main problem is how natural resource management, especially forests, can improve community welfare without compromising environmental sustainability. This study aims to analyze the role of natural resource capital in supporting sustainable livelihoods in the social forest area of Enrekang Regency and evaluate the social and economic impacts of the social forestry program implemented in the area. The research method used is a qualitative approach with in-depth interviews with communities and relevant stakeholders and analysis of relevant secondary data. The research findings show that the social forestry program provides positive impacts through increased income, food security, and employment opportunities for the community. However, there are still challenges in the form of a lack of technical knowledge and dependence on illegal logging practices. This research makes a new contribution by exploring the potential for collaboration between the government, communities, and non-governmental organizations in sustainable social forest management. In conclusion, the success of social forest management is highly dependent on strengthening community capacity and implementing environmentally friendly forestry practices. The policy implication of this finding is the importance of government support in providing technical training and supervision of social forestry programs. The recommendation for future research is to conduct further studies on the long-term impact of the agroforestry program in improving economic and environmental sustainability in social forest areas.

Keywords: *Challenges, opportunities, land production, Livelihood system*

INTRODUCTION

Natural resources, especially forests, play an important role in the economy of communities in rural areas, including Indonesia. Forests provide raw materials for the economic sector and provide various ecosystem benefits that support the sustainability of community life (Susanti & Wibowo, 2019). In this context, social forestry programs have become one of the strategies to empower communities to manage forests sustainably, which impacts improving their welfare (Nasution & Damanik, 2021). One of the areas implementing this program is Enrekang District in South Sulawesi, where social forestry is expected to increase community income through the sustainable use of forest resources (Firdaus & Mustari, 2020).

According to previous studies, Enrekang has extensive forest potential with various forest products that can be utilized by the local community (Muhamad & Hadi, 2020). Social forestry in this region includes various activities such as planting timber trees, non-timber forest products (NTFPs), and agroforestry that can provide additional sources of income for the community (Sari & Tanaka, 2019). Therefore, it is important to analyze how

natural resource management through social forestry programs can create sustainable natural capital for community livelihoods in Enrekang (Rizki & Suryani, 2021).

According to data from the South Sulawesi Provincial Forestry Service, the forest area in Enrekang Regency reaches 150,000 hectares, with around 60% of this area located in limited production forest areas managed through social forestry schemes. The program covers various forms of forest utilization, such as timber tree planting, non-timber forest products (NTFPs), and nature tourism. Based on research conducted by the Forestry Research and Development Agency (2019), the social forestry program in Enrekang has positively impacted the local economy, especially in increasing income through sustainable forest products. However, the program faces several challenges, such as inadequate regulations and community dependence on illegal logging practices.

However, the social forestry program in Enrekang is not without challenges. Some obstacles include a lack of knowledge about sustainable forestry practices and community dependence on illegal logging (Andayani & Setiawan, 2022). Efforts are needed to increase community capacity through training and education in environmentally friendly forest management so that the sustainability of this program can be maintained (Sutanto & Wijayanto, 2020). This research also shows that the success of social forest management depends on close cooperation between the community, government, and non-governmental organizations (Wijaya & Alamsyah, 2021).

In addition, the results of research conducted by Santoso and Harahap (2021) show that agroforestry programs involving a combination of timber and food crops can improve community food security and income from forest products. This aligns with the findings reported by Fitria and Triyono (2019), who stated that implementing agroforestry systems can provide multiple benefits for the community regarding economic and environmental sustainability. However, proper and sustainable management is needed to achieve optimal results and avoid broader ecosystem damage (Setiawan & Hasibuan, 2022).

This research explores how social forest management in Enrekang can be used as sustainable natural capital to improve community livelihoods. It will also assess the challenges faced and explore potential solutions to achieve them, focusing on collaboration between communities and related parties (Rizki & Suryani, 2021). As stated by Yuliana and Ismail (2020), a better understanding of the relationship between natural resources and community livelihoods can help design more effective policies in supporting the sustainability of social forestry programs in this region. This study aims to analyze the role of natural resource capital in supporting sustainable livelihoods in the social forestry area of Enrekang District.

RESEARCH METHODS

Research Location

This research was conducted from August to December 2023 in Enrekang District, South Sulawesi Province. This district was chosen as the research location because it has excellent potential in forest management through social forestry programs. Enrekang has large forest areas and communities that depend on using natural resources for their livelihoods. This research focused on several villages involved in the social forestry program implemented in limited-production forests and protected forest areas.

Types and Sources of Data

The types of data used in this research are qualitative and quantitative data. Qualitative data was obtained through in-depth interviews and focus group discussions (FGDs) with communities, social forest managers, and related parties. Quantitative data was obtained from field surveys that included data collection related to community economic conditions, forest production, and factors affecting the sustainability of the social forestry program. Data sources in this study consist of:

- Primary data: Direct interviews with communities, social forest managers, and other parties in Enrekang District.
- Secondary data: Relevant documents such as annual reports, forestry statistics, and previous studies on social forestry in the Enrekang region.

Population and Sample

The population in this study is all communities living around forest areas involved in the social forestry program in Enrekang District. These communities consist of farmers, social forest managers, and community groups involved in social forestry activities. In addition, the population also includes the local government, forestry service, and non-governmental organizations that support the program. Enrekang District consists of 12 sub-districts with 129 villages and sub-villages. Sample determination refers to purposive random sampling, a sampling technique tailored to the research needs, and then the sample is taken at simple random. The number of samples

in this study was 372 people spread across 12 villages.

