Author/s:
Dunphy, MB;Toumbourou, TD;Dressler, WH;Hasudungan, A;Utomo, A

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Caves of Fortune? Gendered Labour Precarity and Securitisation Involving the 'Wild' Edible Birds' Nest Trade in Kapuas Hulu, Indonesia

Mia B. Dunphy[1] · Tessa D. Toumbourou[2] · Wolfram H. Dressler[1] · Albert Hasudungan[3] · Ariane Utomo[1]

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Abstract
Harvesting edible birds' nests (EBN) produced by swiftlets from caves and purpose-built dwellings has generated a new high-value, non-timber forest product-based livelihood for rural smallholders across Indonesia. Drawing on extended fieldwork, we explore the gendered labour and livelihood outcomes for households transitioning from EBN cave harvesting to domestication in West Kalimantan, Indonesia. Following calls from feminist political ecology, we investigate the more visible 'men's work' associated with EBN access and labour and highlight women's pivotal, yet often overlooked, role in managing the associated household incomes and land-based livelihoods. We show how the increasing demand for 'wild' EBN drove significant changes in the ownership rights of caves in the region, securitisation and scarcity of the nests, and the rise in precarious labour conditions. The increasing demand for 'wild' EBN has intensified extraction and securitisation of caves and nests, and the precarity of work for Dayak men working as cave guards and harvesters. In response, many Dayak women—who receive and manage their husbands' salaries—saved to scale up their household's EBN production using purpose-built swiftlet farmhouses. Both spouses' labour contributions were integral to securing a sustained source of income through the EBN trade, enabling income diversification and a more hopeful future for rural households.

Keywords Edible birds' nests · Non-timber forest products (NTFP) · Gender · Livelihood · Feminist political ecology · Dayak · Indonesia

Introduction

Ibu Maria, a middle-aged Dayak Taman woman, sits in the shade in front of her two-storey home in Nangah village, a testament to the prosperity brought by her husband's work in the wild edible birds' nest (EBN) trade. As she cleans and trims rice stalks[1] to replant into her family's *uma* (swidden) plot, she recalls the many months spent managing the farm and household alone while her husband was away guarding caves containing swiftlet nests: 'I managed everything in my household. The key is that I manage it as a wife. I had three young children, and sometimes I left them in the house while I hauled the water [from the river] back to the house.' Many Dayak women in similar situations labour behind the scenes, managing their households and farms, while their spouses pursue new opportunities through the lucrative harvest of cave-dwelling EBNs. Maria's persistent efforts—or 'staying work'—aim to decouple her household's reliance on the precarious labour of harvesting wild nests in caves in rural West Kalimantan, Indonesia.

Like *Ibu* Maria, many Dayak Taman households[2] take advantage of income derived from EBN cave work, which requires families to adjust their labour needs across increasingly diversified livelihoods. While Dayak households have

[1] A process known as '*mandapur'* or '*marabut ase tungkan sasak'* in Dayak Taman. Some mature rice species are pulled out to clean and trim and then replanted in a wetter location (closer to river or a natural dip where the land is soggy) of the swidden plot.

[2] We use household and family interchangeably in this paper due to the on-going transition from 'communal' longhouse (*betang* or *rumah panjang*) households to more nuclear families living in individual houses in Nangah. See below.

✉ Mia B. Dunphy
m.dunphy@unimelb.edu.au

[1] School of Geography, Earth and Atmospheric Sciences, University of Melbourne, Melbourne, Australia

[2] School of Agriculture, Food and Ecosystem Sciences, University of Melbourne, Melbourne, Australia

[3] School of Business and Economics, Universitas Prasetiya Mulya, Jakarta Selatan, Indonesia

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long pursued livelihoods combining timber extraction, swidden, small-scale rubber (*Hevea brasiliensis*), and other non-timber forest products (NTFPs), many households have turned to the lucrative income from harvesting wild EBNs in caves and then specializing in farming EBNs in purpose-built *rumah walet* (swiftlet farmhouses). Although men typically control access to sites of EBN production (caves and farmhouses), Dayak women's less visible labour remains essential in managing the changing livelihood roles and responsibilities as their families engage the trade and the associated labour precarity, securitisation, and aspirations for prosperity.

EBNs are made from the hardened saliva of the swiftlet species (*Aerodramus* spp.).[3] Often referred to as the 'Caviar of the East' or 'white gold,' EBNs are among the most expensive animal products consumed by humans. Rendered and used in soups, drinks, and cosmetics for perceived health benefits (Jandam, 2021; Jordon, 2004), EBNs command prices as high as US $10,000 per kilogram in retail settings (Ito et al., 2021).[4] In forest and coastal settings, swiftlets produce nests in limestone caves and increasingly in farmhouses across Southeast Asia. For centuries, Indigenous and local men controlled and harvested nests from karst cave systems to exchange or sell them to supply the demand of aristocrats in East Asia (Lau & Melville, 1994; Warren, 2007). In the last few decades, demand has surged among an expanding middle class in China and wealthy consumers in overseas Chinese communities in Singapore, Vietnam, and Australia (Hobbs, 2004; Suzuki et al., 2020; Thorburn, 2014). While several studies have examined the rise and impact of EBN production in urban Southeast Asia (see Chew et al., 2020; Chua & Zukefli, 2016; Connolly, 2016; Jandam, 2021; Thorburn, 2014), few have considered the gendered roles and responsibilities among households who navigate the transition from the wild EBN cave harvest to the domesticated production of the nests (and its greater capital outlays and risks). Focusing on the changing gender roles of husbands and wives in the harvesting transition, we describe how the intensification of high-value NTFP harvesting can lead to uneven levels of wealth and how this places additional burdens upon women whose less visible labour demands increase across a range of livelihood activities that are needed to spread risk. In doing so, we build on previous studies that examine how household gender relations change due to livelihood transformation (Chant, 1997; Sitepu, 2000), the feminisation of agriculture (Leder, 2022), and out-migration (Chant, 1998; Elmhirst, 2007; Rodenburg, 1997).

From the early 1990s to the mid-2000s in the interior of Kalimantan, EBN cave work provided a relatively lucrative source of off-farm income for Dayak and other households seeking to supplement other livelihood activities such as swidden, small-scale rubber production, and NTFP harvesting. Dayak men travelled for many days by foot and speedboat along the Kapuas River to guard various karst caves for months at a time. Many of these cave workers were young married men with small children and their wives shouldered the varied reproductive work of raising children, running a household, and maintaining *uma* crops. In recent years, although cave work continues, families (largely men) have sought to capitalize on EBN demand by constructing farmhouses to attract swiftlets and cultivate their nests since they produce a cleaner, more desirable nest and drive down the price of ('dirtier') cave nests. As prices for cave nests decline, cave managers have intensified cave harvests to increase yields and sustain profitability, significantly depleting the number of 'wild' nests and swiftlets populations. As a result, cave workers (and their wives) face increasingly precarious labour conditions and are concerned about the future of cave-based operations and associated incomes.

