The initial assessment of the impacts of Covid-19 pandemic on forest resilience and forest-dependent community resilience in East Kalimantan

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Abstract. Many groups of people living in and around forests in Kalimantan are confronted with particularly acute and simultaneous challenges during the covid-19 pandemic. These challenges include forest security, food security, nutrition, and basic livelihoods, declining incomes due to social restrictions, vulnerable land and resource rights that are critical, access to health care, lack of access to government social protection measures, and information mainly through digital mode. This paper seeks to build an understanding of the sustainability of the communities most dependent on forest resources for the vulnerable members of society’s livelihood and an understanding of the importance of secure land and forest rights to adapt and cope with livelihood difficulties in times of pandemics and other difficult circumstances. We combined social scientific methods including review of relevant published literature, participatory observation, and semi-structured interviews. This paper identified factors influencing community resilience to include population size, autonomy, community leadership, economic diversity, and infrastructure base. The covid-19 experience shows that resilient communities (e.g. with secure land and forest rights, ability to govern forests, and having incomes from forest products) were able to invest in health care, livelihoods, and employment generation activities during the pandemic. They were also able to prevent the spread of disease by using customary practices to enforce self-isolation and protective measures.

1. Introduction
The Indonesian government has declared the coronavirus or covid-19 outbreak as a National Disaster [1]. The covid-19 pandemic is a non-natural disaster and became a ghost terrifying everybody throughout 2020-2021 and has yet to end. Indonesia is in an emergency response position to handling the covid-19 pandemic and is one of the most affected countries in South East Asia [2]. The covid-19 pandemic was confirmed to have spread to Indonesia on March 2, 2020 [3] [4] and within a month, the pandemic had spread to 34 other provinces. The number of patients infected with covid-19 in Indonesia is still growing [5] [6].

Covid-19 is one of the zoonotic diseases, which ways of transmission move from animals to humans [7] [8]. Despite its origin and the way transmission to humans is still uncertain, it is believed that covid-19 comes from bats and is transmitted to humans through contact with wildlife living in the forest. Bat is a very risky source of the pathogen, and from the research over the past two decades, it is found that the bat is a natural host for various zoonotic diseases [9] [10].
To overcome the increasingly widespread of covid-19, the government is trying to intensify the socialization of large-scale social restrictions (PSBB). After the PSBB, the government issued a policy to enforce restrictions on community activities (PPKM) for Java-Bali in early January 2021. The restrictions imposed by the government influence the economy and the business world at varying levels. Another hard challenge is that many workers face the risk of lack of money and or loss of work at various levels. Migrant workers face a severe economic situation with reduced or even loss of their job and income, which will, in turn, affect those dependent on them. The history of the crisis in Indonesia, for example the 1997-1998 monetary crisis, also left a relative note of the survival of the agriculture and forestry sector and even accommodated labor-loss of work in urban jobs [11] [12]. It seems that the agricultural, forestry, and forest-based sectors as a buffer sector in times of crisis will repeat themselves. These sectors have the opportunity and play a very important role in providing solutions for recovery from the covid-19 pandemic.

The economic difficulties during the beginning of the pandemic have been felt by almost all groups, including those getting the impacts from forest destruction [13], although data released by the Directorate General of Forestry Planning and Environmental Management, the Ministry of Environment and Forestry (Ditjen PKTL KLHK) states that Indonesia has reduced the national deforestation rate by 75.03 percent during the covid-19 pandemic of 2019-2020, reaching 115.46 thousand ha. This figure is much lower than the deforestation in 2018-2019 of 462.46 thousand ha [14].

The covid-19 pandemic affects forests, forestry, and people or communities in many ways. This is not to mention the impacts of the pandemic on those whose lives are completely dependent on land and forests that took place before the pandemic and were made worse during the pandemic. One serious concern for forest communities in Kalimantan has been inadequate food resources, especially for local communities around the forests who have limited access to agricultural land, precarious land and resource rights that are critical for their survival, or communities without formal land title to customary land where they would be able to engage in farming and food cultivation [15]. They have been struggling hard to survive on land and forests, even long before the pandemic. Due to scarcity and food insecurity, they may leave the village in search of food and they are potentially infected. Another critical concern for people around the forests is the lack of access to proper healthcare as one part of a continuous lack of protection of their rights, an issue that has worsened during this health and security crisis [16].