Sampling Technique

The sampling techniques used in this study were purposive sampling and snowball sampling. Purposive sampling was used to select informants with knowledge and experience relevant to the research topic, such as forest farmers, social forest managers, and other related parties. Snowball sampling was used to identify additional respondents who could provide more profound information on the area's successes and challenges in social forestry management. This technique allows researchers to find more specific subjects who can provide more in-depth data.

Data Collection Technique

Data collection in this study was conducted through the following methods:
- In-depth interviews: Interviews were conducted with household heads, social forest managers, and government representatives to gather information on social forest management, its impact on the community's economy, and the challenges faced in its implementation.
- Focus Group Discussions (FGDs): FGDs were conducted with community groups involved in social forestry to get a broader picture of their perceptions of the program and to identify problems and solutions they encountered.
- Participatory observation: Researchers will also be directly involved in the daily activities of communities in the field to gain a deeper understanding of the implementation of the social forestry program and its influence on community life.
- Quantitative survey: This survey collects statistical data on community income, forest products, and the economic and social impacts of social forest management.

Data Analysis Technique

The data obtained from various data collection techniques will be analyzed qualitatively and quantitatively as follows:
- Qualitative Analysis: Qualitative data obtained from interviews, FGDs, and observations will be analyzed using thematic analysis techniques. This technique will identify key themes from the collected data, such as challenges, successes, and community expectations related to social forest management. This process will be done by categorizing and coding relevant data and linking it to existing theories and literature.
- Quantitative Analysis: Quantitative data from field surveys will be analyzed using descriptive statistics to describe community economic characteristics and forest production outcomes. This analysis will use statistical software to calculate frequencies, averages, and percentages to understand data distribution and identify significant trends related to social forestry programs. Presentations may include tables, graphs, and figures that represent the findings.

Results from the qualitative and quantitative analysis will be combined to provide a comprehensive picture of natural resource management in social forest areas in Enrekang District, as well as its impact on community livelihoods and the program's sustainability.

RESULT AND DISCUSSION

Existing Condition of Farmer Livelihood

The sustainability livelihood framework describes a holistic approach to understanding and improving people's living conditions by considering several key aspects: natural capital, physical capital, social capital, human capital, and financial capital. However, this research focuses on the ownership of Natural Capital, which refers to existing natural resources, such as land, water, clean air, biological resources, and other physical environments. The sustainable use of natural capital is the main focus in maintaining ecosystem balance and preserving the environment for long-term sustainability (Wu et al., 2024).

Livelihood Assets

Livelihood assets refer to assets or resources owned by individuals or communities that directly or indirectly contribute to creating and sustaining a decent livelihood. These assets can be diverse and include natural, financial, social, physical, and human capital. The importance of livelihood assets lies in their role as the foundation for sustainable economic growth. These assets provide the basis for individuals or groups to start

businesses, create employment opportunities, and generate income. For example, land ownership or financial capital can be the basis for starting an agricultural enterprise or small business. On the other hand, skills acquired through education or training can open doors to better jobs or business opportunities.

The importance of livelihood assets is not only limited to physical ownership but also inclusion in access to resources and services that support economic growth. Social conditions, food security, access to financial services, and access to markets and technology are important aspects of strengthening livelihood assets. Improving livelihood assets is often the focus of development strategies to address poverty and inequality. Efforts to expand access to education, health services, skills training, and policies supporting property rights and access to resources are ways to improve livelihood assets for individuals or communities. Strengthening these assets will provide a stronger foundation for a better and more sustainable society (Landicho et al., 2024).

Natural Capital as a Modal for Livelihood Sustainability

Natural capital is a reserve of natural resources that are helpful as a support for community livelihoods, both as public goods that can be enjoyed by many people and goods that can only be privately utilized by members of a particular community or village. The community utilizes these natural resources through social forestry areas.

1. Land Ownership

In an agrarian society, land is significant in supporting their livelihoods. Many rural communities rely on land as a source of income for family needs.

a. Plantation Land

Plantation land refers to an area of land used to grow cash crops. These plantations can be land used to grow crops such as coffee, tea, oil palm, rubber, chocolate, fruits, and other crops with economic value. Plantation land is often organized and intensively managed to ensure optimal growth and crop production. Plantation land management includes proper agricultural techniques, pest and disease control, soil maintenance, and efficient harvesting.

Plantations can be a significant source of income for farmers, landowners, and even for a country's economy. Crops grown on plantations are often exported or sold, making an important contribution to international trade. However, plantations are also often controversial as they can have significant environmental impacts.

Sustainable approaches to plantation management are becoming increasingly important, where environmentally, socially, and economically responsible practices are emphasized. Efforts to improve agricultural practices, address the welfare of local communities, reduce environmental impacts, and increase the sustainability of production are some of the steps taken to achieve sustainable plantations as a whole (Li et al., 2024).

Large-scale plantations, especially for specific crops such as the Onion plantation in Enrekang Regency, convert forests into onion plantations. These have been linked to deforestation, loss of wildlife habitat, and conflicts with local communities over land rights and socioeconomic impacts.

Table 1. Plantation Land Tenure

District	Year of Land Tenure
Anggeraja	1977
Baraka	1965
Baroko	2019
Bungie	1978
Buntu Batu	1979
Cendana	1990
Curio	2011
Enrekang	2000
Maiwa	1984
Marseille	1982

Source: Primary data after processing, 2023.

Table 1 shows that the longest land tenure is in Baraka Sub-district, where land has been controlled since 1965. This land is hereditary for them in terms of making a living through the plantation sector. This concept is important in understanding land use history, environmental change, and future land use planning. Land can undergo various changes in its use over time. For example, land previously used for agriculture may be converted to residential or industrial areas after a few years. Conversely, natural forests may be converted initially into agricultural land or plantations.