We conducted our study among the Dayak Taman in Nangah village of Kapuas Hulu, a forested region in West Kalimantan relatively unaffected by the industrial logging that ripped across Kalimantan decades earlier (Gaveau et al., 2019). We focus on the recent history of EBN cave work to examine emerging gendered labour relations, responsibilities, and precarity involved in the transitions of EBN-based livelihoods. We emphasise Dayak women's critical yet less visible roles in negotiating and managing the journey from the wild cave harvest to specialized domestication through new farmhouse production. Women help reduce livelihood precarity by maintaining the agricultural foundation of their households during this uncertain transition.

We first examine the rise of cave labour among men in Nangah and the accompanying precarious conditions and economic gains. We then turn to how cave-worker wives manage the agricultural base, finances, and family while their husbands are absent and how younger and older men and women involved in past and present EBN cave work negotiate the social and economic outcomes of the evolving trade. We then examine changing gendered roles as households scale up EBN production using domesticated swiftlet farmhouses.

[3] *Aerodramus fuciphagus* produce white nests made purely of saliva, while *Aerodramus maxima* produce black nests, which contain additional feathers as a structural component in combination with saliva—the latter are perceived to be inferior.

[4] According to interview respondents from one of Indonesia's major birds' nest trade associations, the following five factors determine the price of birds' nests: size (bigger get higher prices); colour (whiter get higher prices); shape (intact, unbroken bowl shaped get higher prices); cleanliness (cleaner nests get higher prices); and weight (heavier nests get higher prices).

Methods

We draw on ten months of ethnographic fieldwork carried out over two phases in Nangah, Kapuas Hulu from December 2021 to February 2023. We conducted 84 interviews (1–1.5 h each) with various EBN traders associations and stakeholders, including cave workers and their wives, cave shareholders, managers, and individuals who had recently constructed EBN farmhouses. We compared the experiences of husbands and wives of households involved in the wild EBN harvest and domestication. Finally, we administered 34 household questionnaire surveys (10% of households) about livelihoods, assets, and family dynamics.[5] Interviews were recorded, transcribed, and translated from Bahasa Indonesia into English in 2023. All participants provided their consent. Pseudonyms are used for all people and places; University and Indonesian government ethics approval were granted.

Gendered Labour and Relations, Power, and Access

Drawing on feminist political ecology (FPE), we examine changes in gender roles and labour in relation to the EBN trade and broader processes of agrarian change. Initially, FPE scholars aimed to bridge feminist theory and political ecology to 'bring into a single framework a feminist perspective combined with an analysis of ecological, economic and political relations' across scale (Rocheleau et al., 1996: 327). Informed by neo-Marxist feminism, FPE focuses on the gendered impacts of political economic change (e.g., commodification processes), and environmental transformation, and how these shape household divisions of labour, contrasting access, and use rights between men and women over time and space (Elmhirst, 2015).

Growing attention to intersectionality has seen FPE commit to often-underexplored gendered knowledge, struggles, and voices of those from the margins (Sultana, 2021; Tran et al., 2021). Intersectional FPE focuses on how multiple and marginalised gendered identities and subjectivities become co-constituted through intersections of class, race, ethnicity, age, sexuality, and religion in uneven political economies (Elmhirst, 2015; Sultana, 2021). It problematises naturalised and undifferentiated categories of people, social relations, and the environment by critically (re)examining how gendered subjectivities and struggles are influenced by patriarchal relations and constraints that are intensified by the complexities, constraints, and impacts of global to local socio-environmental change (Elmhirst, 2015).

We examine two interrelated concerns from FPE: the micro-politics of household gender relations and how gender is articulated with differentiated access, use, and control of livelihood resources over time and space. Informed by feminist and agrarian change scholarship, FPE has revealed how the household and community in changing agrarian settings are comprised of shifting ecologies, socio-political relations, and uneven power dynamics across class, gender, and ethnicity (Rocheleau et al., 1996; Rocheleau, 2008).

Ribot and Peluso (2003) developed *access theory* by considering the gendered dimensions of access and control over emerging commodity production and exchange. The politics of access involves the 'ability to derive benefit from things,' (Ribot & Peluso, 2003: 154) through the maintenance and control of social relations across uneven geographies (Ribot, 1998). *Maintenance* refers to the allocation and expenditure of resources or powers to 'keep access open for oneself or others,' while *control* involves the 'ability to mediate others' access' (Ribot & Peluso, 2003: 154). Mediated by uneven power relations, gendered access, control, and maintenance work together to situate groups and individual women and men in local settings and along commodity chains (Ribot, 1998). Such gendered access and use dynamics are influenced by a multi-scalar mix of political relations, economic structures, and changing ecological dynamics (Ribot & Peluso, 2003; Ribot, 1998).

Like other resources, EBN extraction sites are subject to gendered norms and institutions that shape access, control, and management along production and supply chains from forest villages to major urban centres. A burgeoning literature has shown the inherently gendered nature of access amidst agrarian transformations, revealing how patriarchal norms can control and steer market opportunities, capital, resources, and labour relations (Elmhirst, 2015; Razavi, 2009; Toumbourou & Dressler, 2020). With deepening commodity markets in frontier settings, control over property rights and markets becomes increasingly aligned with (or embedded in) dominant patriarchal relations, with male brokers, elites, and harvesters holding greater control. These gendered imbalances often sideline women, limiting their influence and participation in commodity production and exchange (Toumbourou & Dressler, 2020). However, a more nuanced analysis also reveals how gendered practices and identities are sharpened by new labour demands, struggles, and contestations at the confluence of social, economic, and ecological change.

