WORKING PAPER 250

Connecting the dots in the forest–migration nexus

A case study from Malinau, Indonesia

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CIFOR
CGIAR
RESEARCH PROGRAM ON
Forests, Trees and Agroforestry

Working Paper 250

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Working Paper 250

DOI: 10.17528/cifor/007306

Juniwaty KS, Basnett BS, Thung PH, Sanjaya IM and Busra MI. 2019. *Connecting the dots in the forest–migration nexus: A case study from Malinau, Indonesia.* Working Paper 250. Bogor, Indonesia: CIFOR.

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We would like to thank all funding partners who supported this research through their contributions to the CGIAR Fund. For a full list of the 'CGIAR Fund' funding partners please see: http://www.cgiar.org/our-funders/

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Acknowledgments

We would like to express our sincere gratitude to Christine Padoch, who initiated the research project and guided us throughout the research process. We wish to acknowledge the research assistance provided by Nugroho Adi Utomo, Bambang Trihatmodjo, Benita Nathania, Rilin Purwati, Andes Nofita, Ratna Purba and Ratna Tondang, as well as the Center for Social Forestry Universitas Mulawarman, who partnered with us in the household surveys. We thank Peter Cronkleton, Houria Djoudi, Moira Moeliono, Habtemariam Kassa, Christopher Martius, Cynthia Maharani and Shintia Arwida, for their input and suggestions during the writing process, and Indrawan Suryadi and Yves Laumonier, for input and suggestions in GIS analysis. We are grateful to Rita Hasibuan and Kuntum Melati for their administrative support throughout the project.

We would also like to thank our partners, the Forests and Climate Change Programme (both Technical Cooperation and Financial Cooperation), for their support, input and guidance in the research and workshop process. FORCLIME is an Indonesian–German partnership. It has the overall objective of reducing greenhouse gas emissions from the forest sector, while improving the livelihoods of Indonesia's poor rural communities. This working paper is a technical report for the research project *"Understanding migration and remittances to improve forest management projects and policies"*, which is conducted with the financial support of the Federal Ministry for Economic Cooperation and Development, Germany. This working paper is a synthesis of findings on three interrelated topics.

Executive summary

The link between migration and sustainable development has garnered much attention in recent years. The Sustainable Development Goals (SDG) reflect an increased awareness of the importance of migration for development. SDG 10, on reducing inequalities within and among countries, explicitly aims to "facilitate orderly, safe, regular and responsible migration and mobility of people". This stems from a recognition that better management of migration will protect the well-being of a vulnerable demographic, and harness migrants' contribution to inclusive development. SDG 17 further recognizes remittances as a way of mobilizing additional finances for developing countries from multiple sources. However, in their focus on well-being and development, the SDGs fail to address how the social and economic aspects of migration are linked to the environment. The framing of migration and remittances in SDG 10 and SDG 17 does not acknowledge the complementarities, connections and tradeoffs between migration, remittances and environmental sustainability, nor ways in which 'managed' migration can be leveraged for greater environmental sustainability (Sijapati Basnett et al. forthcoming).

In-depth research exploring the nexus of migration, remittances and forests is needed to address these issues. However, research on migration, on the one hand, and on forest-based livelihoods, on the other, often overlooks the connections between migration and forests. The scant literature that exists on the topic tends to be based on simplistic assumptions that tropical deforestation is an outcome of migration into forests or that forest recovery is a consequence of out-migration. Both of these potential impacts on forests occur in some, but not all, cases. The mediating factors – social, economic, political, spatial and historical – that determine these outcomes are still little researched and narrowly understood (Hecht et al. 2015).

The Center for International Forestry Research (CIFOR) is currently leading a research program on the links between migration, remittances and forests. The aims are to enable policy makers and other stakeholders to improve forest management practices and policies, and to contribute toward global debates on the value of forests for socially responsive and environmentally just landscapes. Research is underway in a number of countries. This working paper is part of a three-country study on *"Understanding migration and remittances to improve forest management projects and policies"*, financially supported by the Federal Ministry for Economic Cooperation and Development, Germany. For this Indonesia case study, we partnered with The German Agency for International Cooperation (GIZ)-Forest and Climate Change (FORCLIME) program. FORCLIME is supporting the Government of Indonesia in its efforts to mitigate the effects of climate change through forestry sector reform, capacity development and implementation of best management practices for sustainable forest management and biodiversity conservation.

Literature on migration and forests in Indonesia mostly focuses on the effect of migration on forest in the destination areas. In this research, we focused on migrant-sending areas. We explored three aspects of the relationship between migration and forests:

1. Changes and continuities in migration patterns
2. The interrelationship between migration and forests
3. The implications of the research results for policy reforms on social forestry.

First, we traced changes in recent migration patterns and the factors contributing to the observed changes. Second, we examined the observable changes in forest cover and forest condition in the research sites and how migration may or may not play role in the observed changes. Third, we identified how our results could be leveraged to support ongoing reforms in the forestry sector in Indonesia, and in the social forestry program, in particular.

We used a mixed-method approach to investigate the three topics, with a household survey followed by in-depth qualitative methods. In addition, the second topic also draws on spatial data analysis and the third topic considers findings from expert group discussions at subnational and national levels.

The study is located in Malinau Regency in North Kalimantan Province. It builds on a a long history of in-depth research carried out by CIFOR dating back to the 1990s. The aim is to document migration trends, understand the driving factors and assess whether migration is having an effect on forests and forest management. The research aims to inform FORCLIME operations in Malinau, as well as government and non-government policies relating to sustainable forest management and livelihood promotion. Malinau's history of cross-border migration and high forest cover, amidst changing socioeconomic and political dynamics, provides important context for this research (Jessup 1981, Eghenter 1999, Wunder et al. 2008, Moeliono et al. 2009).

We distinguish between two different landscapes in Malinau Regency. Lower Malinau (downstream) is a peri-urban area and coal mining zone on the outskirts of the capital of the regency. Upper Malinau (upstream) or Apo Kayan, is a vast forested landscape, located at the border with Malaysia and partly in Kayan Mentarang National Park. Access to Upper Malinau remains limited, while the sites in Lower Malinau are more accessible. The household survey was conducted with 141 migrant-sending households from eight villages at two research sites: Upper and Lower Malinau. Follow-up qualitative studies were conducted in four villages: Setulang and Long Loreh (Lower Malinau) and Long Nawang and Nawang Baru (Upper Malinau).

Key findings

Topic 1: Migration patterns

While the research sites have a history of migration for employment purposes, or peselai, there has been a generational shift in migration patterns. We found that 77% of the 227 migrants in our sample had migrated outside their village in pursuit of higher education. An important implication of such a shift is that migration has switched from being an income-generating activity to one that is a financial burden on rural households. The primary motivation for young people and their families to invest in education is related to the expectation that the ongoing process of decentralization, or *pemekaran*, will open up job prospects in the public and private sectors; education improves eligibility for such jobs. In addition, the ongoing construction of the Trans-Kalimantan Highway is expected to bring new jobs to the villages. The vast majority of current migrants expressed an interest in returning to their villages upon completing their higher studies, to contribute to village development. Interestingly, while those in Upper Malinau tended to view village development as a way of modernizing their village and diversifying their livelihoods, those in Lower Malinau wanted to bring back what they felt was lost or find a way of holding onto their culture and tradition. Their aspirations were, therefore, linked to specific political ecologies of their villages.

Topic 2: The forest–migration nexus

Our GIS and remote sensing analyses suggest that there is no observable relationship between migration for education purposes and land-use change. The vast majority of Malinau district (95%) has remained forested since 2017. During the period 1990–2017, Malinau lost 2% of its forest; this is significantly lower than the national (20.15%) or Kalimantan-wide (25%) loss. The main drivers of primary and secondary forest conversion are agricultural expansion, settlement expansion and road construction. Our short-term analysis of land- and forest-use change in the four villages where we carried out follow up qualitative research (Setulang, Long Loreh, Nawang Baru and Long Nawang) also reveal that the most significant change is a decline in primary and secondary dry land coupled with an increase in agriculture land and settlement expansion.

While education migration is accelerating these observed changes in land and forest change due to the need to finance the costs of migration, these changes (such as ongoing road construction) are motivating people to seek an education too. Hence, it is difficult to establish the direction of causality between migration and factors contributing to observed land and forest change.

The indirect effects of migration on land use and labour allocation is apparent at the household level. We found that educational migration is a financial burden for migrant-sending households. The average educational and living expenses for one student to pursue an undergraduate degree is IDR 100,000,000 for 4 years. In order to cover the costs of education, households whose livelihoods are based primarily on farming and forests, are intensifying agricultural production and forest product collection.

The most profitable forest products currently used to finance educational migration include: bushmeat, construction timber, gaharu (or agarwood), rice (from swidden fields) and cash crops (such as cocoa). However, gaharu collection is only possible in Upper Malinau, and its supply is dwindling rapidly. Gaharu expeditions are costly and the risks of returning empty handed high.

Most households rely on more than one product to meet all expenses related to education migration. They use different products to cover different expenses. For instance, to cover hefty upfront enrollment fees or semester fees, people rely on timber or gaharu. Whereas for more regular monthly expenses, they depend on hunting and selling bushmeat, selling rice from their swidden fields and selling other cash crops.

The gathering of forest products, such as gaharu and timber, is men's responsibility. When men leave for prolonged periods to gather these, their labor is lost from the from agricultural fields. Migration, therefore, contributes to labor specialization between the genders: domestic, swidden agriculture and casual work for women and forest product collection for men. Older women/mothers are also experiencing an increase in their work burden as they take on domestic responsibilities previously carried out by the young women migrants.

Topic 3: Links to policy

Our research highlights the urgent need for jobs and economic opportunities for young people in forest frontiers. We observed a rise in migration for education, a growing need to earn regular cash income in order to finance such migration and aspirations among young people to return to their villages upon completion of their studies. In the absence of such opportunities, improvement in higher education attainment will not result in expanded economic opportunities for the next generation. It remains uncertain whether and to what extent the ongoing processes of decentralization and infrastructure development will result in new jobs, as expected by migrants and their families. The current labor market is unlikely to absorb the increase in educated youth.

Social forestry, a priority program for the Indonesian Ministry of Environment and Forestry (MoEF), could contribute by granting local people legal recognition of their forest land, facilitating the creation of forest user groups for more effective and inclusive management of forests, and expanding opportunities to generate sustainable livelihoods. At the same time, the changing pattern of migration among young people from forest areas and their diverse perspectives on the future of agriculture (and forestry) offers opportunities for incentivizing them to be agents of change in supporting forest management programs through social forestry.

Leveraging newly educated youth to participate actively in social forestry can be beneficial for both the young people and for forests. The youth may return equipped with greater technical skills (such as GIS, spatial monitoring of forests, business management, legal skills etc.). They may better appreciate the value of investing in forests for their future. They could bring new ideas and energy to complement and revitalize existing indigenous forest management efforts. Successful implementation of social

forestry programs will also require capable and committed managers who can apply the skills that they have learned to create and enforce rules to govern and identify opportunities to expand/strengthen their livelihoods.

A series of expert group discussions facilitated by the CIFOR team were held in the research sites, Malinau city and Jakarta. These generated the following options and opportunities for leveraging the power of youth in the social forestry program. They also highlight the importance of adopting a landscape approach to generating an enabling environment for the promotion of social forestry and youth development.

Education and skills

- Improve access to scholarships and other financial assistance (such as tied loans) for young people interested in pursuing higher education to reduce the financial burden on their families.
- Identify what kinds of skills and qualifications are needed for social forestry and expand opportunities to pursue relevant subjects, such as forestry and natural resource management, GIS and spatial analysis, information management systems, economics and business studies, accounting, etc.
- Scale-up education programs to raise awareness on the importance of forests for people and the environment. This could be done by building environmental awareness modules into the existing school curriculum, complemented by the use of various platforms (such as locally available channels, social media) to disseminate information about social forestry and Forestry Management Units (FMUs).
- Increase legal awareness among young people about their rights and responsibilities. Connect local youth to relevant civil society organizations that support local communities to negotiate effectively with extractive industries.

Forest management

- Encourage young migrant returnees to participate actively in forest management efforts, through attending and voicing their concerns in meetings, setting up quotas for youth in FMUs, encouraging them to assume roles and responsibilities in FMUs, empowering youth clubs or youth-led NGOs to monitor the work of the FMUs, etc.
- Help youth to play a meaningful role in community-wide efforts to develop and implement forest management plans to restore degraded landscapes (such as in Long Loreh), continue existing forest management efforts (such as in Setulang), maintain sustainable extraction of valuable forest products (such as in Nawang Baru/Long Nawang), etc.
- Promote the use of digital technology to monitor forest management efforts, establish and expand environmentally responsible businesses, connect and supply to sustainable value chains, access finance through banks and FinTech, etc. Encourage young migrant returnees, with relevant skills, to become involved in these efforts.

Jobs

- Support the creation of medium forest-based enterprises (such as agroforestry or ecotourism) that can offer jobs to young migrant returnees and help them to supply to sustainable forest product value chains at local levels and beyond.
- Extend access to financial services and business development training to assist young people interested in starting small and medium enterprises. Where possible, leverage current migrants in destination areas to market these products and services.
- Train young people to provide (on a voluntary and/or paid basis) training in forest management, enterprise development and job matching. Encourage and promote youth champions of change.

1 Introduction

The link between migration and sustainable development has garnered much attention in recent years. The Sustainable Development Goals (SDGs) reflect an increased awareness of the importance of migration for development. SDG 10, on reducing inequalities within and among countries, explicitly aims to "facilitate orderly, safe, regular and responsible migration and mobility of people".[1] This stems from a recognition that better management of migration will protect the well-being of a vulnerable demographic, and harness migrants' contribution to inclusive development. SDG 17 further recognizes remittances as a way of mobilizing additional finances for developing countries from multiple sources.[2] However, in their focus on well-being and development, the SDGs fail to address how the social and economic aspects of migration are linked to the environment. The framing of migration and remittances in SDG 10 and SDG 17 does not acknowledge the complementarities, connections and tradeoffs between migration, remittances and environmental sustainability, nor ways in which 'managed' migration can be leveraged for greater environmental sustainability (Sijapati Basnett et al. forthcoming).

In-depth research exploring the nexus of migration, remittances and forests is needed to address these issues. However, research on migration, on the one hand, and on forest-based livelihoods, on the other, often overlooks the connections between migration and forests. The scant literature that exists on the topic tends to be based on simplistic assumptions that tropical deforestation is an outcome of migration into forests or that forest recovery is a consequence of out-migration. Both of these potential impacts on forests occur in some, but not all, cases. The mediating factors – social, economic, political, spatial and historical – that determine these outcomes are still little researched and poorly understood (Hecht et al. 2015).

The Indonesia-specific literature on forests and migration highlights the simplistic assumptions underlying much research on migration and forests. In the 1980s and 1990s, following an influential article on the environmental impact of transmigration (Secrett 1986), deforestation and forest degradation were often blamed on "environmentally destructive migrants". Since then, a number of high-profile studies have sought to quantify the effects of in-migration on forest cover through spatial and statistical analyses (Thung and Juniwaty 2018). Such research is problematic. First, it attributes deforestation to the activities of migrants without considering contextual factors. Second, it only looks at the effects of migrants on the environment in their destination sites. Third, it fails to consider that intermediate factors, such as resource management institutions or levels of integration could be more decisive in determining environmental impacts. Remittances and circular migration patterns often have surprising effects; for example, in re-shaping or re-affirming gender norms (Colfer 1983; Elmhirst 2000; Williams 2007), moving toward non-land-based livelihoods (Elmhirst 2002) or spurring investment in agricultural innovation (Peluso and Purwanto 2018; Elmhirst et al. 2017).

The Center for International Forestry Research (CIFOR) is currently leading a research program on the links between migration, remittances and forests. This aims to enable policy makers and other stakeholders to improve forest management practices and policies, and to contribute toward global debates on the value of forests in socially responsive and environmentally just landscapes. Research is underway in a number of countries: Indonesia, Tajikistan, Peru, Nepal, Ethiopia, Burkina Faso, Laos and Vietnam. This paper presents the findings from the Indonesia country study of this larger program.

1 SDG Target 10.7, https://sustainabledevelopment.un.org/sdg10 (accessed 4 February 2019)

2 SDG Indicator 17.3.2. https://sustainabledevelopment.un.org/sdg17 (accessed 4 February 2019)

This is financially supported by the Federal Ministry for Economic Cooperation and Development (BMZ), Germany.

The Indonesia study is located in Malinau District in North Kalimantan Province where CIFOR has a research history, dating back to the early 1990s. The objective of this project is to document migration trends, understand the driving factors and assess whether migration is having an effect on forests and forest management. The research aims to inform FORCLIME operations in Malinau, as well as government and non-government policies relating to sustainable forest management and livelihood promotion. Malinau's history of cross-border migration and high forest cover, amidst changing socioeconomic and political dynamics, provides important context for this research (Jessup 1981, Eghenter 1999, Wunder et al. 2008, Moeliono et al. 2009).[3]

Our findings show that migration patterns among forest communities have changed over time and that government policies and economic development are important drivers. During Dutch colonization, circular migration enabled people in Kalimantan to procure goods that could not be produced locally, particularly salt (Eghenter 2006a). There were also groups that moved permanently to find areas with better public services, such as health and education facilities (e.g. Ernawati 2017). Revisiting Malinau in 2017–18, we found that the communities were settled in villages and no longer move in large groups. Education was the most prevalent motivation for migration. Strikingly, those communities living along the border and have a long history of circular labor migration to Malaysia are now settled and mainly rely on economic opportunities in their areas. They are able to send their children away to pursue higher education outside the villages. Migration, which used to be a cultural and economic strategy for getting quick cash and experience, has become a long-term investment in human capital. However, this creates a current financial burden for the expected future return. This affects the migration-related flow of money, instead of getting remittances for those left behind, this type of migration creates an outflow of money from the origin areas to the destination areas. We examine how parents are able to utilize their resources and adapt their livelihood strategy to finance education migration. We discuss how this might relate to land-use change and forest management. Furthermore, we suggest factors that forest and development policy makers should consider, putting migration in the context of an important livelihood strategy.

We start by reviewing the literature on migration and forests in Indonesia, and how our research contributes to it. We then discuss the conceptual and methodological framework used for the analyses. We provide an overview of Malinau and the context of the research, followed by a synthesis of the major findings of our study. We conclude with a discussion of how to link this migration–forest nexus research into forest and development policies to improve the well-being of forest communities while conserving the forest.

3 See section on Research Context.

2 Migration and forests in Indonesia: Gaps and scope for further analyses

Much has been written about the drivers and effects of migration in Indonesia. These include the social, economic, environmental, political and demographic dimensions of migration. Our review of the literature on migration and forests in Indonesia (see Thung and Juniwaty 2018) found that for decades such research has focused on the question of whether internal migrants cause deforestation in their destination sites and, if they do, how and how much. There is a correlation between in-migration intensity and deforestation (e.g. Vadya and Sahur 1985; Abdullah 1996; Maertens et al. 2002; Darmawan et al. 2016), however, the type and context of migration are more important than migration itself. Another strand of literature focuses on the influence of government-sponsored migration on deforestation (Secrett 1986; Whitten 1987; Fearnside 2015). Many intermediary factors, such as resource management systems, technological change, tenure systems and cultural norms, also have an effect (Cassels et.al 2005). The pressure of in-migration can lead to formalization and changes in the land tenure system to attract investment and stimulate agricultural intensification (Galudra et al. 2014; Grimm and Klasen 2015). There are diverse mechanisms that influence the effect of migration on forest: such as the direct effect of in-migrants requiring land and the indirect effect of economic development which may reduce pressure on the forest (Klasen et al. 2010).

Migration tends to bring economic benefits to migrant households (e.g. Hetler 1989; Hugo 1995; Parinduri and Thangavelu 2008; Meng and Manning 2010). These benefits are mediated by social structures and are spread unevenly across economic strata (Hetler 1989). The benefits of social remittances may be limited by the social isolation of migrants and the lack of applicability of new skills to their place of origin (Lumayag and Sail 2015). Patterns of migration are highly responsive to economic change, and its relationships to family life and gender are often dynamic (Hugo 1995; Silvey and Elmhirst 2003; Kreager 2006; Kreager and Schröder-Butterfill 2015).

Thung and Juniwaty (2018) highlighted that focusing on the question of whether immigrants cause environmental degradation limits research on the forest–migration nexus in Indonesia. Despite the wealth of information on the effects of migration, the interconnections between them have not been sufficiently considered. Existing research on migration still only tends to consider the relationship between migration and one specific factor, although it is sometimes conceded that this relationship cannot be fully understood without reference to the other factors. The research looks for a direct causal relationship between immigration and environmental degradation by singling out and comparing two variables. However, this relationship exists only in interaction with a host of other variables. Research that takes a qualitative approach to interpreting the correlation between immigration and deforestation concluded that other factors are relatively more important than migration alone. The time and type of incorporation, feedback loops of economic development and technological change, changing tenure systems and differences in cultural norms all play a role in determining outcomes for the forest. It is also important to draw a distinction between personal characteristics of migrants (e.g. skilled/non-skilled, married/unmarried). These observations bring us to Sunderlin and Resosudarmo's (1999, 164) dictum that "population is best viewed as an intermediate variable affected by others and not simply as an independent variable that acts alone in influencing the fate of forests". The relationship between immigrants and forests is therefore better conceptualized as occurring within a complex web of interactions bamong immigrants, locals, ecology, economy, politics, culture and social structure.

The focus on immigration misses many other, increasingly important aspects of migration. Studies tend to conflate the general term migration with a specific form of migration, namely the recent settlement of people in forested areas. Moreover, it only considers the effects of migrants on the places they migrate to, and ignores the effects on the places they come from. However, phenomena such as international migration, rural–urban migration, temporary migration and circular migration

also impact upon (and are impacted by) mediating variables, such as social, cultural, economic and political factors. These, in turn, are likely to impact on (and be impacted by) forest management – not only in the migrants' destinations but in their places of origin as well. The implications are not limited to the extent of deforestation, but also the impact on forest-related livelihoods, access to and distribution of natural resources and the design of forest management interventions (Hecht et al. 2015; Rubinov 2016).

The challenge ahead is to combine these various strands of inquiry into an integrated theory on the forest–migration nexus. One way of working toward such a theory would be through a series of case studies of communities affected by migration. These studies would consider the whole range of factors identified in the literature as relevant to migration.

3 Conceptual framework

We build on Black et al.'s (2011) conceptual framework regarding the effects of environmental change on migration, which formalized a consensus among scholars that migration can rarely be explained with reference to a single factor, because "migration is a multi-causal phenomenon in which a range of factors are interrelated" (Black et al. 2008, 7). Hence, instead of trying to identify and count "environmental migrants", Black et al. (2011, S4) suggested that it was more useful to look for "the net effect of environmental change on migration in aggregate".

This framework conceptualized migration as the result of "an assemblage of drivers of migration" (Black et al. 2011, S4) and distinguished five 'families' (S3) of migration drivers: (i) economic, (ii) political, (iii) social, (iv) demographic and (v) environmental. These families of drivers constitute the macro context within which the decision to migrate takes place. Additionally, Black et al. (2011, S5) acknowledged that these drivers vary geographically and change over time. The decision to migrate is also influenced by characteristics of the household and by institutional, social, legal and political 'obstacles and facilitators'.

While Black et al.'s (2011) framework aids understanding of the effects of environmental change on migration, we also want to look at how migration in turn affects the environment. The limitations of Black et al.'s framework for this purpose are: (i) that it regards environmental change as an independent variable and (ii) that it considers migration only as an outcome and not as a factor that might in turn affect other factors. We therefore expand on their model by adding these reverse effects. Where Black et al. advocated an understanding of migration as a multi-causal phenomenon, we shall also understand environmental change as a multi-causal phenomenon, influenced by migration as well as a range of other, interdependent factors. Accordingly, we will talk not of 'families of drivers', but of types of factors, which dynamically interact.

We investigated these dynamics in Malinau, as part of an international, comparative project in three countries Tajikistan, Peru and Indonesia on *"Understanding migration and remittances to improve forest management projects and policies"* funded by the Federal Ministry for Economic Cooperation and Development, Germany. The research relates to similar projects in Laos, Vietnam, Nepal, Ethiopia and Burkina Faso. In Indonesia, we are partnering with the German Agency for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit, GIZ), which is providing technical assistance to the FORCLIME program. FORCLIME Technical Cooperation (TC)–GIZ is promoting sustainable forestry in Malinau through a range of interventions, such as social forestry and forestry management units (FMUs). The project aims to investigate patterns of migration and remittances to understand how to leverage these for forest management.

In our research, we focused on migrant-sending areas and not on migrant-receiving areas to address the gaps in the literature on migration and forests in Indonesia. Our aim was to explore the forest–migration nexus, then link it to policy by doing step-by-step topical analysis: examining migration patterns (T1), linking migration and forest (T2) and linking forest–migration nexus findings to policy (T3). In the first topic, we explore migration, determining recent migration patterns and the factors influencing them. Second, by considering the change in livelihood strategies, we link migration patterns with forests. In the third topic, we link our findings to the ongoing social forestry program in Indonesia.

4 Research context

Our research context is Malinau, which was established as a regency in 2001. Before that, Malinau was a subdistrict in Bulungan Regency, East Kalimantan Province. When North Kalimantan Province was established in 2012, Malinau Regency was included in the new province. Malinau is an interesting and important context in which to carry out our research because:

- It has a low population density, high forest cover and there is political will to maintain forests, despite threats from logging, mining and infrastructure development.
- It is GIZ FORCLIME's project site, which allows our research findings to inform FORCLIME's operation.
- CIFOR has a long history of carrying out research on forests and land-use change in the region, giving this research historical continuity.
- It is close to Malaysia and there is a documented history of cross-border migration for employment purposes.

4.1 Forest cover, political commitment and persistent challenges

The Government of Indonesia's Statistics Office (Badan Pusat Statistik, BPS) estimates that, in 2017, the total population of Malinau was 77,492 persons (16,253 households) over an area of 40,088.41 km^2 (BPS 2016a). The average population density is thus 1.89 people/km^2. However, the population is not evenly distributed within Malinau. In the most populated area, Malinau City Subdistrict, the population density can reach 167.76 people/km^2, while in the remote areas of Kayan Hilir Subdistrict, the density is only 0.14 people/km^2. Nevertheless, Malinau's population density is low relative to the national rate of 134 people/km^2 and North Kalimantan Province rate of 9 people/km^2.

More than 90% of Malinau's land area is classified as 'forest', and 50% of the district is located in the Kayan Mentarang National Park. In 2005, in an effort to preserve these forests,, the Government of Malinau declared Malinau District to be a 'conservation district' (Angi 2009). The aim was to implement sustainable development in a way that balanced forest conservation with development. The formal regulation governing Malinau as a conservation district was issued 2 years later in 2007 through Malinau Regulation No. 4 2007. The district government hoped this initiative would make the district more attractive to national and international conservation partnerships and increase funding opportunities. To some extent it did. However, the initiative lacked a clear conceptual and legal framework stipulating, for example, how conservation interests would be reconciled with the need for development and how equitable distribution of benefits at the community level would be ensured. The initiative has been hampered further by a lack of support from central government, and the slow development of effective payment mechanisms for conservation (Moeliono and Limberg 2009).

A large part of Malinau Regency is also included in the 'Heart of Borneo' conservation initiative of the World Wide Fund for Nature. This initiative aims to protect 220,000 km forested area on Borneo Island known as 'Asia's last great rainforest'. The initiative was signed by three countries according to share of area: Indonesia (73%), Malaysia (25%), and Brunei Darussalam (2%) (Van Paddenburg, et al. 2012). The three governments formally agreed to support the initiative in Bali on 12 February, 2007.

While the issuance of the conservation district regulation shows local government commitment to developing Malinau sustainably, there is lack of clarity about how to implement the policy on the ground (Angi et al. 2009). Conservation concerns are relegated to the periphery in the face of commercial pressures (Mumbunan 2018). Malinau is facing considerable pressure that threatens to derail the conservation goals set out by both the local government in Malinau and the Heart of

Borneo Initiative. Angi et al. (2009) reported that within a year of the issuance of the conservation district regulation, six mining (at least 9,200 ha), eight large private plantations (at least 125,000 ha) and nine timber licenses (more than 620,000 ha) had been issued. These activities are still taking place, although recent figures indicate a 10% decrease in mining production between 2015 and 2016 (BPS 2017).

Furthermore, the recent surge of investment in road infrastructure, such as the Trans-Kalimantan Highway, poses additional threats to the remaining forests in Kalimantan (Alamgir et al. 2019). While roads can improve the well-being of communities living in the area, there are many potential social and environmental externalities that are not considered (ADB, 2011; Caliskan 2013; Boston 2016; Alamgir et al. 2019). Road development can create negative externalities, such as facilitating access to exploit forest resources and habitat disconnection. Six of 15 subdistricts in Malinau can only be reached by plane. These include our research site, Kayan Hulu subdistrict. The ongoing construction of the Trans-Kalimantan Highway in this subdistrict is expected to bring changes in livelihood opportunities and also migration patterns. Specifically, in our research site, a 60 km road will be built to connect Long Nawang to Long Punjungan, the capital of neighboring Punjungan subdistrict. The road will open up the area, and will likely result in environmental change and alter migration and mobility patterns.

