Jurnal Manajemen Hutan Tropika, *28*(3), 279–291, December 2022
EISSN: 2089-2063
DOI: 10.7226/jtfm.28.3.279

Scientific Article
ISSN: 2087-0469

Environment Degradation and Rural Livelihoods of Mulawarman Community in Indonesia

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Received December 31, 2021/Accepted November 1, 2022

Abstract

This article aims to describe the livelihoods of communities around the mining area through cases in Mulawarman Village, Tenggarong Seberang District, Kutai Kartanegara Regency, East Kalimantan Province, Indonesia. This research uses a qualitative method with a case study approach. These findings show that the vegetation index value in Mulawarman Village degraded from 2014 (0.35) until 2019 (0.33). It shows forest degradation, which affects the livelihoods of rural communities that depend on agriculture or forestry. The leading cause of the decline in the vegetation index value is the expansion of coal mining activities. Indirectly, coal mining activities have limited the ability of the Mulawarman village community to access natural resources. Some residents of Mulawarman village have decided to sell agricultural land and move to other places. However, residents still survive to live in Mulawarman village by starting livestock and trading businesses to maintain their livelihoods.

Keywords: *forest degradation, rural livelihood, Mulawarman, East Borneo, Indonesia*

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Introduction

Indonesia has coal reserves scattered in various archipelago islands, one of which is Kalimantan Island. Mining is one of the sectors that drive the acceleration of the national economy. However, environmental damage due to waste from mining activities is a central problem in mining dynamics (Suoth & Nazir, 2014). Sarminah et al. (2018) show negative impacts through changes in environmental conditions that decrease soil productivity, soil compaction, erosion and sedimentation, and land movements or landslides. The consequences of mining activities affect the people's health around the mining site (Pasaribu, 2007). In addition, mining impacts the livelihoods of surrounding communities, both job opportunities and per-capita income (Suharto et al., 2015). Mining also encourages increasing the capacity of human resources through the corporate social responsibility (CSR) program, which is allocated to communities around the mining area (Juhaidi, 2012). It shows that mining activities harm the environment and benefit the economy and social welfare. Therefore, the principles of sustainable development need to be accommodated in policies and institutions responsible for the balance of growth both in social, economic, environmental, and even political aspects.

The government sets production quotas through policies to reduce environmental damage due to excessive dredging of natural resources in coal mining. The policy regulating production quotas in the coal mining system is an ecological, political entity for regional development (Fünfgeld, 2016). Mining activities also influence social life in the community, so communication between stakeholders is needed (Fitryarini, 2018). In addition, the existence of the mining industry also affects the technological development of an area (Devy & Sarungallo, 2018). Furthermore, Gandi et al. (2015) show that the mining industry is an alternative livelihood for agricultural people. Thus, the existence of the mining industry does not lead to a transformation of the livelihoods of the agrarian community around the mine but also encourages the productivity of agricultural and plantation activities to become more advanced (Baon et al., 2014). Policies can resolve conflicts of interest due to coal mining (Subarudi et al., 2016). Thus, public policies in mining have an essential role in maintaining a balance in the use of natural resources, improving the economy, and maintaining the social and cultural stability of the communities around the mining area.

Apart from policies, institutions also play an important role in supervising mining activities so that irregularities outside of policy occur. For instance, Yunianto (2009) points out that illegal mining activities are directed against regulations. The institution in question can be a Regional Environmental Agency or an institution formed by the community with a supervisory function not to harm the livelihoods of the surrounding community (Listiyani, 2017). Law enforcement by authorised institutions strictly addresses pollution and environmental damage (Natalia & Priyanta, 2019). Through institutions, companies are urged to optimise the mining operating system to reduce the ecological damage detrimental to the surrounding community (Santoso & Setiawan, 2009). It is a strategic step

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to mitigate negative social prejudice against coal mining activities, not to become a stimulus for conflict (Erlyani, 2013). When the coal mining activity permit has been completed, the reclamation can be utilised through social functions (Barkatullah & Ifrani, 2018). Thus, institutions have an essential role in carrying out the oversight function of policies to realise the environmental, socio-cultural, and economic sustainability of communities around the mining area.

Research on coal mining in East Kalimantan has been carried out before but is still dominant in technical matters with the coal mining operational system and geological aspects (Adinugraha et al., 2018; Devy & Sarungallo, 2018). In addition, there are studies on the positive and negative impacts of mining activities on the environment and the lives of local communities (Roby et al., 2018; Zaini, 2018). Considering the effects caused by the mining sector, this research will examine in-depth aspects of the livelihoods of the communities around the area of consideration using a sustainable livelihood approach. This research will also identify changes in the vegetation index value in Mulawarman Village, Tenggarong Sebrang District, from 2014 to 2019. Thus, an analysis of changes in the value of the vegetation index can be carried out on community access to natural resources to sustain livelihoods.

Methods

The research method used is qualitative with a case study approach. Thus, a study of community livelihoods around the mining area establishes a case study in Mulawarman Village, Tenggarong Seberang District, Kutai Kartanegara Regency, East Kalimantan Province. The research process consists of the initial assessment stage, the data collection stage, the data processing stage, and the reporting stage, as shown in Figure 1.