Against these uneven experiences of livelihood change and access conditions, husbands and wives often work

[5] We coded the data collected from interviews and surveys to identify emerging themes. Throughout the second phase of data collection, we employed triangulation techniques to validate and refine these themes and enhance the robustness of our findings. By combining the expertise and perspectives of the lead author and the fourth author, we present a comprehensive ethnographic account of the cave industry in Nangah.

together to diversify household livelihoods (Akram-Lodhi & Kay, 2009; Park & White, 2017; Razavi, 2009). Men and women's different roles and perspectives in the access and use of natural resources and income opportunities reflect co-contributions toward building mutually beneficial household income streams (Elmhirst, 2015; Rocheleau et al., 1996). Women's agency and control of resources is central to the 'cooperation' of 'staying behind' while their husbands out-migrate for cave work (Chant, 1998; Colfer, 1983; Leder, 2022; Rodenburg, 1997; Großmann, 2017). They manage their husbands' profitable but precarious income to support other livelihood activities. Women's persistence in land-based livelihoods, which we describe as 'staying work', ensures their families are less dependent on insecure cash incomes (e.g., EBN cave guarding) alongside maintaining familial and community social reproduction.

Cave Precarity amidst Fortune?

While many state and non-state actors have long advocated for the marketization of NTFPs as a 'win-win' for forest conservation and livelihood security (IFAD, 2008; Ingram, 2014), the intensifying commodification of NTFPs can reinforce socio-economic differentiation, further disadvantaging poor harvesters with low wages and income as the comparatively wealthy accumulate more of a resource supply in decline (Gauli & Hauser, 2011; Shaanker et al., 2004). As NTFP harvesting intensifies, resource access and income distribution become increasingly uneven along pre-existing social and economic lines (see Großmann, 2017; Wollenberg, 2001). The trade in high-value NTFPs is often dominated by wealthy male elites and their cronies who cover production costs and invest in the social connections needed to collect the products, access varied markets, and adhere to international import standards (Belcher et al., 2005; Belcher & Schreckenberg, 2007). Poorer women and men are excluded from better sale prices, injury compensation, and the ability to access resource flows under the control of elite traders (Shackleton & Pandey, 2014).

Both men and women harvesting NTFPs at the extractive end are 'price takers.' Unless politically organized, they tend to have little power and navigate price fluctuations and poor labour conditions (Shackleton & Pandey, 2014; Großmann, 2017). NTFP harvests are inherently precarious in nature, involving 'uncertain, unstable, and insecure work, where workers are subject to risk and are entitled to limited, if any, social benefits' (Sunam et al., 2021: 2).[6] Much literature on precarity examines how globalisation and 'late' capitalism have created a new highly marginalised working class that Standing (2012) termed the 'precariat'—a group facing persistent marginalisation, economic insecurity, and or social unpredictability. Although the term is important to debates on labour precarity, it is derived from the neoliberal foundations of rural-urban economies in the global north (Munck, 2013; Scully, 2016). Rather, we build on literature that focuses on the micro-politics of rural precarity involving 'uncertain relations of labour, fragile conditions of life, ecological dependence and reconfigured rural patronage relations' (Hougaard, 2023: 2440) in agrarian frontiers transforming due to regional and global political economic drivers (i.e., the consumption preferences of the Chinese upper middle class) (Hewison & Kalleberg, 2013; Rigg et al., 2016).

In rural frontier areas, the intensification of existing NTFP markets, like EBN, has led both rural men and women into increasingly precarious situations for much needed cash income. Such work was never 'secure'—EBN cave harvesting is extremely risky, involving climbing highly elevated rickety bamboo or rattan ladders attached to weak ropes in dark caves (see also Satizábal et al., 2022). Cave owners and buyers rarely provide any compensation should workers get injured or even perish and there are few if any other means of financial recourse. Typically, only able-bodied younger and middle-aged men can scale ladders or move through openings to reach the nests in the short windows of time cave owners are granted access to caves (Hobbs, 2004). The associated physical risk, terrain, and duration has meant that caves have always been a male space. Older men, children, and most women are excluded from the cave harvest. Women generally carry on with the 'staying work' of managing the family and farm and often redirect household finances towards the domestication of EBN in farmhouses. Although saving and investing in the farmhouses is a joint contribution, it is the husband's role to manage the production and maintenance of the 'business'. And yet, in the transition to EBN domestication, women increasingly play a greater role in maintaining all aspects of household production and social reproduction to ensure a smoother pathway to building wealth.

Nangah Village

The population of the Dayak Taman village of Nangah (Fig. 1), located along the Kapuas River in the eastern-most part of West Kalimantan, is 1,152 individuals across 357 households in four hamlets (*dusun*) and seven longhouses (*betang*). Young adult men frequently travel away in search of work, either in Malaysia's timber industry, planning for gold upriver, searching for *gaharu* (agarwood, *Aquilaria malaccensis*) and *damar* (resin of the *Dipterocarpus* spp.),

[6] As an ongoing process, precarity refers to limits in 'the options and conditions of 'wage-earning', and the kin-based, classed, and generational structures of feeling' (Matos, 2019: 17).

Fig. 1 Map locating Nangah, Sumber cave, and Pontianak in Indonesia (*Copyright: Chandra Jayasuriya)*

or guarding EBN caves. While the men are away, Dayak women intercrop vegetables and fruit in their swidden plots to sell locally or in Langkang's markets nearby (along with cakes, fish, and woven or beaded handicrafts).

Both women and men maintain the family's swidden. Traditionally, men fell trees and dug holes, while women planted seeds, weeds, and husk-harvested rice. However, women increasingly manage the entire *uma* plot (see also Anandi et al., 2020; King, 1985) with the assistance of other women in the household or '*bawa hari*' (reciprocal or paid labour)[7] when men look for off-farm income opportunities like EBN cave guarding. Both women and men (upon their return) manage rubber,[8] banana (*Musa* spp.), and kratom[9] (*Mitragyna speciosa)*, and crop gardens. These three cash crops have become the economic foundation for many households as they try to mitigate the risk of relying on only one crop (and fluctuating market prices). Cash crops are sold to wealthy Nangah buyers, who then sell to buyers in the nearby town of Langkang.

Extended families and kin connected by their *betang* (longhouse) have relatively recently begun to reorganize into nuclear families in individual houses in a move toward independent living.[10] Farm and off-farm livelihoods are diversifying, and technology, transportation, and higher education are increasingly accessible (Borras Jr, 2023; Rigg & Vandergeest, 2012; Sunam et al., 2021). Most Dayak Taman households invest in a 'dual household economy' (Dove, 2011): subsistence is supplemented with cash crops like rubber and banana and increasingly the income from off-farm labour opportunities. As rubber prices fall, many choose to replace or intercrop their ageing rubber gardens with kratom, an endemic plant that has emerged as a key cash crop.[11]

In the last decade or so, young men and women with a higher education (university or similar) have begun to look for off-farm work in nearby towns or in village construction to fill household cash needs partially or entirely. Wealthier households have increasingly invested in profitable arowana fish (*Scleropages formosus*),[12] cultivated in large purpose-built ponds. They also invest in EBN cultivation, with 18 swiftlet farmhouses built in since 2015.