4.2 FORCLIME TC (GIZ) operations in Malinau

Malinau Regency is one of three demonstration areas for the GIZ 'Forest and Climate Change' (FORCLIME) program (FORCLIME 2017). FORCLIME is a bilateral program between the Indonesian Ministry of Environment and Forestry (MoEF) and the German Ministry for Economic Cooperation and Development (BMZ). There are two modules in the program: a technical cooperation (TC) module implemented by GIZ and a financial cooperation (FC) module supported by KfW Development Bank. The latter is focusing on implementing Reduction Emissions from Deforestation and forest Degradation (REDD+) demonstration activities with local communities. FORCLIME TC focuses on three strategic areas: (i) forest and climate change policies, (ii) development of FMUs and (iii) capacity building. The overall objective of the program is *to reduce greenhouse gas emissions from the forest sector while improving the livelihoods of Indonesia's poor rural communities.*

In Malinau, FORCLIME TC's activities include: facilitating the development of a long-term forest management strategy based on REDD+; facilitating partnerships between FMUs and forest farmer groups; developing agroforestry demonstrations as a REDD+ pilot project; supporting the development of Village Forest (*hutan desa*) management units; and strengthening the capacity of FMUs and farmer groups to achieve their goals. FORCLIME FC has focused its activities on helping communities to develop and implement participatory decision-making mechanisms on a range of issues related to agroforestry development, forest monitoring, social forestry and village border mapping. These activities have been conducted in 15 villages in Malinau.

CIFOR's Indonesia country study under the Forest and Migration project has been developed in partnership with FORCLIME TC in order to provide accurate information on the links between forests and migration in Malinau. Its aim is to collaboratively develop a set of recommendations and action points for using research to inform FORCLIME's operations and support for national policies.

4.3 CIFOR's operations in Malinau

CIFOR has conducted research and collaborative management activities in Malinau since the 1990s. Malinau itself is a relatively young regency. Until 1999, it was part of a larger regency of Bulungan. Malinau is located in the province of North Kalimantan, which was part of the province of East Kalimantan until 2012. This proliferation or *pemekaran* of the regencies and provinces was part of the larger decentralization of fiscal and authority processes from the central government to the local government that began in 1998 (Thung 2019). Malinau hosts 321,000 ha of research forest that has been allocated to CIFOR by the Government of Indonesia to establish a long-term case study of sustainable forest management research and practice (Kartawinata et al. 2002).

The impacts of 'big bang decentralization' on forest governance has been an important focus of CIFOR's research in Malinau. Although Malinau has benefited from increased political and economic power, researchers have also found that decentralization increased local uncertainties, conflicts and disparities over forest control. All of these changes in turn led to a period of intense resource extraction (Moeliono et al. 2009).

In addition to exploring the impacts of national policies on forest–people dynamics in the context of Malinau, CIFOR researchers have also carried out action research, helping local communities to manage their resources sustainably. They have documented the interaction of communities and forest, mapping the socioeconomic condition of forest-dependent communities. These research activities included participatory land-use planning (Anau et al. 2001), identifying forest resources and biodiversity (Iskandar 2004; Basuki and Sheil 2005) and creating demonstration areas of reduced impact logging (Kartawinata et al. 2006)

Returning to Malinau 16 years after the initial implementation of the decentralization laws, we found that decentralization is still unfolding. The hopes and opportunities it brought for many people have triggered new patterns of migration. Similarly, research on 'forestry' has also shifted and changed, and is no longer solely concerned with deforestation but on broader concerns about the social and economic well-being of forest-dependent communities and their interactions with forests.

For the purposes of this research, we distinguish between two different landscapes in Malinau Regency. Lower Malinau (downstream) is a peri-urban area and coal mining zone on the outskirts of the capital of the regency (Site 1 in Figure 1). Upper Malinau (upstream) or Apo (Apau) Kayan, is a vast forested landscape, located on the border with Malaysia and partly in Kayan Mentarang National Park (Site 2 in Figure 1).[4]

4.4 Documented migration history into and out of the forest frontier

As Jessup (1981) and later Eghenter (2006a) explained, the history of Upper Malinau or the Apo Kayan region is one of migration and mobility. The area was first inhabited in the seventeenth century. The Upper Malinau is now considered the 'homeland' of the Dayak Kenyah who came after the first settlers had moved. The Indonesian government has had contradictory migration policies in the area (Eghenter 2006a; Lumenta 2010). In the late 1960s and 1970s, the Indonesian government followed a policy of encouraging resettlement of the Dayaks in lowland areas closer to government services, public infrastructure and markets. Subsequently, for border security purposes during the confrontation with Malaysia (1963–66), people were encouraged to remain in the frontier areas.

4 Throughout this paper, we use the terms 'landscape' and 'site' interchangeably when we discuss the two areas: Lower (downstream) Malinau and Upper (upstream) Malinau. Upper Malinau is used when we referring to Apo Kayan. Apo Kayan literally means the upstream Kayan (river), which is one of the rivers in Malinau.

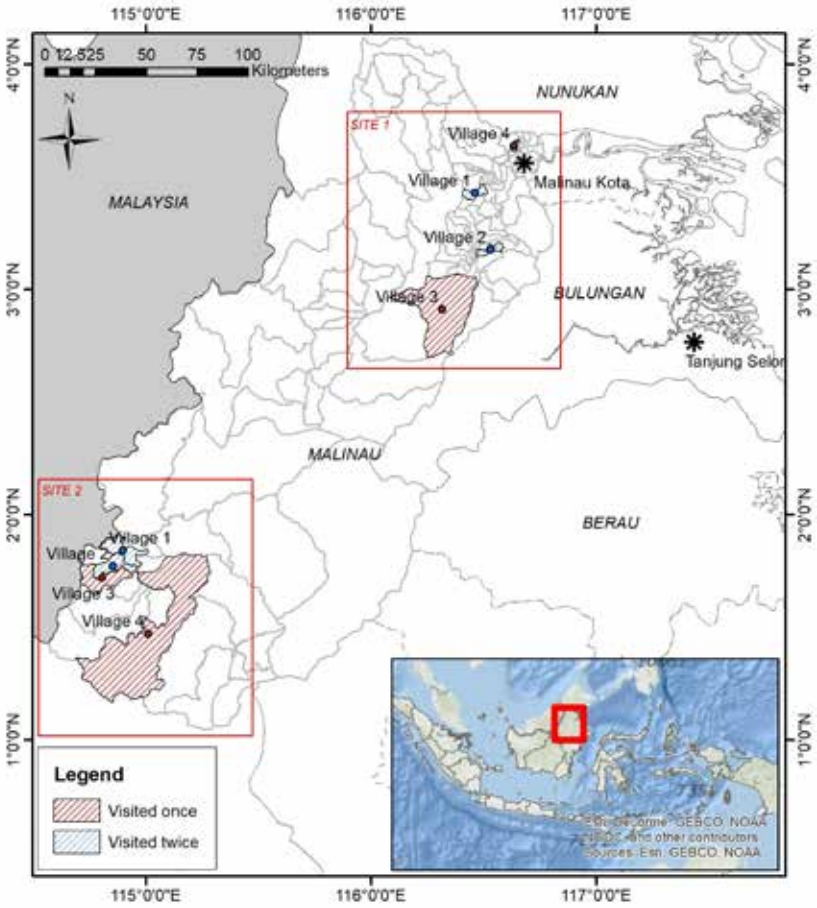

Figure 1. Map of the research sites in Upper and Lower Malinau

Even though voluntary movement was not encouraged by the government, during the 1960s to 1980s, 15,000 people from remote areas moved to lowlands, with some moving to Sarawak. This was primarily to access better public infrastructure (such as health and education facilities) and more easily obtain basic products, such as salt, tobacco and gasoline (Eghenter 2006a).

The communities who are currently settled in Upper Malinau remained in the interior while those in Lower Malinau moved during the period 1960-1980. Access to Upper Malinau remains limited. In contrast, the sites in Lower Malinau are closer to the capital city, and have more economic opportunities and better infrastructure.

In order to gain a deeper qualitative understanding of the relationship between migration and forests, two villages from both Lower and Upper Malinau were chosen for follow-up qualitative and validation study. The villages were selected based on the number of migration cases found in the village and also the forest changes identified by spatial data analysis. These two indicators were hypothesized to be related. Focusing on these areas allowed this hypothesis to be investigated.

5 Research methodology

Here, we outline the methodology used to examine our three major themes:

Topic 1. Migration patterns. Determining migration patterns and financial flows between migrant-sending and -receiving households; investigating the effects of these patterns and flows on land, labor and livelihoods in the research sites; and identifying potential drivers of the observed migration patterns.

Topic 2. The forest–migration nexus. Determining changes in forest cover in the research sites and whether and to what extent migration patterns and financial flows played a role in these changes in forest cover.

Topic 3. Links to policy. Developing strategies for improving outcomes for the forest management program, based on our findings.

We relied on a mixed-method approach of primary data collection and analysis to investigate the three topics. Additionally, the second draws on spatial data analysis and the third considers findings from expert group discussions at subnational and national levels. Figure 2 provides an overview of research topics and methodology.

5.1 Field data collection

We adopted a *mixed-methods approach* in this research, which included a combination of qualitative, quantitative and spatial analyses. This allowed us to draw on the strengths of each method and gather more comprehensive data (Cresswell 2015). We employed an *explanatory sequential design* which was particularly useful for our purposes because the initial quantitative data revealed larger trends in the research sites, such as how many people were migrating, for what purposes and what kinds of households were they coming from (Cresswell 2015). The qualitative data provided further context for our quantitative findings. Combining these, we were able to triangulate the broad patterns of migration, transfer of funds and relative dependence on forests observed in each of our research sites, as well as between Lower and Upper Malinau. The qualitative findings allowed us to further examine the mechanisms behind the associations revealed by the quantitative data analyses, and to explore in depth our respondents' perceptions of education, expectations from migration and views on the relative importance of forests, both now and in the future. The latter would not have been possible with the household survey data alone.

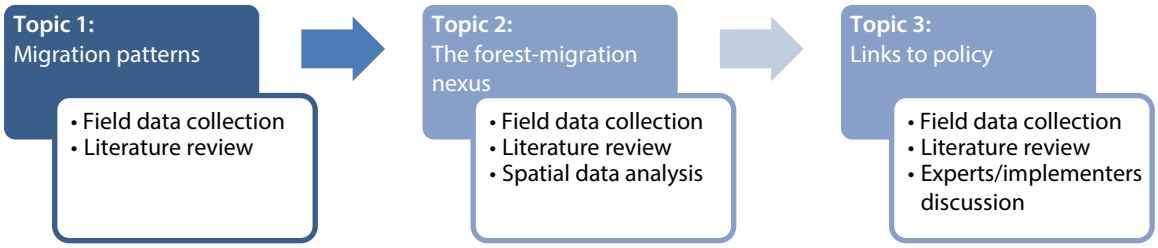

Figure 2. Overview of research topics and methodology

Figure 3. Chronology of field data collection

We divided the data collection into two rounds. We started with quantitative data collection by employing household surveys and following up with qualitative interviews. We first carried out a household surveys in eight villages (four villages in Lower and four in Upper Malinau) using a structured questionnaire and additional focus group discussions with local leaders. The timing of the data collection is presented in Figure 3. We also visited the research sites for a third time to share and validate our research findings and to fill any missing gaps.

After analyzing the findings from the household survey, we developed a protocol for qualitative data collection with the goal of gaining a deeper understanding of the results from the survey. This time, we focused on two villages per landscape, and selected the four villages with the most migrant households, based on our household survey data, and an observable change in forest cover over the last 15 years, based on spatial data analyses of forest cover change. Detailed technical information on the household surveys, qualitative data collection and validation is provided in Appendix 1.

5.2 Remote-sensing data analyses

Land-cover change analyses were performed at two levels for two time spans. First, we looked at the long-term change overall at Malinau level. Then we focused on short-term change in each research area.

Long-term land-cover analysis was based on land-cover data from the Ministry of Environment and Forestry's (MoEF) land-cover map for the period 1990–2017. There are 23 land classifications in the data set. These include 7 classes of forest, 15 classes of non-forest and a cloud-cover classification.[5] Satellite images were obtained from Landsat 7 ETM and Landsat 5 ETM. As the land cover in Indonesia is complex, MoEF uses visual interpretation instead of relying solely on automatic classification. Interpreters work in the MoEF's regional offices. They also ground check selected field sites and correct misclassifications where appropriate (Wijaya et al. 2015). Improved technology has allowed land-cover maps to be produced on an annual basis since 2011 (MoEF 2018). Prior to that, the data is only available at increments of 3 years or more.

In a second step, as we aim to analyse land-cover change at the village level, higher resolution data was needed. To measure the temporal dynamic of the land cover in the research areas, we utilized data from Sentinel 2 satellite with a 10 m pixel resolution. As the Sentinel 2 satellite was recently launched in 2015, we only can do short term analysis using this data. The images were interpreted visually based on the national standard classification as mentioned above. We compared the land cover over 2 years, 2016–18. Figure 4 shows the sequence of the analysis.

5 Explanations of each class are provided in BSN (2008).

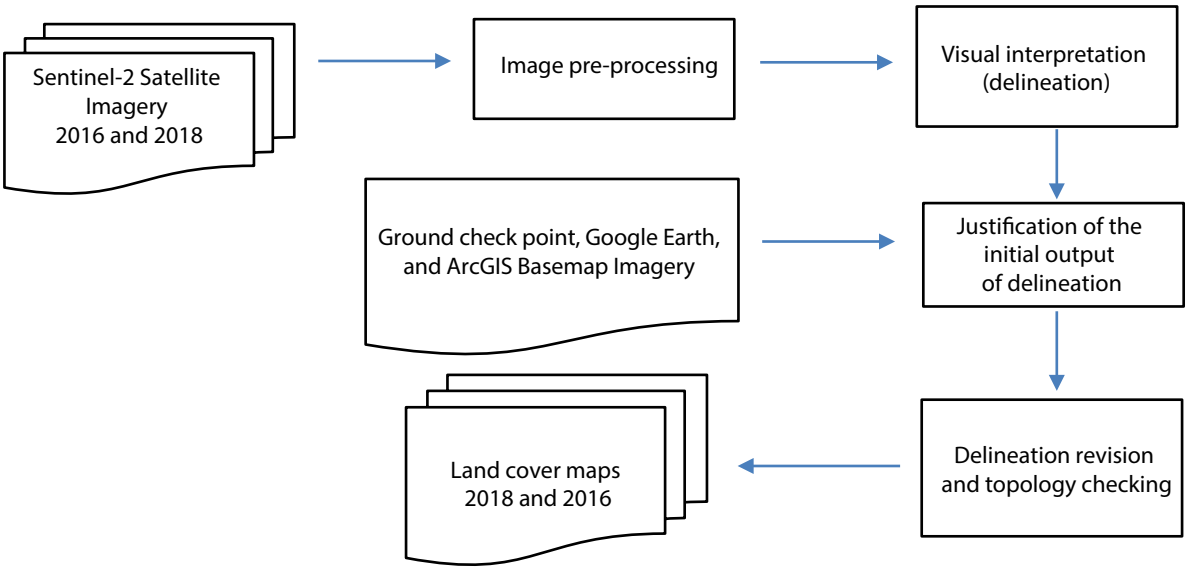

Figure 4. The land-cover classification process

The Sentinel 2 images were overlaid with village boundary data from Statistics Indonesia (BPS). The boundary data is part of maps of statistical working area that was updated during the Village Potential Census that was conducted every three years (BPS 2018b). In this working paper, we used the boundary data that was updated during Podes 2011. Following the overlay process, the digitization and interpretation of the land cover was conducted for each village following a time series manner.

There are advantages and disadvantages to using the village administrative boundaries in the analysis. Data are available for all villages in Indonesia. However, these maps often do not accord with local people's views of their boundaries. This is because local communities are not involved in data collection and there is much conflict over overlapping claims (Moeliono and Limberg 2009; FORCLIME, 2017). Hence, the village borders presented in this analysis are only indicative, not definitive. Fewer than 5% of the villages in Indonesia have a definitive officials recognized boundaries, while more than 50% of villages have a border that overlaps forest land delineation (Zakaria et al. 2018).

For our land classification, we wanted to draw on local interpretations of land type. In focus group discussion (FGDs) with the village leaders in Long Nawang (July 2018), we learned the local people used multiple and nuanced classifications of land: '*ladang*' is currently cultivated agriculture land; '*bekan*' refers to fallow land that was utilized for agriculture purposes a year back and will be re-used after one year; '*jueh*' is the agricultural land that has been left fallow for 2–3 years; '*jekau*' is land that has been left fallow for 3–25 years; and '*empa*' is land that has been fallow for over 25 years.

However, such nuanced understanding was difficult to translate into our remote-sensing analyses. We drew on national standard definitions of land (into primary forest, secondary forest, agriculture land, shrub land), but we have tried to relate them to local-level understandings as far as possible. Combining the two interpretations in this way helped to validate our observations. Therefore, for the purposes of our analysis, 'primary forest' (or *empa*) refers to land under high forest cover. Forest land that shows signs of being used –because of its close proximity to river or to road – is considered to be 'secondary forest' (*jekau*). 'Agricultural land' is a combination of dryland agriculture and mixed dryland agriculture, but it is difficult to distinguish fallow land from cultivated land. Such land is likely to be a combination of *ladang*, *bekan* and *jueh*. 'Scrubland' captures *jueh* and young *jekau*.

The aim of our short-term land-cover change analyses was to examine the direction of changes and not decipher the exact magnitude of the changes. Our analysis was limited because:

- The village boundaries used are only indicative not the definitive borders. Village boundaries are highly contested due to overlapping claims between villages and local people, government and local people, and among local people themselves.
- The majority of the local people in all four villages are practicing swidden agriculture. This creates a mosaic landscape where land-cover changes are difficult to interpret. This is also the case for mixed fallow and cultivated land (Heinimann et al. 2017).
- High resolution images were not available making detection of small village polygons susceptible to biases.
- The size of the areas from the spatial data of total village boundaries at the subdistrict level do not correspond with the official BPS reports (e.g. BPS 2018a).

In Appendix 3, we provide some indication of the bias estimate due to the adoption of the boundary in the analysis and also more technical information on how the satellite imagery data was processed.

5.3 Workshops with policy makers and researchers

To provide spaces for engagement and build consensus on research and policy/practice, among policy makers, practitioners and local community representatives, we conducted two workshops at the subnational and national level in Tarakan and Jakarta. The participants included policy makers and practitioners from the forestry sector, education, tourism, and national and local planning agencies, among others (Table 1). The aim of the workshops was to produce concrete recommendations for how our findings could be applied to policy and practice.

Table 1. List of participants in national and subnational workshop

Sub-National Workshop		**National Workshop**	
Institutions	**Number of representatives**	**Institutions**	**Number of representatives**
District-level government	4	Ministry of Environment and Forestry	10
Forest management unit	3	National Planning Agency	3
National park	1	Ministry of Tourism	1
NGOs and private sector	6	Ministry of Village	1
Customary leader	1	Research institutions	5
Village officials	3	Student	1
Household representative	1	FORCLIME TC	2
Migrant returnees	2	FORCLIME FC	2
Students/potential migrants	2	CIFOR	7
FORCLIME TC	2		
FORCLIME FC	9		
CIFOR	5		
Total	39	Total	32

The workshops were conducted in collaboration with our partner, FORCLIME, and included presentations of their activities, roles and achievements in implementation of their program. This was followed by our presentation on the forest–migration nexus research findings. The workshops provided an opportunity for participants to reflect on how their own work related to our research findings and to consider options for leveraging the research findings to inform action at a collective and institution-specific level. Results from the workshop will be discussed later in the discussion of findings of Topic 3.

6 Overview of research context: Villages and households

In this section, we provide an overview of the villages and characteristics of households we surveyed. We begin by presenting the village characteristics drawn from qualitative studies in four villages to provide a clearer context of the features of the two research sites of Lower and Upper Malinau. Two villages represent each research site. In Lower Malinau, the villages are Setulang and Long Loreh, and in Upper Malinau, the villages are Long Nawang and Nawang Baru.

Household characteristics, based on household surveys in eight villages, are then presented.

6.1 Overview of the villages: Social history of land and forest use

All four villages included in this study are populated by Kenyah people. Their ancestors were from Sarawak (Malaysian Borneo) and moved to Iwan River in East Kalimantan. These smaller groups then created the Kenyah ethnic subgroups, such as Leppo Tau in Long Nawang and Nawang Baru, Leppo Ke in Long Loreh and Oma Lung in Setulang (Anau 2003; Lawai 2003).

All four villages mostly rely on swidden agriculture, supplementing livelihoods by using natural resources, such as hunting, fishing and gathering forest products. Initially, fertile land was obtained by clearing primary forest by burning. Each household claims multiple plots of land. Claims are distinguished by various forms of locally recognized land demarcation (such as canals or certain species of tree). On average only 1–3 plots are farmed at a time, depending on how much labor is available at the household level or how many workers the household can pay to work. Generally, the same plot of land is farmed for one or two agricultural seasons, and then left fallow until there are shrubs/trees. While inhabitants in Lower Malinau generally have some sort of legal recognition of their land, farmed areas in Upper Malinau are technically part of Kayan Mentarang National Park. Struggles over land, whether within the village (such as with mining companies, as in Long Loreh), between neighboring villages (such as in Setulang) or with the state (such as in Upper Malinau) form a major part of political ecologies of these villages.

Kenyah people uphold a tradition of setting aside large tracts of land as sacred forests for their customary leaders/ancestors. This is referred to locally as '*Tane' Olen*'. People cannot clear, farm or extract forest products from the land without prior approval from the customary leaders (Momberg et al. 2000). *Tane' Olen* often serves as a biological resource bank for the local people to overcome personal disasters, for example needing to rebuild their house after fire (Ernawati 2017). Management practices vary considerably from one village to another, however. For example, while certain villages charge an entrance fee to collect forest products in the *Tane' Olen*, others charge per item collected. While some villages have defended and maintained their *Tane' Olen*, others have witnessed a shrinking due to various commercial pressures (Konradus 2003; Sirait 2003).

The development trajectories of the villages are very different. The villages in Lower Malinau (Long Loreh and Setulang) are easier to access due to their close proximity to Malinau City and good road network. As a result, the inhabitants have more diverse livelihood options, both within and outside the village. In contrast, Long Nawang and Nawang Baru in Upper Malinau are more remote, with poor connections to urban centers via road transport. However, due to their close proximity, forests and forest products constitute a bigger part of villagers' livelihoods, whether for self-consumption or for sale.

Table 2. Overview of village characteristics

Characteristics	Lower Malinau		Upper Malinau	
	Setulang	**Long Loreh**	**Long Nawang**	**Nawang Baru**
Village establishment	Established in 1968. People moved to this village from Long Saan to be closer to public services.	Established in 1972. People moved to this village from Long Lat and Long Lio' to be closer to public services.	The oldest village surveyed, more than 200 years.	Established after move from Village 3 in 1952, located 1 km away from Long Nawang
Ethnicity and homogenity	Homogenous, mainly are Kenyah Oma-Lung	Heterogenous, mainly Kenyah Lepo Ke and also includes migrants from other parts of Indonesia.	Homogenous, mainly are Kenyah Lepo Tau	Homogenous, mainly are Kenyah Lepo Tahu
Distance from district capital	1 hour by car (46 km)	3 hour by car (76 km)	25 minutes by plane to nearby village, Long Ampung, and then 30 minutes by car (278 km)	25 minutes by plane to nearby village, Long Ampung, and then 30 minutes by car (280 km)
Access to Market	Permanent market outside the village (*pasar inai*)	Permanent market in the village (not yet operated)	No market	No market
Classification of Location from the forest	Close to the forest (conservation/protected)	Close to the forest (production forest)	Inside the forest (conservation/ protected)	Inside the forest (conservation/ protected)

The discussion of Long Nawang and Nawang Baru is combined due to similarities in social and economic characteristics. A deeper context is presented below, including location and village history, distinct livelihood options, forest management and recent developments. A summary of the four villages is provided in Table 2.

6.1.1 Setulang

Location and village history

Setulang is located in West Malinau subdistrict. It is an hour away by road from Malinau City, the capital of Malinau Regency. The inhabitants of Setulang Village first moved to the village in in 1968 from the village of Long Saan to find better public infrastructure, especially the health and education services (Ernawati 2017). The entire village moved in a few large groups, with the last group arriving in 1978. Currently, Setulang has 933 registered inhabitants (Village Office data, September 2018). The majority of villagers, 93%, are Dayak Kenyah Oma' Lung. The rest are immigrants from other parts of Kalimantan, Sulawesi and Java, most of whom have married in.

Forest management practice

The Oma' Lung have managed their land and forests for generations. When they moved to Setulang, they aimed to preserve a large part as *Tane' Olen*. When the logging activities boomed in Kalimantan in 1990s, the area, close to Kayan Mentarang National Park, was one of the few remaining patches of mature forests in the lowland mountain. Between 2000 and 2003, the community was under intense pressure from logging concerns and others to log and convert the forest to other land uses, both of which threatened the biodiversity of the area. The villagers refused because they had learned from migrants returning from Malaysia that logging can cause considerable damage to villages by increasing exposure to risks, such as flooding, mudslides and droughts. The villages collectively decided to wait and see what would happen to neighboring villages who opened their doors to logging

companies. They felt the well-being of their neighboring villages had declined due to logging, and hence, decided to continue to resist the offers of logging companies (Ernawati 2017; focus group discussions with local communities, April 2018).

The Setulang community has not always been unified in their views toward forests. As logging companies started to offer lucrative compensation packages, few were tempted to concede (Ernawati 2017). In mid-2000, CIFOR researchers tried to assist the local communities of Setulang Village in developing a payment for environmental scheme (PES), as an alternative to logging. Subsequently, Wunder et al. (2008) documented how and why the scheme did not work. PES at that time was viewed as more efficient than integration conservation, development programs and 'green premium' approaches (e.g. ecotourism) in protecting direct, area-based conservation of forests and highly biodiverse areas. The idea was to pay the community of Setulang in Malinau District to keep their forest intact rather than sell the logging rights to timber companies. Despite three potential funders eager to finance the PES scheme in the village, all fell through because none had a time horizon to make continuous payments. Another concern of the funders was having to employ direct conditional payments, as their image as benevolent benefactors would suffer in the event that they would have to withdraw their funding due to non-compliance. There were also justifiable concerns that PES may inadvertently exacerbate inter-village conflicts over land in a context where disputes over land tenure were rife. Finally, the 'payment' for PES would need to consider opportunity costs, which were expected to be high and require that the payments would have to be front-loaded due to the profitability of cashing in logging rents.

In spite of these pressures and failures, Setulang established the *Tane' Olen* Forest Management Board in 2003 with the aim of seeking legal recognition from the government. In 2013, with support from FORCLIME, MoEF recognized their Tane' Olen as *hutan desa* or Village Forest. In 2016, the Governor of North Kalimantan Province awarded over 4,415 ha of the Village Forest management rights to the Tane' Olen Setulang Village Forest Management Body (Ernawati 2017). The legal rights over the forest and the management body have provide legitimacy to local forest management practices. The license is for a period of 35 years with the possibility of extension based on evaluation results. Setulang has since established itself as a tourism village, attracting both domestic and international tourists, and generating a modest income. This has provided additional impetus for protecting the forests.

Recent economic development

Proximity to *pasar inai* (mother market), a traditional market that specifically sells farm and forest products in a neighboring village, Kuala Lapang, has opened up the opportunity for women, in particular, to generate income. The market operates twice a week, every Tuesday and Friday morning. On average, women sellers can bring home a profit of IDR 200,000–300,000 (approximately USD 14–21) each time from selling vegetables, fruits, rice and also forest produce. Many Setulang inhabitants also work in mines, oil palm plantations in neighboring districts or elsewhere in Kalimantan. The tourism generated by the establishment of the tourism village has provided additional sources of income to the communities, as many offer boat transportation, homestays, meals and guide services. Some income is also generated from students who come to learn about the *Tane' Olen* in the village.

6.1.2 Long Loreh

Location and village history

Long Loreh is the capital of South Malinau subdistrict, and is a 2–3 hour drive from Malinau City; half of the drive is paved with asphalt, the other half is a dirt track. The village was established in 1972 when two groups of Kenyah people moved into the areas from Long Lat and Long Lio' in Upper Malinau to be closer to the downstream public facilities (Anau 2003). Long Loreh currently has a

population of 1,520 persons, including temporary migrants. Roughly, 65% of people living in the village are local Dayak Kenyah Leppo Ke people. The other 40% are migrants from Java, Sulawesi and East Nusa Tenggara, who are working for the mining companies.

Livelihood and forest management

Long Loreh is a coal mining village. Mining exploration began in the early 1990s, with exploitation work beginning in 1996–97. Since then, three large mining companies, through subcontractors, have operated in Long Loreh. Of these, one has moved exploitation to a neighboring village but still maintains its head office in Long Loreh. While the mines have opened up job prospects for locals, most of the jobs are filled by immigrants from other parts of the country, which creates resentment in the village. However, the flow of immigrants to Long Loreh has also opened up other livelihood opportunities for locals, such as grocery shops, accommodation rentals and other services. Both the compensation that local people received for the private and communal land that they gave up to the mining companies, as well as increased economic activities in the village, as a consequence of the mining, have raised living standards in the village. In focus group discussions (April 2018), villagers explained how local people can now afford to buy motorcycles and invest in their children's education. They can find jobs in the village, and do not need to migrate to Malaysia for employment.