Understanding years of land use is important in analyzing trends in environmental change, evaluating the impacts of human activities on land, and planning for more sustainable land use in the future (Sibarani &

Somboonsuke, 2024). Information on land use history can help identify patterns of change, analyze the consequences of such changes on the environment, and develop wiser strategies for future land management.

Monitoring and recording years of land use can also help evaluate the impacts of development policies or human activities on ecosystems, biodiversity, natural resource availability, and overall environmental quality. With this information, decision-makers can plan more sustainable activities and consider environmental sustainability in future land management.

Land location includes the geographical location of the land, while ownership status indicates who owns or controls the land. Location information is important for planning and assessing the value of an area, while ownership status determines the rights and responsibilities of land owners. Ownership status can be private, public, communal, or leasehold, and this information is crucial for legal aspects, resource management, and development planning. Both play an important role in understanding potential land uses, socioeconomic impacts, and environmental management.

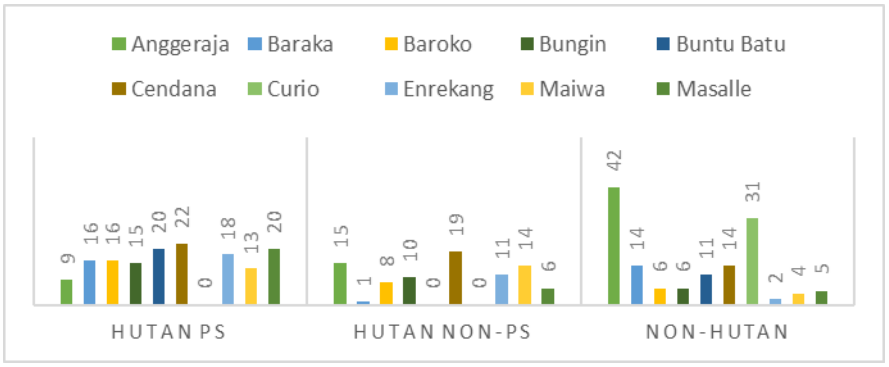

Figure 1. Total Land Ownership by Sub-district

Land tenure in the livelihood context refers to how communities or individuals utilize and depend on the natural resources on or around the land they own or control. Land ownership also plays an important role in people's livelihoods, especially in rural areas where agriculture and settlement are the main activities. In the figure above, it can be seen that the land controlled by respondents is mainly outside the Social Forestry Area; this is shown by 42 respondents who gave this information in Anggeraja Sub-district, followed by Curio Sub-district, where 31 respondents in this area all own land outside the SF area.

Average landholding is an important indicator in an agricultural context, referring to the amount of agricultural land owned or managed by individual or family farmers within a region or country. Information on average land ownership has far-reaching implications, covering aspects of wealth distribution, farmer welfare, agricultural production, and its influence on agricultural and environmental policies. Regarding wealth distribution, average land ownership affects how much agricultural land is evenly distributed among farmers. A more equitable distribution could help reduce economic inequality among them. Furthermore, average land ownership is important in determining farmers' welfare. Farmers with more extensive landholdings have better access to agricultural resources and tend to have higher incomes. From an agricultural production perspective, average land ownership affects production potential. Farmers with more extensive land holdings can produce more agricultural products (Sibarani & Somboonsuke, 2024).

In addition, this data is relevant in agricultural policy planning, especially in land redistribution programs or providing financial support to farmers with small landholdings. Lastly, average land ownership also impacts agricultural practices and environmental conservation. Farmers with more extensive landholdings tend to be incentivized to implement sustainable farming techniques that contribute to environmental conservation. Thus, equitable distribution can help reduce inequality and support environmental sustainability in the agricultural sector.

Tarjih: Agribusiness Development Journal. Volume 04 Number 02 December (2024) Page: 197-208
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Table 2. Average Area of Farmland Controlled and Managed

Sub-District	Mastered (Ha)			Managed (Ha)		
	PS Land	Non-PS Forest	APL	PS Land	Non-PS Forest	APL
Anggeraja	0,4	0,8	1,2	0,5	0,6	0,4
Baraka	0,4	0,4	0,3	0,3	0,4	0,4
Baroko	2,2	1,0	1,3	0,8	2,2	1,3
Bungin	0,6	0,9	0,6	1,0	0,7	0,5
Buntu Batu	0,6	-	0,4	0,5	-	0,4
Cendana	0,9	2,1	1,2	0,8	1,0	0,7
Curio	-	-	0,4	-	-	0,4
Enrekang	0,8	0,5	0,8	0,8	0,6	0,8
Maiwa	1,0	4,1	0,4	1,2	3,0	0,4
Masalle	0,4	0,6	0,4	0,6	0,4	0,4

Source: Primary data after processing, 2023.
*PS: Social Forestry
*APL: Other Use Areas

The National Land Agency, based on the Decree of the Head of the National Land Agency of the Republic of Indonesia No. 3/2006, assigns the Deputy for Land Management and Arrangement the task of coordinating and implementing policies related to land management and arrangement. One of its roles is to conduct an inventory of Land Tenure, Ownership, Use, and Utilization (P4T) and to evaluate land that has become an object of land reform (Hossain et al., 2024).

The average land area required for livelihoods (especially in agriculture or mining) varies widely depending on the type of natural capital exploited, the technology used, and local factors such as soil type, climate, and traditional or modern ways of utilizing natural resources. The table shows that the dominant controlled SF land is in Kecamatan Cendana, totaling 0.9 ha, with 0.8 ha managed. In the Curio Sub-district, there is absolutely no land in the area, and both PS and non-PS forests are absent because their family livelihoods primarily depend on horticultural commodities and rice field products such as rice.