A Brief History of Cave Harvesting in Borneo

For centuries, the harvest and exchange of EBN has connected Borneo and East Asia, with some tracing the trade back to the Tang dynasty (618–907) (Blussé, 1991; Lau & Melville, 1994).[13] In the past, younger and middle-aged Dayak men harvested nests from deep inside karst cave systems to trade with wealthy intermediaries who exported them for resale in Chinese and Hong Kong consumer markets (Chew et al., 2020; Connolly, 2016). Before the cash economy, merchants offered Dayak groups Chinese porcelain, linen, and cloth (Blussé, 1991; Cleary & Eaton, 1992). In these times, EBN was only consumed by Chinese emperors or elite court officials, although it is now consumed by a growing middle class (Connolly, 2016; Jandam, 2021).[14]

North and Northeast Borneo[15] were historical centres of the EBN trade and harvest (Warren, 2007).[16] EBN caves were considered owned by those who first discovered nests, with many Dayak households claiming ownership over specific caves (Koon & Cranbrook, 2002). Traders, often Tausug (from southern Philippines) and then Bugis (originally from southwest Sulawesi), entered into mutual agreements with cave-owning Dayak households to buy the nests. Traders were in constant competition, often allying with rival Dayak groups to access nests (Blussé, 1991). By the 1800s, competition became fierce with many traders resorting to forms of violence and slavery to capture the growing EBN trade (Blussé, 1991; Warren, 2007). In response, Dayak

[7] *Bawa hari* is paying for a day's work from another person. Traditionally, rice would be exchanged for labour; however, cash is increasingly used now. One day's labour is IDR 70,000 to IDR 150,000 and is usually in the swidden plot, but others hire for extra labour on cash crop farms, such as harvesting kratom leaves. Although men were often paid more for their labour due to their strength, women dominated the reciprocal labour system.

[8] Rubber yields on average 2.5 tons a year per household, from an average of around 600 trees. Households have planted between 0.25 and 2 hectares of their old rubber or banana gardens or swidden fallows with kratom trees.

[9] Further study is needed to understand this cash crop, the history of wild harvesting, the politics of trade, and the market.

[10] Although most households have now moved to individual houses, they are still inextricably linked to their *betang* and other families from the same *betang*. The *betang* is a central site of social, cultural, and economic activity in Taman society (see also King, 1985). *Adat* events, such as a funeral or a wedding, are held at the respective *betang* where all families from that *betang* together to host the rest of the village and beyond. Respondents explained that the *betang* continues to be a central component of Dayak Taman culture, kinship, and togetherness.

[11] Kratom leaves contain the chemical mitragynine, which is used as a stimulant in overseas pharmaceutical markets. The leaves are picked and dried before being crushed into a coarse grind.

[12] Arowana (or Siluk in Dayak Taman, also known as 'Dragon Fish') is a lucrative fish endemic to West Kalimantan. It is not consumed but rather kept in indoor aquariums in Chinese or Chinese Indonesian homes to symbolise prosperity and luck.

[13] There is much debate about the exact period when different areas of Borneo began trading with China. The first formal record of an influx of EBN from Borneo to China is from 1567 (Koon & Cranbrook, 2002).

[14] Jandam (2021) notes that some Indonesian Indigenous groups, such as those in Aceh, ate the nests during special occasions. This rapidly decreased when they could sell the nests for high prices.

[15] Previously, the Malaysian state of Sabah.

[16] The first EBN harvests probably occurred in the Niah and Gomantong caves in Sarawak (North Borneo), Sabah (Northeast Borneo), Malaysia (Jandam, 2021; Jordon, 2004) and further north in southern Palawan, the Philippines (Warren, 2007).

elites, who had long monopolised the caves, installed permanent guards to secure them (Rousseau, 1990).

Over the last century, in some Malaysian caves, overexploited EBNs drove swiftlet populations into sharp decline. In response, the Malaysian army was deployed to enforce a harvesting ban; however, this did little to curb the harvest as the 'soldiers were incapable of effective patrolling [because] they were corrupted and took bribes…to ignore theft' (Hobbs, 2004: 2216).[17] Our work shows similar dynamics at play in the EBN caves of West Kalimantan. Harvesters intensify their efforts to secure diminishing numbers of EBN in a rapidly changing ecological landscape. As with NTFP more generally, as commercial EBN harvests intensify, surplus value is consolidated into the hands of an elite group of intermediaries able to access markets and cover the high cost of extended travel into forests (Peluso, 1992; Peluso & Jessup, 1985).[18] Cave guard work is dangerous; the threat of robbers ambushing them to steal cave nests is ever-present. With increases in demand, scarcity, and prices, the military and or police were involved and exercised masculinised control over access points and travel routes along the EBN supply chains. The enforcement of bans, guarding of caves, and poaching of EBN is ultimately a male domain expressed through coercive and precarious masculinities.

Over the last decade, the cleaner nests from swiftlet farmhouses have become increasingly valued. Their emergence has reduced cave employment opportunities and effectively crashed cave-based nest prices, making cave-based incomes increasingly uneven. With the reduction of cave work and the rise of swiftlet farmhouses, husbands have returned more permanently to their villages.

A New Commodity Frontier: Emerging Cave Work in Nangah

Dayak groups in Kapuas Hulu only began harvesting from caves in the late twentieth century when the value of cave nests began rising in the 1980s (Hobbs, 2004) and rumours of highly profitable opportunities travelled up the Kapuas River. Groups of men from Kapuas Hulu undertook surveying trips to locate and claim productive caves, typically financed by local male Dayak entrepreneurs whose wealth stemmed from the timber trade in the Upper Kapuas and/or Malaysian Borneo. The survey groups followed wild swiftlets in the late afternoon as they returned to their roosting caves. The expanding Chinese-Indonesian population in Pontianak and increasing migration into the uplands stoked demand for EBN, turning these initially isolated caves into lucrative, sustained employment opportunities. The cavernous mountains emerged as a new commodity frontier (Joseph, 2019).

The 1990s brought significant changes to Nangah, including paved roads and electricity. Swidden and rubber-based livelihoods could no longer meet daily household and material needs. Meanwhile, the EBN cave harvesting and related work expanded, becoming increasingly profitable amidst economic decline, low rubber prices, and limited civil servant jobs. Up to 80% of men worked in various caves between the 1990s and early 2000s. In the Upper Kapuas, wealthy Dayak and Melayu men eventually monopolised the most productive EBN caves and hired poorer Dayak men as labourers. The Sumber Cave emerged as one of the most productive and lucrative harvesting sites in Kapuas Hulu (Fig. 2).