Mining has also had profound and alarming impacts upon environmental and societal change. In semi-structured interviews, local people spoke about the destruction of landscapes and agricultural land, contamination of their water and soil, and the increased frequency and intensity of floods due to erosion. Mining operations have caused deep divides between local people and the mining companies, customary and local leadership responsible for issuing concessions, and migrant workers. Some local people interviewed felt the mining companies had not honored their legal commitments of assessing possible environmental impacts, defining development activities for the villages and setting up a special fund for restoration after the mines are closed (Mining Law No.4/2009). Indeed, there are three open pits in the village that were never restored. Following advice from the mining companies, local people explored the possibility of establishing fishing ponds in one of the mines but all the fish died due to contamination. At the time of the final round of field work in the village, customary and village leaders had granted permission to one of the mining companies to build a 30 km road through the Village Forest to allow the company to transport its coal, and the road construction was almost complete. While village leaders sold the idea as 'the road would eventually be ours', interviewees pointed out the road would have no function for local people in the short term. It was unclear what would happen to the trees that were cut down to make way for the roads, whether and how the logs would be distributed among the local people or be retained by the mining company.

The following case study 1 of a migrant returnee illustrates the ambivalent attitudes toward mining operations in the village.

Recent development

Traditional swidden agriculture has largely been replaced by cash crops such as cocoa, rubber and more recently, palm oil. While 80% of households in the village have invested in smallholder palm oil of varying sizes, only a small minority of the early adopters have started to profit from palm oil. The village government was using village funds to distribute fertilizers to the households to subsidize the cost of production. But most villagers do not yet understand how to fertilize plots.

6.1.3 Long Nawang and Nawang Baru

Location and village history

Long Nawang and Nawang Baru are neighboring villages in Kayan Hulu subdistrict in Upper Malinau, neighboring Malaysia. The easiest way of reaching the villages from Indonesia is by starter plane from

Case Study 1. Ambivalent attitudes toward mining

Melati is the first in her family to pursue tertiary education and have a formal job as an administrator in one of the mining companies operating in her village. She earns a hefty salary of IDR 5–7 million (USD 350–490), depending on how much overtime she works. She can now afford to support her aging mother, who is no longer able to work in the agricultural fields. She is also paying for her younger brother to pursue undergraduate study in Yogyakarta. She feels proud that she is a position to support her family.

As an employee of a mining company, she thinks opening her village up for coal mining operations has been beneficial insofar as it has generated jobs. There were very few jobs before the mines. Although office jobs such as hers are often taken by outsiders, there are still many jobs (such as operating machinery, construction) for local people. As mining companies have brought many outsiders, it has had spillover on other forms of employment in the village too. Local people have opened *warungs* (small grocery kiosk or food stall), hotels, guest houses and home rentals to service the immigrants.

On the other hand, as a community member, she has witnessed firsthand all the environmental destruction that has accompanied coal mining. Dense forests that she was scared of even entering during childhood, are now sparse. Forests and people's lands have been converted into mining pits. Roads that only service mining companies have been built. There river is drying, but at the same time there is a higher incidence of flooding. She does not feel that her community has been adequately compensated for the loss that has accompanied mining. The companies have not invested sufficiently in village infrastructure, such as schools, electricity and other public facilities. She is very concerned that once the mining companies shift operations elsewhere, there will be nothing left in the village.

Melati thinks that the village government has not taken a decisive stance with the companies in demanding their rights. She thinks that a fairer deal for her community is possible if the local government and mining companies deliberate on emerging concerns, and come to a mutual agreement.

Melati, Long Loreh, interviewed April 2018

Malinau to Long Ampung, and then a 1-hour drive from Long Ampung to the villages. Although there are two daily flights, they are serviced by the same airlines and are unpredictable. Both villages are only an hour away from the nearest check point on the Indonesia–Malaysia border. Long Nawang has a long history dating back 200 years. Nawang Baru was established in 1952 by Long Nawang residents who were resisting widespread and forcible conversion to Christianity during that period (Lawai 2003).[6] Both villages are inhabited by Kenyah Leppo Tau and have a common ancestry. Other ethnic groups constitute a small section of the population, and are mainly those who have either married into the village and/or public servants from elsewhere in Indonesia assigned to work in the villages.

Main sources of livelihood and forest management

Swidden agriculture, sale of forest products (such as gaharu), cross-border trade in goods and government construction contracts or wage employment are the main sources of livelihood. Gaharu or agarwood is a fragrant, resinous heartwood of *Aquilaria* trees that have been infected by fungus. It is in high demand in the Middle East for use in perfumes and China for traditional medicines. The average price can reach USD 4,400 per kg, with the good quality specimens can price much more (Sustainable Asset Management 2019). While the 'gaharu rush' of the late 1990s and early 2000s has largely saturated the market, immigrants now flock to North Kalimantan on expeditions to find gaharu and it is still an important source of income for residents.

Much of the cash and food crops are sold and consumed locally and not marketed outside due to the remoteness of the villages and the very high costs of transport. The cost of transporting goods via

6 Lawai (2003) provides detailed background and historical movement of Kenyah Lepo Tau people.

airplane is IDR 30,000 per kg (USD 2) which is higher than the market price of one kilogram of most of the food crops. Only gaharu is sold externally, and not consumed by the villagers themselves.

Both villages are located nearby the Kayan Mentarang National Park. Much of the surrounding forests are secondary forests that were cleared for swidden agriculture and village settlement. The Kenya Leppo Tau also have *Tane' Olen* that they protect.

Recent development

Since 2017, there has been considerable investment in road infrastructure as part of the national government's Trans-Kalimantan Highway. The roads are expected to improve connectivity to neighboring subdistrict capital of Long Punjungan, which can then be used to reach the city of Samarinda.

Kenyah people are currently seeking legal recognition for their customary land. This includes the forest in Long Nawang and Nawang Baru. The establishment of Upper Malinau region as a new regency has been under discussion since 2016. However, due to the moratorium on establishing of the new districts, this has not been formally approved.

6.2 Overview of household characteristics

In this subsection, we present household-level data on demographic characteristics, source of livelihoods and the level of nature and forest dependence. These are mainly based on household survey data from eight villages supplemented with qualitative research findings.[7]

6.2.1 Demographic characteristics

Table 3 summarizes the household characteristics. Approximately 70% of the households surveyed were nuclear families, a family group consist of two parents with their children only, with an average of 4.68 people per family. There were noticeable differences between the two sites. Upper Malinau had more extended families, whereas Lower Malinau more nuclear. The vast majority of households are headed by men.

Less than 10% of household heads have never attended school. Those in Lower Malinau are generally more educated than in Upper Malinau. However, the proportion of the head of households with higher education is higher in Upper Malinau. This may capture the fact that our sample is overrepresent the migrants sending households, and it might be the case that in Upper Malinau, those who are able to send their children to school are better educated ones.

In Upper Malinau, the vast majority (72%) of household heads stated that they were born in the village, whereas in Lower Malinau only 33% stated that they were.

6.2.2 Sources of livelihood

> *"Here, people rely on multiple sources of livelihood. Everyone does rice farming, and in between different farm activities, they do wide range of other income gathering. This is different from the city where people only have one main job that they do all the time."* (Village leader, Long Nawang, July 2018)

7 Purposive sampling targeted migrant households, and the sample consists of migrant households and randomly selected non-migrant households. This means that the data presented here overrepresent the migrant households.

Table 3. Descriptive statistics: Household characteristics

Variables	Lower Malinau	Upper Malinau
	n **= 180**	***n*** **= 180**
Household characteristics		
Nuclear family (%)	80.00	59.44
Household size (persons)	4.83	5.96
Household head characteristics		
Female headed household (%)	8.88	8.33
Age of household head (years)	46.06	50.02
Household head born in the village (%)	33.33	71.66
Educational background of the Head of household (%)		
None	10.00	7.78
Primary school	26.27	32.22
Junior high school	23.89	18.89
Senior high school	28.89	21.11
Higher education	10.56	20.00

Table 4. Descriptive statistics: Source of livelihoods

Variables	Lower Malinau	Upper Malinau
	n **= 180**	***n*** **= 180**
Main Source of Livelihood (%)		
Agriculture	36.11	48.89
Salary	28.33	27.78
Casual work	13.89	7.78
Micro enterprise	10.00	6.67
Remittance	1.67	1.67
Forest products	1.11	5.00
Other	8.89	2.22

In the research sites, it is common for households to have multiple sources of livelihoods, as shown in Table 4. Generally, a household has 2–3 sources of livelihoods in both Upper and Lower Malinau. The major sources of livelihood in our sample were agriculture followed by casual work. Very few respondents said that 'forest products' were their primary source of livelihood. Overall, 74% of the respondents stated that agriculture is one of the three most important sources of livelihoods. Even among those who responded that agriculture is not the most important source, 42% of them still ranked agriculture as second highest. Lower Malinau has a broader range of income sources, with more people involved in micro enterprises and casual labor.

The percentage of households involved in formal employment was similar in the two research sites. However, our qualitative data indicate that those in Upper Malinau are public sector employees, while in Lower Malinau, they are both public and private sector, as many people work for mining companies.

6.2.3 Level and nature of forest dependence

We inferred 'forest dependency' in a number of different ways: proportion of respondents who said forests were the primary source of livelihood, number of forest products collected, and perception of forest and forest products for livelihood. Hence, we considered both objective and subjective criteria.

While respondents in both Upper and Lower Malinau did not rank forests and forest products as their primary source of livelihood, our analysis shows that reliance on these remains high in both Upper and Lower Malinau. Respondents in Upper Malinau are relatively more dependent on forests than those in Lower Malinau. Two reasons for this observed pattern include the more diverse livelihood options available in Lower Malinau, which reduces reliance on the forest, and the larger forest areas available to access products in the Upper Malinau.

Our results show high rates forest product utilization among all households surveyed. Around 93.3% of households reported having collected at least one forest product once during the past 12 months. The proportion of households who said they collected the following forest products for consumption and sale were: firewood 78.8%, timber 57.22%, non-timber forest products (NTFPs) 32.22%, bushmeat 21.39% and fruits 14.4%.

Generally, our sample households in Upper Malinau collected three types of forests products, while those in Lower Malinau collected two types. These results are detailed Table 5. The range of forest products that were mentioned include (from the highest proportion of households that collect the commodity to the lowest proportion) firewood, bushmeat, other NTFPs, timber and fruit. This ranking of the most collected products are the same between the two research sites.

Respondents in Upper Malinau perceive forest products as 'very important' for their livelihood. This is partly because of the better supply of forest product due to the larger area of forest in Upper Malinau and the fact that people use these forest products to generate both cash and for subsistence purposes. In Upper Malinau, slightly more than a quarter of sample report that they are generating cash from selling forest products, whereas in Lower Malinau, only 3% of sampled households reported the same.

As shown in Table 5, there are far fewer households that sell the forest products in relation to the proportion who collect them, suggesting that most households use forest products for their own consumption. However, the characteristics of the product (e.g. whether it is easy to collect or size of collection) might also affect what people consume themselves or sell.

During the qualitative interviews, we learned the broad categories of forest products that were used. 'Timber' and 'NTFPs' did not capture the full volume of forest products that are monetized and sold from the village. In Upper Malinau, in particular, the local economy is very much dependent on the collection and sale of gaharu, which we shall discuss in greater detail in the following section.

According to numerous interviews and focus group discussions, in both Long Nawang and Nawang Baru, gaharu is a major source of income and wealth in the village, though natural gaharu stock has reduced considerably due to intense competition over its collection among the villagers and immigrants who came to search for gaharu (Eghenter 2006a). We will discuss whether and to what extent this is related to migration in Topic 2.

Table 5. Descriptive statistics: Household–forest relationship

Variables	Lower Malinau	Upper Malinau
	***n* = 180**	***n* = 180**
Perceptions on the importance of forest products for livelihood		
Forest products were very important, 5 years ago (%)	56.25	88.27
Forest products are very important (%)	53.98	88.27
Forest dependency		
Collect any forest product (%)	90.00	96.66
Average number of forest products collected	1.97	2.83
Collect timber (including gaharu) (%)	18.89	23.89
Collect NTFP (%)	25.00	39.44
Collect firewood (%)	70.00	87.22
Collect bushmeat (%)	39.44	75.00
Collect fruit (%)	15.56	13.33
Mention forest product as an income source (%)	2.78	26.11
Sell timber (including gaharu) (%)	2.77	13.88
Sell NTFP (%)	3.33	27.77
Sell firewood (%)	0.5	0
Sell bushmeat (%)	9.4	25.55
Sell fruit (%)	3.3	0.5

7 Key findings and discussion

7.1 Topic 1: Migration patterns

In this subsection, we present the results of the household survey and qualitative data, documenting the recent patterns of migration and implications for household budgets. We also discuss what happens after migration, in particular, for the returnee.

7.1.1 A generational shift from employment to educational migration

Embarking on this research project, we expected to find that migration would be for employment purposes. This would be either cross-border, given the proximity of the research sites to Malaysia, or rural–urban migration, given the growth of urban centers in Samarinda, Tarakan and Malinau City. We hypothesized that remittances would be an important component of rural livelihoods for those who stayed in the research villages in Upper and Lower Malinau. This hypothesis was shared by FORCLIME, who had not yet assessed migration or demographic change in Malinau. They suspected that cross-border migration to Malaysia for wage work would the dominant form of migration. Research on border regions elsewhere in Kalimantan has documented cross-border migration in response to greater employment opportunities, differences in market prices and shared ethnicity across borders (Eilenberg 2012). This pattern was observed in another CIFOR migration project in Kapuas Hulu.[8] Furthermore, cross-border migration for employment purposes or *peselai* has also been documented by other scholars who had carried out research in Upper Malinau and Lower Malinau (e.g. Wunder et al. 2008).

However, from a total of 227 migrants in our sample, we found that 77% (175 migrants) were motivated by education, 17% (38 migrants) for employment and 6% (14 migrants) for family reasons. While many older people have a history of migration, there has been a generational shift in migration patterns. As aspirations and opportunities to access education have grown, mixed-gender migration to cities for higher education has taken the place of male labor migration to Malaysian logging concessions as the dominant form of migration.

In our sample, the male–female migrant ratio was almost equal; 55% of migrants were male and 45% were female. However, when the reasons for migration are broken down by gender, as shown in the Figure 5, education drives more women to migrate than men. This proportion is even higher for migrants from Upper Malinau.

In order to examine this migration phenomenon, we looked at education participation over time. Using data on 1,944 individuals, we considered the education background of individuals between the ages of 15 and 24 years by dividing them into cohorts of youth for the years 1980, 1990, 2000 and 2010. The results are shown in Figure 6. The graph shows the cross-tabulation of education and age group for ranges of 9 years, based on cross-sectional data.[9] Of the people who were 15–24 years old in 1980 (cohort 1980), 20–30% did not finish primary school, whereas over 40% of the 2010 cohort have completed tertiary education. This demonstrates significant generational shifts in educational

8 Preliminary findings were shared during the IUFRO Conference, 2018 in Vaasa Finland. Details can be accessed here: http://www.uef.fi/documents/1577130/1956431/Bong.pdf.

9 The cohorts are defined as follows: youth cohort 2010, 22–31 years old (in 2017); youth cohort 2000, 32–41 years old; youth cohort 1990, 42–51 years old; youth cohort 1980, 52–61 years old

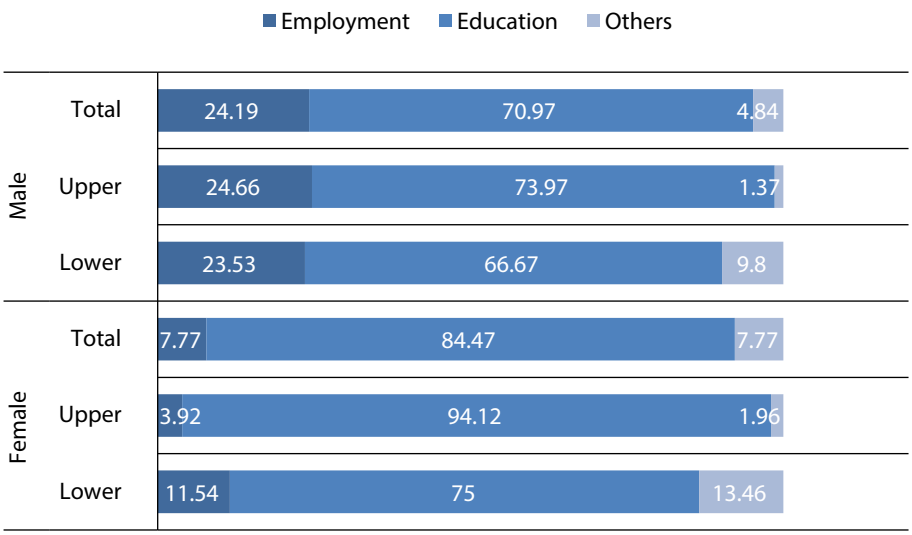

Figure 5. Reasons for migration

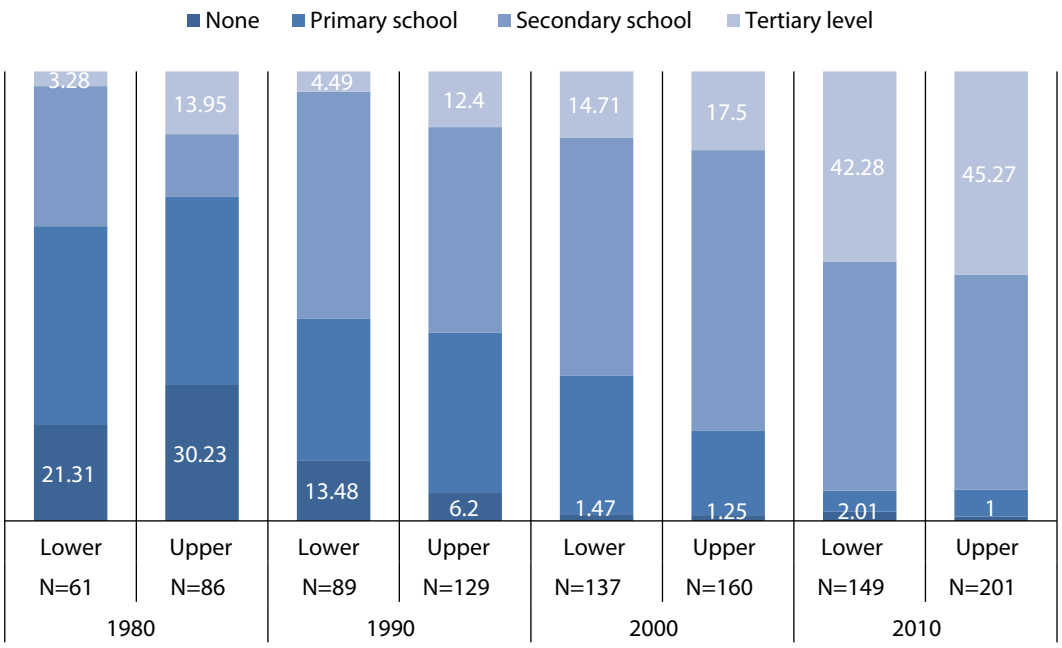

Figure 6. Educational attainment by youth cohort

attainment: the younger generation are much more educated than previous generations, who are mostly uneducated due to limited infrastructure and lack of awareness of the importance of education (Lawai 2003).

Two factors contribute to the observed changes in educational attainment: first, the establishment of schools, both primary and secondary, in the villages; second, increased migration to pursue higher education. A significant increase in higher education participation is observed in the period 2000–2010, which is when macro policy changes established Malinau as a new regency in 2001, as part of the decentralization policy resulting in a higher share of the budget and increased autonomy in

spending it. This splitting of administrative entities, called '*pemekaran*' or 'proliferation', is connected to Indonesia's national decentralization reforms that aim to improve democracy, governance and territorial stability by devolving political power, fiscal resources and responsibilities for public service delivery (see Thung 2019).

The significance of decentralization policies in improving infrastructure, including schools, and economic opportunities were repeatedly mentioned by respondents in various focus group discussions (FGDs), particularly those conducted in the Upper Malinau. The two quotes below reveal the conditions before and after decentralization. The communities can clearly see the benefit of regional autonomy, such as increased subsidies for plane tickets, which makes travel easier. This has increased the expectation that good jobs will be available when people finish their education. This has resulted in higher migration for education in all areas, but also pulls migrants back after they have completed their education.

> … in the past, people didn't aim to pursue higher education. As soon as they graduated from junior high school, they would start a family instead. There were no jobs available for educated people. However, since decentralization and regional autonomy, there has been a steady increase in formal jobs (as government employees) and this is encouraging the new generation to invest in education.
>
> Bungeh, one of the first women to move away for study, Long Nawang, Sept 2017.
>
> … decentralization has brought a lot of opportunities, such as scholarships, subsidized flights, new schools – making education more affordable.
>
> Selong, local leader, Nawang Baru, Sept 2017

Based on our household survey data, we were also able to map out the destinations of education migrants. They mostly travel within North Kalimantan or to East Kalimantan, although migrants from Lower Malinau generally travel further, many to Java. Our results shown in Figures 7 and 8.

A total of 73 students have moved from Lower Malinau: 38.33% moved to Java Island to study (26% in Yogyakarta, and 12.33% in other cities in Java), 23% moved to Samarinda, 23% moved to Malinau City and 15.07% studied in other cities in Kalimantan. Of the 102 migrant students from Upper Malinau, most stayed in Kalimantan Island, with 60.2% going to Samarinda, 12.24% to Tarakan, 7.14% to Malinau City and 1.3% to other cities in Kalimantan; only 5.1% move to Java.

The finding that Java is a main education destination for youth in Lower Malinau while youth from Upper Malinau mainly relocate within Kalimantan island is a perplexive finding. Java is recognized as a renowned center for higher education in Indonesia and during the interviews with migrants households we learned that they understood that the living cost in Java, in particular Yogyakarta, is cheaper than in Kalimantan. With this two characteristics, then Java should attract students from both areas the same way. The possible explanation of the observed pattern is people from Upper Malinau people are limited by accessibility. In FGDs during our research validation visits, we found that the range of destination options for Upper Malinau are restricted because of physical distance, the high cost of transport, lack of access to banking facilities and limited social and telecommunication networks to reduce the financial and emotional costs, among others.

For instance, in interviews with 21 migrant-sending households in Upper Malinau, 11 households pointed out that difficulties in transferring funds without access to a bank limited destination options. Upper Malinau had no banking facilities until 2014 when BPD Kaltim was established in Long Nawang. Parents, therefore, had to rely on sending funds through family members and acquaintances who were visiting the city (e.g. Malinau, Tarakan and Samarinda) where their children were studying. Communicating with children who required funds and/or receiving the funds in destination areas was

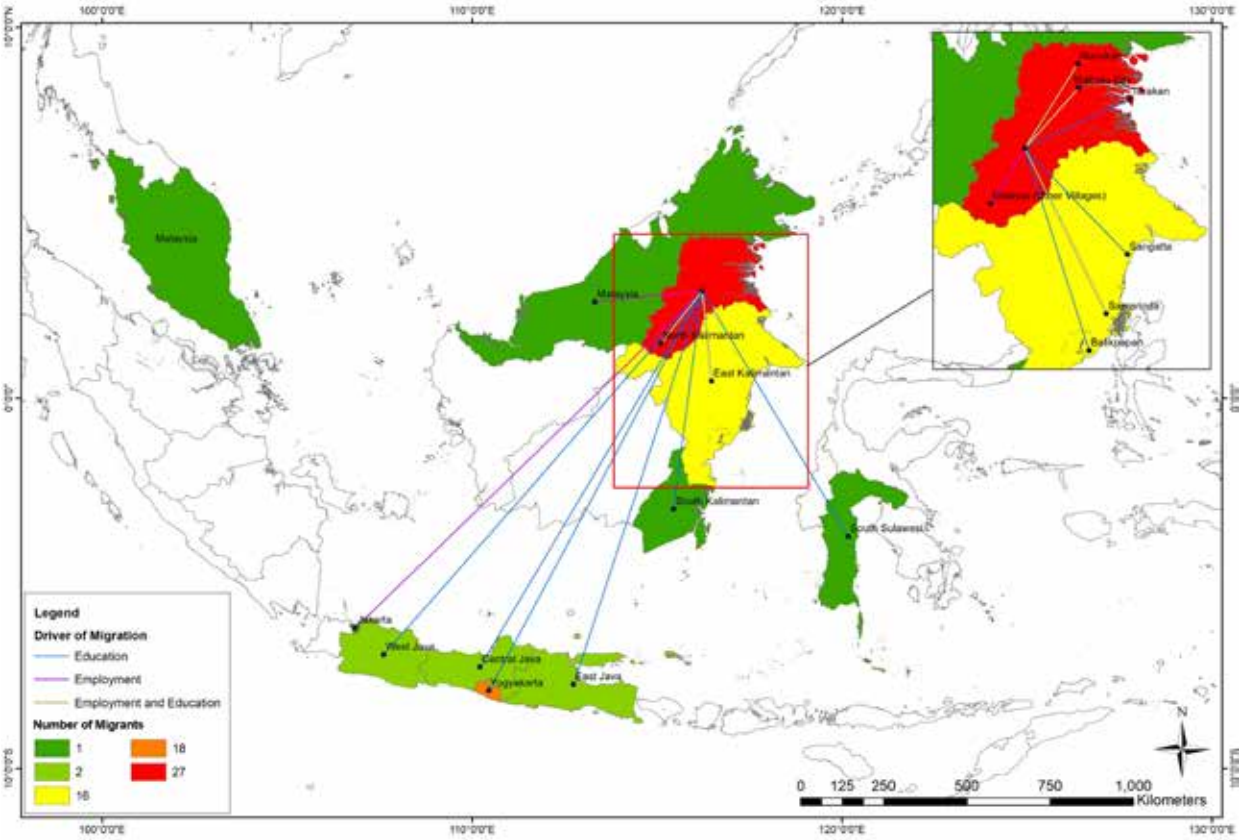

Figure 7. Destinations of education migrants from Lower Malinau

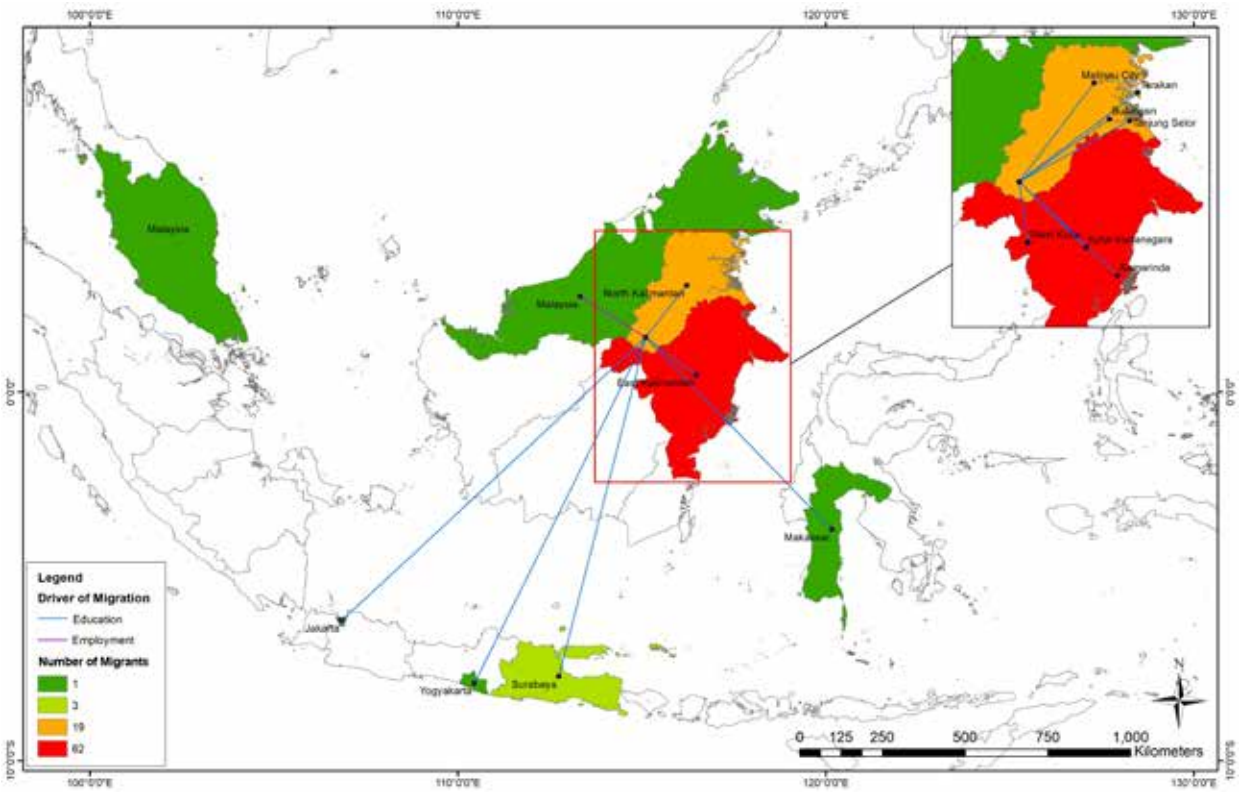

Figure 8. Destinations of education migrants from Upper Malinau

also difficult. Family members would either have to wait until there was mobile signal or to walk to a nearby location with a better signal to get in touch. A further hurdle was faced by migrants to Java. As one migrant returnee explained:

> "My parents would send the money in an envelope to someone they knew who was planning to travel to Tanjung Selor as I have an aunt who lives there. Often enough, my aunt would then have to arrange to meet the person at the airport to pick up the money and she would transfer the funds to my bank account in Yogyakarta".
>
> Leti, migrant returnee, July 2017, Long Nawang

7.1.2 Migration generate expenses instead of income

A profound implication of such a shift in migration patterns is that migration has switched from being an income-generating activity to one that is a financial burden on rural households. This is because those left behind pay for the migrants' tuition fees and living expenses, or part of them. The cost is significant. Over 90% of education migrants receive transfers from home. A median transfer of IDR 800,000 (USD 56) per month, with a total median household expenditure of IDR 2.5 million (USD 175), means that the transfer is as much as 32% of the household's expenditure (Figure 9).