Figure 1 shows that before the data collection process, the research preparation process was carried out by exploring the social, economic, and environmental conditions of the Mulawarman Village community. An exploratory approach is needed to identify potential actors who can be involved as key informants for this research. At the data collection stage, in-depth interview techniques were used to obtain an overview of the livelihood conditions of the people living in Mulawarman Village with backgrounds as farmers, loggers and traders. The observation process is carried out to observe directly agricultural locations that have been used as coal mining areas. Furthermore, document studies are needed to obtain credible data related to the transformation of the vegetation index value of Mulawarman Village in 2014 and 2019. Specifically, the document study in this research is the data processing of Landsat 8 OLI satellite imagery in 2014 and 2019, which is managed using the QGIS 3.24.1 application and remote sensing techniques. Furthermore, the normalized difference vegetation index (NDVI) method was applied in raster data processing to identify, classify, and analyse changes in the vegetation index value in 2014 and 2019. The output of the raster data processing of Mulawarman Village is in the form of a visualisation of a regional map that displays the vegetation index value.

Triangulation is used in data processing to maintain the

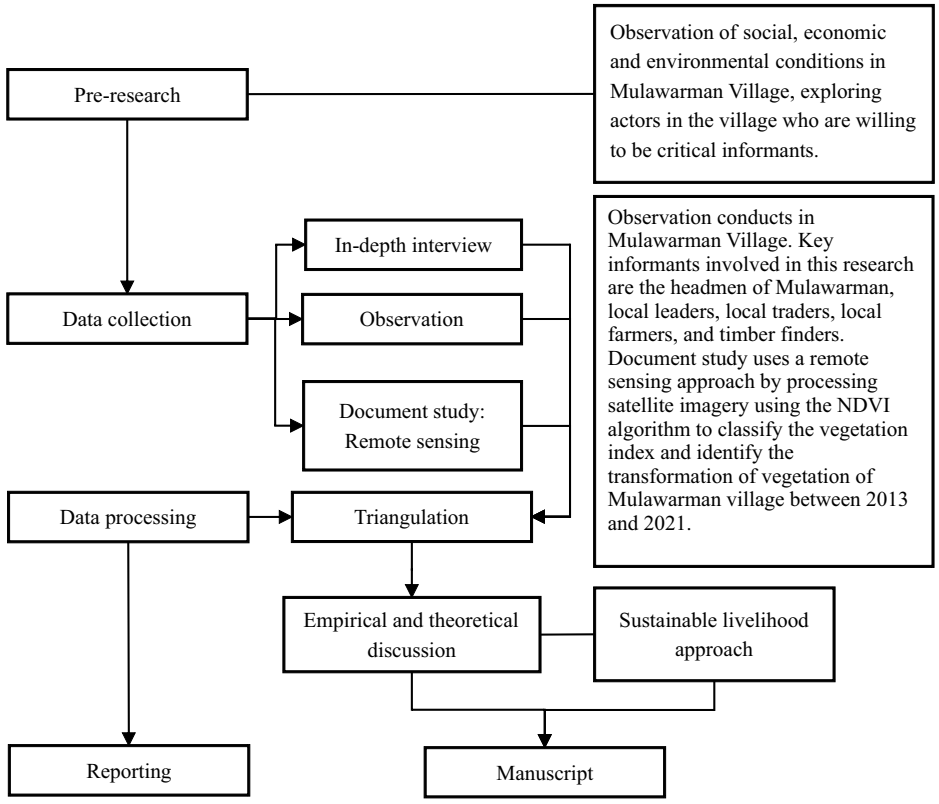

Figure 1 Research stages.

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validity and credibility of the results of document studies, observations, and in-depth interviews. Furthermore, the results of empirical data processing are discussed with the perspective of the sustainable livelihood approach (SLA) proposed by the Department for International Development (DFID) to analyse changes in the structure and mechanism of the livelihoods of the Mulawarman community starting from the process of capital accumulation (human capital, physical capital, financial capital, social capital), politics and local government policies, to the vulnerability context in the form of shock, trends, and popularity.

The output of this study describes the dynamics of the Mulawarman community's livelihood in terms of the SLA framework. Furthermore, the findings show the dynamics of capital accumulation, political dynamics and local government policies to the context of vulnerability that drives the transformation of community livelihoods from agriculture to mining. In addition, the output of this study also describes how the Mulawarman community's coping strategies respond to the vulnerability context (shock, trends, and seasonality).

Results and Discussion

The livelihood of Mulawarman community in Tenggarong Sebrang Regency. Vulnerability context: Land conversion, social segregation and conflict The Mulawarman community has a vulnerability context that can be classified into three parts, namely shock, trends, and seasonality. Movements occur because of the conversion of agricultural land into coal mining areas. In addition, the shock happened because of social conflicts regarding the pros and cons of coal mining activities. Meanwhile, in this case, seasonality is also a context of vulnerability that changes the mechanism and structure of community livelihoods in Mulawarman Village when accumulating capital.