Resilience is a multifactorial term that has been given several definitions in different fields. According to the researchers’ claim, the use of the term resilience in the scientific literature has increased eight times more than the previous years [17], and it also has increased in policy-making as well as in practice [18]. On the other hand, the definitions of resilience are as various as the diversity of the fields.

Resilience is defined as the ability of a system to maintain key functions and processes in the face of stress by resisting and then recovering or adapting to changes or uncertainties and shocks (such as climate variability, pandemics, and other difficult circumstances) [19]. This also applies to the concept of stability in a study of forest-dependent communities [20]. The concept of resilience has evolved from an ecological definition, which emphasizes the sustainability of ecosystem structures and functions in a changing world, to an emphasis on the ability of the combined socio-ecological systems to adapt [21].

More recently, the concept of resilience includes the ability of society to transform in the face of global change [22]. Therefore, resilience refers to the capacity of a system to survive in its current state of functioning while facing disturbances and changes [23] [24], to adapt to future challenges, and to transform in a way that improves its functioning [25]. The aim of the study results can be useful for decision-makers, policymakers, and also for those who are responsible for community safety.

2. Methods

2.1. Study sites

Our main study sites were located in five villages namely: Muara Salung, Muara Kebaq, Muara Tiq, Muara Tuboq, and Muara Belinau. These villages are located in Tabang Sub-District, Kutai Kartanegara District, Province of East Kalimantan (see Fig. 1). The selection of the research location was based on the consideration that the residents of the five villages depended heavily on their livelihood needs from
land and forest resources.

Tabang sub-district is located in the Production Forest Management Unit (PFMU) Unit XXVI Watershed Belayan area (hereinafter referred to as PFMU Belayan). The area under the management of the PFMU Belayan is approximately three-fourths of the forest area in the Kutai Kartanegara District. The land cover of the PFMU Belayan area is mostly forest, which is 72%, which consists of primary dryland forest, secondary dryland forest, and secondary swamp forest. While the remaining 28% is a non-forest area consisting of shrubs, settlements, plantations, agriculture, and open land [26].

The PFMU Belayan has carried out forest area management which is its duties and responsibilities by following per under the Long Term Forest Management Plan (RPHJP) document of the PFMU Belayan 2018 – 2027 based on the Ratification Decree SK.290/MENLHK-KPHP/PKPHP/HPL.0/2018 on 6 February 2018 [26].

Geographically, PFMU Belayan as one of 4 PFMU reserved in Kutai Kartanegara District is located between 115°13’30” to 116°37’30” East Longitude and 01°35’15” North Latitude to 00°18’ 22.5” South Latitude. Administratively, the government is located in 6 sub-district administration areas from 18 sub-districts in Kutai Kartanegara District, namely: Kenohan, Kembang Janggut, Tabang, Kota Bangun, Muara Wis, and Muara Kaman.

There are 19 (nineteen) villages of Tabang sub-district, namely Muara Ritan, Umaq Dian, Gunung Sari, Long Lalan, Ritan Baru, Umaq Tuboq, Muara Belinau, Bila Talang, Umaq Bekuay, Sidomulyo, Tukung Ritan, Tabang Lama, Muara Salung, Muara Kebaq, Muara Tiq, Muara Tuboq, and Muara Belinau. Sidomulyo Village is the capital of the Tabang District.

All of these villages are located on the banks of the Belayan River which crosses the 3 most upstream sub-districts in Kutai Kartanegara District, namely Kenohan, Kembang Janggut, and Tabang Sub-Districts. All of these villages are also located outside the forest area according to state forest area status. However, five villages namely Muara Salung, Muara Kebaq, Muara Tiq, Muara Tuboq, and Muara Belinau, called villages on the Lunuk River, are relocation villages located in the Sidomulyo village area.