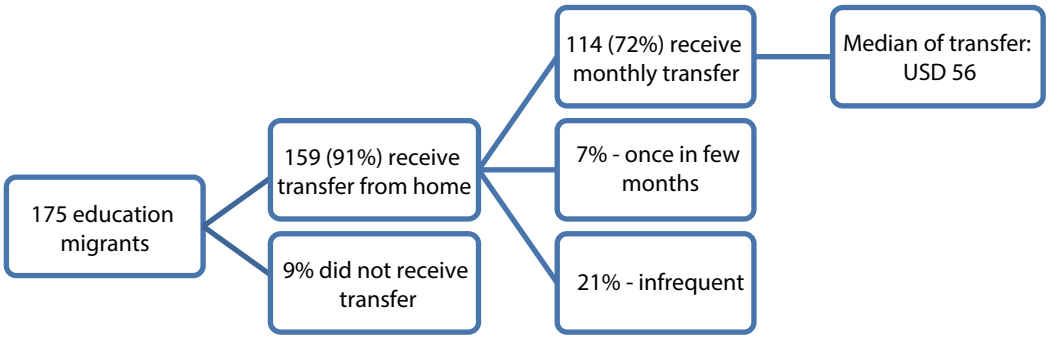

Figure 9. Frequency and amount of transfers from households to education migrants

This initial finding changes the fundamental questions that we sought to investigate during the course of our research. Whereas we anticipated looking at remittances, who receives them, how are they used, who decides and the effects on forest-based livelihoods and land-use change, we now asked how are people financing educational migration, what drives them and what are the emerging effects on forest–people dynamics?

One of the main ways of financing education is through government scholarships. The Indonesian Constitution and Law Number 20 of 2003 concerning the National Education System stipulates that 20% of the total annual budget should be spent on education. These policies are percolating to the research sites in the form of a number of scholarships being awarded to people from these areas. There are different layers of scholarship from the government, private sector and universities. government scholarships may be from the national, provincial or district level. Out of the 17 migrants and returnees we asked about scholarships, 10 said that they received at least one type of scholarship. Most received scholarships from the district and village level.

Table 6 presents the amounts and frequencies of scholarships received by students. Information about current migrants was provided by the parents, while the returnees provided information themselves. Fully funded scholarship recipients received tuition fees and monthly stipends to cover their accommodation and daily expenses. Only some asked for additional support from their families.

Table 6. Source, size and frequency of scholarships received by migrants

No	Migrant's background	Source of scholarship	Frequency	IDR (1)	IDR (2)	IDR (3)	IDR (4)
1	Curent migrant	District Government	3	5,000,000	1,500,000	1,500,000	
		Village Government	3	1,500,000	1,000,000	1,000,000	
2	Curent migrant	District Government	1	1,500,000			
		Village Government	2	1,500,000	1,500,000		
3	Curent migrant	District Government	1	5,000,000			
4	Curent migrant	District Government	1	5,000,000			
		Village Government	1	2,000,000			
5	Curent migrant	District Government	3	5,000,000	7,500,000	5,000,000	
6	Returnee	District Government	yearly	6,000,000	6,000,000	6,000,000	
		Village Government	1	1,000,000			
7	Returnee	District Government	yearly	12,500,000	17,500,000	10,000,000	
8	Returnee	District Government	4	9,000,000	7,000,000	5,000,000	800,000
		Province Government	1	2,300,000			
		Village Government	2	1,000,000	500,000		
9	Returnee	District Government					
10	Returnee	District Government					

However, there are a number of limitations of the current scholarship programs. District-level government only provides full scholarships for students pursuing public health or teaching. Even then, they are no longer as generous as they used to be. In the past, a special scholarship fund was developed to encourage students to study nursing and teaching to reduce shortfalls in these professions and encourage local people to fill these positions. Such scholarships covered all expenses. Upon return, the students were recruited by district governments to work as teachers and nurses. In recent years, however, such fully supported scholarships tied to job placements in teaching and nursing have been replaced by one-time grants that students need to reapply for every year.[10] Such changes are shown in Table 6. The amount and frequency of scholarships, validated by interviews, varied among current migrant returnees.

At the national level, the Ministry of Higher Education offers generous scholarships, such as the Affirmative Scholarship (*Afirmasi Pendidikan Tinggi*, ADik) These aim to support students from remote/forest frontier, outermost and least developed regions (such as Malinau). However, access to them remains low. The ADik scholarship scheme is explained in Box 1. None of the scholarship recipients we interviewed mentioned receiving funds under this scheme.

In spite of this proliferation of scholarships, financing for education was a major financial burden for parents in the villages. Based on figures provided in the in-depth-household interviews, we estimate that the cost for an undergraduate degree can be as high as 100 million IDR per student.[11] The breakdown of the cost estimation included transport costs, enrollment fees, living costs, accommodation and tuition fees, are presented in Box 2.

The burden of financing higher education becomes particularly apparent when we compare the costs of education with total monthly expenditure of an average six-person household. Analysis of household

10 The size of scholarship varies from year to year and it regulated by Head of Regency decrees, such as SK Bupati Malinau Nomor 900/K.268/2017 or SK Bupati Nomor : 422.5/K.356/2015.

11 The figure here is rounded up from IDR 97,229,000 mentioned in Box 2.

Box 1. Expansion of scholarships for higher education

In 2012, the Ministry of Research and Higher Education introduced the ADik scholarship to open up opportunities for youth from Papua to study at reputable higher education institutions across Indonesia. A year later, the scholarship target group was extended to youth living in the outermost and least developed regions often referred to as the 3Ts (*Terdepan, Terluar dan Tertinggal*). Students from Malinau District, a frontier region, are eligible for this scholarship. The goals of the program are to develop the human capabilities of people living in these regions, and support them to contribute to regional and national economic development.

The scholarship includes education fees (IDR 2.4 million or USD 168 per semester) and a monthly living allowance (IDR 6 million or USD 421 per semester). The recipients can choose from 48 public universities and 22 polytechnics. However, the coverage of these scholarships is limited. In 2018, a maximum of 2000 students could receive this scholarship. Even then, 25% of the 2000 scholarships were reserved for recipients of a similar program at the high school level to provide continued support. A further 5% of the quota is for children of migrant workers in Malaysia.

The selection process is lengthy and complex. It starts with national-level program implementers setting quotas for each province. Each province then subdivides the allocated quota by districts. Schools recommend students to the district government, which then selects those who can take an academic test at national and provincial level. Students who pass the test will then have their names sent to the university of their choice. In the event that the university rejects their application, they are allocated to a partner university or a polytechnic. Students can choose what to study, but those who choose subjects that are seen as benefiting their areas of origin, such as health, technical, agriculture, environmental studies, mining and education, are prioritized (Nurfuadah 2016).

survey data indicates that average expenditure ranges from IDR 2–2.8 million (USD 145 to USD 195) making the per capita monthly expenditure USD 24–32 or USD 2–3 per day. These figures are considerably higher than the poverty measure used in the national standard or the World Bank's USD 1.9 in purchasing power parity indicating that even though people's livelihoods are semi-subsistence, they are not considered to be poor household by official classification. Further calculations reveal that migrant households spend 28% of the monthly total expenditure for education.

Respondents in Upper Malinau, in particular, commented on the high cost of financing education, given the already high price of commodities in the village and limited opportunities to earn a steady income. To get a better understanding of the price differences, we checked the prices of basic items sold in three grocery stores in Long Nawang, and compared them to prices of markets in Bogor, where CIFOR's headquarters are located or in another city in Java as reported in the website of market management or local government office (PD PPJ 2019; Disperindag Jatim 2019).[12] Although some items (such as rice, which is produced locally) were roughly comparable, other items that need to be imported cost significantly more in Upper Malinau than Bogor (see Table 7). Particularly startling was the cost of sugar, eggs, salt and gasoline, which were between 58% and 133% higher than in Bogor, Java. On the other hand, commodities such as meat are cheaper in Upper Malinau, as the meat is hunted from forests, while in Jawa, the meat is domesticated beef.

7.1.3 Drivers of investment in education and returnee aspiration

In the qualitative interviews and field work, we asked about what was driving young people and their families to invest in education, especially since the costs of education are so high and stretched their household budget. We learned that the main driver was the expectation that ongoing decentralization

12 The prices of those commodities are taken from Pasar Baru Bogor from the website of PD Pasar Pakuan Jaya www.pdppjkotabogor.com, accessed 4 January 2019. The prices similar to other prices in East Java accessed through Disperindag Jatim http://siskaperbapo.com/harga/tabel on the same date. The price of rice is taken from the second website. Bogor is located in West Jawa. Jawa is the most populated island and the most developed area of Indonesia.

Box 2. Estimating the costs of migration

Parents on average spent IDR 97,229,000 (USD 6,780) on financing an undergraduate education for each child, assuming that an undergraduate degree took 4 years to complete.[1] This estimation is calculated from in-depth interviews with 41 migrant-sending households in four villages. As far as possible, we recorded all expenses incurred, including transport costs, enrollment fees, living costs, accommodation and tuition fees. If households could not provide a detailed breakdown of the costs, we estimated *initial cost*, how much money parents provided the migrants with when they first moved. This covered transport, tuition and living allowances. The average initial cost incurred by our respondents was IDR 5,830,000 (USD 406). Even then, these initial costs amounted to almost three months' total expenditure incurred by their households, as reported in the household survey data.

Expenses included:
Transport costs depended on origin, destination and whether migrants returned during holidays. As an ilustration, the cost to reach Samarinda, the most popular city for studying is IDR 750,000 from Upper Malinau with the flight price subsidized; without subsidy, the cost can reach more than IDR 2,000,000. From Lower Malinau, the cost to reach Samarinda is around IDR 1,500,000. If the students moved to Java, they need an additional IDR 1,000,000 for flight and airport transfer.

The average one-way transport cost is IDR 612,000. This average figure is lower than the estimation for Samarinda because many students have moved closer to Malinau and Tarakan. Assuming that the students return to the village after finishing their study and return for one holiday per year, then the transport cost becomes IDR 4,896,000 (4 return trips) over the study period.

Enrollment fees range from IDR 1,500,000 to IDR 25,000,000, with an average of IDR 9,510,000.
Tuition fees per semester are an average of IDR 3,277,000, making the total for a course up to IDR 26,216,000 (two semesters per year).
Living allowances average around IDR 907,000 per month (total for 4 years: IDR 40,815,000 – for 45 months, allowing for three holidays of a month per year). This measure is likely to be an underestimate, as we only recorded the out of pocket expenses incurred by parents, and did not include amounts received through scholarships or through support from other relatives.
Accommodation costs average IDR 329,000 per month (ranging from IDR 83,333 to IDR 500,000) making the total accommodation cost for 4 years IDR 15,792,000.

[1]Exchange rate from www.xe.com per 4 January, 2019: USD 1 = IDR 14,340.

Table 7. Comparison of commodity prices

Commodity	Price (IDR)		Difference
	Upper Malinau	Bogor/Jawa	
Rice, medium quality (1kg)	13,000	11,700	11%
Meat (1 kg)	40,000	110,000	-64%
Sugar (1 kg)	25,000	14,000	79%
Eggs (1 kg)	60,000	26,000	131%
Condensed milk (1 can)	15,000	9,500	58%
Salt (250 g)	7,000	3,000	133%
Gasoline (1 liter)	18,000	10,000	80%

Sources: Field survey, www.pdppjkotabogor.com and http://siskaperbapo.com/harga/tabel, accessed 4 January, 2019

and *pemekaran* would open up job prospects and they would need to position themselves to be eligible for these jobs.

From the goverment side, additional civil servants were indeed needed. A Government of Malinau official indicated that there is a shortage of 1,500 personnel (*Radar Kaltara* 2017). When we checked in the Government of Malinau's website, we found that 230 civil servant positions were being advertised in Malinau in 2018. These included technical, governance/administrative, teaching and health jobs. This is despite the fact that there is a national moratorium on the recruitment of new civil servants, except for teachers and nurses.

We found that the young migrants and their families were trying to match what they were studying with the jobs that they anticipated would be opening up. We learned through interviews and information from our key informants that many migrants who returned home were under- or unemployed, as the civil service positions were yet to open up and there was high competition for existing jobs. Many were willing to take on 'honorary' teaching jobs in the hope that the government would convert them into permanent jobs, or wait until there were vacancy jobs.

> … there are formal jobs available in the village, such as teaching or nursing. However, our youth cannot get these jobs because of tough competition. These jobs are meant for local people, however, because our youth can't pass the civil servant exams, outsiders get the job instead. But, these outsiders just come for a short-time and leave, as soon as they get their civil servant status. And then the jobs are vacant again. We wait for these openings, and look for gaharu in the mean time to make ends meet.
>
> Young male participant, FGD with youth, Nawang Baru, September 2017

In Upper Malinau, in particular, young people and their families also expected that the ongoing construction of the Trans-Kalimantan Highway would expand prospects for jobs in the village. Final-year high school students interviewed in Long Nawang (July 2018), for instance, mentioned they would like to pursue higher studies in mining engineering, tourism, finance and banking and agriculture management, among others. They felt that these would help them develop the skills needed for jobs for the future.

In both Upper and Lower Malinau, all aspiring migrants and their parents said they expected to return to the village once they completed education. This would allow them to combine new skills with their existing culture, and maintain ties to their families and their land. Formal jobs would offer secure and reliable income. While they would not be able to devote all of their time to agriculture and forest-based livelihoods, as their parents did, they would be able to continue to farm during their time off. This would inevitably transform the ways in which swidden is practiced. They would not be able to go far for long durations. However, they did not anticipate a complete transformation from swidden to settled agriculture. The participants in FGDs and interviews stated that swidden is tied to their identity and to their heritage, which they hope to retain, even if in a changed form. These findings challenge a common assumption in contemporary discourses that youth are leaving agriculture/forestry sectors.

> .. actually, it is still possible for us to do [farming] even if we have formal jobs. We will invest less effort to farm compared with what our parents put in. We can continue farming after our normal working hours. Let's say once a teacher finishes their teaching duties for the day.
>
> (Taduh, Youth FGD Nawang Baru, September 2017)

> .. for me, rice farming brings back childhood memories. but, now people tend to invest in cash crop farming, and for me this is more viable. But still, we have to continue rice farming because we have a deep-rooted cultural belief that if we don't farm, no food will be available next year. Even young still believe in this, even though there are many other work opportunities available to us now. We opt to combine activities rather than stop rice farming all together. Even if this means that we can only manage 1 ha of land rather than 5 ha as our parents did. And we combine rice farming with other cash crops such as corn, ground nuts, pepper. This way, we can sell these in the market and earn cash while continuing to produce food for ourselves too.
>
> Angan, Youth FGD Setulang, September 2017

The vast majority of current migrants and migrant returnees expressed an interest in contributing to village development upon their return. Interestingly, while those in Upper Malinau tended to view village development as a way of modernizing their village and diversifying their livelihoods, those in Lower Malinau wanted to bring back what they felt was either lost or find a way of holding onto their culture and tradition. They felt that the knowledge and experiences they acquired while living and studying away from the village would allow them to contribute on their return. The following case studies from our research sites in Lower Malinau serve to illustrate these views.

Case Study 2. Education, social remittance, and environmental advocate

As soon as he finished his education in computer science from a reputable university in Yogyakarta, Bagin chose to return to Long Loreh to help his father run their family businesses in the village. His father manages a small hotel, cultivates palm oil and has a small grocery stall. Back in the village, Bagin was offered work as an administrator at a coal mining company. He refused the offer as he felt the company caused considerable environmental and social disturbances in the village. He said that the majority of his people did not know what their rights are, or how to voice their concerns with the companies. He is also not fully aware of how to do this, but, he can use the internet to find out, and leverage the power of social media. Two months ago, he found that one of the mining companies was dumping waste into the river. He took photos and shared them through social media. An influential Jakarta-based nongovernmental organization (NGO) picked up the photos and lobbied the local government to put pressure on the company. The company closed its operations for two weeks. This experience has galvanized his interest in standing up for his community. He has started to volunteer at his church and help the local elementary school with their administrative work. He thinks that between his family's business and these local-level efforts, his computer skills are being put to good use.

Bagin, Long Loreh, interviewed April 2018

Case Study 3. Role of scholarship and aspirations to contribute to village development

Paulus works as a contract teacher in a recently established high school in his village. He was able to secure a scholarship from the district government to pursue his studies in education and teaching. The scholarship was barely enough to cover his accommodation and living costs, and he had to turn to his parents for help. This put additional financial stress on his parents, who were already paying for his sister's education. He had to wait until his sister had completed her studies before he started his own further education. Luckily, the scholarship helped to ease the burden on his family. Paulus returned to his village to teach, because this was one of the conditions of his scholarship. He hopes to be converted into a permanent teacher soon. He is grateful for the opportunity because he is able to pass on his knowledge and train the next generation of young people in his village. He also likes to build in his sense of appreciation for the role that forests and trees play in shielding his community against natural disasters and food shortages in his village. He feels that such a 'hybrid' education will encourage the next generation to continue investing in sustainable management of the *Tane' Olen* into the future.

Paulus, Setulang, Interviewed April 2018

7.2 Topic 2: The forest–migration nexus

In the Topic 1, we found that migration was mainly for education, which placed a financial burden on households in the forest frontier, many of whom are still relying on the forest and agriculture for their livelihoods. The aim of Topic 2 is to establish the link between migration and the forest. We examine whether, and to what extent, forests have a role to play in financing migration, and what the effect of migration is on labor allocation and land-use change.

7.2.1 Forest support for education migration

Past research on migration and forests has described diverse mechanisms that link the two both direct and indirectly (Hecht et al. 2015). The direct contribution of migration to deforestation in the destination area, as well the contribution of mass out-migration to forest resurgence on abandoned agricultural lands in source areas have been most widely studied. However, there are many other mechanisms. The investment of remittances that labor migrants send back to their households, for example, can significantly transform landscapes (Peluso and Purwanto 2017). On the other hand, rural-to-urban migration may lead to overexploitation of the forest by outsiders, because fewer men are available to monitor the forest (Parry et al. 2010).

In education migration, there may be yet another indirect link between migration and forests. Unlike labor migration, education migration does not lead to a flow of remittances which can be invested in forests. On the contrary, this type of migration is itself an investment, with the return of a salaried job in the future. The need for regular cash may trigger a change in livelihoods, especially for previously semi-subsistence households. For education migrant-sending households, increased forest exploitation is a potential means to obtaining the required funds.

Our study provides empirical evidence which can help assess how the need to find cash to pay for education migration is affecting forests. We found that, when people struggle to pay for education migration, they increase their exploitation of the forest. However, the extent to which they do so varies. It was harder for people with mainly farm-based livelihoods to finance migration than for people with salaried jobs. People with primarily farm-based livelihoods frequently needed to intensify their existing livelihood or look for additional sources of income, often from forest products. People with regular jobs or their own businesses were less likely to turn to the forest. They could often afford to send household members away without having to look for extra sources of income or intensify their non-forest incomes.

Table 8 shows the change in livelihood strategies of 15 migrant-sending households in Upper Malinau as response to migration. Each row represents one household, and each column represents an additional source of income or coping strategy adopted. If one particular household has a specific additional income/coping strategy, a value of “1” is recorded. Prior to the migration, their main sources of livelihoods were: agriculture (6 households), micro business (1 household), public employment (teacher and civil servant; 7 households), and economic migration (1 household). As the table illustrates, across the different occupational categories, those involved in ‘agriculture’ were making the most significant changes to their livelihood to accommodate additional costs incurred to finance education migration. They were, for example, selling more rice (by planting more), hunting and searching for gaharu (withdrawing labor from agriculture). Those who sold rice or cultivated more land, said that they were reducing their fallow period and opening more plots that were in fallow. They were not claiming new land, because of the high financial costs and labor requirements of doing so. Others were also expanding into non-farm income-generating opportunities, such as starting their own business, earning a salary by becoming a village official or migrating to Malaysia. Borrowing and debt also played a role, though we did not investigate the terms and conditions of such debt.

Table 8. Change in livelihood strategies of Upper Malinau migrant-sending households

Respondent	Main source of income before migration	Additional sources of income following migration								
		None	Sell rice	Forest-based livelihoods				Scholarship	Others	Coping strategies	Migration
				Hunting	Gaharu	Sell firewood	Construction timber				
1	Agriculture			1		1			Run a business		
2	Agriculture		1		1					Family support	
3	Agriculture				1					Sell asset	
4	Agriculture		1				1	1	Honorary job		
5	Agriculture				1		1	1		Borrowing/ family support	
6	Teacher/honorary		1		1					Borrowing	
7	Civil servant		1		1			1			
8	Agriculture								Casual job	Borrowing	Short-term migration to Malaysia, women
9	Teacher/civil servant	1									
10	Teacher/civil servant	1									
11	Running businesses	1									
12	Civil servant							1		Borrowing	
13	Civil servant		1								
14	Civil servant							1			
15	Labour migration							1			Sibling works in Malaysia

Table 9. Current livelihood strategies in Lower Malinau migrant-sending households

Respondent	Type of incomes																Total source of incomes
	Farming-based livelihood							Forest-based livelihood				Other livelihoods					
	Rice	Vegetable	Oil palm	Cocoa	Coffee	Rubber	Casual work	Construction timber	Hunting	Processed forest product	Fishing	Migrant worker	Government employee	Private employee	Rent-out rooms	Micro business	
1	1	1					1	1			1						5
2	1	1	1						1	1							5
3	1	1		1	1	1			1								6
4	1			1	1		1	1									5
5	1	1					1					1					4
6	1	1										1					3
7							1						1				2
8	1	1										1					3
9	1													1			2
10	1	1	1	1			1								1		6
11	1						1							1			3
12	1	1					1						1				4
13			1												1	1	3
14	1	1	1	1										1			5
15													1		1	1	3
16	1						1										2
17	1																1
18	1			1		1											3
19	1		1				1										3
Total households with each income	**16**	**9**	**5**	**5**	**2**	**2**	**9**	**2**	**2**	**1**	**1**	**3**	**3**	**3**	**3**	**2**	

Similar patterns emerge from the Lower Malinau site as shown in Table 9. Households with members who have occupations that can provide secure, regular incomes, do not rely on forest-based income to meet migration expenses. Questions were formulated in a slightly different way to those asked at the Lower Malinau research site; we only have information about post-migration livelihood strategies from 19 migrant-sending households. When returning to the villages almost a year later, we validated the finding that households in Lower Malinau also diversify their livelihoods following the migration. Farming is conducted by almost all households, while 4 out of 19 households included forest-based income in addition to their original strategy. This number is considerably higher than our survey data which show that only 2.78% of people reported forest incomes, even though almost 10% reported sell bushmeat. This indicates that migrant-sending households' reliance on forests is higher than the average.

Furthermore, a wider range of livelihoods options are available in Lower Malinau than Upper Malinau. In Lower Malinau, farming livelihoods include cash crops such as coffee, cocoa, oil palm and rubber. This enables households to rely mainly on agriculture and cash crops to support migration, while in Upper Malinau, those who rely on agriculture are more likely to turn to collecting gaharu for additional income. All informants in FGDs and in-depth interviews told us that gaharu is important source of income and currently most of the young men in the village gathered it. Both educated young men and those who left school early gathered gaharu. The education migrants, for example, collect gaharu when they return home for holidays. Students may even take leave from their university in order to gather gaharu to cover education and living expenses, as illustrated in case study 4. The story also describes the process, costs, benefits and risks of a gaharu expedition.

Case study 4. Gaharu as the source of financing for human capital investment

Yulius is studying theology at the University of Tenggarong. He is from a family of four brothers and sisters, and his parents are swidden farmers. His parents hope that Yulius can support his younger siblings to pursue higher education in Samarinda or Tarakan. He aspires to a life where he can continue swidden farming, while simultaneously pursuing formal education. But Yulius had to take leave of absence from his university when his parents could no longer afford to pay for his tuition and living costs.
He learned to search for gaharu when he was in junior high school. However, he has only been on two searches in the last 8 years due to schooling obligations. At the time of the interview, Yulius had just returned to his home after 3 months of collecting gaharu from the forests close to Sungai Laham. He went with three of his friends to the excavation. As they spent much time in the forest, they needed large of supplies of food, gasoline and soap; hence the initial cost was high. There are gaharu traders in the village who also run a grocery shop. The gaharu trader will usually advance supplies to collectors to be paid back when they return. The cost is generally higher than if the groceries are bought with cash. Advancing the goods gives that particular trader first rights to buy the gaharu that is collected. However, if the price is not agreed by the both parties, the gaharu trader may allow the collector to find another buyer. Then the collector pays for the goods. The highest income for gaharu recorded by Yulius' group was IDR 70,000,000 (USD 4,900). It was achieved in an expedition a year before the interview. His group obtained 0.1 kg of the best quality and a few kilograms of lower quality gaharu. After repaying the cost of the supplies, IDR 8,000,000 (USD 560), each of the group members received IDR 15,000,000 (USD 1,051). Yulius used a large proportion of this gaharu money for his migration and education expenses, a smaller proportion was given to the family at home.

During his latest expedition, which lasted 1.5 months, Yulius and his friends traveled for 2 days by boat to reach the edge of forest. From there, they spent another day walking to the gaharu areas, where they started to cut the trees to search for gaharu. They worked hard for 6 days a week, to find enough gaharu to repay their expenses. Luckily, Yulius and his friends managed to find some good quality gaharu before their food supplies ran out. Although they do not exactly know what constitutes good quality gaharu, everyone in the group has agreed not to sell the gaharu they found to the local trader, as the price he is offering is significantly lower than they anticipated. They have agreed to keep the gaharu until they can get a better price. Yulius is concerned about how long it will take to find such a buyer, and whether it makes sense to wait.

Yulius, Long Nawang, interviewed July 2018

7.2.2 Potential revenue and risk associated in forest products gathering

In Box 2, we estimated the costs of education migration, and in the section above we have seen the struggles of the households and their livelihood strategy responses to financing education migration, in particular, how they turn to forest. The next questions are: Can forest products generate sufficient revenue? How does this affect the forest? In this subsection, we will try to answer the first question, by calculating the effort needed to match the costs with the expected revenue from the three most collected forest products: bushmeat, construction timber and gaharu. The second question will be answered in the following subsection, in which we use a remote-sensing analysis to see the short-term change in the research areas.

Table 10 illustrates a simulation of the effort needed to cover the cost of educating one child for 4 years (at least IDR 100,000,000, see Box 2). Detailed information on the potential revenue and risk associated with gathering the three most 'cashable' forest commodities: bushmeat, construction timber and gaharu is provided in Appendix 2. The simulation shows how the forest can provide resources to match the cost of education migration. As price of the forest product varies according to quality, we used a price within the mentioned price range and amount collected as illustrations. We estimated the minimum effort needed to generate forest revenue to match the cost of education for one person. The estimated effort is the minimum as it is calculated with the assumption of no risk and uncertainty, however, in reality, there are high risks and uncertainties in gathering forest products.

Based on the above calculations, it seems possible to finance migration by relying on just one forest product. However, in reality, there are considerable risks and uncertainties. Moreover, many households send more than one education migrant simultaneously. This explains why households

Table 10. Simulation of effort needed to finance one educational migrant from forest product collection

Type of forest products	Gather	Price	Average working time	Risk and uncertainty	Minimum effort needed*	Who can do?
Bushmeat	1 wild pig of 40 kg	IDR 25,000 per kg - assuming all sold	1 day	There are times when wild pigs are not available in the areas due to their migration cycle	100 days over 4 years, at least once every forthnight	Men, young and older
Construction timber	2 m3 of wood planks	Net IDR 2,500,000 per m3 - assuming middle quality of wood; reduced by direct cost	2-3 weeks	Depends on order when someone needs to build house, quite rare	20 times over 4 years, at least once every 2-3 months	Men, young and older
Gaharu	Mixed low and good quality gaharu	Varies - target assumed IDR 10,000,000 per person per trip	1-3 months	Far away, high risk of low availability and quality obtained and whether searching time is limited by amount of food supplies brought from village	10 times over 4 years, once or twice every 6 months	Young men

*) to meet the education cost for 1 child

diversify and combine different activities instead of specializing on one. Furthermore, gaharu is only accessible to those reside in Upper Malinau.