The average size of agricultural land required for farmers' livelihoods can vary significantly. Land ownership in the research location is divided into one land (102 people), two land (142 people), three land (76 people), and four land (26 people), where the most dominating are households that own two land. Farmers may only own a few thousand square meters to a few hectares of land in some areas with subsistence or family farming. In places with commercial farming, farmers manage larger plots of land, which can reach hundreds of hectares. The table shows that the area of land owned by respondents is divided into three, namely Plantation, Rice Field, and Pond. Plantation land is more dominant than the other land.

The figure shows that the number of people with ownership title deeds (SHM) or certificates for their land is still minimal. SHM ownership acts as legal evidence of land ownership while also serving as a security guarantee for the land from claims or interference from other parties who wish to control or utilize it. On the other hand, forest-related livelihoods, such as timber processing or forest plant collection, can involve a wide range of land areas, depending on the location and scale of the activity. Some individuals or communities may have exclusive rights to a particular piece of forest, while others may move around searching for forest resources. Land tenure status is a key factor in natural capital livelihood arrangements. It can affect access rights, resource management, income rights, and environmental responsibilities. Moreover, land tenure conflicts often arise in different regions, especially when land rights are unclear or disputes between landowners, communities, and commercial entities. Therefore, understanding land tenure status in natural capital is essential to maintain sustainable livelihoods and minimize conflicts.

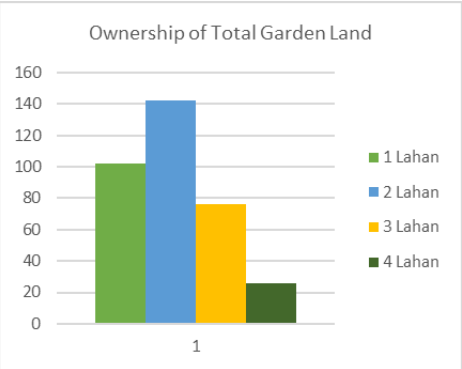

Figure 2. Ownership of Total Garden Land

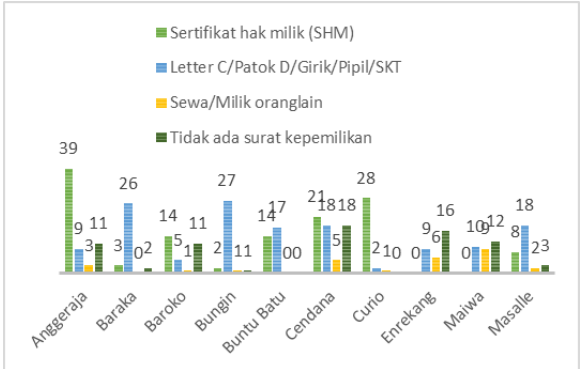

Figure 3. Document of Ownership of Controlled Garden Land

Regarding utilization, not all land owned (Figure 2) by the community can be managed thoroughly. This difference relates to the community's capabilities in managing their land. Constraints such as lack of capital, human resources, and limited access are the main factors preventing optimal land utilization. These three factors significantly affect the ability to maximize land utilization. The lack of land management optimization will significantly impact household income. Ultimately, this condition will have an impact on the overall level of household welfare.

Land location in natural capital livelihoods is important because it impacts access to natural resources, environmental management, and livelihoods (Syaban & Appiah-Opoku, 2024). Appropriate and sustainable land use is key to maintaining sustainable livelihoods and minimizing environmental negative impacts. In many areas, land management can also be a source of conflict, especially when land tenure rights or access rights to natural resources are unclear or disputed. As a result, a good understanding of land location and management is important in understanding natural capital livelihoods. Some communities or individuals have exclusive rights to a particular piece of forest that they manage to extract timber or other forest products.

Land location (Figure 3) in the context of natural capital refers to the geographical area where individuals, communities, or companies engage in livelihoods related to exploiting natural resources. Land tenure status refers to the rights or governance of land used for livelihoods related to natural resource exploitation. This land tenure status can vary greatly depending on factors such as a region's laws, policies, culture, and socioeconomic conditions.

b. Rice Field

Rice fields are areas of land explicitly designated for cultivating food crops such as rice, corn, wheat, and other aquatic crops. Rice paddies are farmland that usually consists of land explicitly irrigated for rice growth or other aquatic crops that require much water. Farming in paddy fields usually involves setting up appropriate irrigation systems to maintain proper crop moisture levels. In addition, agricultural techniques such as planting systems, irrigation, weed control, and fertilization are applied explicitly in paddy fields to support optimal crop growth and yield.

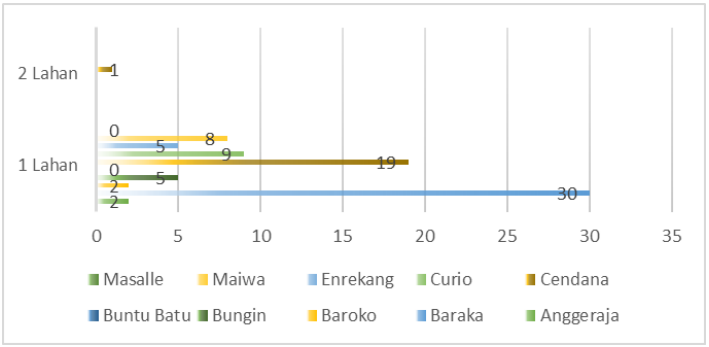

Figure 4. Comparison of ownership of the number of rice fields
Source: Processed Research Data, 2023.