The majority of villagers work on artisanal gold mining, swallow nest finder from a cave, agriculture, and harvesting forest products such as rattan, gaharu (from the heartwood of Aquilaria spp. infected by fungi), cutting the Borneo ironwood (Eusideroxylon zwageri – belian – local name) and other wood building for community houses. Mountain or upland rice is the main crop grown by farmers in shifting cultivation, besides maize, vegetable, cassava, and local fruits. Other livelihood activities include animal husbandry mainly swallow nest cultivation, raising cattle, fishing in rivers, rattan craftsman, and hunting, which provide additional income. Other livelihoods are working as employees or village officials and sub-district offices as well as employees in timber and mining companies located around and outside the village or in other sub-districts within a district.

Tabang Sub-District is one of the settlements in East Kalimantan Province with high heterogeneity because the community consists of various ethnic groups dominated by local ethnicities such as Kutai, Dayak Kenyah, and Dayak Punan. This also has an impact on the variety of customs, languages, and religions in the region.

Table 1. Socio-economic of the five villages of study sites in Tabang Sub-District of province of East Kalimantan.

| Name of village          | Muara Tiq | Muara Salung | Muara Kebaq | Muara Belinau | Muara Tuboq |
|--------------------------|-----------|--------------|-------------|---------------|-------------|
| Number of populations    | 250       | 164          | 252         | 181           | 252         |
| Population density (people/km²) | 1.15  | 1.51         | 0.25        | 3.46          | 2.32        |
| Area (km²)               | 217.18    | 108.59       | 980.60      | 52.27         | 108.59      |
| Main livelihoods         | Gold      | Gold miner,  | Bird nest   | Rattan        | Farmers,    |
| (in order of importance) | miners, swallow nest seekers, farmers, rattan craftsmen | hunting, farmer, bird's nest seeker | finder, farmer, hunting, gold miner | craftsmen, hunting, NTFP collectors, farmers | gold miners, rattan craftsmen, swallow nest seekers |

Figure 1. Location of Research Villages in Tabang District, Kutai Kartanegara District, Province of East Kalimantan.

2.2. Research methods
Document studies, literature reviews, and collection of secondary data for the discussion of this paper were carried out through the collection of documents, and literature studies related to the role and governance of the PFMU Belayan. Primary data collection was carried out through field research, namely semi-structured in-depth interviews with 27 villagers or respondents, village officials, and guided by a list of topics that had been compiled previously. Respondents were selected with the consideration that the person concerned has experience and knowledge by following the research focus.

This research was conducted qualitatively and quantitatively. Qualitative research is research that uses a deductive-inductive approach and emphasizes processes and meanings that are not rigorously studied or have not been measured, emphasizes the socially constructed nature of reality, the close relationship between the researched and the researcher, the pressure of the situation that forms the investigation, full of values, highlighting how social experiences arise as well as their acquisition of meaning [27].

Surveys and field observations are intended to find out, study, and at the same time verify or cross-check the issues or problems that are the focus of research. The survey aims to obtain specific information about strategies and ways to respond to local communities affected by the pandemic.
3. Result and discussion
3.1. Settlement history of villages in The Lunuk River Basin
In the 1970s – 1980s, one of the most obvious activities in fostering isolated communities in Kalimantan was the Isolated Community Welfare Guidance Program, hereinafter better known as the Resettlement Program for Isolated Communities (PKMT). The PKMT program was a program from the Ministry of Social Affairs which was run during the New Order government by resettling or relocating isolated tribal communities to improve their social welfare to be able to achieve a standard of living equal to other Indonesian people [29]. Resettlement is intended by the government to facilitate regulation and guidance, that these isolated communities can develop and participate by the demands of development [30].

The PKMT program was also implemented for isolated communities in Tabang District during that period. This is based on the confession of one of the Lunuk River residents who stated that they are the third generation living in the relocation settlement. The relocation was carried out by a head of sub-district to facilitate the administration of the general election at that time. The Punan Dayak people from Muara Belinau, Muara Tiq, Muara Salung, Muara Kebaq, and Muara Tuboq were gathered and resettled in a relocation village called Sungai Lunuk settlement in the village area of Sidomulyo.