Considering the workload and also potential revenue, households combine effort on different types of product based on the expenses that need to be paid. For example, people rely on construction timber or gaharu to cover university enrollment or tuition fees, if they have young men in the household. To cover the monthly living costs of the migrants, they might hunt. The forest, then, becomes a 'bank' from which people draw to finance education migration.

From our FGDs, it is clear that gathering the above forest products is the men's domain; gaharu, in particular, is mainly gathered by young men. The heads of households interviewed repeatedly mentioned that they used to collect gaharu, but have stopped because the expeditions take longer, with distances and yields becoming unpredictable.

When men gather forest products, their labor is no longer available in the agricultural fields. This can result in gendered specialization: women in agriculture and men gathering forest products. In the next section, we discuss the gendered effects of migration intra-household allocation of labor. We start with the direct effect of migration through reduced labor availability, and then look at indirect effects through change in livelihood strategies.

7.2.3 Gendered effects of migration on intra-household allocation of labor

In order to determine whether migration has an effect on intra-household labor allocation, we asked household survey respondents to rank the relative importance of the contribution of migrants to household domestic and agricultural work, whether someone is replacing the work that they did and, if so, their name or gender. According to the respondents, one-fifth of youth migrants make a significant contribution to agricultural work and a third contribute to domestic work (Table 11). However, the responses varied by gender of the education migrant and location of the households. Parents were more likely to recognize girls as playing a very important role in domestic work, while more boys than girls were ranked as playing an important role in agriculture. In Lower Malinau, no girls and only 3% of boys were ranked as playing an important role in collecting forest products. In comparison, in Upper Malinau, 10% of girls and 40% of boys were acknowledged as playing an important role in collecting forest products. In cases where the parents felt their children's contribution was 'very important', there was substitution by other people, namely siblings or parents.

We further investigated the survey findings in FGDs with youth and women's groups in September 2017. The respondents mentioned that migration was not having an observable effect on labor allocation in agriculture or forest product gathering because young people were rarely engaged in these activities prior to migrating for education. They were preoccupied with school and could only help out

Table 11. Percentage of migrants recognized by parents as making a 'very important contribution' to work activities

Type of activity	Lower Malinau		Upper Malinau		Total (n=175)
	Women	Men	Women	Men	
	(n=39)	(n=34)	(n=48)	(n=54)	
Agriculture work	0	26.47	10.42	50	23.43
Domestic work	23.08	14.71	66.67	22.22	33.14
Non-agriculture income-generating activity	0	0	4.17	9.26	4
Collecting forest products	0	2.94	10.42	40.74	16

with small chores, such as taking their parents to the farm and/or weeding. Hence, their parents did most of the agricultural and/or forest-related work. In comparison, young girls had to take on more domestic responsibilities, such as cooking and caring for younger siblings, while their mothers worked on the farm.

Participants in the FGDs pointed out that young men, in particular, returned home during the holidays to join gaharu expeditions into the forests. This was to contribute to family income and address shortfalls in financing for their education. Such information could not be captured through the household survey.

When young girls migrated for education, their domestic work responsibilities fell to their mothers. Hence, mothers felt their work burden increased when their daughters migrated, as they needed to juggle farm work with increased domestic work. Their work in the field or in other income-generating activities also increased due to the need to support education migrants financially.

Case studies 5 and 6 show the importance role of women (mothers of the migrants) in providing financial support for education migrants. Women are typically working harder in their fields or laboring in neighbors' fields. Following decentralization, many labored in government construction projects, but building ceased a few years ago.

7.2.4 Land and forest cover change in research sites

In this subsection, we examine land and forest changes in the research sites and explore whether or not migration for education purposes has affected the observed changes. We found that the changes could be attributed to other factors (such as conversion of primary and secondary forest, increase in settlement, increase in agriculture and increase in open land). Education migration only plays an indirect role, if any, in the process.

We start by examining land and forest cover change at the Malinau District level using secondary data from the MoEF. We complement this with our own remote-sensing analyses of what is happening in the specific research sites. For the latter, we focus on four villages (Long Loreh, Setulang, Nawang

Case Study 5. Mother's persistency and hardwork

Rani is the mother of five children, with three education migrants. Two of them started their higher education in 2011, and another one started in 2015. Prior to this, she supported her family through subsistence farming. She produced rice, cassava, beans, peanuts and vegetables for their own consumption and distributed excess produce among relatives.

When the children migrated, she needed cash to support them. She told us that it was miracle when someone she knew knocked on her door looking for rice as food supply for gaharu seekers. They needed 100 cans of rice, while she did not have enough. She asked for a down payment, which she used to buy paddy from neighbors. She grew rice on the paddy and made a profit. It was unusual to receive a request for such a large amount of rice. As she learned that there was a demand, she started to work harder in her fields.
She was able to reduce her workload when her husband got a contract with a supplier to deliver gasoline for a road development project nearby. This provided them with a more secure and frequent income. Prior to getting the contract, the husband used to log or collect agarwood, which provided an irregular income and put a greater burden on Rani and her farm.

When we revisited her house in July 2018, she said that her work burden was not as high as earlier because her first son had completed his degree. The son returned home and while waiting for an honorary position in the village, he helped his mother in the field.

Rani, Long Nawang, interviewed August 2017 and July 2018

Case Study 6. Struggle to finance education

Abi and Sani are parents of five children. Their third son is currently in his final year in university studying sociology in Samarinda. Their second son just graduated from senior high school and aims to pursue higher education, but has not started yet because he has to save money from gaharu collecting.

Similar to other men in the village, Abi relied on the forest for hunting, fishing and collecting construction timber. He also practiced swidden agriculture. He used to collect gaharu, but is now too ole, especially as gaharu is riskier to collect and much farther from home. However, one of his older sons is currently searching for gaharu, and is sometimes joined by the third son when he is on holiday from university.

Sani had just returned from Malaysia when we interviewed the family. She went with a group of other women from the village. She hoped to get casual jobs there, but was ill, so only worked for few first days.

Despite their efforts, they still cannot cope with the expenses. They sometimes need to borrow from the money lenders. They still have some debt, and the interest can reach 10% per month. They cannot borrow from the credit union as they do not have savings there.

Abi and Sani, Nawang Baru, interviewed August 2017 and July 2018

Baru and Long Nawang), where we carried out follow-up qualitative research. For more detailed information on the methods we used, please see section on research methodology and Appendix 3 for more detailed information.

Long-term land-use change in Malinau District

Our analysis of land-cover data based on MoEF data shows that, in 2017, out of a total area of 4 million hectares, 95.26% were still classified as 'forest'. The area of 'Agriculture and scrub' land was only 4.22% and 'settlement' was less than 1% of the total land area. The rate of deforestation in Malinau is significantly lower in Malinau District than the overall rate in Indonesia. Our calculation showed that the deforestation rate over the past three decades (1990–2017) in Malinau was 2.04% while, for comparison, Indonesia lost 18.3% of its forest over the period of 1990-2012 and Kalimantan contributed to 37.5% of the overall deforestation – and lost 22% of its forest for the same period (Wijaya et al 2015).

Figure 11 shows areas of deforestation (forest area that has been coverted to non forest) and forest degradation (change from primary to secondary forest) during the period 1990–2017. Our land-cover-change analysis showed that that deforestation in Malinau can be attributed to an expansion of agriculture, settlements and estate crop plantations. However, the rate still remains low, which is attributable to the inaccessibility of these areas by road transportation combined with policies to conserve forests. A third of Malinau's total land area is located in the Kayan Mentarang National Park. We hypothesize that the planned construction of the Trans-Kalimantan Highway through Malinau will improve the accessibility of the district. This is likely to attract new investments in coal, timber and other resource extraction.

Short-term land-use change at research sites

Figure 12 presents land-cover maps for our four research sites, and Table 12 summarizes land-cover change between 2016 and 2018 showing the short term changes in the research sites.

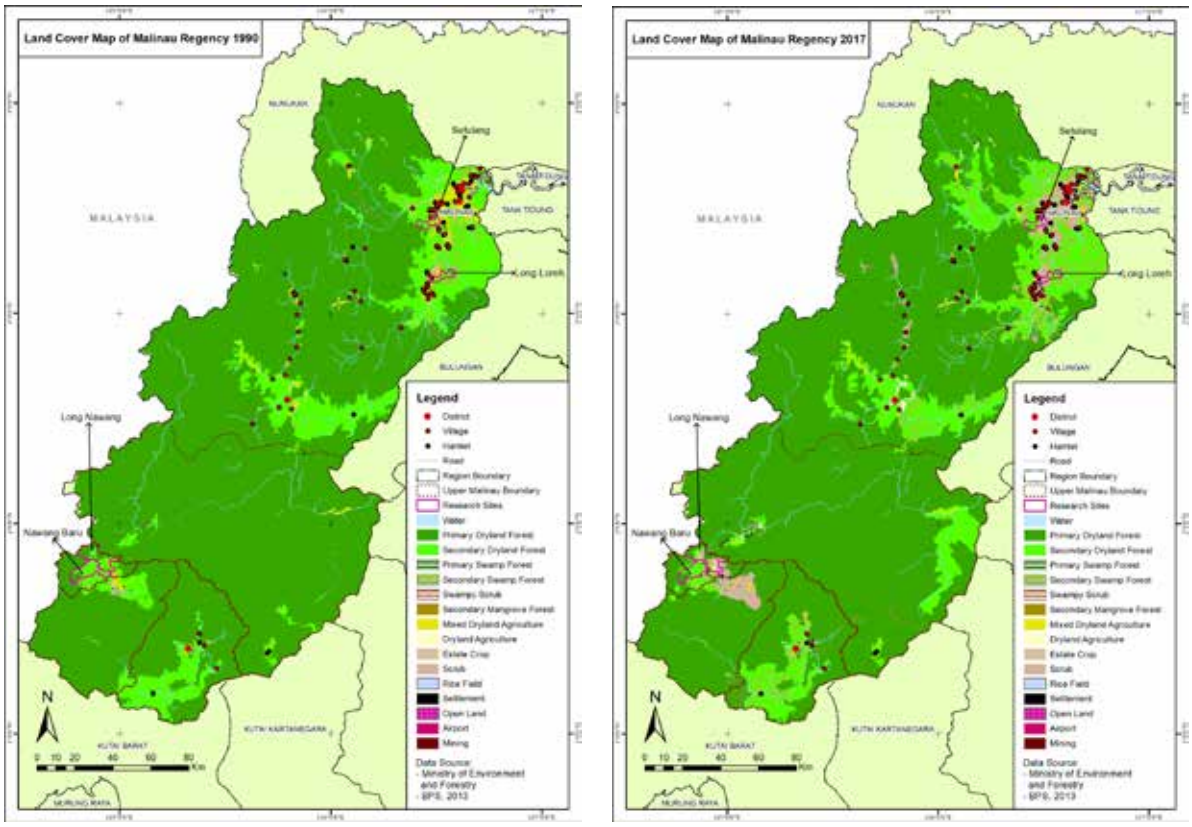

Figure 10. Land cover in Malinau 1990 and 2017

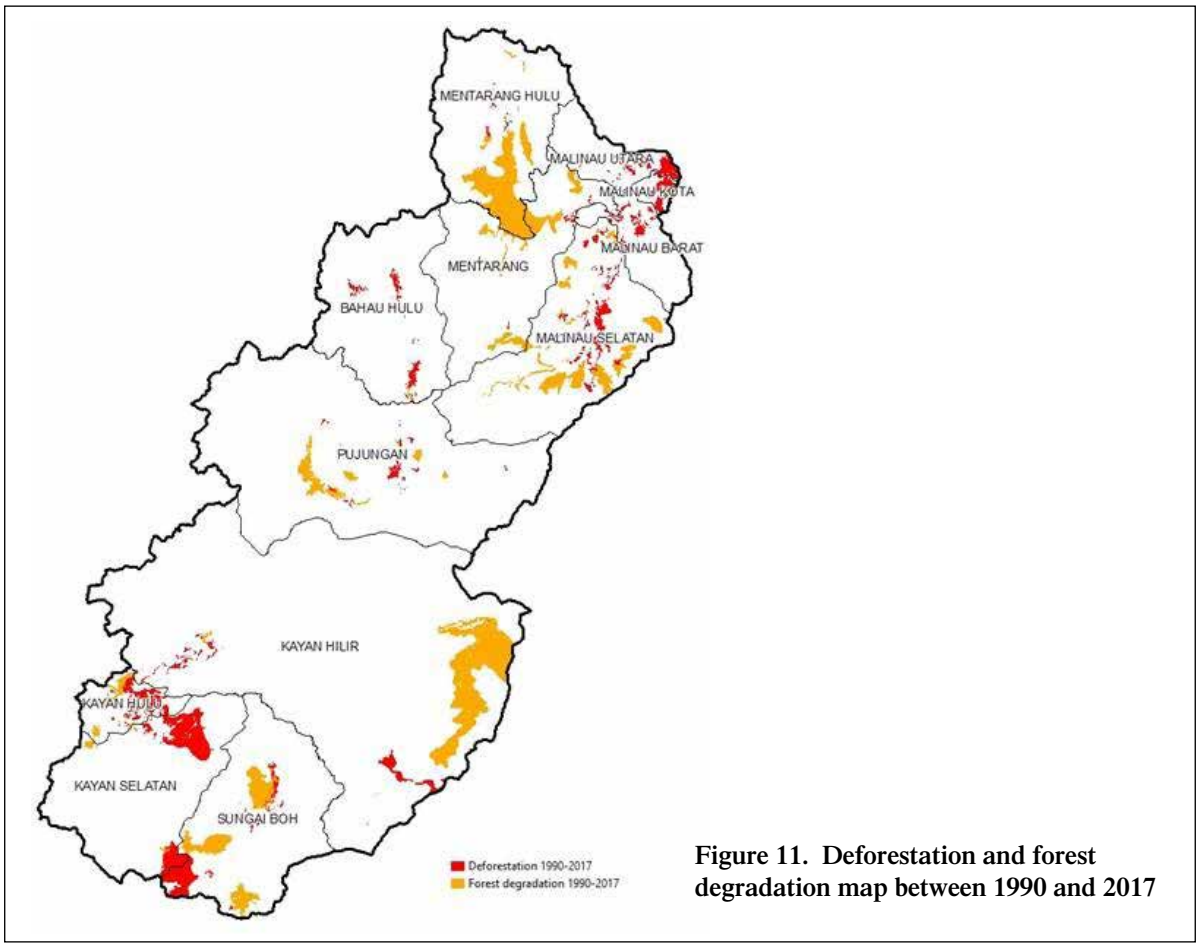

Figure 11. Deforestation and forest degradation map between 1990 and 2017

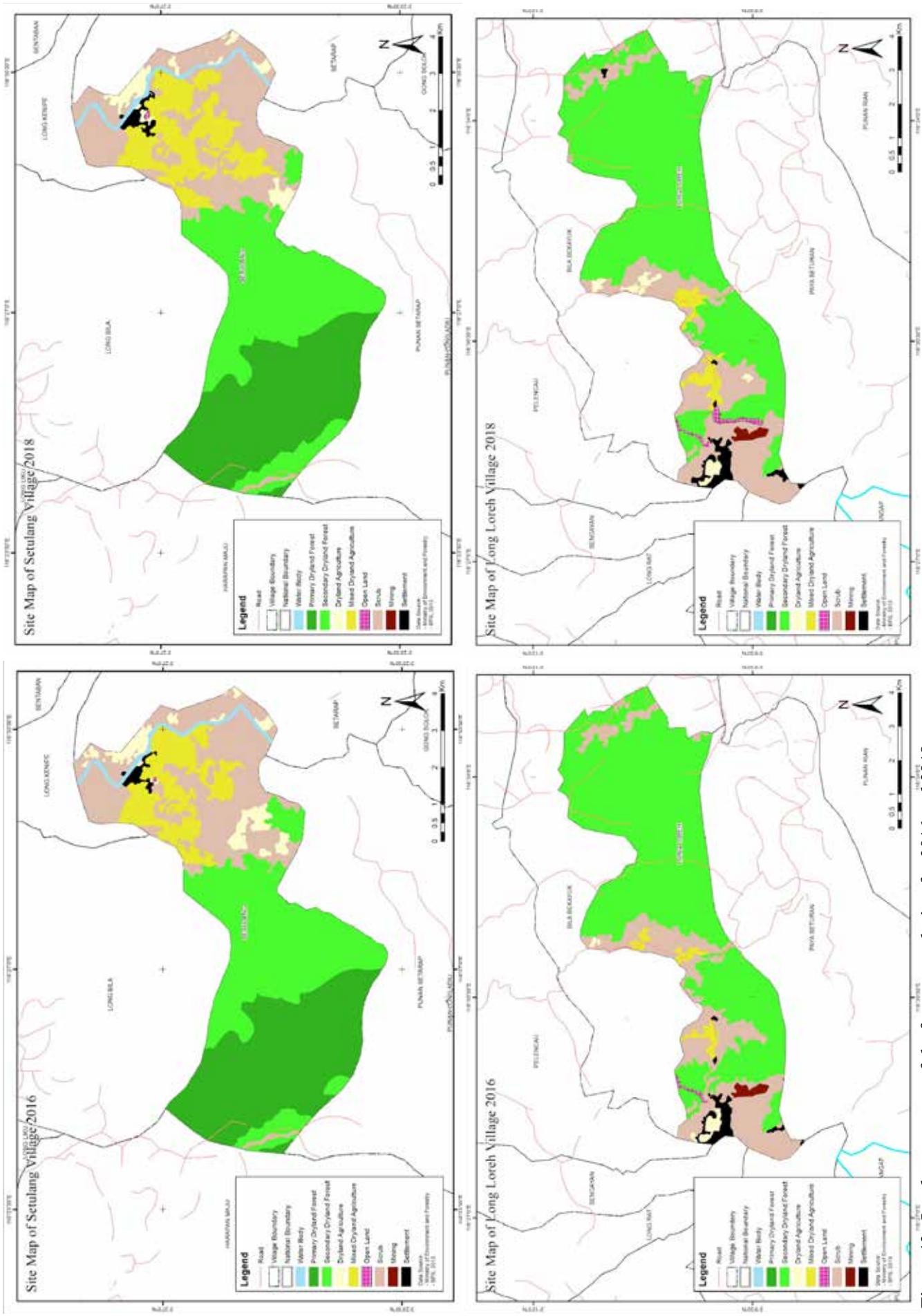

Figure 12. Land-cover maps of the four research sites for 2016 and 2018

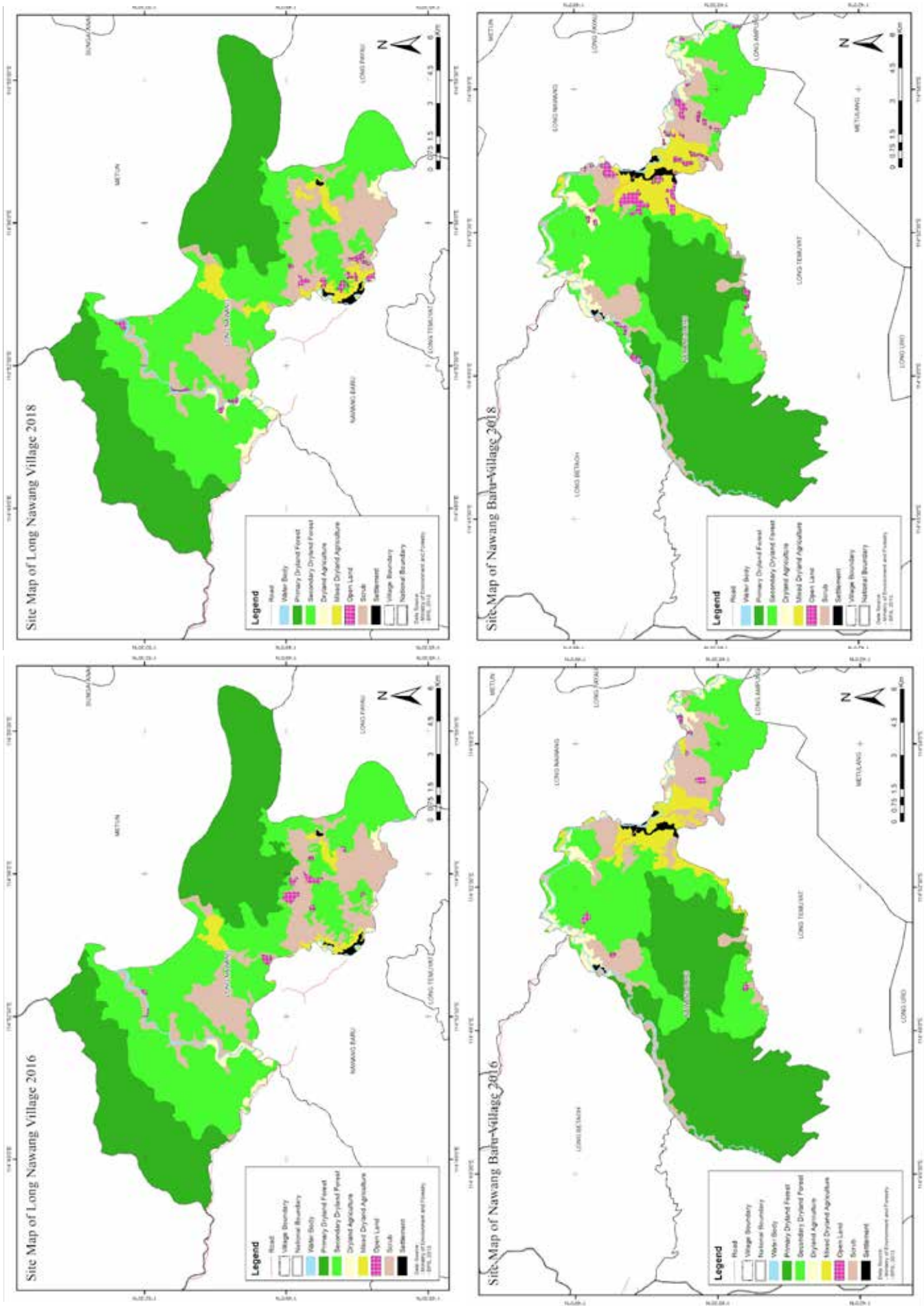

Figure 12. Land-cover maps of the four research sites for 2016 and 2018

Table 12. Land-cover change at the four research sites from 2016 to 2018

Land cover	Setulang						Long Loreh					
	2016		2018		Change		2016		2018		Change	
	Hectares	%	Hectares	%	Hectares	pp.	Hectares	%	Hectares	%	Hectares	pp.
Primary dryland forest	1419.86	30.03	1384.18	29.28	-35.68	-0.75						
Secondary dryland forest	1461.22	30.91	1452.77	30.73	-8.46	-0.18	3005.91	72.08	2860.73	68.60	-145.18	-3.48
Agriculture (dryland + mixed)	657.15	13.90	732.18	15.49	75.03	1.59	118.23	2.76	193.16	4.63	74.92	1.87
Open land	1.20	0.03	2.16	0.05	0.97	0.02	10.70	0.26	35.43	0.85	24.73	0.59
Scrub	1083.08	22.91	1043.10	22.06	-39.98	-0.85	928.99	22.28	958.78	22.99	29.79	0.71
Settlement	28.54	0.60	36.65	0.78	8.11	0.17	76.47	1.83	92.21	2.21	15.74	0.38
Water body	76.61	1.62	76.62	1.62	0.01	0.00						
Mining							29.91	0.72	29.91	0.72	0.00	0.00
Total	4727.66	100.00	4727.66	100.00			4170.22	99.92	4170.22	100.00		

Land cover	Long Nawang						Nawang Baru					
	2016		2018		Change		2016		2018		Change	
	Hectares	%	Hectares	%	Hectares	pp.	Hectares	%	Hectares	%	Hectares	pp.
Primary dryland forest	5899.02	40.39	5719.99	39.16	-179.04	-1.23	5309.28	43.70	5254.83	43.26	-54.44	-0.45
Secondary dryland forest	5928.82	40.59	5959.02	40.80	30.19	0.21	3762.97	30.98	3730.57	30.71	-32.40	-0.27
Agriculture (dryland + mixed)	459.40	3.15	656.53	4.49	197.13	1.35	1092.83	9.00	1195.50	9.84	102.67	0.85
Open land	100.39	0.69	118.57	0.81	18.18	0.12	53.28	0.44	310.83	2.56	257.56	2.12
Scrub	2174.89	14.89	2102.66	14.40	-72.22	-0.49	1521.43	12.52	1242.07	10.22	-279.36	-2.30
Settlement	43.13	0.30	48.90	0.33	5.77	0.04	80.66	0.66	84.39	0.69	3.72	0.03
Water body	1.14	0.01	1.13	0.01	-0.01	0.00	327.67	2.70	329.92	2.72	2.25	0.02
Mining												
Total	14606.80	100.00	14606.80	100.00			12148.12	100.00	12148.12	100.00		

Table 12 demonstrates that most significant direction of change across the research sites are:

- a reduction in primary dryland forest (no data available for Long Loreh) and secondary dryland forest (apart from Long Lawang where the area has increased);
- an increase in agriculture land;
- an increase in settlements;
- an increase in open land.

Our qualitative data help to explaining these trends. Agriculture is one of the main drivers of land-use change in all four villages, including in Long Loreh, which has the least agricultural land. The relatively small amount of agricultural land in Long Loreh is likely to be because there is less dependence on agriculture, even though their population sizes are roughly comparable to other villages (230–250 households per village). Our household survey revealed that only 15% of households in Long Loreh rely on agriculture as their main source of income. The increase in agricultural land in the village is likely to be due to an increase in cash crops, such as palm oil which has been on the rise over the past 2 years (in-depth interview with village leader, Long Loreh, September 2017).

Settlement area also increased in all villages. This is likely to be due to the splitting of existing households rather than an influx of immigrants. In FGDs in Upper Malinau (July 2018), we learned that the entire village has discussed and agreed to allocate a new area to expanding existing settlements. In both Upper and Lower Malinau, many people opt to build their homes on their agricultural land to be closer to their fields. Such a trend is likely to increase as the new generation becomes absorbed into formal job market. It will be difficult for them to travel to tend to their fields and they will have to rely on more settled agriculture in close proximity to their homes.

The size of open land increased in all four villages, but the rate of increase is more substantial in Long Loreh, Long Nawang and Nawang Baru. One explanation of these results is the construction of new roads which appears as open land in remote-sensing images. A road being built through the village forest land by a mining company in Long Loreh. At the time of the field work in Upper Malinau, a 16 km road was also being constructed from Long Nawang through to Long Punjungan as a part of the Trans-Kalimantan Highway construction. Along the route, we found that secondary forests were being logged in anticipation of the road development. Road construction is a major driver of deforestation (Busch and Feretti-Gallon 2017).

7.3 Topic 3: Links to policy

Our research highlights the urgency of investing in job creation and economic opportunities for young migrant returnees in forest frontiers. Higher education attainment alone will not translate into expanded economic opportunities for the next generation. It is uncertain whether ongoing processes of decentralization and infrastructure development will result in new jobs, as is expected by migrants and their families. The current labor market is unlikely to absorb the rise educated youth.

Broader efforts are needed to promote jobs for the next generation in remote areas. The social forestry program, a priority program for Indonesia's MoEF, can contribute to these efforts by incentivizing young people to manage forests, which will also expand economic opportunities for them. Recent studies evaluating the impact of social forestry on farmers' revenue in Yogyakarta and Lampung, found a positive correlation between social forestry and farmers' income, employment status and production potential (Kuncoro and Cahyani 2018).

In what follows, we will offer an overview of the Social Forestry Program, current gaps in realizing the vision behind the programs and how the findings of this study can help address these gaps.

7.3.1 Overview of the development of Indonesia's social forestry program

While the concept of social forestry as a way of mobilizing local people to manage forests in collaboration with the government was first introduced in 1970s, it only started to become a policy instrument in the late 1980s (Lindayati 2002 cited in Moeliono et al. 2017). The Ministry of Forestry formally introduced a social forestry program in 1995 through the issuance of Minister of Forestry Decree No. 622/Kpts-II/1995 on Community Forest Guidelines (Kuncoro and Cahyani, 2018). Since then, social forestry program has undergone many changes, most recently through the updated policy based on Minister of Environment and Forestry Decree No.83 Year 2016 on Social Forestry. The decree calls for the promotion of social forestry by recognizing the legal rights of local communities to manage protection and production forests in a way that alleviates poverty, reduces unemployment and promotes sustainable livelihoods, while halting deforestation and promoting an inclusive way to mitigate the effects of climate change.

There are many different interpretations of social forestry schemes. The program in Indonesia is a "collaborative enterprise conducted by a group of local people who manage forests either independently or with outside support for the production of resources for consumption and sale"

(Moeliono et al. 2017). There are a number of different schemes under social forestry: community forest (*hutan kemasyarakatan*), village forests (*hutan desa*), community plantation forests (*hutan tanaman rakyat*), customary forests (*hutan adat*) and collaborative forest management (*kemitraan*). In protection forests, communities cannot harvest timber but are permitted to collect NTFPs. In production zones, communities are able to grow timber trees and to harvest them. *Hutan adat* resulted from the Customary Court Ruling No. 35 of 2013, which recognized the rights of customary communities over traditional territories. *Kemitraan* refers to a collaborative partnership between a company (state-owed or private) and local community that aims to support community empowerment in state areas in which the government has issued licenses for companies to carry out logging or establish plantations. All companies are mandated to implement this program with a clear benefit-sharing agreement whereby companies receive the benefits from timber and communities receive the use rights from NTFPs (Banjade et al. 2016).