Monopolising Caves: Uneven Control, Precarious Labour

The Sumber Cave was first claimed in 1992 by Pak Marcellus. He had heard about the emerging EBN market in Pontianak while working as an independent *belian* (Borneo Iron; *Eusideroxylon zwageri*) timber cutter along the Upper Kapuas River. He and four men from a village near Nangah surveyed the mountainous areas in the hope of finding caves containing a steady supply of EBN. When they discovered the Sumber cave, they became partial claimants ('shareholders', *orang saham*), owning and controlling access rights in accordance with a local first-finder practice.[19] Ownership and work systems created during this time remain largely the same today. Each of the five shareholders is allocated two months on rotation to access the cave and harvest the nests. Shareholders either outsourced the labour to local men, often close kin, or, more commonly, rented out their two-month right to access and control the cave to someone else (often wealthy local men) for hundreds of millions of rupiah. Declaring and sustaining ownership rights required visible evidence of occupancy and use, such as the presence of a *pondok* (hut) and, importantly, armed men guarding the cave entrance.[20] The active presence of local cave

[17] The army was employed by the Sarawak Museum and, later, the Sarawak Forest Department.

[18] In East Kalimantan, intermediaries extract rent from NTFP harvesters by providing them credit to cover the cost of travel to harvest products, then by purchasing NTFPs they harvest at a low price (Peluso & Jessup, 1985).

[19] According to Sellato (1994), examining the area up river of the Sumber cave, the market for EBN during his field work in the 1970s was minimal and the Punan did not harvest and trade nests from surrounding caves.

[20] The last decade has seen a growing number of seemingly 'abandoned' caves that reaped profitable harvests for previous owner/s. As prices and harvests fell, several cave owners decided it was not financially viable and 'abandoned' the cave by withdrawing the guards. Further study is needed to understand this decision-making process and what withdrawal means for cave control and access.

Fig. 2 Approximate location of Sumber cave (in relation to Nangah and Langkang) (*Copyright: Mia Dunphy)*

Table 1 The rise and fall of cave nest prices

Year	Median price for cave nests in IDR per kilogram	IDR equivalent in 2023 per kilogram[a]
1992	0.2 million	2.2 million
2000	5.5 million	21.1 million
2003	8 million	23.1 million
2022	1.5 million	1.5 million

Source: Interviews with current and former cave owners and managers

[a]These numbers are based on CPI Inflation Calculator. (https://www.officialdata.org/indonesia/inflation/1992?endYear=2023) and shows the equivalent in purchasing paper in 2023 due to inflation of goods

Table 2 Sumber cave guard salaries since 1992

Year	Sumber cave guard salary in IDR per trip	Equivalent IDR salary in 2023
1992	2 million	22.7 million
2000s	2.5 million	8.6 million
2023	3.5 million	3.5 million

Source: Interviews with previous and current cave guards and managers in Nangah

guards and harvesters sustained the durability of cave ownership claims and prevented theft. These workers, many from local villages like Nangah, travelled several hours up rivers and along uneven forest trails through limestone mountains to reach Sumber Cave. Cave nests were harvested every 45 days. As the nest prices rose, the need to guard further intensified.

In 1992, nests sold for IDR 0.2 million per kilogram, peaking at IDR 8 million or more in 2003. Due to inflation, it is difficult to compare such amounts in nominal values (Table 1). Nevertheless, cave owners accumulated significant wealth and status. According to *Pak* Marselus, 'The income I received from selling the nests (over the years) was almost IDR 50 billion…but I spent it on alcohol and gambling quickly.'

When cave guarding first began in 1992, wages were approximately IDR 2 million for 45 days of constant work (known as a 'trip'), including travel to and from the caves.[21] Workers supplemented their dry rations (up to 50 kg of supplies) with hunted food–*ular* (snakes) caught around the caves, pigs, *kijang* (barking deer), *kancil* (mouse deer), and fish from the river. All workers contributed to maintaining the camp, including cooking for each other, collecting firewood, and rostering night guard shifts. Today, guards at the Sumber Cave receive IDR 3.5 million per trip (Table 2), which is far higher than wages in rubber tapping and lower-level civil service positions.

The quality and price of cave nests change with the seasons. Nests collected during the dry season between October and May, known as *kaki*[22] *kering* (dry feet), are thin, dry, white, and higher valued. Those collected in the wet season from June to September, known as *kaki basah* (wet feet), are thick, wet, black, and prone to insect and caterpillar

[21] Cave shareholders covered all workers' costs including food, equipment, coffee, and cigarettes while travelling to and living in a wooden *pondok* (hut) at the caves.

[22] *'Kaki'* refers to the section of the nest that is stuck to the cave wall, rather than the protruding.

infestation. As the season influences nest value, the number of workers also varies, with fewer workers at the cave during the wetter seasons due to lower profits and lower likelihood of theft.

Despite lucrative incomes, cave work was isolating and dangerous. The wives of cave workers recalled their initial concerns for their husbands' safety; however, as extended work trips became routine, their concerns gradually subsided. Their husbands spent months away at caves, returning home only for brief periods (up to one week), many missing important events like the birth of their children. Men would often only spend about 50 days a year at home. To combat isolation, some couples exchanged letters or information via circulating workers. A wife of one former cave worker, *Ibu* Cindi, noted: 'Usually I sent a letter saying that me and our family were healthy. I provided information if someone died in the village.'

Nest harvesting occurred every 45 days and was only done by the 'bravest' guards.[23] *Pak* Tomba, a long-time cave worker, explained that there was no training or insurance—'we only give advice.' The shareholder allocated most harvesting roles to young and middle-aged men brave enough to endure the dangerous depths and darkness, reinforcing the masculinised skills, experience, and bravery. Many women tended to agree with this. As *Pak* Tomba explained, '[working at the cave] requires guts. If you don't have the guts, you can't go up to the caves.' The precarious cave work entailed lowering younger men from the surface using the *'ulur'* method, a belaying rock-climbing technique with handmade rattan rope tied around the harvester's waist and attached to a large rock at the surface opening.[24] A wooden floor was built at the bottom of the cave (Fig. 3) to collect the dropped nests, which were placed in a hessian sack, sewn up, and carried to the shareholder in Langkang.