> "*Our livelihoods, the Mulawarman community, were initially forest loggers because we were part of a family that participated in the transmigration program. We were provided with land to be managed as a place to live and our livelihood in meeting our daily needs. As transmigrants from Java, we cut down the forest and turned the area into a rice field farming area. The fields that we have worked on have produced good results, proven to meet the needs of clothing, housing and food for families from generation to generation. However, when the coal mining sector expanded, several family heads decided to sell their rice fields and moved out of the village. The mining company threatens us when the mining company broadens the area of operation until we are pressed and forced to sell our paddy fields. We are encouraged because the water supply to our agricultural regions is limited due to mining activities. The land is not fertile. Road access is also limited because a mining company owns the road we have been using. We are forced to find other livelihoods to survive here* (*Mulawarman Farmer*)*".*

The problem of converting agricultural land to mining is one of the fast changes or shocks faced by the Mulawarman community. Meanwhile, social conflicts occur between residents who want to maintain agricultural activities and residents who wish to switch from agricultural activities to mining. The pros and cons of causing chaos causing social relations between residents are not harmonious. Social problems are getting worse due to residents who decide to sell land to coal mining companies to be closer to residential areas. The people of Mulawarman are worried about the environmental impact of expanding the company's operational site, which is slowly taking away the community's livelihood activities as farmers. In desperation, some farmers decide to change their livelihoods to become traders or ranchers, and some choose to maintain agricultural activities but no longer grow rice but corn.

> "*Some family heads conflict because some of them have agricultural land next to each other, but the other party wants to sell their land to a mining company. After knowing these intentions, their relationship did not get along. Finally, one of the families decides to move to another village or town. Farmers who are disappointed because the water irrigation system is no longer as smooth as it used to be, have now decided to engage in the cattle and chicken farming business. Even farmers who initially worked on rice fields are now turning to corn. Communities still surviving in Mulawarman Village are trying to maintain their livelihoods even though most of the land resources have been controlled by coal mining companies* (*Mulawarman Farmers and Breeders*)*".*

The existing condition of Mulawarman Village has formed a transformation of farmers' livelihoods in Mulawarman Village due to the context of vulnerability in terms of trends, shock and seasonality. On the other hand, politics and overlapping policies have also exacerbated the social conditions of the people who are vulnerable to causing public resistance to local governments. Nevertheless, the provincial government encourages the community's efforts to maintain their livelihoods through alternative agricultural programs such as the corn planting assistance program, as shown in Figure 2.

Figure 2 shows that the transformation of rice paddy farmers' livelihoods to alternative livelihoods has occurred. The livelihood transformation of paddy rice farmers into corn farmers and ranchers is also being mobilised by the village government, regional government, and coal mining companies. Diversification and livelihood transformation are unavoidable, so this becomes a coping strategy for the Mulawarman community to meet their daily needs. Mulawarman Village is one of the villages in Tenggarong Seberang District that trans people inhabited due to the placement from transmigration in 19801981. Currently, its location is surrounded by several coal mining companies. As for several coal mining companies operating in the area, PT Jembayan Muara Bara (JMB), PT Kayan Putra Utama Coal (KPUC), PT Pama Persada Nusantara, PT Coconut Milk from Batu-Bara, and PT Kutai Lama. Before establishing the coal mining company, the education of the people of Mulawarman Village was still low, namely only graduated from elementary school, and many were not even educated. People's livelihoods depend on nature, such as farming, casual labour, carpentry, and livestock. Community income levels are still low, but the social relations of the community

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Figure 2 Corn and livestock planting assistance program in Mulawarman Village. Corn farmer (A) and livestock group (B).

are still close, such as working together in making public facilities such as building mosques, houses, bridges, and roads voluntarily and with a sense of kinship. Since the existence of the coal mining company, the education level of the community's children has increased until high education level. Otherwise, their livelihoods have begun to settle.

In addition, the opportunity to do business for the community in trade, services, and others is wide open. The community income has also increased by opening their businesses such as food stalls, catering, house rentals, car rental, grocery stores, etc. People's welfare has begun to grow, reflected in the houses where they live and living facilities. They have, but social relations began to decline because they were already busy with their work. Since mining activities, people who work as farmers have started to feel restless because the land has become less productive.

Figure 3 is the result of documentation of the livelihoods of the Mulawarman Village community as farmers who experience restraint due to exploited productive agricultural land, which affects their primary livelihoods. Based on the observations and interviews, several houses were damaged by residents, and some left the village because they were deemed unfit for habitation. It shows that community livelihoods in Mulawarman Village are essential to be studied scientifically and in-depth, related to the availability of resources, the capability of access to resources (capital), the role of government institutionally, and policies in supporting the sustainability of local community livelihoods.

The document study result shows that environmental degradation in Mulawarman Village might cause livelihood transformation. The transformation of the vegetation index value in Mulawarman Village from 2014 to 2019. In 2014, the average value of the vegetation index in Mulawarman Village was 0.35, while the average value of the vegetation index in Tenggarong Sebrang District was 0.36. Furthermore, in 2019, the average value of the vegetation index in Mulawarman Village decreased to 0.33, while the average value of the vegetation index in Tenggarong Sebrang District also decreased significantly to 0.31. The decline in the average value of the vegetation index in Mulawarman Village and Tenggarong Sebrang District was caused by increased coal mining activities and a change in agricultural activities to non-agricultural activities.