Implementation of social forestry is prioritized in the government's overall national and village development policy framework. The National Medium Term Development Plan (2015–19) includes a target for allocating 12.7 million hectares of forest land to local people, including through the recognition of customary rights of indigenous peoples of their forest lands.

As stipulated in the Ministry of Village, Disadvantaged Regions Development and Transmigration Decree No 16 Year 2018, social forestry is included as a priority activity that can be financed through the 'Village Fund' (*dana desa*). Since 2015 (based on Law No 6 Year 2014 on Village), all villages in Indonesia receive funding from the national budget for village governance and development. The transfer of funds for *dana desa* has steadily increased from IDR 280 million/village per year 2015, to IDR 628 million in 2016, and IDR 800 million in 2017. This means that each village government can use village funds to support social-forestry-related activities in their respective villages.

There are also complementary support services offered by the government to local communities. These include capacity-building initiatives for local communities to develop and implement sustainable economic activities, improved access to subsidized inputs (such as fertilizers and seeds) and enhanced access to credit through the government's Kredit Usaha Rakyat (People Business Credit) program, among others.

Despite these efforts, communities face a number of challenges in acquiring licenses for social forestry and managing the institutional and the business side of social forestry once a license is obtained. Overlapping claims on lands is a barrier to accessing licenses, while a lack of infrastructure and skills challenge the management of social forestry. There are also chronic shortages of facilitators who are able to support local communities in establishing and managing social forestry.

As a consequence, the government has not been able to meet its ambitious target of allocating 12.7 million hectares of land to local people. By November 2018, only 16.8% or approximately 2.13 million hectares of forest lands had been handed over. The Ministry of Environment and Forest stated that a more realistic target is 4.38 million hectares by the end of 2019. This is based on the number of local communities who are ready to implement social forestry and the availability of facilitators to support them (Zakaria et al. 2018).

7.3.2 Successful implementation of social forestry requires qualified personnel

FMUs are public service providers, under the responsibility of national and subnational government, providing day-to-day onsite management of clearly demarcated forest areas in collaboration with local communities, concessionaires and other stakeholders. FMUs cover different types of forests including conservation, protection and production forests (FORCLIME 2015). The aim of the current Medium Term Development Plan (2014–19) is for all forest land in Indonesia to be allocated to 629 FMUs. Each FMU will be based on landscapes that cut across administrative boundaries of village government.

FMUs have been criticized for running alongside rather than being well integrated into the government's social forestry initiatives (Banjade et al. 2016). However, Zakaria et al. (2018) suggest a bigger role for FMUs in supporting the government to meet its social forestry targets in a new white paper (*naskah akademik*) for Social Forestry Reformulation Policy. In this role, FMUs will: review and approve social forestry applications; offer institutional and business management support to local communities once they have secured social forestry permits; and develop the capacity of village business units (*Badan Usaha Milik Desa*), among others. If these proposals are implemented, FMUs will come to play a significant role in social forestry. Preparing the FMUs to take on these expanded roles will be critical.

Consultations with representatives from FMUs and implementers of the social forestry program (December, 2018) revealed that human capital is one of the key constraints on FMUs. The FMUs in Malinau are severely understaffed. There are only 18 persons managing 1.3 million hectares of forests covering 33 villages. Recruiting staff for FMUs can be challenging, given the wide range of responsibilities that FMUs need to fulfill. These include:

- developing long-term and short-term management plans for different forests (protection, conservation and production);
- providing advice/services, approving, monitoring and controlling forest management plans and forest operations carried out by local communities (e.g. community and Village Forest) and private forest concessions;
- directly managing state forest not devolved to third parties for management (e.g. open access forest) including forest rehabilitation, reclamation, protection and nature conservation;
- helping to resolve overlapping claims that cause conflict and may threaten forest functions (FORCLIME 2015).

In addition, the MoEF plans to have one facilitator assigned to each social forestry license. There is currently a shortage of over 1,400 facilitators (Sukarelawanto 2018). Demand is likely to increase further as more land is handed over to local communities to be managed.

Local communities who have acquired a license to operate social forestry initiatives also need support. Committed individuals are needed to develop and implement management plans, identify opportunities for employment and enterprise development, liaise with a wide range of stakeholders on a regular basis and generally further community well-being and sustainable forest management objectives. This means that a diverse range of skills and experiences are needed within the community to successfully implement and benefit from social forestry.

7.3.3 Mobilizing youth engagement in social forestry

A rise numbers of university educated youth presents a unique opportunity to address personnel shortages in FMUs, among facilitators and in local communities. Engaging young people from the very outset would also ensure the sustainability of vision underpinning social forestry programs, and the continuity of local-level initiatives once the initial license period of 35 years lapses. However, mobilizing youth also requires investment in equipping young people with relevant skills (such as GIS and spatial monitoring of forests, business management and legal skills). A strong commitment toward promoting forests for the future must be cultivated. Further, youth should be supported to inject fresh ideas and energy to complement and/or revitalize existing forms of forest management. This may necessitate cultural shifts and willingness among older generations to open up spaces and opportunities for the younger generation to step up. At the same time, the younger generation should be able to mediate between their outside experiences and the realities of their village (White 2012; Clendenning et al. forthcoming; Clendenning forthcoming).

Our research shows that most educational migrant aspire to return to their villages and contribute to village development efforts. Young people are interested in contributing to the specific, forest-related challenges that their villages face, such as the restoration of open mining pits in Long Loreh, continued management of *Tana Olen* in Setulang and traditional swidden agroforestry in Long Nawang and Nawang Baru.

We found that Setulang had successfully leveraged its youth migrant returnees to contribute to sustainable forest management. Young people supported the village elders in securing legal recognition of their forests as village forests or *hutan Desa*. Young migrant returnees were playing an instrumental role in establishing the village as a reputable ecotourism site and attracting a wide range of national and international visitors. While staying there, we found that the local community offered many services and there was a set rate for each that was pre-agreed among all community members. Prices were fixed for accommodation costs per night, hiring a local guide, renting a boat and meals, among others. This meant that opportunities to generate cash from tourists were shared equally by everyone. Young migrant returnees also maintained up-to-date censuses of the village. A new generation of young people were studying tourism and hospitality. While only a few young people devoted full-time effort to forest management and village development activities, a majority were willing to take a break from their regular jobs to contribute to forest management efforts. At the time of the third field visit, for instance, 15 young men from the village were away on a 2-week long forest monitoring expedition. In this regard, Setulang presents a good example of how to mobilize and incentivize young people, including migrant returnees, to contribute to sustainable forest management and livelihood promotion.

While it is neither possible nor advisable for every village to invest in developing ecotourism, there were other opportunities to engage young migrant returnees in forestry. However, such opportunities were yet to be capitalized. For instance, the customary or *adat* leaders of Nawang Baru and Long Nawang were seeking legal recognition to establish their forests as *hutan adat*.[13] A vast majority of young people we met were interested to pursue their education and return to contribute to improving their village. However, many of their aspirations hinged on opening the village to commercial agriculture, mining and other large-scale development once the Trans-Kalimantan Highway through their village was completed and their villages were more accessible. Very few knew about the *hutan Adat* or saw themselves as contributing to it in any meaningful way if it were handed over. In comparison, in Long Loreh, many young people interviewed were interested in understanding their rights and responsibilities vis-à-vis extractive companies; negotiating more favorable agreements with mining companies; and planning restoration once the mining companies left. However, they stated that as many of the decisions about land-use change were made by village and customary leaders, they did not feel that they had a voice in the process.

13 Eghenter 2006b provided detail information about Hutan Adat.

8 Conclusion and recommendations for policy and practice

In this report, we set out to examine the links between migration and forests through a case study of Malinau District in North Kalimantan, Indonesia. Malinau is an interesting research site because the communities living there has a long history of migration and mobility, the area is still mainly forested and is part of the Heart of Borneo conservation area, and it is also one of the demonstration areas of our partner, FORCLIME, which allows findings to be used as input for program and policy reform.

We distinguish between two different landscapes in Malinau Regency. Lower Malinau (downstream) is a peri-urban area and coal mining zone on the outskirts of the regency's capital. Upper Malinau (upstream) is a vast forested landscape, located on the border with Malaysia and partly in Kayan Mentarang National Park.

We used a mixed-method approach to conduct our study, which included a household survey in eight villages, GIS and remote-sensing analysis in Malinau District and at four research sites, and follow-up qualitative surveys in the four sites.

Our study focused on three main topics which were: examining changes and continuities in migration patterns (Topic 1), exploring the interrelationship between migration and forests (Topic 2), identifying the implications of the research results for policy reforms on social forestry (Topic 3).

Our study shows that while the research sites have a history of migration for employment purposes, or *peselai*, there has been a generational shift in migration patterns. We found that 77% of the 227 migrants in our sample had migrated outside the village in pursuit of higher education. The primary motivation behind young people and their families investing in education is related to an expectation that ongoing processes of decentralization, or *pemekaran*, would open up job prospects for them in the public and private sector and that they would need to position themselves to be eligible for these jobs. It is also expected that the ongoing construction of the Trans-Kalimantan Highway will create new jobs in the migrant-sending villages. The majority of current migrants expressed an interest in returning to their villages upon the completion of their higher studies to contribute to village development upon their return.

An implication of such a shift is that migration has switched from being an income-generating activity to one that is a financial burden on rural households. The indirect effects of education migration on land use and labor allocation is apparent at the household level. The average education and living expenses for one student pursuing an undergraduate degree is IDR 100,000,000 over four years. In order to cover the costs of education, households whose livelihoods are based primarily on farming and forests, are intensifying agricultural production and forest product collection. The gathering of forest products, such as gaharu and timber, is men's responsibility. When men leave for prolonged periods to gather forest products, women must take over their labor in agricultural fields. Migration is therefore contributing to labor specialization between the genders: domestic, swidden agriculture and casual work for women and forest product collection for men. Older women/mothers are also experiencing an increase in their work burden as they are taking on additional domestic responsibilities previously carried out by young women migrants.

Our research highlight the urgent need to create jobs and economic opportunities for young people at the forest frontiers. This is created by a rise in migration for education, a growing need to earn regular cash income in order to finance such migration, and aspirations among young people to return to their villages upon completion of their studies. In the absence of such opportunities, greater educational attainment will not result in expanded economic opportunities for the next generation. It is uncertain

whether the ongoing processes of decentralization and infrastructure development will result in new jobs, as expected by migrants and their families. The current labor market is unlikely to absorb increased numbers of educated youth.

Social forestry is a priority program for the Indonesian MoEF. Through it, local people can gain legal recognition of their forest land, forest-user groups can be created for more effective and inclusive management of forests, and opportunities expanded to generate sustainable livelihoods. At the same time, the changing pattern of migration among young people from forest areas and their diverse perspectives on the future of agriculture (and forestry) offers opportunities to incentivize young people to be agents of change in forest management programs through social forestry

We facilitated a series of consultations at the national and subnational level to share the findings of our study and generate options for leveraging young people to contribute meaningfully to social forestry. These also highlight the importance of adopting a landscape approach to generating an enabling environment for the promotion of social forestry and youth development.

Recommendations for action

Education and skills

- Improve access to scholarships and other financial assistance (such as tied loans) for young people interested in pursuing higher education to reduce the financial burden on their families.
- Identify what kinds of skills and qualifications are needed for social forestry and expand opportunities to pursue relevant subjects, such as forestry and natural resource management, GIS and spatial analysis, information management systems, economics and business studies, accounting, etc.
- Scale-up education programs to raise awareness on the importance of forests for people and the environment. This could be done by building environmental awareness modules into the existing school curriculum, complemented by the use of various platforms (such as locally available channels, social media) to disseminate information about social forestry and FMUs.
- Increase legal awareness among young people about their rights and responsibilities. Connect local youth to relevant civil society organizations that support local communities to negotiate effectively with extractive industries.

Forest management

- Encourage young migrant returnees to participate actively in forest management efforts, through attending and voicing their concerns in meetings, setting up quotas for youth in FMUs, encouraging them to assume roles and responsibilities in FMUs, empowering youth clubs or youth-lead NGOs to monitor work of the FMUs, etc.
- Support youth to play a meaningful role in community-wide efforts to develop and implement forest management plans to restore degraded landscapes (such as in Long Loreh), continue existing forest management efforts (such as in Setulang), maintain sustainable extraction of valuable forest products (such as in Nawang Baru/Long Nawang),etc.
- Promote the use of digital technology to monitor forest management efforts, establish and expand environmentally responsible businesses, connect and supply to sustainable value chains, access finance through banks and fintech, etc. Encourage young migrant returnees, with relevant skills, to become involved in these efforts.

Jobs

- Support the creation of medium forest-based enterprises (such as agroforestry, ecotourism) that can offer jobs to young migrant returnees and help them to supply to sustainable forest product value chains at local levels and beyond.
- Extend access to financial services and business development training to assist young people interested in starting small and medium enterprises. Where possible, leverage current migrants in destination to market these products and services.
- Train young people to provide (on voluntary and/or paid basis) training in forest management, enterprise development and job matching. Encourage and promote youth champions of change.

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Appendix 1. Detailed field data collection procedure

Quantitative data: Household surveys

We carried out household surveys from January to April 2017. The survey asked about each member of the household including gender, level of education, age, relation to head of household and occupation. Household-level information was also collected on sources of income, expenditure, land access and ownership, agricultural practices, forest use, forest dependence and exposure to a range of shocks. We asked households with migrants additional questions relating to the destination of migration, duration of migration, reasons for migration, remittances and flow of funds to migrants, among others. Our questionnaire was built on the Association of Southeast Asian Nations (ASEAN)–Swiss Partnership on Social Forestry and Climate Change (ASFCC) questionnaire that CIFOR researchers developed for research on livelihoods, risk-coping strategies and migration in Indonesia, Laos and Vietnam. We also drew on the World Bank's migration module, versions of which had been previously adopted by CIFOR researchers studying migration and forest change in Ethiopia, Nepal and Tajikistan.[14] The online supplementary material includes a copy of the questionnaire that we used.

We sought and secured approval from the CIFOR Research Ethics Committee prior to embarking on our field work, which ensured that our research was in line CIFOR's research ethics policy and procedures.[15] We translated the questionnaire into Bahasa Indonesia. The survey was administered by our research partner, the Center for Social Forestry (CSF), Universitas Mulawarman. We trained the enumerators over a 2-day workshop to make sure that there was uniform understanding of the questionnaire. The CSF research team and enumerators collected data, first in the Lower Malinau, and then in Upper Malinau. We also accompanied them to the piloting of the questionnaire and made slight adjustments together before rolling the survey out. We regularly followed up with the enumerators and cross-checked and validated the data that they were collecting.

With an a priori judgment that the percentage of households with migrants in our study areas was relatively small compared to the rest of the population, we used purposive sampling in this study to obtain a larger sample of migrant households in comparison to non-migrant households (Shively 2011). Our a priori judgment was based on the number of migrants in the village according to 2011 Village Potential data. However, that data only included international migrants, and there was no secondary data on internal migration. We defined 'households with migrants' as those with household members who have moved elsewhere for at least 3 months and/or who intend to stay outside for more than 3 months (if they have left recently). This definition is shorter than the typical length of the period of 12 months used in international migration surveys (Skeldon 2017). It is also shorter than the 6 months used, for example, in the 2009 Kenya–World Bank's migration survey because we aimed to capture circular seasonal migration. We used the same definition in the other two country studies (Tajikistan and Peru) to ensure uniformity across the three country studies.

When the listing process in the field was carried out, we learned that the number of the households that fulfill our criteria for migrant households in each village was much lower than expected, we ultimately conducted a census of 141 migrant households, with a total 227 migrants in eight villages.

14 The World Bank questionnaires can be accessed through: http://microdata.worldbank.org/index.php/catalog/94

15 The process of Research Ethic Review can be downloaded from: http://www.cifor.org/fileadmin/downloads/CIFOR-Research-Ethics.pdf

In addition, non-migrant households were also surveyed using random sampling of non-migrant households to fill the rest of the planned village quota, a total of 45 households, both migrants and non-migrants, per village. In total, we sampled 360 households in eight villages: 180 households in Lower Malinau and 180 households in Upper Malinau.

In-depth qualitative research

In the second round of research, we purposefully selected a subset of households who were surveyed in the household survey to capture new information not collected in the first round. In each village, we revisited at least 12 households: 4 households with employment migrants, 4 households with education migrants, 2 non-migrant households; and 2 forest-dependent households (irrespective their migration status). Information gathered from the migrant-sending households included history and drivers of migration, financing and the expected return of migrants, decision making in relation to migration, and changes in livelihoods and forest use/dependence that could be directly or indirectly attributed to migration.

In order to capture information from migrants themselves, we also interviewed migrant returnees in the villages on their migration experience and what they had been doing since their return. We complemented this with interviews of migrants at their destination to capture their migration journey and future aspirations. In total, we interviewed 16 migrants in at their destination, of whom 15 were pursuing higher education and 1 was working. We interviewed migrants who originated from Lower Malinau in Malinau and Tarakan. We interviewed migrants from Upper Malinau in Samarinda.[16]

We also conducted key informant interviews with village-level elected officials, customary leaders (*kepala adat*), religious leaders, youth representatives and women's group representatives to better understand the socioeconomic and political history of the village, composition of village and intercommunity relations, livelihood trajectories, agricultural practices, forest use and dependence, and gender dynamics. Table A1.1 provides an overview of the number of the qualitative interviews.

We carried out FGDs during all three rounds of research. The first round of FGDs was carried out by our implementing partner, CSF–Universitas Mulawarman. This provided an overview of the history of the village, major sources of livelihood and social composition. Two FGDs were held in each village (separately with men and women), with approximately ten participants per village. These discussions also helped build rapport with research participants and gave us a chance to clarify our research objectives and plans, which made our follow-up research easier.

The FGDs in the second round of research went into greater depth with a more diverse array of participants. We conducted two sets of FGDs, which included separate discussions with local leaders, women's group representatives, forest-user groups and youth groups (see Table A1.1 below). The second set was with at least one representative from all of the aforementioned groups. Our objective was to provide information about specific issues that we were particularly concerned with; for instance, aspirations for youth migration, changes in migration patterns and level of dependence on forests. This facilitated a discussion among participants as we observed and asked probing questions. In total, 112 participants from four villages participated in the FGDs. We made sure that women were fully represented: 52.68% of our FGD participants were female. For a list of topics discussed in each FGD, please see Appendix 4.

16 We conducted the interviews of migrants in Malinau, Tarakan and Samarinda as the research teams needed to pass these cities on their return journey from the villages to CIFOR headquarters in Bogor.

Table A1.1. Number of FGDs and in-depth interviews in the qualitative data collection (2nd round)

Village level interviews/discussions		**Individual level interviews**	
FGD	20	Education migrants at destination	15
KII	18	Returnee	9
Total	38	Individual eco	2
Household level inverviews		Individual forest	1
HH with edu migrants	43	Potential migrant	4
HH with non migrants	13	In migrant	6
HH with eco migrants	13	Individual women, short-term labor migrant to Malaysia	6
HH forest dependent	6		
Total	**75**	**Total**	**37**

Validation and follow up

During the final round of field work, we organized FGDs and key informant interviews to share our preliminary findings (on changes in migration patterns, forest cover change) and elicit feedback from the participants. We also used this time to fill data gaps and clarify issues that were unclear. We revisited the households we had interviewed in the first and second rounds of field work to ask, in particular, about recent jobs and activities of returnees.

Appendix 2. Information on selected forest products to estimate income

Bushmeat

Of the forest products that are sold, bushmeat is ranked as the first in both research sites (Table 5). Almost 1 in 10 households in Lower Malinau and around a quarter of households in Upper Malinau hunt bushmeat to be sold at the local market. The price of bushmeat varies depending on local preference, ease of hunting, supply availability, income of buyers, etc. For instance, wild pigs are generally sold for IDR 15,000–35,000 per kg with a typical wild pig weighing approximately 40 kg. Wild pigs are generally in high demand at the local market. However, not all bushmeat is commercialized. For example, an informant in a FGD mentioned that he avoids selling hedgehog meat and prefer to keep it for his family's consumption as it has medicinal uses (FGD Setulang, September 2017). However, animals vary in their frequency in the forest. Wild pigs, for example, have a migration cycle that moves them away from areas where people live and hunt (Luskin and Ke 2017). Local people adjust their hunting effort to this migration cycle: when they know that wild pigs are rare, they do not hunt (in-depth interview with a hunter, Nawang Baru, July 2018).

The prices for the two other most common hunting and fishing outputs are: deer (IDR 35,000-40,000/kg) and fish (IDR 25,000/kg).

Construction timber

Timber is the second most monetized and traded forest product (Table 5). During our follow-up qualitative research in the two villages in Upper Malinau, we learned that people procure timber for house construction from the forest. All men in the village are generally able to do that, especially if they possess a chainsaw. If they have time and are able, they cut and prepare the planks themselves using a chainsaw in between seasonal swidden activities. Alternatively, they may hire other people in the village to do it. Such work can generate considerable income for those who are hired, although this is neither predictable (as demand varies) nor reliable (contingent on the type of wood). The costs (as recounted by Abi, case study 3) to hire a construction timber gatherer are as follows: gasoline for boat transportation and chainsaw operation (at least IDR 360,000 with additional of IDR 90,000 per day of work), labor for three persons (opportunity cost in casual agriculture labor: 1 laborer with chainsaw, IDR 450,000 per day or two laborers without chainsaw IDR 100,000 per day each). Capital in the form of boats and chainsaws is also needed.

Considering the heavy work involved and the opportunity cost of labor, the margin for the gatherer is quite small. They usually require a minimum order of 2 m^3 of wood planks, which they can prepare in 2–3 weeks. However, casual work in agriculture is also not always available. In this case, Abi, for example, will work on orders for 1 m^3. The price of planks range from IDR 1–7 million/m^3 with variation in price contingent upon the quality of the timber and whether transportation is included. Merang wood fetches the highest price because it is hard to find and regarded highly durable.

According to our informants, trade in timber is generally limited to their village and neighboring villages because of the high cost of transport. During our transect walks through the village, we found that many households had stored wooden planks in front of their houses. During FGDs with local leaders in Long Nawang in July 2018, we learned that people accumulate and store planks for construction, to sell locally and as a form of savings that they can easily exchange when required.

However, not many people dare to prepare large volumes of wood planks for sale as they are afraid there will be no demand, after they have invested money and labor in gathering the wood.

Gaharu

As is reflected in Table 8, in the Upper Malinau research sites, respondents mentioned that gaharu collection and sale as important to financing education, although the current depletion of natural gaharu stock is not necessarily caused by the need to finance education. Gaharu, or agarwood is the fragrant, resinous heartwood of *Aquilaria* trees that have been infected by a fungus. It is in high demand for use in the Middle Eastern perfumes and Chinese medicines. It is solely exported and there is no local demand for it. The gaharu rush in the Upper Malinau region began in the early 1990s when the price of gaharu began to escalate. Gaharu collection has peaked and plummeted according to fluctuations in price. Nevertheless, the demand for gaharu remains high and in 2018, agarwood chips sold for around USD 4,400/kg in average (IDR 62,800,000), with the very best quality specimens cost much higher (Sustainable Asset Management 2019).

Much of the initial gaharu rush was driven by migrants who flocked in large groups to search for gaharu themselves. They would bring sufficient food supplies for the months of excavation. The local Dayak Kenyah could neither commit to joining these groups nor to compete with them. Many could not leave their swidden farms for long periods and could only join periodically during off-peak seasons (Momberg et al. 2000). Furthermore, the local gaharu traders in the village neither had access to buyers who exported the gaharu to the Middle East and China nor understood how to accurately grade and price the gaharu that they collected. However, as the gaharu rush has continued, gaharu trade is increasingly driven by the Dayak Kenyah, as the number of local traders who are able to successfully grade gaharu and sell directly to buyers in Samarinda and Jakarta has grown. All the interviewees in the research sites agreed that gaharu is the most significant source of cash income in the village. Almost all households have one member who has invested full-time or part-time effort in gaharu collection, although there are still only a few traders in the village. One local gaharu trader maintained that the gaharu rush is one of the main sources of wealth and cash income in the village, “The vast majority of purchasing power and consumer durables that you see in the village are from gaharu trade” (Leading gaharu trader, male, mid-40s, July 2018).

However, finding natural gaharu is not as easy as it was before. The risks of never finding any gaharu or only finding low quality are omnipresent. Making the initial investment to buy food stock to take is also very costly. Furthermore, gaharu trade is ridden with market asymmetries in grading and pricing. The gaharu seekers often do not know the grade of the gaharu found as there are different grades depending on the color, appearance, extent of fungus infection, which have a substantial impact on price. The collectors only receive a fraction of the price that is commanded in the export markets.

Appendix 3. Technical information on remote-sensing data analysis

The main source of the remote-sensing data in this analysis is Sentinel-2 satellite imagery acquired in June and August 2016 and 2018. The data was downloaded from https://earthexplorer.usgs.gov/ and https://scihub.copernicus.eu/dhus/#/home. The research area boundaries used in the analysis are the provincial and village administration boundaries from Statistics Indonesia. Tile numbers T50NHK and T50NMJ cover our research areas.

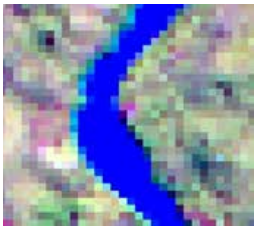
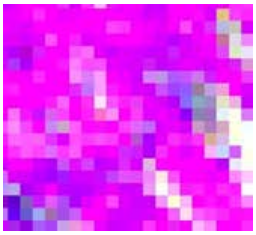
The data was processed using ArcGIS 10.6 by performing the layer stack process and setting the stretch type to 'Standard Deviations' to produce a range of pixel values that could be visually interpreted. The visual interpretation was chosen because the research area is limited and specific, which makes the alternative automatic method less accurate as it uses brightness to identify an object. The visual method uses interpretive keys that support and complement each other, including shape, size, pattern, hue, shadow, texture and location.

We started by digitizing the 2018 images of the research sites based on the same land-cover classification, which is used by the MoEF for their land-cover map. Digitization of each type of land cover was done using Band RGB 11-8-2 composition on Sentinel-2 images. This is visually similar to the composition of Band 6-5-4 on Landsat 8 and Band 5-4-3 composition on Landsat 7 at a scale 1: 25,000 for the digitizing process. The results of this process are an image of research areas that can be classified as primary and secondary dryland forests, settlements, dry agricultural land, bushes mixed farming land, water body, shrubs, open land and mining sites.

Justification was based on a ground check of each type of land cover nearby the settlements areas in the research site. Correction and re-interpretation of the land classifications was performed using the survey points in the ground check, as well as high resolution images on Google Earth and base map images found in ArcGIS 10.6 for unsurveyed areas in the research sites. Topology was checked to detect and correct any errors (overlapping features) in the delineated data.

Then, the 2016 data was interpreted using the land cover for 2018 used as reference. When the process was completed, we had both 2016 and 2018 land-cover maps for the research areas. An intersect process was used to determine the extent of changes in each land cover and the direction of change. Table A3.1 compares field conditions and satellite imagery.

Table A3.1. Comparison of field conditions and satellite imagery

No	Land cover	Comparison of field conditions and satellite imagery		Notes
		Field conditions	Sentinel-2 images	
1	Water body			Water bodies found in the field are rivers and puddles that fill former excavations.
2	Settlement			Settlements are land used for residential areas.

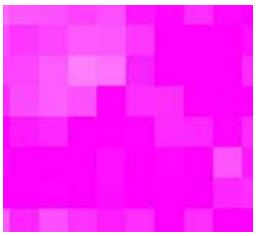
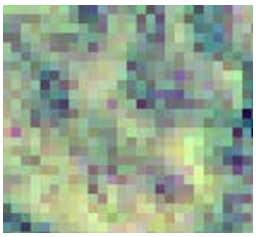
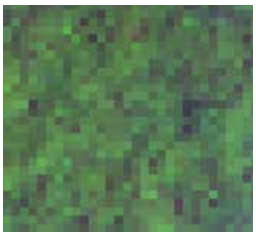
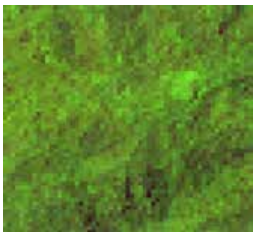
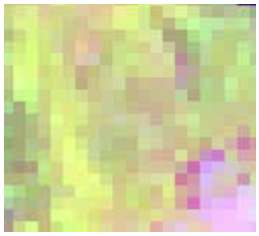
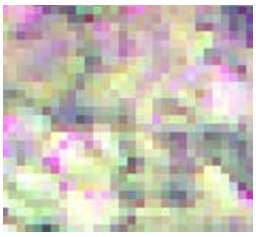
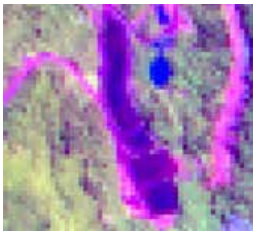
No	Land cover	Comparison of field conditions and satellite imagery		Notes
		Field conditions	Sentinel-2 images	
3	Open land			Open land is land without any natural, semi-natural or artificial cover. Open land found in the field includes unexploited, previously explored areas and/ or excavated areas, or areas that have been prepared for village infrastructure, such as sport centers or football fields.
4	Scrub			Scrub is dry land overgrown with heterogeneous and homogeneous natural vegetation at low and medium density, dominated by low vegetation.
5	Primary dryland forest			Primary dryland forest is grows in dry habitats. It could be in the form of lowland forests, hill, mountain or upland tropical forests that are compact with low human activity intervention.
6	Secondary dryland forest			Secondary dryland forest grows in dry habitats. It could be in the form of lowland forests, hill, mountain or upland tropical forests that are compact with low human activity intervention.
7	Dryland Agriculture			Dryland farming is an area planted with seasonal crops, which are usually separated from the house yard. Plants in the form of rice, do not require extensive irrigation, their vegetation is artificial and human intervention is required.
8	Mixed Dryland Agriculture			Mixed dryland agriculture is land planted with heterogeneous perennial trees, which produce flowers, fruits and sap without the need for any logging. This land is usually associated with residential settlements or farms.
9	Mining			Mining is open land resulting from mining activities. Land cover is rocks or other earth materials that are moved or explored by humans.