Rice fields play an important role in meeting food needs as most major food crops are grown in these areas. Farming on paddy fields is the backbone of the economy and a significant source of income for farmers and local communities. However, the sustainability of paddy fields is an important concern, as factors such as urbanization, climate change, soil degradation, and environmental degradation can threaten their sustainability. Therefore, efforts to maintain the sustainability of paddy fields through sustainable farming practices, water conservation, good soil management, and technological innovations are crucial to support the sustainability of food agriculture (Goli et al., 2023).

Rice fields controlled (Figure 4) by respondent households averaged 0.5 and 0.4 ha. This land can provide staple food in the form of rice. In the Anggeraja sub-district, the average is 0.8 ha, suggesting that some respondents manage other people's paddy fields (profit sharing). Two sub-districts, such as Buntu Batu and Masalle, have no rice fields. Rice fields can be found in various locations, especially in areas with geographical conditions that favor rice growth or other aquatic plants. These locations are often in lowland or floodplain areas with easy access to irrigation water sources. The government often recognizes the importance of paddy fields due to their crucial role in food security. Therefore, there are efforts to protect and maintain paddy fields from conversion for non-agricultural uses, such as infrastructure or settlement

development.

The status of paddy fields can also vary regarding the legality of ownership and usage rights. Some countries have policies that protect paddy fields as part of a strategy to maintain food security and environmental sustainability. However, paddy fields are vulnerable to conversion to other uses such as housing, industry, or infrastructure in some other areas. The status of paddy fields may also change over time due to factors such as urbanization, changes in agricultural policies, or changes in land ownership. Monitoring and protecting paddy fields is important to ensure the continuity of sustainable food agriculture.

The status of paddy fields can vary depending on the agricultural policies of a country or region. Most paddy fields can be privately owned, communally owned, or managed by local communities, or they can also be part of a government-managed farming system. Unsustainable farming practices, soil degradation, or climate change can also cause changes in the status of paddy fields. Therefore, maintaining the sustainability of paddy fields requires efforts to protect, manage, and sustain natural resources and promote sustainable agricultural practices to ensure the continuation of adequate food production for the population.

The average travel distance between paddy fields can vary depending on the geographical area and distribution pattern of farmland. In the study location, the farthest travel time is in Cendana Subdistrict, with an average distance of 1.9 km, where road access to rice fields tends to be easy to reach using two-wheeled vehicles. In general, paddy fields are often scattered along lowland areas, rivers, and floodplains, allowing easy water access for irrigation. Topography and the irrigation system used are other factors influencing the distance between paddy fields. In steep or complex irrigation systems, the distance between paddy fields may be greater regarding land use planning that considers good access to water.

c. Land Use

Land use in livelihoods refers to how land is used to support livelihoods associated with exploiting natural resources, such as agriculture, fisheries, mining, forests, or livestock. Land use is an important aspect of sustainable practices and plays a key role in safeguarding the natural environment and achieving sustainable livelihood goals.

Land use refers to how land is used and managed to support livelihoods associated with exploiting natural resources such as agriculture, fisheries, mining, forests, and livestock. It includes practices and policies designed to achieve balanced economic and environmental objectives. Land use in sustainable agriculture involves organic farming, crop rotation, and wise water management. The goal is to maintain soil fertility, reduce erosion, and minimize the use of pesticides and chemical fertilizers (Barbieri, 2023).

Sustainable land use is key to maintaining long-lasting livelihoods and protecting natural resources. It also helps protect natural ecosystems, reducing damaging environmental impacts and preserving the environment for future generations. Wise land management can also help fight climate change by reducing greenhouse gas emissions and increasing carbon sequestration.

1) Land Production

Land production refers to the results or outputs generated from using an area of land for agricultural, plantation, livestock, or other economic activities. Land production can be in the form of food crops, fruits, vegetables, or other commodities obtained from land cultivation and productive use. Land production is strongly influenced by factors such as soil quality, climate, agricultural techniques used, and management by farmers or land managers.

Table 3. Agricultural Land Prediction by District in Enrekang Regency

Anggeraja	**Baraka**	**Baroko**	**Bungie**	**Buntu Batu**	**Cendana**	**Curio**	**Enrekang**	**Maiwa**	**Marseille**
Red onion	Clove	Coffee	Coffee	Coffee	rambutan	Clove	Clove	Clove	Red onion
Corn	Coffee	Clove	Red onion	Snake fruit	Banana	Pepper	Corn	Pepper	Coffee
Peanuts	Tomato	Cocoa	Clove	Clove	Pepper	Paddy	Nutmeg	Paddy	Tomato
Sweet potato	Lombok	Cabbage	Pepper	Tomato	Corn	Corn	Lombok	Sugar palm	Cabbage
Banana	Corn	Red onion	Paddy	Corn	Lombok	Rambutan	Paddy		Cayenne pepper
Clove	Red onion	Leek		Cocoa	Cocoa		Cocoa		Big Chili
Tomato	Paddy	Lombok		Palm oil	Red onion		Sugar palm		Peanuts
Cucumber		Teak wood			Paddy				Clove
Lombok		Paddy			Candlenut				Corn
Chocolate		Tomato			Coconut				Cocoa
Pawpaw		Goldfish			Sugar palm				Ginger
Avocado									Carrot
Red beans									Beans

Source: Research data after processing, 2023.

Based on Table 3, Agricultural production in the Anggeraja sub-district is dominated by shallots, with a production of 287,110 kg/year. Meanwhile, in the Baraka sub-district, agricultural production is dominated by horticultural crops, namely tomatoes, with a production of 5,680 kg/year. Farmers' production in livelihood includes various products resulting from agricultural activities, fisheries, mining, livestock, or other natural resource management. These products can be used to fulfill food needs, industrial raw materials, and local consumption or sold as commodities in the market.