Figure 4 shows that environmental degradation due to the expansion of coal mining activities is actual, resulting from processing data from Landsat 8 OLI satellite imagery for 2014–2021 in Tenggarong Sebrang District. Several previous researchers used satellite image data and then processed it using the NDVI model to identify vegetation density in an area (Andini et al., 2018). Sudarsono et al. (2016) used Landsat 8 OLI satellite image data. They then processed it using the NDVI algorithm combined with the EVI, SAVI, and LSWI models to analyse the growth phase of rice in an area. Otherwise, Ariani et al. (2020) used the NDVI, EVI, and SAVI methods to analyse rice productivity. It shows that satellite image data processing results using the NDVI model can be used as secondary data to study environmental changes based on the vegetation index value, as previous researchers have discussed the vegetation canopy density classification.

Since the company's entry in 2000, it has explored and operated using underground mining systems (underground mining) from 2001 to 2005. The people's views of Mulawarman Village gradually changed in viewing the value of land and rice plants. As a result of the mining company's presence, the community's mindset regarding the importance of land has changed, from initially viewing land as sacred as a source of life and prosperity, turning into a high selling value. The company has acquired residents' agricultural lands for coal mining operations. The compensation for the residents' agricultural land is valued at a fantastic amount, around IDR500600 million ha^{-1}. The amount of money tempts the residents, and it changes the community's mindset toward the value of the land.

Natural capital The history of the formation of Mulawarman Village began with a settlement unit that gradually became a transmigration target village. The naming of the town as Mulawarman started with the Mulawarman University fieldwork practice program. During the transition from a city's residential unit in Mulawarman were 400 families from Indramayu, DKI Jakarta, Boyolali, Pati, and Ciamis. Each head of the family is given access to a forest area of 1 to 2 ha, managed as agricultural land for rice fields. The government, as a facilitator, plays a role in the process of clearing a forest area of 74 ha. During the land clearing period, the harvested trees are sold by local communities to earn income and meet their clothing, shelter, and food needs. After fulfilling the administrative requirements of Mulawarman Village in Tenggarong Sebrang District, land resources are optimised for the agricultural and livestock sectors as the wheels of the economy. In addition to meeting the needs of clothing, housing, and food, agricultural products are also used to meet the needs of children's education and family health.

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Figure 3 Field observation document (28-03-2022). Coal mining area (A), ricefield (B), and residential area (C).

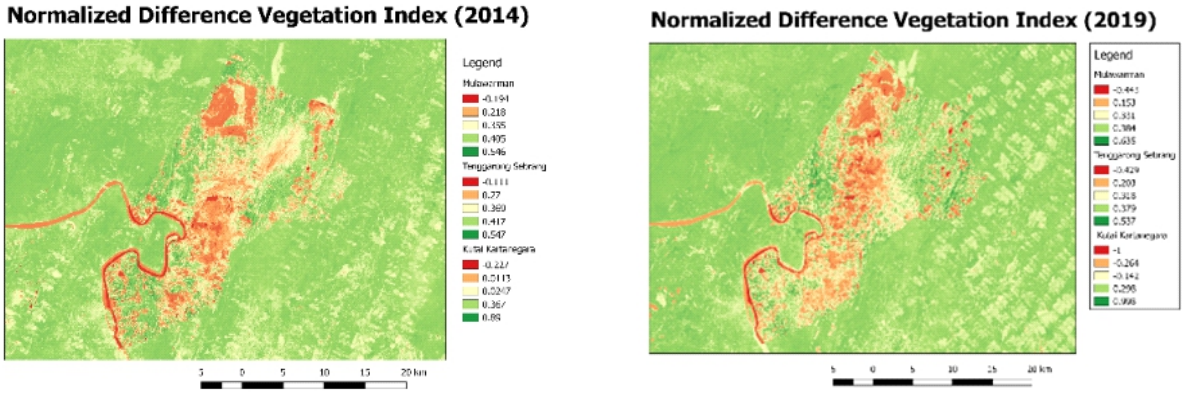

Figure 4 Normalized difference vegetation index (NDVI) based on Landsat 8 OLI.

Mulawarman Village began to clean up and met its glorious era in the agricultural sector. The local government of Kutai Kartanegara Regency was established in 1985 as a rice-producing area or rice barn Kutai Kartanegara Regency. The total production land from the agricultural sector in this village reaches 500 ha and produces around 7,0008,000 tons of dry rice annually. However, around the 1990s, the community again encountered problems related to land ownership which were also often experienced by residents. One of the reasons for this is the emergence of Government Regulation Number 24/1997 regarding land ownership which a land certificate must prove. The residents in the 80s have been able to cultivate the land according to their abilities must be limited. Not infrequently, this causes overlapping land ownership of residents and triggers conflicts with other residents.

Human capital The accumulation of human capital is not only caused by formal and non-formal education. Skills honed by the environment to sustain a livelihood are also classified as human capital. In the context of this research, some of the community's agricultural lands acquired by the company and converted into underground mining areas do not affect the people's rice cultivation process. Because of this system, it does not damage the lands on the surface that farmers use. However, many residents have sold their land to the company. Of course, it affects the daily habits of the villagers. People who used tools and materials for traditional farming began to switch to using tools and materials from manufacturers. Although using these materials is more pragmatic and makes the harvesting process faster, there will be a paradigm shift for farmers who initially consider the value of rice to be sacred, switching to only looking at commodities with a selling value.

Activities such as the Baritan tradition are also gradually disappearing because many people are selling their land. Only a few people are left who do not sell their land to the company. Of course, it harms the rice planting tradition. The clean village tradition is also gradually being interpreted only as a symbolic celebration of the village's birthday. Villagers are no longer diagnosed as having a harmonious relationship between humans and nature. It shows the accumulation of new knowledge, from knowledge in the agricultural sector to knowledge in the mining sector. The knowledge that is either intensified or converted based on socio-economic conditions can also be classified as human capital.