Table A3.2. Comparison of published and calculated areas of subdistricts

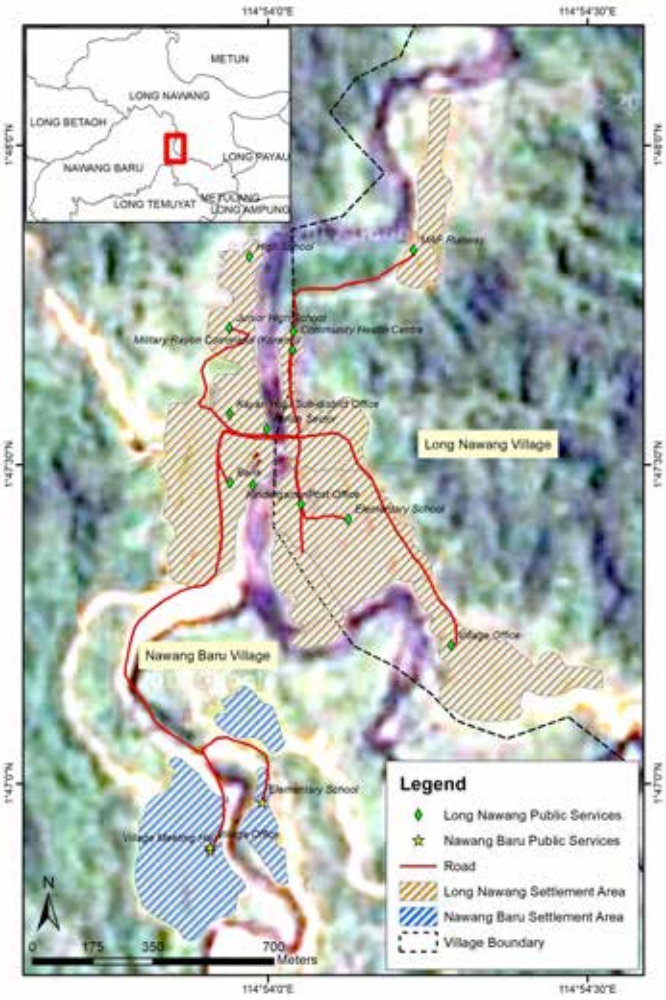
Sub-district	Village included	Size (ha)	Size based on spatial data (ha)	Difference (%)
Malinau Selatan Hilir	Setulang	57,220	36,321.80	-36.52%
Malinau Selatan	Long Loreh	115,335	95,305.76	-17.36%
Kayan Hulu	Long Nawang	73,500	65,361	-11.07%
	Nawang Baru			

Source: Administrative sizes are based on BPS (2018) which is transformed to ha from km^2 by multiplying the size with 100, size based on spatial data are based on the calculation of area based on Village Potential map data.

Checking the reliability of the village boundary data

Maps are problematic in Indonesia. Different government institutions have their own maps that suit their own purposes. The current one map policy initiative aims to solve this problem. Here, we show discrepancies in the boundary data and the field cross-check.

First, we aimed to check the size of the villages. However, we were not able to find records of village sizes in Malinau from BPS. The area size is only available at subdistrict level. Table A3.2 compares the size of subdistricts based on the BPS report (BPS 2018) and the calculation of the spatial data boundaries, also with data from the BPS. Based on the comparison, we conclude that the spatial data underestimates the size of the subdistricts. The discrepancy can reach 11–36%.



During our second visit in July 2017, we mapped the settlement location at Long Nawang and Nawang Baru village. Some of Long Nawang village, is included in the areas of Nawang Baru, based on the map from BPS. The ground-checking results confirmed that the village border in the BPS map data does not represent local people's perceptions of their village land. This analysis indicates that more work is needed to define village boundaries. Mapping villages boundaries is important, particularly in relation to recent government policies that provide more support to the village through the Village Fund (*dana desa*) and social forestry. Furthermore, during the subnational workshop, one government official also mentioned that they needed mapping support to allocate the land of Malinau District to villages. However, this requires both technical support to build the map and an advocate for villagers that have overlapping claims on the land (Anau et al. 2001).

Figure A3.1. Validation results of the village boundaries of Long Nawang and Nawang Baru

Appendix 4. Household questionnaires

HOUSEHOLD ID							

Note for interviewers: respondents for the interview must be either the primary female/male adult in the household. No children, hired laborers or others as possible informants. If one of the two primary adults is not present after multiple attempts, make note of why they are not available and move on to an alternate randomly selected household).

Introduction and informed consent:

Madam/Sir. Good morning/afternoon/evening, I am a researcher from the Forest Action and Center for International Forestry Research. We would like to gather information from you about the socioeconomic condition and livelihood strategies of your household to better understand how migration is affecting rural areas. You have been randomly selected to participate in the study. We will ask you a series of questions on: basic information about your household, household migration trends, income sources, land and forest use, expenditure patterns, shocks and strategies, decision making and perceptions on the implications of migration for your household. The study is purely for research purposes but we hope to be able to highlight to relevant policy makers the situation in your village. We will not share your name and personal information with anybody. All personal information that you will provide will be anonymized and stored. Your participation is purely voluntary, you may refuse to participate, discontinue at any time, or skip any questions that may make you feel uncomfortable, with no affect or penalty or loss of benefits. You are free to ask questions concerning the study, both before agreeing to be involved and during the course of the study. Here is my contact information (provide name and mobile number). You can contact me if you need any clarification or change your minds about participating in the research (any segment or the entire research). Are you willing to be interviewed?

Yes – start the interview Yes - but would like to schedule another time for the interview Refused Cannot be located after several attempts	INF1	Name and Signature of the respondent

BLOCK I. LOCATION IDENTIFICATION				BLOCK II. SURVEY IDENTIFICATION			
B1R1 District name B1R1C District Code		B1R3 Village name B1R3C Village code		Survey Information		Entry Data Information	
B1R2 Sub-District name B1R2C Sub-District code		B1R4 Sub village name B1R4C Sub village code		B2R1 Survey Date (dd/mm)		B2R5 Data Entry Date (dd/mm)	
B1R5 Respondent's name				B2R2 Surveyor name B2R2C Surveyor code		B2R6 Data entry name B2R6C Data entry code	
B1R6 Head of Household's Name		B1R7 Address		B2R3 Verification date (dd/mm)		B2R7 Verification date (dd/mm)	
B1R8 Phone number				B2R4 Verificatior name B2R4C Verificatior code		B2R8 Verificator name B2R9 Verificator code	

BLOCK 3 HOUSEHOLD MEMBERS (HM)

Interviewer: "Now, we will ask you about each member of your household." Please mention all of your household members who live here in the house, as well as those who usually live here but currently are away." First, ask about head of the household, followed by spouse of the household and then other household members. Note for interviewer: if ALL responses in HM17=2, then go to BLOCK 5 INCOMES.

Person ID	Name	Does this person live in the house? 1 Yes 2 No	Relationship with Head of HH (See code)	Gender 1 M 2 F	Age (Years)	Place of Birth (See code)	FOR HH MEMBER OLDER THAN 5 YEARS OLD ONLY				In the next 12 months, how likely or unlikely is this member to move away from this household for at least three months?	If the answer to HM14 is 1, where this member expected to move?	If the answer HM14 is 1 state why he/she is expected to leave?	In the last 5 years, has this person lived outside this house for more than 3 months? 1 Yes Write PID in MR 2 No
							Can Read and Write 1 Yes 2 No	School Participation (See code)	Highest level of Education (See code)	Occupation (specify)				
PID	HM1	HM2	HM3	HM4	HM5	HM6	HM10	HM11	HM12	HM13	HM14	HM15	HM16	HM17
			1 Head of HH 2 Spouse 3 Child 4 Son / Daughter in Law 5Grandchild 6 Parents/ Parents in Law 7 Maid 8 Others			1 In this village 2 In neighboring village 3 In another district 4 Another province		0 No/not yet in school 1 Currently in school 2 No longer in school	0 None 1Primary School 2 Junior High school 3 Senior high school 4 Diploma 5 Undergraduate 6 Graduate		1=Likely to move 2=Unlikely to move 3=Do not know 4=Refused to answer	1 In neighboring village 2 In urban areas? 3 In other districts 4 In anoother country, specify--- 5in other areas, specify---	1 Employment purposes 2 Marriage 3 Follow parents 4 Education Purpose 5, Other, specify____	Note for interviewers: **If HM2=2, then HM17=1**

ORIa. If the head of household was not born in this village, in which year did he arrive? _____ (four digit of year)

ORIb. Where did the HH head live before coming to this village? Specify _____, Code: 1 in neighboring village 2 in other district 3 In other anchal 4 Other country

ORIc. Why did the HH head leave your previous place to live here? _____
_____

BLOCK 3 HOUSEHOLD MEMBERS (HM) (TO BE USED IF MEMBER OF THE HOUSEHOLDS IS MORE THAN 6)

Person ID	Name	Does this person live in the house? 1 Yes 2 No	Relationship with Head of HH (See code)	Gender 1 M 2 F	Age (Years)	Place of Birth (See code)	FOR HH MEMBER OLDER THAN 5 YEARS OLD ONLY				In the next 12 months, how likely or unlikely is this member to move away from this household for at least three months?	If the answer to HM14 is 1, where this member expected to move?	If the answer HM14 is 1 state, why he/she is expected to leave?	In the last 5 years, has this person lived outside this house for more than 3 months? 1 Yes Write PID in MR 2 No
							Can Read and Write 1 Yes 2 No	School Participation (See code)	Highest level of Education (See code)	Occupation (specify)				
PID	HM1	HM2	HM3	HM4	HM5	HM6	HM10	HM11	HM12	HM13	HM14	HM15	HM16	HM17
			1 Head of HH 2 Spouse 3 Child 4 Son / Daughter in Law 5Grandchild 6 parents/ Parents in Law 7 Maid 8 Others			1 In this village 2 In neighboring village 3 In another district 4 Another province		0 No/not yet in school 1 Currently in school 2 No longer in school	0 None 1Primary School 2 Junior High school 3 Senior high school 4 Diploma 5 Undergraduate 6 Graduate		1=Likely to move 2=Unlikely to move 3=Do not know 4=Refused to answer	1 In neighboring village 2 In urban areas? 3 In other districts 4 In anoother country, specify--- 5in other areas, specify---	1 Employment purposes 2 Marriage 3 Follow parents 4 Education Purpose 5, Other, specify____	Note for interviewers: **If HM2=2, then HM17=1**
B3 NOTE:														

Note for enumerator: IF HM17 all 2 Then go to Block5

BLOCK 41 MIGRATION RECORDS (MR1)

Interviewer: "Now, we will ask you about each member who is currently away and also about those who are currently living in the household, but have lived away for at least 3 months outside your household in the last five years."

Note for interviewer: Please re-check those names to be included in this table.

Person ID	Name	When did this person leave? MM/YY	Destination (WRITE THE NAME OF THE LOCATION IN MR2 and WRITE THE CODE IN MR2Code]		Reason for Move	Activities prior to moving (detailed specification) Farm work	How was [name's] contribution to the following activities before his/her migration?				Who takes the responsibility for the activity listed when [name] is migrating	When did this [name] last return? MM/YY	If has returned, Reason for coming back	If has not returned, how frequently do you communicate with this person?	Activity in destination when away from home
							Non-farm work	Domestic chores	Collecting Forest Products						
PID	HM1	MR1	MR2	MR2code	MR3	MR4	MR5A	MR5B	MR5C	MR5D	MR6	MR7	MR8	MR9	MR10

Person ID	Name	When did this person leave? MM/YY	Destination (WRITE THE NAME OF THE LOCATION IN MR2 and WRITE THE CODE IN MR2Code]		Reason for Move	Activities prior to moving (detailed specification) Farm work	How was [name's] contribution to the following activities before his/her migration?				Who takes the responsibility for the activity listed when [name] is migrating	When did this [name] last return? MM/YY	If has returned, Reason for coming back	If has not returned, how frequently do you communicate with this person?	Activity in destination when away from home
							Non-farm work	Domestic chores	Collecting Forest Products						
PID	HM1	MR1	MR2	MR2code	MR3	MR4	MR5A	MR5B	MR5C	MR5D	MR6	MR7	MR8	MR9	MR10
Rewrite PID if H17=1	**Rewrite HM1 if H17=1**		1 In neighboring village 2 in other sub district 3 In other district 4 In other province 5 in other country		1 Employment purposes 2 Marriage 3 Follow parents 4 Education Purpose 5, Other, speficy____		1=Important 2=Average 3=Unimportant				Note: **Write the Person ID,** and 0 if none 99 if hired labor	If not returned, write 99/99 If HM2=2, its automatically 99/99		1 daily 2 weekly 3 monthly 4 infrequently, specify _____	
NOTES B4_1:															

BLOCK 42 MIGRATION RECORDS

Person ID	Name	In the last 5 years, how many times has [name] lived outside for more than 3 months?	ABOUT THE LAST TRIP								
			Did this person receive money/in-kind from home? 1 Yes 2No	If receive Money/ in-Kind from Home		Did this person send money/in-kind to home? 1 Yes 2No	If Sending Money/ In-kind to Home				
				Frequency of transfer per year	Amount of last transfer (monetary)		Frequency of transfer per year	Amount of typical (monetary) transfer	Who typically receives the money/ in-kind in the household?	Who decide what to do with the money/in-kind?	What do you typically spend the money/in-kind on?
PID	HM1	MR11	MR12	MR13	MR14	MR15	MR16	MR17	MR18	MR19	MR20
Rewrite PID if H17=1	**Rewrite HM1 if H17=1**			1 monthly 2 once in few months 3 infrequent, specify ____ 4 other			1 monthly 2 once in few months 3 infrequent, specify ____ 4 other		**Rewrite PID**	**Rewrite PID**	
NOTE B4_2:											

BLOCK 5 HOUSEHOLD SOURCES OF INCOME

Interviewer: "Now, we will ask you information about sources of income that your household has had for the last 12 months. What is the most important source of income your household has? Do you have other sources of income? What are they?"

Note for interviewer: please ask the respondent to start from the most important one and then probe for different sources of income and re-check when asking them about the rank.

No	Specify the income	WRITE THE INCOME CODE	Who earns it (WRITE PERSON ID)	Please rank the importance of this income for your household?	How frequently does your household receive this income?	Was this also a source of income for your household 5 years ago?	If yes, what was the condition of the income compared to 5 years ago?	If no, when did this item become source of income?	Why do you /your HH member choose this item as source of income?	Do you think you will still have this item as source of income five years from now?
INC1	INC2	INC3	INC4	INC5	INC6	INC7	INC8	INC9	INC10	INC11
1										
2										
3										
4										
5										
6										
7										
8										
9										
11										

No	Specify the income	WRITE THE INCOME CODE	Who earns it (WRITE PERSON ID)	Please rank the importance of this income for your household?	How frequently does your household receive this income?	Was this also a source of income for your household 5 years ago?	If yes, what was the condition of the income compared to 5 years ago?	If no, when did this item become source of income?	Why do you /your HH member choose this item as source of income?	Do you think you will still have this item as source of income five years from now?
INC1	INC2	INC3	INC4	INC5	INC6	INC7	INC8	INC9	INC10	INC11
	Income source code: 1 Agricultural production for consumption 2 Agricultural production for selling 3 Wage laborer in agriculture 4 Small business 5 cCasual labor in-non agriculture 6 Remittances 7 Selling livestock and livestock products 8 Selling/Consuming Forest Product 9 Transfer from NGOs/Government 10 Other			Start from 1 for the most important one	1 Daily 2 Weekly 3 Monthly 4 Yearly 5 Other, specify	1 Yes 2 No	1 Increased 2 Stayed Same 3 Decreased	1 Less than a year 2 1–2 years ago 3 3–5 years ago		1 Yes 2 No
NOTE B5:										

Follow-up questions on remittances (ONLY for those who mentioned remittances as one of source of income above)

REMa. What channel is used for you to send the remittances? 1 Bank 2 Migrants bring the money/in-kind when they come back home 3 Sent through friends or relatives 4 Other, specify _____

_____

REMb. What channel is used for you to receive the remittances? 1 Bank 2 Migrants bring the money/in kind when they coming back home 3 Migrants send the money through their friends or relatives 4 Other, specify _____

_____

BLOCK 6 LAND HOLDING AND USE

Interviewer: "Now, we will ask you about the land that you own or manage."

AGCa. How many parcels of land (in total) does your household own or manage (the latter as sharecroppers, contractors)? _____plots

AGCb. What is the total area of the land that your household owns or manages (the latter as sharecroppers, contractors)? _____ ha (hectares)

AGCc. Has the size of the total parcles that your household owns or manages changed over the last five years? 1 Increase 2 Same 3 Decrease

AGCd. What are the reason(s) for the change or no change on the condition mentioned in AGCc? (open ended question)

_____

_____

AGCe. How do you rate your landholding (own and manage) compared to the land needs of your household? 1 Too small 2 Just enough 3 More than enough

AGCf. Looking back 5 years ago, how would you rate your landholding (own and manage) compared to the land needs of your household? 1 Too small 2 Just enough 3 More than enough **AGCg.** What are the reason(s) for the change or no change on the condition mentioned in AGCe and AGCf? (open ended question)

_____

_____

AGCh. During the past 12 months, did you hire labor to work in any of your land? 1 Yes 2 No

AGCi. If yes, roughly how many did you hire and for what purposes? _____

_____

Interviewer: "Now, we will ask you information about each of the land that you own or managed." Please start with your house and then your agriculture land.

							FOR THE LAST 12 MONTHS				
No	Land Use	Area (in m^2)	Ownership status	If house/land is titled, under whose name the land in?	Acquired or used since (year)	What is the distance between your house and the land? (in minutes)	How many persons work on the land?	Which household member(s) works on the land?	If you plant crops in this land, how many months?	If you plant crops in this land, what crops do you plant?	What do you do with the harvests?
AGC1	AGC2	AGC3	AGC4	AGC5	AGC6	AGC7	AGC8	AGC9	AGC10	AGC11	AGC12
1	1 House										
2											
3											
4											
5											
	1=Rumah 2=Padi Ladang 3=Kebun Sayur 4=Belukar 5=Hutan 6=Perkebunan 7=Lainnya _____		1 = Owned by household member but no title 2= Owned by household with title 3= Customary land	PERSON ID							1 All consume 2 Sell some 3 All sell 4 Other_____
B6 Notes:											

BLOCK 7 FOREST USE

Interviewer: "Now, we will ask you about your forest related activities."

FORa. Currently, what is the main source of cooking fuel? 1 Firewood 2 Kerosene 3 Gas 4 Electricity 5 Other, _____

FORb. Looking back five years ago, what was your main source of cooking fuel then? 1 Firewood 2 Kerosene 3 Gas 4 Electricity 5 Other, _____

FORc. What are the reason(s) of the change or no change in the source of cooking fuel you use (between **FORa** and **FORb**)? (open ended question)

_____

_____

FORd. Currently, how important are forest products for your household livelihood? 1 = Very important 2 = Average 3 = Unimportant

FORe. Looking back five years ago, how important were forest products for your household livelihood? 1 = Very important 2 = Average 3 = Unimportant

FORf. What are the reason(s) of the change or no change on the condition mentioned in **FORd** and **FORe**? (open ended question)

_____

_____

FORg. Are you involved in the following activities (1=Yes 2 =No)

Now		5 years ago	
FORg11 Forest monitoring		FORg21 Forest monitoring	
FORg12 Trimming and pruning		FORg22 Trimming and pruning	
FORg13 Attending meetings about forest management		FORg23 Attending meetings about forest management	

FORh. What are the reason(s) of the change or no change on the condition mentioned in **FORg dan FORh?** (open ended question)

_____

_____

FORk1 Did you do forest clearing last year? 1 Yes 2 No

FORk2 Total area you cleared in last 12 months? ____ Ha (Hectare)

FORk3 Type of forest cleared? _____

_____

FORk4 The purpose of forest clearing?" _____

_____

FORl1 Have you planted trees in the past 5 years (or past year)? 1 Yes 2 No

FORl2 If yes, what kind of trees? _____

_____

FORl3 For what purposes? _____

_____

Catatan B7:

Interviewer: "Now, we will ask you about each of the forest and tree products that you/your household members might collect or consume or sell or buy."

							If your household collects from forest				SELL OR BUY						
No	Types of forest products that HH consumes/collects/sells and buys:		Purpose of the forest products (Specify)	Source of collection of the forest products	How long have you been collecting / purchasing this item?	How is the collection/ total purchase compared to five years ago?	How many times did you collect per …?	Unit of frequency	Who collects? Person ID	What is the condition of your collection compared to your household needs for own consumption?	If you buy or sell this forest product, when was the last transaction?	Where did the transaction take place?	What was the volume you seld/ bought in the last transaction? (specify)	Unit of volume	What was the price per unit?	How often do such transactions occur?	How important is this expenditure/ earning for your household livelihood?
FOR1	FOR2	FOR2code	FOR3	FOR4	FOR5	FOR6	FOR7a	FOR7b	FOR8	FOR9	FOR10	FOR11	FOR12	FOR13	FOR14	FOR15	FOR16
		1 Timber 2 NTFPs 3 Firewood 4 Fodder 5 Bush meat 6 Fruits 7 Nuts 8 Honey 9 Others, specify ---		1 = Private forest within the household 2 = Community forest 3 = Purchased from market 4 = Acquired Government land 5 = Others (Please specify)	1=Less than 12 months ago 2=12–24 months ago 3=2–36 bulan lalu 4=37–48 months ago 5=More than 5 years ago	1 Increase 2 Same 3 Decrease	(Write number of times per year/month/ week/day)	1 per year 2 per month 3 per week 4 per day		1=Collection just met our household's need 2=Part of it is consumed, part of it is sold 3= Sold all the collection 4= The collection is not enough, we still need to buy it	1 In this week 2 In this month 3 Few months ago 4 More than 6 months ago 5 Other, specify___	1 In this village 2 In the market 3 Other, specify___				1 Daily 2 Weekly 3 Few times in a week 4 Monthly 5 Every few months	1=Very important 2=Important 3=Average 4=Not so important 5=Unimportant
B7 NOTES:																	

BLOCK 8 HOUSEHOLD EXPENDITURE Interviewer: "Now, we will ask you about each of the following expenses of your household."

No	In the last 12 months, did you spend money on any of the following expenses: 1 Yes 2 No		Specify the nature of expense	How frequently do you incur this expenditure?	How much money did you spend the last time that you incurred this expenditure? (Rupiah)	Please rank the importance of this expenditure for your household? For the remittance that you received in the last 12 months, did you spend your remittance on the following expenditure	ONLY FOR HH WITH REMITTANCE (PLEASE RECHECK with the answer in MIGRATION RECORDS)		
							If yes, how much money did you spend from the remittance on this expenditure the last time? (Rupiah)	If yes, who decides on this expense?	
EXP1	[redacted]	EXP2	EXP3	EXP4	EXP5	EXP6	EXP7	EXP8	EX9
1	Food								
2	Housing								
3	Education								
4	Health								
5	Saving								
6	Buying new land								
7	Ag. investment (Fertilizer, tracktor dll)								
8	Forets investment (Planting trees)								
9	Religious/cultural/social								
10	Business investment								
11	Wage payment								
12	Other 1(Specify)……								
				1 Daily 2 Weekly 3 Monthly 4 Annually		Give the rank 1 for the most important one, please do after all expenditure are filled	1= Yes 2 = No 3 = Don't know		Person ID
B8 NOTE:									

BLOCK9 SHOCKS AND COPING STRATEGIES

Interviewer: "Now, we will ask you about whether your household has experienced the following events during the last 5 years."

No	In the last 5 years, did your household experience any of the following: 1 Yes 2 No		During these 5 years, how many times did you experience this event?	When did this event last happen (DD/MM/ YY)	Did this event cause any reduction in household income and/or assets?	What was the size/ impact of the event on your HH?	How did your household cope with this shock? See the list below, multiple answered allowed	Were these coping strategies sufficient for your HH ?
SCS1		**SCS2**	**SCS3**	**SCS4**	**SCS5**	**SCS6**	**SCS7**	**SCS8**
1	Lost of employment of HH member							
2	Chronic disease/ death of HH member							
3	Natural disaster							
4	Theft							
5	Others, specify							
					1 = Income loss 2 = Asset loss 3 = Both 4 = Neither	1 = small 2 = medium 3 = large 4 = Don't know		1 = yes, fully 2 = yes, partially 3 = No 4 = Don't know

Coping Strategy code 1= Harvest more forest products; 2= Harvest more agricultural products; 3= Spend cash savings; 4= Sell assets (land, livestock, etc.); 5= Do extra wage labor in the village**; 6= Migrate for wage jobs elsewhere**; 7= Seek assistance from friends or relatives; 8= Seek assistance from NGO, community organization, religious organization, etc.; 9= Get loan from money lender, credit associations, financial institutions etc.; 10= Reduce household spending; 11= Reduce household consumption; 12= Did nothing in particular; 13= Other (specify)

B9 NOTE:

Interviewer: "Thank you very much for the information you shared with us"

Appendix 5. In-depth interviews and focus group discussions questions

Category 1: History, pattern and initial cost of migration

Questions
1. Please tell me about anyone in your household who is not from here. (Focus on demographic information, such as age, gender and education level, origin, when did s/he arrive, activities at the origin, activities at the village, reason to move in and stay and period of stay). Whether s/he migrated to another place? Whether s/he came back to his/her origin? Why?
2. Tell me about the way how s/he migrated into the village. (Focus on how the information about the village was communicated, migration path and/or mode of transportation, initial financial cost, how did s/he get the money: if it is loan focus on terms and conditions and how s/he paid it back, any kind of support s/he received and who provided the support.)
3. Please tell me about anyone in your household who has lived and/or is currently living outside the village. 4. Migration in the past. (Focus on history of out-migration in the family and demographic information of who migrated for the first time, destination, activities at the destination, reason to migrate, period of stay, whether s/he returned and for how long, whether s/he returned and for how long, what did s/he do while at home.) 5. Migration in the present. (Focus on demographic information of who migrated, destination, when did s/he migrated, activities at the destination, reason to migrate, period of stay, whether s/he returned and for how long) whether s/he returned and for how long, what did s/he do while at home.)
6. Please tell me how s/he went to the destination. 7. Migration in the past and present. (Focus on how the information about the destination was communicated, migration path and/or mode of transportation, how much did s/he spend on transportation, initial financial cost, how did s/he get the money: if it is loan focus on term and conditions and how s/he will pay it back, any kind of support s/he received and who provided the support.)

Category 2. Migration cost and benefits

Questions
1. What kind of support did your household provide to help anyone in your family to migrate? If it was financial support, how much money did your family spend? On what?
2. How did the family get the money (did they use savings, did they sell anything, did they borrow, if they borrowed, from whom, do they have interest rate, when do they have to pay back)?
3. To what extent does your household meet the expenses? (Additional work/income, selling land/property, borrowing, family support.) Which expenses? How does your household meet them?
4. To what extent does your family have to support your children's education at [name of destination], does your family cover all expenses or only some of them?
5. Does your household or [name of education migrant] receive support from anywhere else (university, government (subnational/national), community, extended kin)? From whom? What kind of support? How much does your household contribution compare to the additional support that s/he receives?
6. How do you send the money to her/him (channels)? How often?
7. When did you start sending money, do you continue sending the same amount as the first time?

Category 3. Family expectations from educational migration

Questions
1. In your opinion, what are the benefits of investing in educating your children outside of the village? (*Probe: investment into the future of your migrant HH member, investment for whole family, social prestige, etc*.)
2. How do you know about education opportunity at [name of destination]? (social network)
3. How long do you expect her/him to study?
4. How much do you intend to support her/him to study?
5. If they are getting support from elsewhere, how likely is it to continue? Will it be sufficient to meet his/her expenses?
6. What do you expect her/him to do upon his/her graduation?
7. In your opinion, does s/he intend to return to the village and/or staying in destination and/or go elsewhere? Why?
8. Do you expect her/him to support the family financially once s/he have competed his/her education? Why or why not?
9. Do you think that this support will cover the costs incurred during his/her studying outside of the village?
10. Do you think that this support will be an important category of your household's livelihood?
11. How will you support (financially, socially and emotionally) other household members to study outside the house? Why or why not?