The Lunuk river settlement is a relocation area measuring 3 km x 7 km which consists of 5 villages namely Muara Belinau, Muara Tiq, Muara Salung, Muara Kebaq, and Muara Tuboq. The home area of the five villages is located southwest of Sidomulyo village. The position of the home area is in the state forest area. Reaching the area takes about 3 hours to travel by boat to the upper part of the Palah River (a tributary of the Belayan River) and then about 80 km to reach the home area on the company road.

The problem of this relocation village will later be related to the need for agricultural land for people with shifting cultivation and its relationship to food security and community resilience in the face of changes in difficult conditions before and during the covid-19 pandemic.

3.2. Forests resilience
The pandemic may not directly affect forest resilience. The increasing pressure of negative impacts on forest resilience is strongly influenced by several disturbances associated with climate change and global warming [31] [32] [33], such as forest fires, forest exploitation and pollution [34] and forest ecosystem management practices [35] [36]. In addition to protecting the environment and biodiversity, forest management practices will -by their ecological and social functions- also be a source of livelihood and act as a safety net for forest communities, especially in difficult conditions, such as climate change (floods, droughts) and pandemics.

The Indonesian government through Forestry Law no. 41 of 1999 divides the forested land into state forests and private forests. The law declares that all Indonesian forestlands that are not subject to private entitlements are state forestlands [37]. On the other hand, to protect forest ecosystems and sustainable use, the Forestry Law also divides the functions of forest into 3 categories, i.e. protection, conservation, and production functions. This division base of forest function is also included in FMU planning. The management block in the FMU area is part of the FMU area with relatively permanent similarity of biogeophysical characteristics (potential, land cover, landscape, and others.) which are determined to increase the effectiveness and efficiency of management.

Based on the actual conditions in the PFMU Belayan area, and after being combined with plan directions, it is classified by area, i.e. Protected Forest Block Area and Production Forest Block Area. The division of forest management block classification in the PFMU Belayan area is as follows:
Table 2. Distribution of Management Area Blocks in the PFMU Belayan.

| No. | Block Division                                      | Protection Forest | Production Forest | Conversion Production Forest | Limited Production Forest | Water Area | Total       |
|-----|----------------------------------------------------|-------------------|-------------------|------------------------------|---------------------------|------------|-------------|
| 1.  | Core Block                                         | 94.784,26         | 2,33              |                              |                           |            | 94.786,60   |
| 2.  | Utilization Block                                  | 112,950,93        | 10,99             |                              |                           |            | 112,961,92  |
| 3.  | Utilization Block NTFP-Environmental Services     | 41.380,11         | 2.028,06          |                              |                           |            | 43.408,17   |
| 4.  | Utilization Block Wood Forest Product-Natural Forest | 21.163,76         | 7.000,83          | 440.857,92                   | 115,08                    |           | 469.138,28  |
| 5.  | Utilization Block Wood Forest Product-Plantation Forest | 191.735,35       | 6.352,51          | 16.845,66                    |                           |           | 214.933,51  |
| 6.  | Community Empowerment Block                        | 10.177,90         | 2.764,16          | 50.028,47                    |                           |           | 62.971,01   |
|     | **Grand Total**                                    | **207.735,19**    | **264.457,11**    | **18.145,56**                | **507.745,52**            | **115,08** | **998.199,49** |

Source: Results of Spatial Data Analysis of PFMU Belayan (2016) [26]

The forest management area in the PFMU Belayan is divided into 6 major groups, namely: core block, utilization block, non-timber forest product utilization block – environmental services, timber forest product utilization block from Natural Forests (IUPHHK-HA), timber forest product utilization block from plantation forest (IUPHHK-HT), and community empowerment blocks (Table 2).