Social capital Changes in human capital also affect social capital formed from the farming community's cultural values to become a mining community. The daily life of rural people is always involved in the world of agriculture. This activity is carried out every day together and hand in hand with planting rice. During the rice planting procession, this kind of mutual assistant activity eventually creates a cultural tradition: the Baritan tradition or the Javanese tradition. The Baritan tradition itself is a tradition that has been passed down from generation to generation among the Javanese people who work as farmers. The values in the Baritan tradition are also often accompanied by religious matters such as reading the prophet's prayers and reading Islamic prayers. Every year, the

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community also holds a Village Clean event to pray for the welfare and prosperity of the village so that it remains sustainable and prosperous for the community. The Clean Village event is usually held in mid-October at the same time after the Baritan tradition is completed. This activity is also enlivened by Javanese arts such as *wayang kulit* performances, which usually feature stories about ancient Javanese mythology related to agriculture, such as Dewi Sri Phase.

Dewi Sri Pohaci is also depicted as a snake in the rice fields whose job is to protect the residents' rice plants from pests such as rats. A farmer interpreted this story at that time, so they respected the position of the rice plant and never wasted even a single grain of rice. In the Javanese tradition itself, the rice plant has a meaning as the embodiment of a goddess. In ancient *wayang* mythology, Dewi Sri Pohaci was incarnated as a rice plant left behind by a farmer during harvest. An older man who crossed the room found this goddess crying in the middle of a rice field area. After the grandfather approached, the goddess turned into a rice plant that the farmer left behind.

Financial capital During the transition from agriculture to mining, accumulated financial capital can find new places to live, build new businesses, and maintain livelihoods in different locations. In 2001 the company started operating using an underground mining system or a mining system using underground tunnels. In this system, the impact felt on the agricultural sector is not so significant because this mining process does not damage the surface of the land, and the community can still cultivate crops. Some residents who have received compensation from land acquisition from the company can no longer farm in Mulawarman Village. The payment for land that the company has acquired is IDR500600 million ha^{-1}. Some even receive compensation of up to IDR billions. Some residents have received payment for more than 3 ha of land area. It caused some residents to suffer from mental disorders due to being surprised to receive such a large amount of money from their land.

The village community tried to create a counterprogram to no longer depend on the rice-type agricultural sector and only depend on assistance from the company. Several programs are currently being carried out by the village government and the community, such as the livestock group program, which is also assisted by the company where each family group (KK) gets a pair of goats to raise livestock. However, this program is still experiencing ups and downs, and some residents even sell their livestock because they feel that there is no progress in the community's economy.

Physical capital Access to physical capital is the facilities and infrastructure built by the government and the private sector to support livelihoods and solve problems caused by development. In Mulawarman Village, mining activities impact economic, socio-cultural, and environmental conditions. Operation using an open pit system began in 2005. The method using an open pit has a significant impact on residents' soil and water sources, commonly used for irrigation of rice fields and the daily water needs of rural communities because this system requires a large area of land. And have to dismantle the soil on the surface and create giant holes. The community began to complain about dust, vibrations from the blasting process (blasting ground to take coal), drought during the dry season, flooding during the rainy season, and disrupting residents' activities in the agricultural sector.

It is a logical consequence of the loss of place for these animals due to deforestation by mining, turning against residents around the area, and creating new conflicts between residents and wild animals. The problem has persisted in recent years. Around September 2019, a new problem arose. The community tried to make demands on the company regarding the construction of a tunnel by PT Jembayan Muarabara which diverts the access road to Mulawarman Village. The district asked the company to immediately fulfil their promise regarding repairing roads that were dusty when dry and slippery when it rained, which caused several villagers to have accidents. The condition of Mulawarman Village itself changed drastically from the golden era of the village, which was dubbed the rice barn, until finally, in the 2000s, it became a coal mining industrial area.

Political environment: Policies and institution Policy interventions and political activities affect an area's socio-economic, socio-cultural, and socio-ecological conditions, including Mulawarman Village. The existence of a coal mining extractive industry has a considerable influence on aspects of the social life of the surrounding community. Especially in areas where the basis is designated as an agricultural area, it becomes a different problem when it has to co-exist with coal mining. Mining activities require large land areas to extract the potential of existing natural resources, automatically destroying existing ecosystems. In other words, coal mining is one of the causes of destroying the people's agricultural sectors. Kutai Kartanegara district, which in the 80s was dubbed the rice granary of East Kalimantan, had to end tragically when the issuance of Regional Regulation Number 9/2013 concerning the spatial plan for the Kutai Kartanegara Regency. The existence of this regional regulation has the potential to make agricultural lands concessioned as mineral and coal mining areas.

Changes due to the coal mining industry in Tenggarong Seberang District occurred in almost all villages that became concessions from coal mining. One example case is what happened in Kerta Buana Village. This village is one of the villages located directly in direct contact with the concession of a coal mining company. Transmigrants from Bali and Lombok mainly inhabit this village. Kerta Buana Village is one of the marginalised villages due to the coal mining industry. As a result of the open-pit mining system, the residents' agricultural lands are also affected. The waste from coal has been mixed with the residents' irrigation canals used to irrigate their fields. It affects the quality of rice produced, and farmers' yields are not under the cost of agricultural production. The farmers in Kerta Buana Village ended up selling their lands to the company voluntarily or by force. The companies say that the local people's agricultural land contained abundant coal, so they converted the ground to exploit coal mining.