Production in the Baroko sub-district is dominated by clove plantation products totaling 18,525 kg/year; this region prioritizes clove farming because it is located in the highlands, which are very suitable for clove growth. Unlike the case in Bungin District, the community tends to cultivate shallot farming, as evidenced by the amount of production of 51,880 kg/year. Farmers' production in natural capital livelihoods varies greatly by livelihood type, geographical area, and local practices. These products play an important role in meeting food, industrial raw materials, and trade needs. Sustainable management and wise agricultural practices can help farmers maximize their production yields while safeguarding the natural environment and sustainable resources (T. Li et al., 2024).

The salak commodity in the Buntu Batu sub-district is a priority for the community there, seeing that their salak production amounted to 122,680 kg/year. The salak they produce is dropped chiefly to big cities such as Makassar and Pare-Pare. However, Cendana produces a lot of corn commodities, where this corn production is not for human consumption but is dominated by animal feed such as broiler chickens and laying hens, which are growing rapidly at this time in various regions in South Sulawesi. In addition, Cendana also produces a lot of rice grain to fulfill food needs in Enrekang Regency and its surroundings.

Agricultural and plantation production has a very significant role in sustaining the lives of many individuals in various countries, especially in rural areas. It provides food supplies for people and is the primary source of livelihood for thousands of farmers, agricultural workers, and surrounding communities. The sector forms the backbone of local economies by creating extensive employment opportunities, from planting to distributing produce. With the income generated from agricultural production, the economic well-being of rural communities can improve, providing better access to education, health, and infrastructure services.

However, environmentally friendly agricultural practices and technological improvements in the sector are essential to maintain sustainability. This allows for increased crop productivity while maintaining environmental and natural resource sustainability. However, challenges such as commodity price fluctuations, climate change, and government policies remain factors that affect farmers' livelihoods. Therefore, supporting the agricultural sector with the right policies is important in strengthening their livelihoods and sustainability.

The Maiwa community utilizes many NTFPs as a source of livelihood, such as the production of Aren Nira, where NTFPs in this area are very famous to communities outside Maiwa; Aren Nira is produced for Aren Sugar and as a traditional drink (teak). Farmers can be involved in raising livestock such as cattle, buffalo, goats, chickens, ducks, or other animals. These farms can produce meat, milk, eggs, and other animal products that the village community can consume to fulfill the nutritional needs of animals. In the study location, the community produces livestock products such as meat and milk from cows, goats, and buffaloes for meat, and milk from dairy cows and goats. However, all of them are in tiny quantities and only in certain areas, such as Maiwa and Bungin, so the data is not yet suitable for display.

The sub-districts that produce teak wood in Enrekang Regency are Baroko and Cendana. Timber production in this area is very minimal; although there are many types of wood in this area, the age of their wood has not yet entered the harvesting age. Wood production is crucial in supporting livelihoods, especially for communities involved in the forestry sector. Not only does it provide raw materials for timber, but it is also the central pillar of income for many individuals. From timber farmers to workers in wood processing plants, many people are involved in the various stages of production that create diverse livelihoods. Sustainable forestry practices, forest protection, and ecosystem maintenance are essential in preventing environmental damage. Policies that support sustainable forest management and natural resource protection also directly impact the livelihoods of communities involved in timber production.

2) Consumption of agricultural, plantation, and livestock products

The consumption of agricultural and plantation products plays a central role in maintaining health and nutritional balance for individuals. These products, such as vegetables, fruits, grains, meat, and processed products, provide essential nutrients to maintain a healthy body. The availability of various agricultural products allows for diverse food choices, supporting a balanced diet. In addition to providing

nutritional benefits, the consumption of local products also contributes to strengthening the food independence of a region and supporting local farmers. Consuming sustainably produced products also helps promote environmentally friendly farming practices. All in all, a thoughtful approach to the consumption of agricultural and plantation products can provide multiple benefits for individual health, the environment, and the local economy.

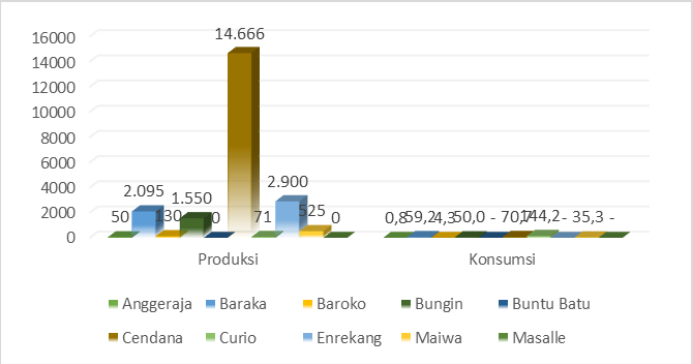

Figure 5. Respondents' Rice Production and Consumption

On the production side (Figure 5), efforts to sustainably increase productivity and use innovative agricultural technologies are the focus to sustainably meet the growing demand for rice. Fluctuations in rice prices in the global market can also impact the availability and prices in the local market, affecting people's purchasing power and access to this foodstuff. Given the important role of rice as a staple food, maintaining sustainable rice production and consumption is essential in ensuring adequate food availability in the future (Wang et al., 2023).