The division of blocks in the PFMU Belayan area refers to the Regulation of the Minister of Forestry Number P.6/Menhut-II/2010, in particular, Article 6 (2) and the Regulation of the Director-General of Forestry Planning Number: P.5/VII-WP3H/2012, dated 14 May 2012 concerning Technical Guidelines for Forest Management and Preparation of Forest Management Plans in Protected Forest Management Units (PrFMu) and Production Forest Management Units (PFMU), that Block Division must pay attention to a) field biophysical characteristics; b) socio-economic conditions of the surrounding community; c) natural resource potential; and d) the existence of rights or business permits for forest utilization and use of forest areas [26].

The MOEF has, however, granted concessionaire licenses to both State-owned and private companies in some State-owned forestlands that have been zoned for production (for example, for logging and industrial timber plantations). Since the 1970s, production forest areas in the PFMU Belayan area have been managed through Timber Forest Product Utilization Permits, which at that time were called Forest Concession Holder (HPH) and Industrial Plantation Forests (HTI). Along with the policy change, several Forest Concession Holders (HPH) went into liquidation and some received extensions of their business licenses.

The PFMU Belayan manages forest areas of 998,199.49 ha and a large portion of the forest area has already been granted utilization permits, namely timber forest product utilization blocks in natural forests (IPHKK-HA) and the timber forest product utilization block - plantation forest (IPPHK-HT) covering an area of 684,071.79 ha. (68.53%), core block covering an area of 94,786.60 ha (9.50%), utilization block covering an area of 112,961.92 ha (11.32%), block of non-timber forest product utilization and environmental services (HBBK-Jasling) covering an area of 43,408.17 ha (4.35%), and community empowerment blocks covering an area of 62,971.01 ha (6.30%) [26].

Existing production forest areas currently have Timber Forest Product Utilization Business Permits (IUPHHK-HA/HT) and Borrow-to-Use Permits for Forest Areas (IPPKH), namely by 9 IUPHHK-HA units, 5 IUPHHK-HT units, and 6 IPPKH units [26]. An overview of the working areas of the IUPHHK-HA/HT and IPPKH companies in the PFMU Belayan can be seen on the map (Figure 2).
A large portion of the forest zone designated by law is also the area of the home for the Punan Dayak community, especially for five villages namely Muara Belinau, Muara Tiq, Muara Salung, Muara Kebaq, and Muara Tuboq. The people of these five villages have lived for generations. This condition gives rise to overlapping problems and conflicts between companies holding permits and claims and the community management areas of the five villages.

The home areas of the five villages, in the map of permits and utilization of forest areas (Figure 2), are located in Limited Production Forests (HPT) and Protection Forests (HL), with most of the managed areas consisting of forest areas with severe topographic conditions (> 80%) (HL and HPT) and with a slope of > 40%, so that most of the area has low accessibility and is still a primary forest area, followed by secondary logged-over areas and also shrubs used for community cultivation (especially around residential areas). With heavy topography and high slopes, the entire area has been allocated and assigned as a company permit area of 9 IPHHK in a natural forest. In addition, the granting of concession permits that are too dense and occupy almost the entire area will accelerate the fragmentation of existing natural forests. An important recommendation for the government to consider in granting new permits for the use of forest products and borrow-to-use forest area permits, even though the forestry and forest-based sectors have opportunities and play a very important role in providing solutions for economic recovery from the covid-19 pandemic.

Although in the PFMU Belayan there is a forest area that has not been burdened with rights or permits for land use, its utilization in the area without management permit is highly dependent on the implementation of planned activity scheme by area function, biophysical condition, socio-cultural and economic community as well as applicable laws and regulations.

Because forests are very closely related to community activities around forest areas, some rules or policies are deliberately made for the welfare of the community and to maintain long-term sustainability.
As part of efforts to overcome land and tenure conflicts occurred before and during the pandemic as well as to fulfill community demands from five villages in the Lunuk River, community empowerment programs and social forestry can be proposed and implemented.