The livelihood of Mulawarman community through sustainable livelihood approach Researchers who study

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people's livelihoods in rural areas are more dominant in discussing the conceptual framework of sustainable livelihoods relevant to development issues in developing countries to observe coping strategies and survival strategies when facing economic pressures that lead to poverty. Based on the case in Mulawarman Village, the SLA framework will be used to analyse the socio-economic dynamics of rural communities.

Figure 5 shows that the community's livelihood patterns are influenced by the availability of resources in capital, namely human capital, social capital, financial capital, natural capital, and physical capital. Meanwhile, the political environment influences the community's ability to access these capitals, including policies and institutions. In addition, demographic and geographic contexts also affect access to capital, including environmental ecosystems, climate change, and even things that cause unpredictable vulnerability to climate change.

Environmental degradation can be caused by converting agricultural land to coal mining. Siburian (2020) shows the social and economic dynamics of the community caused by changes in agricultural activities to mining. The limited mobility of policies causes changes in people's livelihoods from agriculture to mining to support the resilience of rural movements amid the domination and expansion of mining activities. The same thing also happened in Mulawarman Village. Some residents decided to sell agricultural land to mining companies because of government support through policies to optimise agricultural activity. Based on the interviews with Mulyono (Village Head of Mulawarman), there are several problems faced by residents of Mulawarman Village in maintaining their livelihoods as farmers. First, the expansion of coal mining activities has increased from time to time, thereby reducing the agricultural area of residents. Some residents have decided to move outside Mulawarman Village because the mining location has approached the residential area of residents. Second is the lack of mobility in government policies to support food products in Mulawarman Village. Thus, the Mulawarman people slowly shifted from agriculture to livestock, trade, and mining. Government assertiveness is needed to determine policies that favour the people of Mulawarman village to optimise agricultural activities.

The complexity between one aspect and another determines the village community's coping strategy and survival strategy, resulting in diversification, intensification, and transformation of livelihoods. Some researchers adopt this conceptual framework to describe people's livelihoods in rural areas (Kasim et al., 2017; Ndhlovu, 2018). Mulawarman Village is located in the Tenggarong Seberang sub-district with a total male population of 1,335 and 1,235 women. Mulawarman Village is 24.70 km^2 with a total population of 2,570, consisting of 775 households with an average density of 31 km^2. This research shows that the form of community access capability in Mulawarman Village affects the sustainability of local community livelihoods. The ability to access resources determines intensification, extensification, diversification, or transformation of livelihoods.

The community in Mulawarman Village can access social capital (norms, networks, beliefs), which is manifested in strengthening the rites or culture of the local community, namely the Bersih Desa tradition. Local traditions or culture indicate an intensification of social capital. Access to financial capital is obtained from micro, small, and medium enterprises (MSMEs), which, along with their development, have transformed due to coal mining activities around the village which have affected business productivity resulting in the diversification of financial capital through a dual livelihood strategy. In addition, the agricultural activities of the Mulawarman Village community show the ability to access natural capital. Still, there is a transformation or change in livelihoods when agricultural land is sold to companies.

On the other hand, formal and informal education facilities in Mulawarman Village show access to human capital. However, the quality of education that is still being improved reflects the intensification of human capital. Furthermore, the construction of facilities and infrastructure in Mulawarman Village illustrates the capability of access to physical capital that supports the sustainability of the livelihoods of the Mulawarman Village community. The context of the capacity of the Mulawarman Village

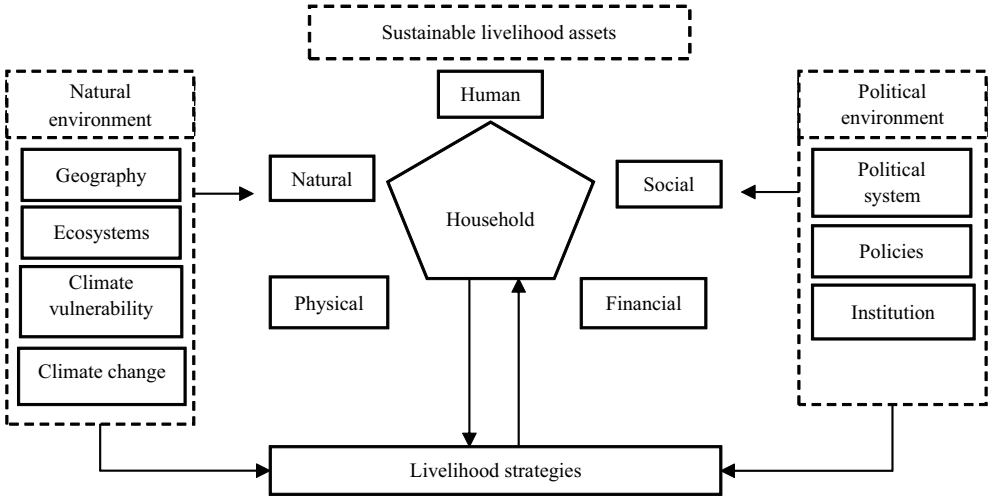

Figure 5 Sustainable livelihood approach frameworks.