Category 4. Family Expectations from economic migration

Questions
1. In your opinion, what are the benefits or losses of having a family member working outside of the village? What are the costs (financial, social)? And do you think that the benefits outweigh the costs?
2. How did s/he know about work opportunity at [name of destination]?
3. How long does the migrant intend to continue working outside the village?
4. How long do you expect him/her to continue working outside the village?
5. Do you expect her/him to return? Why?
6. Does s/he intend to return to the village and/or staying in destination and/or migrate elsewhere? Why?
7. Will you support other household members to also work outside the house? Why or why not? If yes, which household members? And why them?

Category 5. Power relation in migration decision-making process

Questions
1. How was the decision for [name of the migrant] person to migrate to pursue higher studies made?
2. How was the decision for [name of the migrant] to migrate to [name of destination] made?
3. What are the main considerations when deciding?
4. Who had the most voice in the decision-making process? Why?

Category 6A. Migration and labor pool: Migrant prior role

Questions
1. What did s/he do prior to migrating? Whether and to what extent was s/he involved in the following activities – farm, non-farm, domestic work, child and/or elderly care? What was her/his role?
2. How significant was his/her involvement for your household?
3. What was his/her involvement in any forest-related activities? (Such as collecting forest products for consumption, for sale, being part of decision-making process regarding forest management, forest monitoring, forest protection efforts)? What was his/her role?
4. When s/he left, how did your household cope in his/her absence?
5. How has his/her migration affected the work done by other household members? Did anyone take over his/her responsibilities?

Category 6B. Migration and labor pool: Migrant substitute

Questions
1. Who took over their responsibilities, and which responsibilities are they?
2. Do you think his/her involvement is/has been sufficient?
3. Why did [name of the substitute] take over the responsibilities? Or why did you choose him/her to substitute the migrant?
4. If the person substituting is from inside the household, do you see this as an opportunity or burden?
5. Did their responsibilities expand or shrink?
6. How does the person feel about this change?
7. Do other household members recognise or value this person differently? How?
8. How long do you expect him/her to assume the responsibilities? Will it be temporary or permanent?
9. When the migrant returns, will s/he assume the same responsibilities that they had before migrating? Why or why not?

Category 7. Land holding and land management

Questions
1. Please tell me about the pieces of land your household owns and manages.
2. What is the purpose of the land for your family? (Example: agriculture, subjective wealth, safety net.)
3. Do you think that the purpose role of land for your family will stay the same in the future? How about the role that your land played?
4. What was the purpose of the land(s) 5 years ago? What about now and 5 years in the future?
5. How many plots does your household have, and how many hectares each of them? How do you compare this number with 5 years ago, and 5 years from now? Please, describe the reason of the change.
6. How does your family manage them?
7. To what extent was [name of the migrant] involved in managing the land?
8. What has had happened since they left? Are there any changes in (a) land uses, (b) managed land and (c) land ownership? (Probe - from labor point of view and financial)
9. Do the migrants own any land? How much? What kind of land? If yes, in their absence, who made decisions regarding everyday use of the land, such as what to plant, what to consume, what to sell?
10. What about major decisions related to the land – selling, buying and sharecropping?
11. Does the migrant expect to inherit any land? How much? When? Would it be during migration or after they return to the village? If it is during, who will manage the land in their absence?
12. How do they expect to manage the land they will inherit?

Category 8A. Dynamics of livelihood changes due to migration: Salary

Questions
1. In this family, who receives a salary?
2. What do you/they do?
3. Where do you/they work?
4. How much time do you/they spend to work?
5. How much you/they earn? How frequently do they earn?
6. What is this income spent on? (Consumption subsistence, consumption luxury, investment, savings, land purchase, agricultural investment.)
7. In case the current migrant worked for salary, what happened with this source of livelihood since the migrant left?

Category 8B. Dynamics of livelihood changes due to migration: Agriculture

Questions
1. What do you grow? Please tell us the process of planting each of the crop. How long does it takes to harvest?
2. Where do you grow them?
3. How much labor is required to grow, to maintain, to harvest? Who is responsible for each of these activities?
4. What is the cost of production like? (Inputs, labor.) How do you finance it?
5. What's the harvest/yield like? How does it compare to how much you invest? How has harvest changed since the past 5 years?
6. What you do with the harvest? How much do you sell? How much do you consume?
7. If you sell the product, how do you sell it? Where? For how much? What is this income spent on?
8. Is the money you received enough/your harvest to cover your expense/consumption until the next harvest time?
9. Did the migrant contribute to this activity prior to moving? What were his/her contribution? How significant was their contribution?
10. Did anyone have to substitute their work? Why or why not?
11. If yes, who substituted? Were they from inside the household or outside? Were they compensated? How much?
12. Has the agricultural practice changed since they migrated? Explain.
13. Has their migration influenced how much you are able to plant? Please explain.

Category 8C: Dynamics of livelihood changes due to migration: Coal mining

Questions
1. Who works in the mining sector? What do they do?
2. Why did they start working?
3. What do they think about their work?
4. How many hours do they work?
5. How much do they get paid and when? How important is that income or your household?
6. What is this income spent on?
7. Is the money received, enough to cover the expenses until the next payment?

8. Do you receive any other support/payment from the mining?
9. Has this mining attracted more people to come to live and work in this place? What kinds of people have come to work?

Category 8D: Dynamics of livelihood changes due to migration: Forest product extraction

Questions
1. What are major the products collected by your household?
2. How did you extract the product? Who are usually involved?
3. Where did you do that? (Which land, distance from homestead, transport to and back.)
4. What do you do with the forest product collected?
5. How much do you consume? How much do you sell?
6. If you consume, what for?
7. If you sell some, how do you sell it? Where? How much money do you get?
8. Do you sell it regularly? How regular is it?
9. How do you spend the income you get from selling the forest product?
10. Did the migrants usually engage in this activity? What happens with this activity when the migrant has moved to the destination?
11. When did you start collecting forest product? Do you think you collect the same amount and type of product now compared to the first time you did it? If different, why?
12. How about the comparison with 5 years ago?
13. How about the expected comparison 5 years from now?
14. Are you involved in any activities to manage or conserve the forests? If so, what?
15. Are there any initiatives underway to protect or conserve forests in your village? If so, what do you know about them? What do you think about them?
16. With the growing rate of out-migration in the village, what do you think will happen to the forests and trees in the village?
17. Will people continue to be as reliant on them as they are currently? Why or why not?

Category 8E: Dynamics of livelihood changes due to migration: Small businesses

Questions
1. What do you do? Where do you do that? Who is usually involved?
2. How long has this business is operated? How much was the capital to start this business? What was the source of capital?
3. How much is your expected income per day (or month, depending on the business)?
4. How do you spend your income from this business?
5. Did the migrant help you in this business when he/she was here?
6. Have you operated other businesses?
7. How do you think migration affected your practice?

Category 9A. Barriers to migration: For the left behind male and female individuals

Questions
1. You see that some/many people here/ in your family have migrated, what about you? Please tell me why you have stayed and not migrated. (Focus on their role in the family, time and capital constraints, any trade off.)

Category 9B. Barriers to migration: For households to support their members to migrate

Questions
1. Please tell me about your (school/ college age) child. (Focus on demographic information of the child.)
2. What is s/he doing in this village? Does s/he go to school? What does s/he after school?
3. Does s/he want to study outside the village? What about you, do you want him/her to study elsewhere? If yes, where do you or does s/he plan to go? Why?
4. What made her/him stay instead of going to another place to study?

Category 10. Potential migration

Questions
1. Please tell me if there is anyone in your family (including yourself) planning to migrate. Please tell me more about the plan.
2. Why does the person want to migrate to particular destination?
3. What is the person going to do there?
4. How long do they plan to stay in the destination?

Category 11. Remittance

Questions
1. We understand that your HH receives remittance from [migrant's name], when did you start receiving remittance? Was it from the very beginning of their migration?
2. How regularly do you receive remittance?
3. How is the remittance sent?
4. Who receives the remittance? Why?
5. How important is the remittance for your household's livelihood? How does it compare to other sources of income in your household?
6. What are the remittances spent on? (How much is spent on daily consumption relative to other expenses, education, health, any other reasons?)
7. Has the type of food and other items that your household consumes on a daily basis changed as a result of remittance? Can you explain?
8. How is the decision to spend remittance made?
9. Have you used remittance to make any investments such as in acquiring land, better agriculture or businesses?
10. Have you used remittance on any forest-related activities? If so, in what ways?

Category 12A. Life as migrant: Economic migrant

Questions
1. Where do you work? What do you there? How did you get the job? How long you have been working there?
2. How would you describe your work? How would you describe your life in the destination?
3. How do you cope with being far away from your family? What are your working conditions like?
4. Work history: type of jobs respondent has done and how s/he landed in the current job.
5. Does the job match with your skills? How do you feel about your salary?
6. Is your salary enough for the cost of living? Are you able to save?
7. Do you send money back home? Is that enough for your family? Do you still have enough money for yourself?

Category 12B: Life as migrant: Education migrant

Questions
1. What are you studying? How far along are you in your education? Why did you study this?
2. How was your first arrival here (did know anyone from your circle, did you stay with them)?
3. How do you find studying here?
4. How often do you return to the village?
5. What do you do during your holidays?
6. If I may, would you please tell me how much money your family spent? On what?
7. How much did you spend on transportation? What kind of transportation did you use? How long did it take? How did the expenditure on transportation compare to other expenses incurred?
8. How did you get the money (did they use savings, did they sell anything, did they borrow, if they borrowed, from whom, do they have interest rate, when do they have to pay back)?
9. In your opinion, please tell me about the journey to get to the destination and your return to the village? Do you think is it worth it? Why? Does it affect how often you are able to return and/or you are able to see your migrant HH members? In what ways? Does the journey and travel costs influence decisions to migrate or send HH members outside for work and/or education?
10. Do you work? Why or why not? If work, where? What do you do? Do you work part-time or half-time?
11. Who pays for your studies and living expenses? For those who work, do you contribute towards your education and living expenses? How much?
12. Do you send any money home? How much? How often? How important is this for your family back home?
13. What do you expect to do when you finish your studies? Why?
14. Do you expect to stay or return to the village? What does your family back home expect you to do?
15. How long do they expect you to stay out of the village? Do they expect you to return for good or temporarily? Do they expect you to re-migrate?
16. When you return to the village, what are you expected to do there? Are you expected to work as you did before you migrated?

Category 13A. Costs and benefits of migration: Education and pursuit of higher education

Questions
1. In your opinion, what are the benefits of investing in educating your children outside of the village? (Probe: investment into the future of your migrant HH member, investment for whole family, social prestige etc.)
2. How long does [name of the migrant] intend to study?
3. How much do you intend to support the migrant HH member to study?
4. Will you support (financially, socially and emotionally) other household members to also study outside the house? Why or why not?
5. Do you think that this support will be an important category of your household livelihood?
6. What are the regular expenses for your children who migrate for school purposes (tuition fee, LA, accommodation, transport any other expenses, etc.)? How are these regular expenses being met?
7. To what extent do you have to support your children's education in [name of destination]?
8. Do you or your migrant HH member receive support from anywhere else (university, government (subnational/national), community, extended kin)? From whom? What kind of support? How likely is it to continue? Will it be sufficient to meet their costs? How much does your contribution compared to the additional support that they receive?
9. How do you meet these expenses? (Additional work/income, selling gland/property, borrowing, family support.)
10. How do you send the money to them (channels)? How often? When did they start sending money, do they continue sending the same amount as the first time?

Category 13B. Costs and benefits of migration: Economic reasons

Questions
1. How long does the migrant intend to continue working outside the village?
2. Do they intend to return to the village or stay in destination or migrate elsewhere?
3. In your opinion, what are the benefits of having a family member working outside of the village? What are the costs? Do the benefits outweigh the costs?
4. Will you support other household members to also work outside the house? Why or why not?

Category 14. Returning story

Questions
1. Please tell me about your returning story, such as where did you come back from? When did you arrive? Why did you come back here?
2. 2. How long have you stayed for? Is it for good or do you plan to go back to [name of destination], or maybe do you plan to go to another place? Why did you return? Is it for good or you also plan to go back or maybe go to another place?
3. How do you feel about being at home again? Do you need some adjustment?

4. What do you do here?
5. What did you learn from staying there? Do you think that you apply the things that you have learned here?
6. Is there any expectation for you to come back home? Why? Who expected you to do so? Probe also expectation for not returning: for getting better job in destination for example.)

List of focus group discussion and key informant interview questions

Category 1: Historical, demographic, infrastructure and social information

1. Please tell me about the history of the village? How old is it? And what are the two or three most important things to know about the history and about people who live here?
2. How many households currently live in the village?
3. And 10y ears ago, how many people were living in the village?
4. What is the topography of the village like? Roughly what proportion is uphill, flat, etc. (This can be answered by the researchers themselves.)
5. How far is the village from the nearest market and from the nearest administrative centre?
6. What is the infrastructure like from the nearest market to the village? What about from the nearest administrative centre to the village? What about within the village? (This can be answered by researchers themselves.)
7. What are the main modes of transport available (such as bus, private car, rented car) and roughly how much does it cost to get to the nearest market and administrative centre?
8. What are the typical sources of livelihood in this village? 9.
10. What proportion of the village is involved in the following: 11. Subsistence farming? 12. Cash farming? 13. Wage work (un- or semi-skilled)? 14. High-skilled work?
15. What are the main social assistance programs available for people in this village? Identify whether they are offered by government or non-government.
16. Tell me a little bit about the local government here. Are local politicians and officials accessible to the people and active in supporting the people here? Do people regularly attend and participate in local government meetings (*musyawarah desa*)? What about accessibility of forestry and agriculture officials?
17. What are the typical water and sanitation facilities owned by households? Do they have the facilities within their house, or they are sharing?
18. What typical paid work is available in the village?
19. What kind of education is required for the work?
20. Is there unemployment or underemployment in the village? Who are the typically unemployed?
21. What is typical employment after finishing school?
22. How is village development planned? Are there any challenges in the planning stage?

23. The current allocation of village funds is quite good when compared to previous years, how do you see this? Is it a convenience?
24. What are the village funds spent on? For any activity in your own village (physical and non-physical)? Why do you prioritize this?
25. Are there any written/unwritten rules related to migration, forests (and their use) and how to manage land ownership in the village?
26. How does the village treat migrants from outside the village (companies/individuals)? Is there a written/unwritten rule?
27. Are there any specific efforts related to maintaining environmental conditions so as not to be degraded drastically? How is it done?
28. Are there any plans for social forestry schemes (customary forest, village forest, etc.)? How will it be done?
29. Apart from the Village Fund for development is there any a support from others? *Pemkab*, *pemprov*, NGOs, academia or other institutions that help community activities in this village?
30. What does the village government currently need to do to facilitate direct development at the village level? Why is it urgent?
31. According to the Village Government, have all development activities at the village level achieved maximum results? If not how can they be optimized?

32. Where do people in the village access the following:

Facilities	Inside the village	Outside the village (specify the nearest)	Any changes in the past 10 years	Proportion of school age children who attend the facility (¼, ½, ¾, all)	
				Boys	Girls
Kindergarten					
Elementary school					
Junior high school					
Senior high school					
Universitas					
Health center or clinic					
Other services, specify…					

33. If we were to divide the households into five groups: very rich, rich, medium, poor, very poor, then, describe the main characteristics of each group.

	Socioeconomic status	Key characteristics Detail: Land: such as land ownership, how many hectares? Assets: what type of house, etc., Income: How much? Education: What level Ethnicity: What ethnic grup?	Approximate number of households that fall in this category
1.	Very high		
2.	High		
3.	Medium		
4.	Low		
5.	Very low		

34. Please tell me about different social groups who live in the village (KII)

Social group	Share of local population	Language	Is this group associated with any particular livelihood? If so, record livelihood(s).	Is this group among the better off? Yes or No	Is this group among the politically active and influential groups? Yes or no	What proportion of total out-migrants and in-migrants from the village are from this social group(¼, ½, ¾, all)
						Out-migrant: In-migrant:
						Out-migrant: In-migrant:
						Out-migrant: In-migrant:
						Out-migrant: In-migrant:
						Out-migrant: In-migrant:

35. How big is the proportion of the land in this village that can be categorized as: a. primary forest b. secondary forest c. agriculture land (subsistence) d. agriculture land (cash) e. settlement area f. other forms of land uses (such as mining, plantations, etc.)?

36. Can you please tell me about how assets, such as land, housing or savings are commonly distributed through inheritance and marriage practice? Is it common or woman here to receive and control major assets through these practices? [Note to interviewer: Please indicate whether you are referring to legal or actual practice. make sure you get a strong sense of differences between men and women. If the village has more than one ethnic group (e.g. different types of Dayaks, Javanese, Batak, etc.), ask about each group]

Inheritance Patrilineal, matrilineal Land Assets (such as house, consumer items)
Marriage Arranged or love Age of marriage of male and female Residence patterns (patrilocal, matrilocal)

37. Have there been changes in people's socioeconomic position in the village in the last 5–10 years? Have people moved up? Have people moved down? Or have they stayed the same? Can you give examples?
38. What are the reasons for the observed changes? (Probe whether migration for employment purposes has had any effect. If so, how?)

Category 2: Land use and labor

1. What is the cropping calendar like in this village? What is the cropping pattern like? Have these changed in the last 10 years?
2. Do people plant trees, forest products in their private land? If so, what do they plant? How do they decide what to plant? If so, do they use for consumption or sale?
3. What kinds of rights do people have to the land that they live in and/or farm?
4. Where land is not privately owned or registered legally, how do people acquire the right to access and cultivate it? Under what terms and conditions?
5. What is the price of land per hectare? How is the price determined? Has the price increased, decreased or stayed the same in the last 10 years? Why is that?
6. How are terms such as 'grassland', 'underutilized', 'fallow' or 'abandoned' commonly understood in the village?
7. In your opinion, are there more or less land that is being left for fallow than 10 years ago? Why is that? (Probe in terms of cost of production, alternative sources of income, labor costs, etc.)
8. Which social groups are more likely to leave their land for fallow or underutilize their land? (Probe in terms of rich/poor, ethnicity, migrant status, etc.)

9. Where are such landowners who are underutilizing their land and/or leaving their land for fallow? Are they still in the village and/or have they migrated elsewhere? Or were they always outsiders?
10. Do you think that people leave their land for fallow and/or underutilized out of economic choice or compulsion or both? Please explain with specific examples if you can.
11. What is the state of the land that is left fallow? 12. Have trees, shrubs grown on them? 13. Does anybody utilize these forest products? If yes, are they owners or non-owners of the land?
14. Roughly speaking, what proportion of the village works (contributions household labor) on their own land? What proportion of the village works in other people's land as hired workers? Has this changed in the last 10 years? Why?
15. What is the socioeconomic status of the people who work as hired workers? (Refer to activity – socioeconomic ranking.)
16. What is the average wage earned by agricultural workers? Are there any differences in wages between women and men? How are the wages determined?

Land and labor:

Questions
1. How have most people in the community acquired private property? (Through purchase, inheritance, given by the government.)
2. Among the households that own agricultural land, what is the average landholding size?
3. What proportion of households in the community do not own agricultural land?
4. Generally, what is the size the smallest agricultural landholding that people have?
5. And, roughly, what is the share of the small landholders in the community?
6. Generally, what is the size of the largest landholding?
7. And, roughly, what is the share of large landholders in the community?
8. Are women recognized as private property owners? Is this historical or a recent? Is the property that women own, inherited or bought?
9. What kind of recognition (legal or customary) do people have to the land that they live and work in?
10. To what extent do people have legal recognition to the land that they own in the village?
11. How important is agricultural production for household livelihoods now? Has this changed in the last 10 years? In what ways? Explain.
12. Do people mostly produce their own food or do they buy it? Has this changed in the last 10 years? What types of households buy and what types produce their own food?
13. Do people plant cash-crops? What types? And how important is it for their livelihood?

14. How frequently do people buy and sell land in the village? Has this changed in the last 10 years?
15. What are such land owners' views about registering their land as private forests? Do they have any plans to do so? What kind of support would they need, if any?
16. What kinds of jobs do men have (both agriculture and non-agriculture)? Has this increased, decreased or stayed the same in the last 10 years? Why?
17. What kinds of jobs do women have (both agriculture and non-agriculture). Has this increased, decreased or stayed the same in the last 10 years? Why?
18. Do people mostly work outside the village or within it? Is this the same for women and men?
19. Roughly speaking, what proportion of the village works (contributions household labor) in their own land; what proportion of the village works in other people's land as hired workers? Has this changed in the last 10 years? Why?

Category 3: Migration and remittances

About economic migrants
1. Please tell me about the history of migration in your community/village. a. When did people first start migrating outside the village for employment purposes? b. Who were they? Are migrants mostly men or women or both? Has this always been the case? c. Where did they go? d. Why did they go there? Was it spontaneous migration or facilitated by someone else? Please explain.
2. What are the aspirations of young women, do they want to migrate for employment purposes? Or would they prefer to stay in the village? Please explain.
About education migrants
3. Please tell me about the history of migration for education in your community/village. a. When did people first start migrating outside the village for educational purposes? b. Who were they? c. Where did they go? d. Why did they go there? Was it spontaneous migration or facilitated by someone else? Please explain.
4. is migration for education purposes a trend that is widespread across different social groups who live in the village or is it concentrated among certain social groups. Please explain.
5. Where do people generally migrate to? How are the decisions related to the destination made in the household? What are the factors that are usually taken into account in making this decision?
6. Do the education migrants generally return to the village or do they re-migrate? If they re-migrate, where do they go? And why do they re-migrate?

Category 4: Forest utilization, migration impact, and gender relations

FOREST UTILIZATION
1. What are the main types of forest ownership in this village? Proportion of state, customary, community, private?
2. In which type of forest can people collect forest product?
3. Who can get access to utilize the forest (as stated in No. 2)? Is there any customary or legal rules about this? 4. In which type of forest do people collect forest product? Is there any deviation between where they can and where do collect? What are the reasons?
5. Can household's wellbeing be identified by type and frequency of forest product collected? If so, in what ways?
6. What are the typical characteristics of households that depend on the forest the most?
7. What does the community think about the role of the forests (other than to provide forest products)?
8. How big is the proportion of village residents that depends solely on the forest as its source of livelihoods?
9. How has this proportion change compared to 10 years ago? Why?
10. And how is this number expected to change in 10 years? Why?
11. Tell me about the history of community forestry in the village. When was it registered? Why? Who was involved in its formation? Who is involved in its management? What are the benefits that users get? How enthusiastic are people about forest management? How active is community forestry vis-à-vis other groups in the village mentioned above?
12. Are there any programs from government/NGOs to support the forest management? Please explain what the activities in the program are, and who is involved in this program.
Migration impact
13. Has migration impacted on the fuel used for cooking purposes? (Explain in terms of combination of firewood and other technology, replace firewood all together, purchase firewood instead of collect in private or public land, etc.)
14. Do you think migration has had an impact on land being left for fallow? What about on underutilized land? Please explain. (Probe in terms of labor, commodification of land, disassociation of agriculture from rural livelihoods, etc.)
15. Do migrants invest in any of the following: purchasing land, boosting agricultural production? a. Are they interested in making such investments in the future? b. What would incentivize them to do so? c. What about their family members who are left behind?
16. Do you think that there is a need for programs (government or NGO or both) to incentivize migrants and their families who are left behind to invest in agriculture? What about in forestry?
17. Should such programs be targeted at the migrants themselves or the people who are left behind? a. Why? b. If those left behind, whom should they target?
18. Which is the three most important crop for subsistence and/or for sale in the community? And what roles do local men and women presently have at different phases of its production, processing and trade?

	Crops/ forest product	Men's role	Women's role
1.			
2.			
3.			

19. Has migration affected the distribution of responsibilities described above?
    a. In what ways?
    b. Are men's roles still men's roles? Or can women also do them too? Or are other male members of the HH deployed or male workers hired for men's jobs? Please explain.
20. Has the availability of jobs for women in the wider village (not just the study area) changed since migration? What about for men?
21. I am also interested in the labor contribution of men and women to household chores in the village. Generally speaking what unpaid activities do men do for their families? (Includes cooking, cleaning, child care, collection of firewood/fodder, drinking water, etc.)
22. And what are the unpaid labor activities that women provide for their families? (Includes cooking, cleaning, child care, collection of firewood/fodder, drinking water, etc.)
23. In your opinion, has the division of work, drudgery of work, range of tasks or any other aspects of work changed due to migration? Or when men are away? How do people juggle these responsibilities?
24. Do you think that women have more or less autonomy in their lives when men are away? Why or why not? Probe in terms of the following:

	More or less autonomy?	Reasons	Influence of migration?
Marriage			
Acquiring education			
Finding a job			
Social activities			
Stay in extended household or set up nuclear household			
Other main decisions			

25. Do you think that women have more or less decision-making power when it comes to the following when men are away?

	Household decisions	During men's presence	During men's absence
1	Buy land		
2	Make changes to land, sell land, lease land		
3	Expenditure on food		
4	Investment in education		
5	Investment in health		
6	Other decisions, specify…		

Category 5: Role of youth, education aspiration, migration and support for education

1. How big is proportion of the youth who are currently:

	Boy	Girl	Comparing to 5 years ago, how the proportion changed? Increase, decrease or same? Why?	
			Boy	Girl
School age: Pursuing high school education				
College age: Pursuing education at university level				
Helping parents on the farmland				
Helping out parents by doing domestic chores				
Helping out parents by collecting forest products				
Working				
Unpaid work (mention)				

2. What kinds of paid work is available for young people in the village? Has this, and to what extent, changed in the past 5 years, what about 10 years? What about in comparison to their parents' decision?
3. When do young people start paid working? What proportion of work inside the village and what proportion work inside? If outside the village, where do they typically seek employment?
4. What kind of paid work that usually done by youth in this village?
5. What kind of the skills needed for the major categories of jobs that young people do in the village?
6. What do young people generally perceive about the jobs that are available to them or that they they do in the village? What about outside of the village?
7. What is the view of the youth in general about engaging in agriculture activities? Are they interested in agriculture? How is this similar or different from the views of their fathers/mothers generation (so previous generation)?
8. In general, what is the highest level of education that young people aspire to achieve in the village? Why?
9. Compared with 5 years ago, has this aspiration changed? How? Is it different between bos and girls?
10. What proportion of young people actually reach these aspirations?
    a. Boys
    b. Girls
11. Are there opportunities for young people to seek higher education within the village? What about outside the village?
12. What do young people consider as the major barriers to pursue higher education?
13. What kinds of support systems do young people have access to in order to pursue higher education? Who provides them? At what level (family, extended kin, village, district etc.)?
14. Are there any scholarships or subsidies that young people have access to in order to pursue higher education? Are these from the village or outside of it? Who provides them?
15. What proportion of young people out-migrate for work purposes?
16. What are major motivations of youth for out-migrating for work purposes?
17. Are there any distinguishing characteristics between young people who migrate for work versus young people who stay in the village? If so what are they?

18. Do young people return to the village? After how long? How long do they typically stay? What do they do in the village?
19. Do those who migrate for work purposes migrate alone or do they take their families along with them too? Why or why not?
20. What kinds of bonds and relationships do young people maintain with their families who are left behind?
21. What proportion of young people migrate for educational purposes?
22. What motivates them to migrate for educational purposes?
23. Are there any distinguishing characteristics between young people who migrate for education and those who stay back in the village? If so, what are they?
24. What proportion of educational migrants eventually return to the village? What proportion migrate elsewhere?
25. What do the returnees typically do?
26. Are there skills/knowledge transfer from the migrants to other youth?
27. To what extent are the young people who pursue higher education interested in agriculture? Why or why not?
28. What kinds of agricultural practices do they/are they likely to adopt?
29. If they are no longer interested in pursuing agriculture, what do they plan to do with the land that they inherit or access?

Category 6. Dynamics of livelihood changes due to migration: Coal mining

1. What kinds of jobs are available in the mining sector? Please describe the work?
2. Has the mining created more or less jobs?
3. Does the company favor local people?
4. What will happen when the mining stops in the village?
5. Has the existence of this mining and your work in this mining has contributed to you being able to support your children for migration for education purpose?
6. What would you do if you are not working in this mining?

DOI: 10.17528/cifor/007306

This working paper set out to examine the links between migration and forests through a case study of Malinau District in North Kalimantan, Indonesia. The findings indicate that there has been a generational shift in migration patterns: educational migration is the primary driver of migration from the research sites. An implication of such a shift is that migration has switched from being an income-generating activity to one that is a financial burden on rural households. To cover the costs of education, households whose livelihoods are based primarily on farming and forests, are intensifying agricultural production and forest product collection. The research highlight the urgent need to create jobs and economic opportunities for young people at the forest frontiers. This is created by a rise in migration for education, a growing need to earn regular cash income to finance such migration, and aspirations among young people to return to their villages upon completion of their studies. The study links the findings to social forestry policy as it is potential both to provide economic opportunities for people in the forest frontier and at the same time will also benefit from absorbing the returnee educated migrants.

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FTA's research is supported by CGIAR Fund Donors: cgiar.org/funders/

Federal Ministry for Economic Cooperation and Development

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