With a management area of 998,000 hectares, the PFMU Belayan has also limitations to manage a wide area and resources. Therefore, community involvement to jointly manage forest areas is needed. PFMU is trying to implement government development policies that are oriented towards community-based forest management (CBFM), namely the Social Forestry (SF) program, with schemes of Community Forest (Hkm), Village Forest (HD), Community Plantation Forest (HTR), Customary Forest (HA) and the Forestry Partnership which involves villages in the PFMU management area. Regarding the SF program offer, PFMU continues to carry out socialization activities and institutional strengthening of Forest Farmers Groups (KTH) to villagers in their working areas. This ongoing program is expected to continue with the best strategy for developing management and conservation plans that promote forest resilience to integrate the fundamental mechanisms underlying forest response to disturbances into management plans [38][39].

3.3. Community resilience during the pandemic
3.3.1. Community dependence on agricultural land for food security. Due to social restrictions imposed by the government, the resilience of the community is affected in many ways, including food scarcity and other needs. Forests are urgently needed for the most vulnerable members of society facing challenges and changes, such as during floods or droughts, as well as during pandemics. When social and access restrictions occur, there is a shortage of goods and services entering remote areas. Therefore, agricultural land as their food resources becomes very crucial for forest communities to survive.

Based on the results of field visits and observations in October 10-13, 2020, most of the residents of Sungai Lunuk villages and other villages in the Tabang sub-district are still clearing young secondary forests for farming land. Villagers are still able to carry out activities outside their homes and around the forest during the pandemic, but in the case of five villagers resettled in other villages, they have limited land for shifting cultivation. Villagers must obtain approval from the village head or officials when opening new fields. Another option is to return to the previous location -old abandoned village-to open the fields, with of course severe consequences, due to long-distance travel and separation from other family members for a long time.

Agricultural production activities, unlike other sectors, are carried out outdoors in relatively large and low-density areas, as shown in Table 1. However, several aspects become sources of vulnerability. Around 78% farmers, for example, have an average age in the range of pre-elderly and elderly, 45-60 years (field survey results, October 2020).

The shifting cultivation technique is carried out by cutting down small young trees and burning them to ashes in certain areas. The ash from the combustion will help significantly soil fertilization process. Ash from combustion can also raise soil pH, so this technique is very suitable in areas with acidic soils.

The covid-19 pandemic has given impacts on food availability and security. In times of difficult pandemic like today, food security is something that must be pursued to avoid a food crisis. Communities around the forest have long used forest resources to sustain their livelihoods. The community has high dependence level on forests for cultivation and agricultural land to produce food and on forest products that provide food.

Mountain rice cultivation is the dominant activity carried out by almost all villagers of five villages in Lunuk River. Mountain rice is a species of *Oryza sativa* that can be grown on dry land and does not require a lot of water, hence very suitable in areas where the inland Dayak people live.

It was acknowledged through interviews that most household in the villages in the Lunuk River has an average of 2 hectares of swidden cultivation that are scattered in several places within the village area. They have at least 5 locations for shifting cultivation, or about 10 hectares of land for 5 years. This means that there will be an increase in the area of cultivation in line with population growth and the increase number of new households.
Shifting cultivation is a traditional farming system commonly practiced by indigenous peoples in Kalimantan [40]. The shifting cultivation technique is carried out by clearing land in a certain area, cutting down and burning forests, then planting various food crops such as rice, corn, or cassava. The shifting cultivation technique is highly dependent on the climate, because climate greatly affects the burning and planting time of the fields. During the dry season, people cut down trees and then burn the land, but when the rainy season arrives, people plant seeds in the fields. Land used for shifting cultivation continues to be used for a very long time [41].

Normally, fields can only be used 2 to 3 times and then abandoned. Abandoned fields are left for 2-3 years as the land is no longer productive [42]. When the first land that has been abandoned is forested and becomes fertile again, the land is ready to be re-cleared into fields, while the second land will now be abandoned [43]. This process occurs continuously, so that indirectly, the land used for farming has been mapped. Mapping of cultivated areas for traditional communities can reduce the risk of clearing new land from primary forest [44].

Shifting cultivation is indirectly a traditional conservation effort for indigenous peoples inherited from their ancestors [45]. With this technique, the community does not need to open new land other than those that have been mapped for cultivation, so that the primary land and virgin forest are preserved. Shifting cultivation has only a limited annual harvest time, so seasonal factors greatly affect the cultivation process. During the dry season, the cleared fields are dried and then burned but when the rainy season comes, the rice that has been planted is allowed to thrive before harvested. Although it takes a very long time to harvest, with shifting cultivation, people do not need to use fertilizers or pesticides on a large scale.