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community's access to resources in the form of capital, as described by Chambers and Conway (1992), shows a survival strategy for coping with coal mining activities around residents' settlements. The policy perspective is in line with Dye's (2014) view that policies and institutions can support the sustainability of community livelihoods. According to him, three procedural elements, namely public actors, the public environment, and public policies, influence one another. It shows that the integrated approach links prospective analysis with retrospective analysis and continues to produce information transformations at any time through periodic monitoring and evaluation of policies.

The case of the livelihoods of the people of Mulawarman Village shows that institutions and policies must optimally support the sustainability of the livelihoods of local communities. If policy implementation disintegrates with the interests of public actors, social segregation and conflict are prone to occur. It means that the role of stakeholders in policy implementation also determines the sustainability of the policy itself (Zubayr et al., 2014). Arsyiah (2018) argues that weak policy implementation coordination and supervision harm the development process. Policies regulate implementing development and determine strategic steps from the licensing stage to the post-development reclamation stage (Agustiawan, 2014). Therefore, policies need to be optimised and flexible with technology development and the community's economic system. Meanwhile, Sukariamat (2013) emphasises that violations in the policy implementation process lead to administrative sanctions and applicable laws. Therefore, the policy implementation process needs to be optimised to integrate essential aspects into the policy formulation process.

Through the National Program for Rural Community Empowerment, the local government has effectively implemented programs to encourage community productivity in Mulawarman Village. However, there are still several obstacles, namely the absence of Operational Technical Guidelines for the National Program for Rural Community Empowerment at the planning stage for the involvement of elements. Poor households, so community support is relatively low. On the other hand, Gandi et al. (2015) show that East Kalimantan Province has issued mining business permits (IUP), reaching 1,192 until August 2014. Kutai Kartanegara is a district that has issued IUPs for 407 companies. Its shows that mining industrialisation has changed the land structure in Mulawarman Village, where land ownership has concentrated on coal mining companies. Meanwhile, the existence of mining increasingly encourages local people to work outside agriculture.

The results of scientific searches show that studies on the livelihoods of rural communities in developing countries are interesting to research, especially in efforts to alleviate poverty (Nayak, 2017). Livelihood studies are also essential for observing the transition period for changes in people's livelihood patterns from rural to urban areas (Peng et al., 2019). Even livelihood studies after natural disasters are also an essential part of observing the adaptation process of communities in rebuilding settlements (Badri et al., 2006). Infrastructure development impacts people's livelihood patterns. Any action that changes settlement arrangements and affects community livelihoods will change the way people maintain their livelihoods, thus the adaptation process to achieve sustainable livelihoods. Furthermore, Swathilekshmi (2010) shows the vital role of women in efforts to achieve sustainable livelihoods. In the context of women, Mekonen (2016) offers social capital, human capital, and financial capital to maintain livelihoods. Kabir et al. (2012) also showed the same thing regarding financial capital, social capital, and physical capital to access human capital to improve living standards. Thus, it can be seen that the sustainable livelihood approach can be used to describe the community's livelihood patterns in various livelihood contexts for farmers and fishers and to relate them to issues of gender and poverty.

Culturally, household livelihoods are an exciting issue describing coping strategies and survival strategies (Venu et al., 2018). Mutahara et al. (2016) show differences in coping strategies and survival strategies in each coastal area context and deepening then connects them with the culture of local communities. In addition, policies also play an essential role in supporting coping strategies and survival strategies that make it easier for people to alleviate various problems, including poverty (Liyama et al., 2008). Albore (2018) emphasises the diversification of norms influenced by driving and pull factors for income intensification. Furthermore, Baffoe (2017) reconstruct essential things in the concept of sustainable livelihoods for rural communities by considering the availability of assets and aspects of internal and external vulnerability and the ecological impacts of community livelihood activities. Su et al. (2018a) describe explicitly the relationship between humans and nature, which is manifested in the pattern of community life.

Meanwhile, Zada et al. (2019) emphasise the transition period of changes in the livelihood patterns of small-scale to medium-scale communities in the context of entrepreneurship. In addition, Huang et al. (2022) specifically distinguish the context of community livelihoods into three categories: purely agricultural, non-agricultural and part-time agrarian strategies, and emphasises aspects of traditional farm knowledge as capital. Meanwhile, Ding et al. (2018). show a new mechanism formed in people's livelihood patterns when a shock occurs. Thus the use of foreign money determines the other way. It indicates that sustainable livelihoods include a new mechanism or practice based on external and internal factors, namely the level of vulnerability and the form of adaptation. Thus, people's livelihoods are holistic with those connected to economic, socio-cultural, environmental, and political aspects.