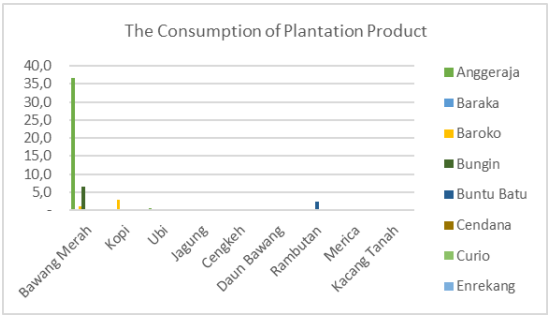

Figure 6. Consumption of Respondents' Plantation Products

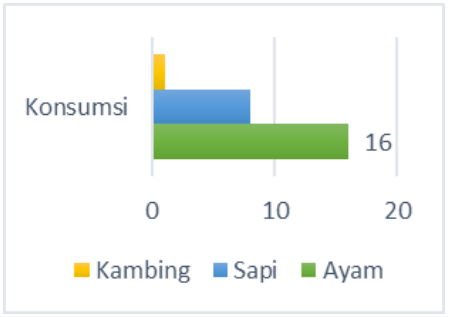

Figure 7. Consumption of Livestock Products (head).

The consumption (Figure 6) of plantation products plays an important role in people's daily lives. Plantation products such as fruits, vegetables, coffee, spices, and other products provide variety in the diet and essential nutrients for health. Fruits and vegetables, for example, are rich in vitamins, minerals, and fiber essential for healthy bodily functions. Estate products are also often integral to a region's cultural and culinary richness, forming a unique culinary identity. The consumption of plantation products has also gained considerable attention due to its importance in healthy diets and supporting environmental sustainability (Shi et al., 2023).

People are increasingly recognizing the importance of supporting sustainable plantation production, including the use of environmentally friendly farming practices and fairness towards farm workers. Consuming plantation products wisely not only provides health benefits to individuals but also plays a role in maintaining local farmers' environmental and economic sustainability.

The consumption of livestock products (Figure 7) plays an important role in food, health, and sustainability. Livestock products such as meat, milk, eggs, and processed animal products provide a source of protein, vitamins, and minerals important for human health. Consumption of livestock products must also pay attention to sustainability in terms of the environment and animal welfare (livestock). By consuming livestock products wisely, both in quantity and origin, individuals can maintain personal health and support efforts to maintain environmental balance and animal welfare (Torres et al., 2023). Consumption of livestock products comes from chickens, cattle, and goats to obtain food nutrients from meat. In contrast, cow's milk consumption comes from dairy cattle primarily raised in the Cendana.

CONCLUSION

Based on the research objectives, it can be concluded that natural resource capital, especially forests, plays an important role in supporting the sustainable livelihoods of communities in the social forest area of Enrekang Regency. Social forestry programs positively impact communities' social and economic welfare by increasing income, creating new jobs, and reducing dependence on illegal logging practices. However, challenges such as lack of technical knowledge in sustainable forest management and dependence on illegal activities still need to be addressed. For this reason, strengthening community capacity through training, implementing environmentally friendly forestry practices, and closer collaboration between the government, community, and related institutions are necessary so that social forestry programs can continue to support community welfare sustainably.

REFERENCES

.

Ahmad, Z., & Kurniawan, F. (2020). Forest-based economic activities in South Sulawesi: A sustainable approach. Forest Policy and Economics, 115, 102148. https://doi.org/10.1016/j.forpol.2020.102148.

Andayani, R., & Setiawan, A. (2022). Impact of forest conservation programs on poverty reduction in rural Indonesia. Sustainability, 14(4), 2368. https://doi.org/10.3390/su14042368.

Barbieri, A. F. (2023). Sustainability of Colonist Land Uses in the Amazon: A Demo-Livelihoods Perspective. Sustainability (Switzerland), 15(19). https://doi.org/10.3390/su151914116

Firdaus, A., & Mustari, D. (2020). Forest resource management and its impact on community livelihoods in Enrekang Regency. Environmental Management, 45(3), 351-365. https://doi.org/10.1016/j.jenvman.2020.03.021.

Fitria, N., & Triyono, E. (2019). Livelihood outcomes of community-based forest management in Indonesia: A comparative study. Forest Economics Review, 43(3), 222-240. https://doi.org/10.1080/14740879.2019.1678745

Goli, I., Azadi, H., Najafabadi, M. O., Lashgarara, F., Viira, A.-H., Kurban, A., Sklenička, P., Janečková, K., & Witlox, F. (2023). Are adaptation strategies to climate change gender-neutral? Lessons learned from paddy farmers in Northern Iran. Land Use Policy, 125. https://doi.org/10.1016/j.landusepol.2022.106470

Hadi, S., & Nurman, T. (2021). The effect of community forest programs on income generation in rural communities: A case study of Enrekang, South Sulawesi. Ecological Economics, 181, 106883. https://doi.org/10.1016/j.ecolecon.2021.106883

Hossain, M., Songsermsawas, T., & Toguem, R. H. (2024). The role of access to finance in disaster recovery: Evidence from coastal communities in India. Journal of Agricultural Economics, 75(1), 218–234. https://doi.org/10.1111/1477-9552.12541

Kartika, N., & Mulyono, P. (2021). Policy impacts of social forestry in Enrekang Regency: Social and economic aspects. Journal of Policy and Environmental Management, 18(4), 220-233. https://doi.org/10.1080/21555618.2021.1987950

Landicho, L. D., Laruan, K. A., Abadillos, M. A. G., & Pascua, R. S. (2024). Impacts of the COVID-19 Pandemic on Livelihood Assets of Smallholder Agroforestry Farmers in Selected Upland Farming Communities in the Philippines. Forest and Society, 8(1), 81–99. https://doi.org/10.24259/fs.v8i1.28095

Li, S., Cheng, Y., Cai, J., & Zhang, X. (2024). Influence of Livelihood Capitals on Landscape Service Cognition and Behavioral Intentions in Rural Heritage Sites. Land, 13(11). https://doi.org/10.3390/land13111770