Rice cultivation by clearing land is done by the Dayak community for several reasons: (1) the dependence of the Dayak community on the need for carbohydrate source from rice, (2) the technology of mountain rice cultivation has been passed down from generation to generation by their ancestors throughout the island, (3) the availability of possible land in the interior of the island, (4) Dayak people's belief in rice plants that is closely related to their religious rules [46].

3.3.2. Community dependence on land for settlement, village autonomy, infrastructure base and economic diversity. In the context of forest management in East Kalimantan, the areas of the villages are still heavily influenced by customs and traditions. The community controls the land for agricultural purposes, settles down, and forms a definitive village. People who directly control the land in the field began to clear land for farming and gardening, build settlements, prepare settlements to become villages, then become definitive villages. When the population of the village begins to grow denser and the land possessed is narrower because it is divided among their heirs, the community tries to find a location to open new land which grows to become a settlement, preliminary village, and definitive village.

The problems that often arise in the five relocated villages are land claims and the old village boundaries abandoned. The relocation area which is located in another village area requires the Sungai Lunuk community to obtain permission from the officials and residents of Sidomulyo Village if they want to open fields or use forest resources. In addition, the number of residents in the five villages is growing, so the need for agricultural land is also increasing [47].

The desire to return to the old villages is due to the small relocation area which limits the movement of the community. Activities that are usually carried out to meet daily needs are cultivating dryland rice or mountain rice and utilizing forest resources including hunting, picking rattan, collecting natural honey, and picking natural swallow's nests.

Land conflicts occur in Sungai Lunuk community has actually occurred in other villages in Tabang District, including Tabang Lama village community who currently resettle in Baru village area with their home area in Umaq Bekuay, and the people of Bila Talang and Muara Pedohon villages that inhabits Umaq Bekuay area with home area in the east of Sidomulyo Village.

The PKMT program has caused most of people in Tabang sub-district complaining the same problem as Lunuk River community. In addition to the limitations of their daily activities, they also have difficulty realizing activities funded by the Village Fund, especially those related to physical activities
such as the construction of buildings, roads, bridges and others. In this regard, the Government of Kutai Kertanegara District has made efforts to facilitate the re-location of villagers in Tabang sub-district to their home areas. This facilitation effort is carried out by conducting dialogues and agreements between village communities regarding natural boundaries recognized by the community as their home area. Currently, the map confirming villagers’ home-area boundaries has been completed (Figure 3) at Tabang sub-district level but has not been proceeded to the next stage as it has not yet received approval from one of the villages.

Figure 3. Map of Village Affirmations in Tabang District (tentative).

Efforts to resolve land conflicts of Tabang sub-district by the District Government of Kutai Kartanegara Regency by publishing an affirmation map need to be appreciated. However, there will still be many challenges, including the status of the area in Tabang sub-district which is dominated by the Forestry Cultivation Area (KBK). To obtain definitive village status according to the proposal on the affirmation map, the District Government must change the function of the area from KBK to Non-Forestry Cultivation Area (KBNK). Changes in the function of forest areas certainly require a long process and time.

Currently, changes in the function of forest areas are regulated through Minister of Environment and Forestry Regulation No. 7 of 2021 concerning Forestry Planning, Changes in Forest Area Designations and Changes in Forest Area Functions and Use of Forest Areas. Another challenge faced is the number of companies holding Timber Forest Product Utilization Business Permits - Borrow-to-Use Forest Area Permits (IUPHHK IPPKH), Natural Forest IUPHHK (HA) and Plantation Forest IUPHHK (HT) operating in the Tabang District. The government will find it increasingly difficult to change the function of forest areas as long as the operating permits of these companies are still valid.

3.3.3. Livelihoods from forest resources. Communities living in forest areas utilize existing resources to meet their daily needs. Community forest resource utilization activities have been carried out for years
using environmentally friendly management rules and practices which are the result of community interaction with nature.