Even though the pattern of livelihood is holistic, several previous researchers have reduced the scope of the research and then linked several social issues with the regional context. (Wang et al., 2019) explored aspects of vulnerability in household strategies in rural areas to increase access to capital to improve living standards, which showed that social relations and financial support were determinants. On the other hand, Pandey (2017) shows that the lack of availability of resources affects the livelihood patterns of rural communities, especially in the context of geographic areas that limit access to natural capital. Su et al. (2018b) show that health risks and social risks are factors of vulnerability after analysing various risks in the context of the livelihoods

Jurnal Manajemen Hutan Tropika, *28*(3), 279–291, December 2022
EISSN: 2089-2063
DOI: 10.7226/jtfm.28.3.279

Scientific Article
ISSN: 2087-0469

of rural communities, namely health, environmental, financial, social, and information aspects. Liu et al. (2018) show that the more availability of livelihood assets, the more strategies to maintain them also vary. Therefore human resources and financial assets play an essential role in the survival strategy. In rural communities facing poverty problems, Walelign (2017) emphasises strengthening financial capital and physical capital by increasing infrastructure that connects rural areas with cities and encourages the increased establishment of small businesses and trades.

Furthermore, Walelign et al. (2017) show that a combination of household income and assets can be a more effective survival strategy. However, sustaining livelihoods in facing poverty will be different if there is a dependency on the environment (Walelign et al., 2017). In maintaining livelihoods, Kibwage et al. (2009) emphasise the importance of the availability and capability of access to capital. It means that differences in socio-cultural conditions and location of regions affect the availability and ability of community access to capital to improve their welfare with sustainable livelihood patterns. Thus, efforts to minimise the vulnerability factor depend on the diversification of livelihood patterns.

Several researchers evaluated the results of implementing the SLA to find methods relevant to the context that can be generalised. However, the results of these evaluations cannot be used as the same pattern to be applied to different regional contexts (Brown et al., 2006). The conceptual framework of rural community livelihood strategies in the household realm is used to identify things that cause dependency as an aspect of vulnerability that can be minimised (Rahmatullah et al., 2015) and alleviate poverty (Khatiwada et al., 2017). Therefore, Hidalgo and Cuesta (2018) reconstructed the vulnerability indicator model in community livelihoods, particularly for informal entrepreneurs providing micro-level food, using the livelihood vulnerability index approach, emphasising adaptive capacity and sensitivity. It finds several components. It affects vulnerability, namely the demographic profile, social networks, livelihood strategies, health security, food security, access and utilities, and experiences dealing with natural disasters. In addition, the perspective of Chambers and Conway (1992) can be used as a framework for identifying aspects of vulnerability and observing the livelihood patterns of people in rural areas. Israr et al. (2014), which uses a conceptual framework of sustainable livelihoods to identify the livelihood patterns of rural communities, then finds a diversification of people's livelihoods in rural areas. It shows that the conceptual framework for identifying the livelihood patterns of people in rural areas depends on methodological issues to explore contextual aspects of vulnerability.

Studies on community livelihoods in Indonesia's context have become popular with previous researchers, especially coping strategies after natural disasters (Hasyim, 2013; Resosudarmo et al., 2013). In addition, Gibson and Olivia (2010) show that infrastructure development plays an essential role in increasing access to capital. On the other hand, Muriadi and Wijaya (2013) offer an idea to examine the vulnerability of households in flood-prone areas in Indonesia. It shows that adjusting the conceptual framework for sustainable livelihoods is relevant to Indonesia's social and cultural context in various aspects. Rani (2016) shows that the vulnerability factor in sensitive people's livelihoods in Indonesia lies in health. However, the vulnerability factor is highly dependent on the socio-cultural context of society based on geographical aspects (Amrifo, 2013; Amrifo et al., 2014). Thus, diversification, intensification, and transformation of livelihoods also vary (Gunawan, 2016; Yuerlita et al., 2013). Overall, the economic aspect is still the fulcrum of the livelihood patterns of people in Indonesia, which has attracted previous researchers in various fields, including tourism (Parmawati et al., 2018). The problem of poverty in Indonesia has attracted researchers to identify coping strategies and survival strategies for fishers and farmers as livelihoods that are vulnerable to climate change (Amin et al., 2019; Ernawati et al., 2013). It shows that economic pressures in Indonesia affect survival strategies to achieve family welfare (Sabania & Hartoyo, 2016).

Conclusion

This study indicates that the people of Mulawarman Village face socio-cultural, economic, and environmental problems that affect the sustainability of their livelihoods. The sustainability of livelihoods is determined by the capability of access to resources in the form of social capital, human capital, natural capital, financial capital, and physical capital. The livelihood context of the people in Mulawarman Village shows the capability to access these capitals. Still, some resources have transformed, such as natural capital, due to coal mining activities around Mulawarman Village, so that many lands are sold, and food production is degraded. Environmental degradation can be seen in the change in the vegetation index value in Mulawarman Village from 2014 to 2019. On the other hand, institutionally and policy, the government is trying to improve the people's economy of Mulawarman Village with various informal education programs to increase the capacity of human resources. not effective in improving community welfare or ensuring sustainability of community livelihoods. The Provincial Governments of East Kalimantan and Kutai Kartanegara Regency policies that issued IUP encouraged the shift of farming communities' livelihoods to other industries without considering the readiness of human resources.

Recommendation

This scientific study can be used to make policies that favour the sustainability of the livelihoods of communities around mining areas in Indonesia, especially in Mulawarman Village, Tenggarong Seberang District, Kutai Kartanegara Regency, East Kalimantan Province. Considering the limited access to resources that threatens the sustainability of the livelihoods of the Mulawarman Village community, it is hoped that decision-makers can assess the results of this study in determining policies to mobilise the capability of access to the community to achieve a sustainable livelihood.

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