Securitisation, Deepening Precarity

Nest theft was a constant threat in the 1990s and early 2000s (Koon & Cranbrook, 2002). Workers did not receive any pay when nests were stolen, which added additional pressures on family finances. A former cave guard, *Pak* Aldo, noted: 'There were risks, if we lost [the nests], we were not paid… One month, I was on duty [and a nest thief stole nests], I didn't get my salary, and went home empty-handed.' Soaring nest prices brought soaring securitisation; at the peak, 40 local men worked as guards at once. Many cave guards were armed with weapons including *mandau* (swords),

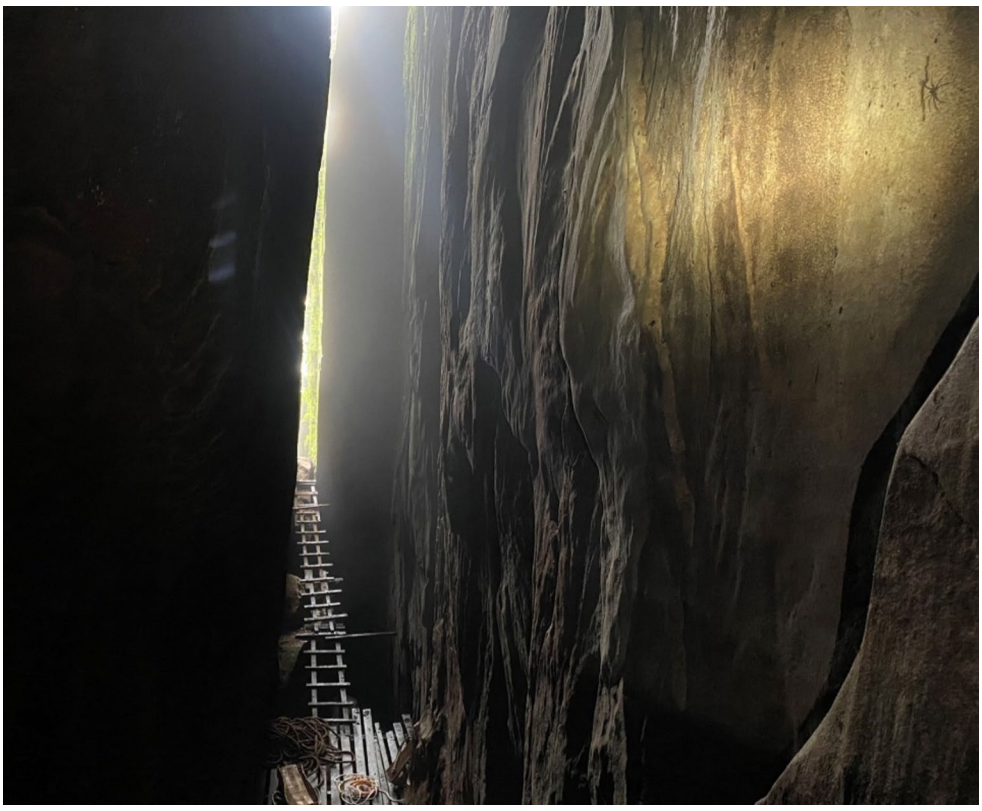

Fig. 3 Inside the Sumber Cave looking towards the entrance *(Source: Mia Dunphy)*

[23] The number of cave harvesters has varied over time, depending on cave quantities. In September 2022, there were three cave-harvesters.

[24] In other cases, groups of workers would simply hold the ropes from above and then slowly lower the harvester down 200–300 m into the cave.

Table 3 Average nest harvests at the Sumber Cave over time (in kilograms)

Year	Average kilograms per harvest
1990s - early 2000s	300–400
2009	100
2022	20

Source: Interviews with current and former the Sumber Cave owners and managers

bogem (knuckle paracords), and rifles. Former cave guard, *Pak* Dayut, recalled his willingness to draw weapons or have others use them, 'We brought snipers to protect us. We had no misgivings. If robbers came, we'd send them back very fast.' Another guard, *Pak* Rajayang, noted the mounting violence, explaining '[thieves] would spy on us.…if we saw a flashlight, we'd start shooting in the direction of the shadow.'

Soon the military (*Tentara Nasional Indonesia*, TNI) and police became enrolled in cave security work. Shareholders negotiated with commanders to recruit low-level military officers from local outposts. When the nests were at their highest value, four to twelve military and police officers helped the teams of local cave guards at Sumber Cave, although they did not harvest nests. *Pak* Yosef explained that in 1995, military recruits were paid IDR 5 million per 'trip'—double the pay of locally hired cave guards: '[Military security] is a government arrangement. The police and military had a different salary than us ordinary people.' Shareholders also gave military commanders several kilograms of nests each month in addition to their cave salary and government salary. The presence of the military with higher pay and nest bonuses intensified uneven power structures in these masculine sites amidst extraction, violence, and risk. However, by 2008, the emergence of an abundance of cleaner and higher-priced nests from swift farmhouses pushed cave nest prices down and reduced security risks, eliminating the need for military and police services at the caves.

Wild EBNs have declined considerably due to the intensification of the harvests. The rolling two-month access system did not give the swiftlets enough time to produce nests and drove unsustainable levels of extraction.[25] *Pak* Remang explained, 'There was no preservation, before the egg hatched and the bird could fly, it had been harvested and replaced by another shareholder [team].' According to *Pak* Balang, 'We must follow the boss' rules. We must obey. If we don't obey, we won't be employed again—fired.' Masculinised power relations between shareholders and cave workers (guards, managers) became increasingly apparent and uneven. Cave owners demanded higher harvests, requiring cave harvesters to perform more dangerous work of finding nests in harder-to-reach parts of caves. Cave workers observed increasingly unsustainable types and levels of extraction, including taking nests before birds could hatch, only to reduce the yield of nests in subsequent months and years (Table 3). In September 2022, harvesters secured only a meagre 20 kg of nests compared to 400 kg harvested per trip in the 1990s.

The price of cave nests has significantly declined in recent years. In September 2022, 18 kg of nests were sold for IDR 0.8 million per kilogram, while in January 2023, nests sold for IDR 2.5 million per kilogram.[26] This is a stark decline from two decades ago and creates new financial challenges for cave managers and their families. *Pak* Yosef explained cave managers live with constant precarity: 'We often experience [financial] losses… usually, losses occur during the wet season which is sometimes paid back by the harvests sale during the dry season…for my wife and *Pak* Tomba's wife, it has become commonplace for them (to experience a financial loss from the caves). Thanks to the support of our wives and children, we don't blame each other, it has become normal.' For *Pak* Yosef and *Pak* Tomba, it has become increasingly difficult to make sufficient income to pay rent to cave shareholders, salaries to guards, and cover other auxiliary costs. Despite diminishing nest quantities and prices, shareholders, managers, and guards all sought to maintain their income. As cave work income becomes increasingly precarious, women labour in the shadows of the cave harvesting effectively stabilised the uncertainties from the declining income of the men's cave work.