Li, T., Singh, R. K., Cui, L., Xu, Z., Pandey, R., Liu, Y., Cui, X., Liu, Y., Fava, F., Yang, Y., & Wang, Y. (2024). Managing multiple stressors for sustainable livelihoods in dryland ecosystems: Insights and entry points for resource management. Land Degradation and Development, 35(3), 968–984. https://doi.org/10.1002/ldr.4964

Muhamad, R., & Hadi, D. (2020). Local knowledge and its role in forest management in Enrekang Regency, South Sulawesi. Journal of Rural Studies, 72, 88-99. https://doi.org/10.1016/j.jrurstud.2020.01.013

Nasution, F., & Damanik, J. (2021). Evaluating the impacts of social forestry programs on local economies in Indonesia: A case study from Sulawesi. Journal of Environmental Economics and Policy, 12(2), 129-145. https://doi.org/10.1080/21606544.2021.1912671

Pramudya, A., & Lestari, F. (2023). Challenges and opportunities of social forestry in Sulawesi: Implications for local livelihoods. Sustainability Science, 18(1), 91-105. https://doi.org/10.1007/s11625-023-01254-5

Prasetyo, L., & Rahayu, S. (2020). Agroforestry as a sustainable livelihood strategy in Indonesian rural areas. Sustainable Development, 32(5), 874-882. https://doi.org/10.1002/sd.2085.

Rizki, D., & Suryani, H. (2021). The role of community forest management in improving rural livelihoods:

Evidence from Enrekang, Indonesia. Land Use Policy, 99, 104895. https://doi.org/10.1016/j.landusepol.2020.104895.

Santoso, W., & Harahap, F. (2021). The integration of community forestry and agroforestry in improving sustainable rural livelihoods. Agroforestry Systems, 95(2), 345-358. https://doi.org/10.1007/s10457-021-00591-2

Sari, R., & Tanaka, Y. (2019). Community involvement in forest conservation programs: Lessons from Enrekang Regency, Indonesia. Environmental Science & Policy, 98, 12-23. https://doi.org/10.1016/j.envsci.2019.04.013.

Setiawan, D., & Hasibuan, H. (2022). Socioeconomic impacts of forest-based community programs in Enrekang: A long-term perspective. Global Environmental Change, 70, 102322. https://doi.org/10.1016/j.gloenvcha.2022.102322

Shi, C., He, Y., & Li, H. (2023). How does ecological poverty alleviation contribute to improving residents' sustainable livelihoods? — Evidence from Zhejiang Province, China. Sustainable Production and Consumption, 41, 418–430. https://doi.org/10.1016/j.spc.2023.09.002

Sibarani, R. W., & Somboonsuke, B. (2024). ANALYSIS OF THE LEVEL OF LIVELIHOOD ASSETS OWNERSHIP OF FARMERS IN CONVENTIONAL AND ORGANIC PADDY FARMING IN TWO ADJOINING VILLAGES. Journal of Sustainability Science and Management, 19(1), 96–112. https://doi.org/10.46754/jssm.2024.01.009

Suryani, H., & Budianto, T. (2019). Implementing sustainable forest management practices: Lessons from social forestry initiatives in Enrekang. Environmental Impact Assessment Review, 76, 24-36. https://doi.org/10.1016/j.eiar.2019.02.004

Susanti, E., & Wibowo, A. (2019). The role of social forestry in community-based forest management in Indonesia. Journal of Forest Economics, 27(4), 315-329. https://doi.org/10.1016/j.jfe.2019.04.005.

Syaban, A. S. N., & Appiah-Opoku, S. (2024). Unveiling the Complexities of Land Use Transition in Indonesia's New Capital City IKN Nusantara: A Multidimensional Conflict Analysis. Land, 13(5). https://doi.org/10.3390/land13050606

Torres, B., Espinoza, Í., Torres, A., Herrera-Feijoo, R., Luna, M., & García, A. (2023). Livelihood Capitals and Opportunity Cost for Grazing Areas' Restoration: A Sustainable Intensification Strategy in the Ecuadorian Amazon. Animals, 13(4). https://doi.org/10.3390/ani13040714

Utami, R., & Ningsih, R. (2020). Forest resources and poverty alleviation in Indonesia: A case study from Enrekang. Forest Economics and Policy, 112, 102253. https://doi.org/10.1016/j.forpol.2020.102253

Wang, P., Liu, R., Zhu, L.-X., & Li, N. (2023). Research on Combined Energy Consumption Choices of Farmers under Carbon Peaking and Carbon Neutrality Goals： Based on Livelihood Capital. Journal of Ecology and Rural Environment, 39(6), 691–698. https://doi.org/10.19741/j.issn.1673-4831.2022.0173

Widianto, H., & Juwana, T. (2021). Enhancing local community resilience through sustainable forestry management in rural Indonesia. Ecology and Society, 26(1), 10-23. https://doi.org/10.5751/ES-12130-260110

Wijaya, H., & Alamsyah, T. (2021). Social forestry in Indonesia: Governance and the challenges of forest management. Forest Policy and Economics, 127, 102438. https://doi.org/10.1016/j.forpol.2021.102438.

Wu, W., Liu, R., He, C., Yang, L., & Zhan, D. (2024). Research on the Sustainable Livelihoods of Rural Households Based on Livelihood Capital: Evidence from the Natural Rubber Production Area in Hainan and Yunnan Provinces. Tropical Geography, 44(4), 746–760. https://doi.org/10.13284/j.cnki.rddl.003859

Yuliana, Y., & Ismail, M. (2020). Sustainable livelihoods and ecosystem services in social forestry areas: A case from Enrekang Regency. Environmental Monitoring and Assessment, 192(6), 391. https://doi.org/10.1007/s10661-020-08557-4