The communities in the five study villages are mostly small rural farmers, which are characterized by a diversity of livelihood sources and dependence on natural resources. Most of the households in the five villages use forests and trees for their livelihoods (collecting NTFPs, hunting, rattan craftsmen). In addition to their main livelihood, communities in all studied villages have various activities to supplement their income. Forest-related work includes felling and transporting trees and collecting NTFPs (e.g. swallow nests, mammals, pigs, rattan, and agarwood).

The potential of abundant natural resources including timber forest products, swiftlet nests, agarwood, rattan, and mineral resources such as gold ore is the reason for many outsiders, including ethnic immigrants such as Banjar and Javanese, to move and settle in Tabang sub-district. It has been described previously, that there are about 15 companies that carry out activities in the PFMB Belayan area. This indicates that the level of mobility of people in and out of the area around the village is quite high. So there is a possibility of being infected with a virus. Moreover, immigrant communities are interested in getting involved in finding gold in traditional mines around the village. Although data and information about the number of people infected with covid-19 do not yet exist and were not reported at the time the research took place in October 2020, the latest information is that there have been fatalities that have died due to exposure to covid-19.

The pandemic’s impact on jobs is caused by different factors such as increased prices of materials, reduced demand for products, and decreased consumer confidence in a product which forces a reduction in employment opportunities. The reduction in job opportunities also occurred in the oil palm plantation sector and the coal mining sector. At the start of the pandemic, the company reduced the supply of raw materials and unhealthy workers (employees who tested positive for covid-19) and the supply chain was also experiencing problems. Palm oil company PT. Sempurna Sejahtera is located in West Sebatik District, while employees come from outside West Sebatik and Nunukan Districts. The layoffs were carried out because employees from outside the region were feared to carry the virus. For the last 2 years, several people have been reported to be positive for the coronavirus in the West Sebatik District.

Many communities are seeing people returning to their localities and although that puts additional pressure on natural resources it also provides an opportunity to utilize the skills of people returning who have knowledge that is relevant to work the land and use the forest strategically. They were also able to prevent the spread of disease by using customary practices to enforce self-isolation and protective measures. The wise way of indigenous peoples living in and around the forest in dealing with food insecurity and fear of being infected with the disease is to go further into the forest which they consider to be customary land located in their old village which is in a forest area. Apart from being a form of protection, this is also because it is close to food resources in the forest.

4. Conclusions
In the face of pandemics, climate change, and other global challenges, healthy forests are critical to establish resilient economies and communities. Forests, trees, and their biodiversity are an inseparable unit in supporting community resilience and reducing their vulnerability to stresses associated with difficult circumstances, such as pandemics, climate change, and other adversities.

In Kalimantan the old paradigm of horizontal expansion of agricultural land and built-up areas over highland and lowland ecosystems is still very common, causing significant changes in land use and land cover, undermining the resilience and sustainability of the socio-ecological system. Efforts to maintain the right balance between the environment, climate, and people will increase the resilience of forests and their people.

The spatial characteristics of the landscape, environmental degradation, and public awareness of the difficult conditions due to pandemics, climate change, and disasters are very important because if the linkages are known, local communities can actively manage natural resources to increase their resilience. Interventions related to forests and trees should take these aspects into account to make ecosystem services a valuable option for integrated strategies to reduce disaster risks and vulnerabilities.
Communities that do not have rights and secure access to forests face serious livelihood-related difficulties and are less able to prevent the spread of covid-19. We examine how forest resources can reduce human vulnerability by identifying factors that affect community resilience including population size, community leadership and autonomy, infrastructure base, and economic diversity. This will remain a challenge if the forestry sector is not considered an important part of the recovery response. It is critical that action and partnership building occur at different levels starting, most importantly, with forest communities and local government.

Forest area management that includes the community and local management rules that have long been used for natural resources living around forest areas are one of the solutions for good forest management because the community is a good provider of information about how resources are used. Forest resources can be managed while maintaining sustainability through management that involves local communities with the recognition of rights by the government to forest resource management.

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