Women's 'Staying Work'

Male migration to work in EBN caves shaped gendered labour relations within and among households. Husbands and wives negotiated how long men were away and how much income would be generated relative to family needs. Wives recognised the necessity of their husband's work to fulfill livelihood aspirations like building individual houses and sending children to school. Women's 'staying work' is best understood as the active caring for and managing public and private reproductive work that underpins diverse livelihood practices and security in the absence of their spouse.

In the absence of their husbands, women play a central role in maintaining household swidden and cash cropping

[25] In other regions of Indonesia, nest harvesting is only undertaken in specific seasons. Lau and Melville (1994) noted how in Sarawak it is common to harvest twice a year in December and June, while in South Java, it is three times a year with many harvesters eating the eggs, creating a decline in some areas and some species extinction.

[26] Since COVID-19, EBN traders noted fluctuations in prices due to consumers linking perceived immunity benefits of the nests to COVID-19 symptoms. However, in the latter part of 2023, EBN traders cited China's animal import regulations for EBN's declining prices.

that underpins food security and income generation. *Ibu* Maria stated, 'I continue to farm swidden so the money we have doesn't have to cover everyday needs like buying rice. I [also] tap rubber for income to cover kitchen costs.' However, other women stopped working in their swidden and gardens without their husbands to share childcare and other social reproductive roles. When they cannot harvest rice, women use their husband's cave salary to buy rice. When their children are old enough to be left alone for short periods, women tap rubber in the early mornings before working on their swidden plots. Cave worker wives often come together to support one another when their husbands work at the cave; as *Ibu* Defi explained, 'We tell stories and exchange opinions… chatting together.' In this way, women create social support systems and spaces that help them navigate the challenges and opportunities emerging from the trade, enabling a sense of community among those who otherwise felt isolated while their husbands worked at the caves.

Staying behind in managing family affairs poses unique challenges. *Ibu* Claudia had difficulties balancing young children and farm work when her husband (*Pak* Tomba) was away. She explained that she planned her three children's births (aged 23, 16, and 4) with this consideration: 'Their ages are far apart so I could work. Because there's no one to help with work, no one to watch over the house, I often work alone that's the reason for their age gaps.' Cave worker wives navigate productive and reproductive challenges alone as they work and maintain the farm and family, making decisions based on their capabilities and needs. When household and farming responsibilities intensify (e.g., during the harvesting season), wives replace their husbands' labour by allocating a portion of their husbands' wage to pay other men and/or women in the village as '*bawa hari'* to work alongside them in their swidden plots or farms. *Ibu* Claudia explained: 'It's rare that my husband comes to the swidden field…I hire my own people and run the clearing of swidden fields myself…If my husband is away and our cash runs out, I sell rice. Sometimes, I give rice to people [in exchange for their labour].' Women often use their husband's salaries or surplus rice to hire others to assist with farm-based tasks that require additional support, such as clearing the swidden field.

Many women also work together to support field and farm management while their husbands are away. When cave workers return to the village, they often work side-by-side with their wives in the swidden fields or farms for a few days before returning to the caves. These gendered roles co-produced livelihoods over time and space (Langill, 2023). Men and women worked separately and jointly to maintain subsistence and fulfill their shared aspiration of a stable, sufficient income. *Pak* Tomba noted, 'After saving money, working together with my wife, we now have our own home, we are independent…the earnings go to my wife, so they aren't wasted.' Some women, like *Ibu* Defi, convinced their husbands to refuse cave work when cash crop prices were high, 'In the past, the price of kratom was low, so my income was also low. Now the price of kratom is high…so my husband and I decided this time he would work on our kratom farm instead of guarding the cave.' Husbands and wives navigated varying opportunities together, prioritising certain income-generating livelihoods over others in accordance with their needs.

The wives of cave workers are *de facto* heads of household, investing savings from their husband's cave work back into household livelihood activities or saving for future investments. For example, *Ibu* Maria noted: 'We women have to be good at saving money, men can't do it, they sometimes are wasteful with money.' Cave workers' salaries are often paid directly to the wives by the cave shareholders or managers. This was the first cash income many cave-working households had received. *Ibu* Maria, wife of *Pak* Rajayang, explained: 'When my husband started working at the caves, we started to have an income and could save… From that, I started to be able to put away a little money each month.' Women play a key role in managing and saving cash incomes, dividing the cash into categories based on needs–children's school, petrol, etc.–and saving the remainder for future investments.

This cash income helped families move out of the longhouse, build their own family home, and fulfill their own social and economic pursuits. For example, with husbands working in caves, many women learned to invest their money in a local Credit Union (CU) in Langkang. The CU investment allowed them to save more and, eventually, earn credit to take out a loan against their off-farm cash income to finance farm and family investments, such as swiftlet farmhouses.

Investing in Swiftlet Farmhouses

Increasingly, cave workers and their spouses use their income savings or CU credit to construct tall concrete or corrugated iron swiftlet farmhouses (also known as *gedung gua* (cave buildings)).[27] Because his wife had proactively saved his income from cave work, *Pak* Dayut was the first to build a swiftlet farmhouse in Nangah in 2015. There are now 18 swiftlet farmhouses in Nangah, six of which were

[27] Swiftlet farmhouses are multi-level towers (3 or 4 storeys) ranging in size from 4 × 8 to 12 × 8 m squared. They cost between IDR 150–300 million depending on the size, quality of materials, and labour costs.

established with income from former employment as coordinators or managers of the cave harvests.[28]

For most households, building a swiftlet farmhouse is an increasingly hopeful investment for their families to pursue new livelihood opportunities for greater long-term financial security. While only a few households in Nangah have managed to harvest a few ounces of nests from their swiftlet farmhouse (the buildings are relatively new), the nest quality and high price help make up for the low yields. The white nests from swiftlet farmhouses can sell for up to IDR 20 million per kilogram. However, prices vary with international and local markets, trade regulations, and global events (such as COVID-19). *Pak* Aldo explained, 'the nest prices fell, they used to be over IDR 20 million for 1 kilo. Now it's most likely 8 million per kilo, up and down.' In addition to fluctuating prices, there is no certainty that one's swiftlet farmhouse will even succeed in hosting swiftlets, creating increased precarities. *Ibu* Afina noted that their swiftlet farmhouse failed, 'We tried. At first, the swiftlets flew in several times but failed because they were preyed upon by rats…it has been more than a year, and the swiftlets do not enter anymore; it is considered a failure.' Many swiftlet farmhouses fail to ever attract swiftlets. Even with these uncertainties, this new development is now part of family livelihood planning. As *Ibu* Selong noted, '[swiftlet farmhouses] will give life to the economy; [we can] spend [the income], save it for our children's future, for the necessities of life.'

EBN production in swiftlet farmhouses has begun to replace cave work, with implications for inter-household relationships and the village's physical landscape. Like EBN caves, swiftlet farmhouses are masculine spaces. Women are either not allowed to or do not want to enter them, citing the dark, smelly, cave-like interior, and many husbands do not allow their wives to enter in case the birds leave. Although often built next to the home (associated with women's unpaid labour and domestication), men are the labourers, harvesters, and managers of swiftlet farmhouses, as in the caves.

Discussion and Conclusion

Drawing on feminist political ecology, our analysis reveals new understandings of the situated gendered roles and power relations that emerge across households, farms, and caves as more families become incorporated into the EBN industry (Elmhirst et al., 2017). Across Indonesia's agrarian frontier, intensifying production of EBNs and other NTFPs has highlighted gendered divisions of labour while generating new, albeit precarious, economic opportunities beyond smallholder farming. The emergence of cave work in the early 1990s was dominated by men, but it required that women, and later both spouses, manage the income streams from the harvest. In many cases, women took on the sole responsibility of maintaining the family and farm.

Routine gendered livelihood diversification was influenced by an intensifying EBN trade that moved from relative abundance to scarcity and securitisation, and then domestication (Tsing, 2018). As commodification intensified, EBN extraction reinforced masculinised norms of access, use and distribution along securitized sections of the rural supply chain. As feminist political ecologists have shown, the local deepening of patriarchal norms can control and steer market opportunities, capital, resources, and labour relations (Elmhirst, 2015; Razavi, 2009; Toumbourou & Dressler, 2020). Access and use of productive EBN caves was confined to a few elite men, resulting in a concentration of profit and creating highly precarious work for young-bodied men, while women were excluded entirely (Ribot & Peluso, 2003). However, women's 'staying work'—managing family, farm, and EBN income—ensured that revenue from cave harvesting income was properly invested in the next generation of EBN domestication (swiftlet farmhouses) and other future livelihood needs. Analysing the gendered micropolitics of the trade is thus crucial for understanding the power structures, gender disparities, and forms of agency exhibited by different social actors within the industry.

During the 1990s to early 2000s, cave owners hired the Indonesian military and police to protect (nests and workers) and ensure elite cave shareowners monopolised and accumulated cave profits. The substantial expenses associated with military protection were ultimately borne by cave shareowners, who adopted more intensive and unsustainable harvesting practices to offset the financial burden. Such militarised forested or resource landscapes are not new. Leonald and Rowland (2016) noted that forests in Kapuas Hulu were dramatically militarised during the New Order, while Kartodihardjo et al. (2009) described how such militarised forests led to 'quasi-capitalism, state corporatism… system[s] of corruption, collusion and nepotism.' This assisted elite shareholder access and control of cave rights and perpetuated the accumulation of wealth while contributing to the decline of nest stocks (see also Satizábal et al., 2022). The over-harvesting and decline in nest quantities seen in Sumber Cave have been observed in caves across Borneo (Chiang, 2011; Thorburn, 2015). Unlike lower-value NTFPs, cave nest revenues significantly reshaped wealth differentiation as local elites accumulated most of

[28] Twelve are owned by wealthy Dayak families who accrued cash savings from employment as teachers or in the timber trade, only building the swiftlet farmhouse once the first few were developed.

the profits. These unequal power relations inherent in the evolving EBN industry and livelihoods have differential impacts on men and women (Colfer et al., 2018; Collins, 2019).

Our analysis reveals how EBN income allows husbands and wives to sustain diverse forest and farm-based livelihood activities while also further specialising in EBN production. However, this process has been fraught with precarious and securitised work. Overcoming such precarity depends on each family sustaining access to the income drawn from cave work while simultaneously sustaining household reproduction by maintaining their swidden plots. Men's and women's roles and responsibilities are both important for negotiating fluctuating harvests, income, risk, and uncertainty as the wild EBN trade gradually declines. Husbands are subjected to militarised masculinities and increasingly demanding bosses as cave EBN grows scarce, while women invest the income into family needs and farm management (see also Chant, 1997; Großmann, 2017; Leder, 2022). Many Dayak women manage the 'fallback' livelihood provisions—subsistence and cash crops in their swidden (an aspect of what Akram-Lodhi and Kay (2009) call the 'non-commodified subsistence guarantee') to provide a degree of livelihood security to buffer against the 'dislocating forces of agrarian capitalism' associated with the precarity of the wild EBN trade and enable development of swiftlet farmhouse production (Barney & van der Meer Simo, 2019).

Cave workers' wives help to 'decouple' the household from the cash income from cave nest harvesting. They increasingly adopt flexible, lucrative income-earning livelihood activities in line with their aspirations (Roscher et al., 2022). Households save cash to invest in swiftlet farmhouse production. Strong conjugal relations and foresight allow households to save sufficient cash to invest in this new opportunity that is proliferating in Kapuas Hulu and beyond. Swiftlet farmhouse production— 'the latest episode of domestication' (Thorburn, 2015)—is not necessarily land and labour-intensive (once built). Their high cost does present risk, but not at the expense of other livelihood activities and land holdings. Local aspirations change in response to new social and ecological realities that bring imagined futures to fruition in changing agrarian frontiers (Bennike et al., 2020). Access to cave EBNs offers both men and women incomes to save and invest in new livelihood pathways (i.e., swiftlet farmhouses), to navigate from precarity to potential prosperity. What such transitions mean for the roles and responsibilities of younger and older men and women in Nangah remains as yet unclear, however. Some households may profit from specialising in lucrative NTFP production, but the uncertainty surrounding localised commodity booms may see households continue with agricultural production as a 'backup' into the future. Sustained access to land is essential for Dayak women to retain the social influence that accompanies continued land ownership and to secure a self-reliant source of income, rather than depending on unstable employment and income sources.

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Declarations

Human Ethics and Consent to Participate This study received and followed ethical protocols/permits from the University of Melbourne and Badan Riset dan Inovasi Nasional (BRIN– Indonesia's national foreign researcher centre). All participants received a Plain Language Statement (either read themselves or had it verbally communicated to them), which outlined the research, data, and privacy. All participants provided consent (written or spoken). All names and places within this study have been changed to ensure confidentiality.

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