Digital Press Social Sciences and Humanities

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International Conference on Nusantara Philosophy: Philosophy of Well-Being: Revisiting the Idea of Sustainable Living and Development

M. Rodinal Khair Khasri, Rangga Kala Mahaswa, Taufiqurrahman, Dela Khoirul Ainia, Shoim Mardiyah (eds)

Rethinking Slash-and-Burn Agriculture: Slowing Down the Progress for Sustainability

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Abstract

Slash-and-burn agriculture is often depicted as a "primitive" or "traditional" form of farming, closely tied to the way of life of indigenous communities. The Dayak Benuaq people, who live in the upstream areas of Kutai Barat, East Kalimantan, continue to practice this method to this day. Anthropologists have extensively documented this agricultural model, revealing its potential sustainability when practiced in balance with ecological processes. This paper aims to explore the strong connections between slash-and-burn farming and indigenous ecological succession, while also encouraging a rethinking of the concept of metabolism within this agricultural system. By incorporating the framework of 'degrowth,' it becomes evident that slash-and-burn agriculture embodies principles of allowing the soil and environment to recuperate during fallow periods. In the context of the rapid expansion of monoculture plantations, such as oil palm and rubber, in Kalimantan, this study seeks to demonstrate how slash-and-burn agriculture is adapting to the pressures of global commodity crop production. Through a systematic literature review, our findings highlight that the Dayak Benuaq community is not isolated but instead demonstrates resilience and adaptability by integrating sustainable practices with global commodity changes. This research seeks to address two main questions: (1) What is the relationship between slash-and-burn agriculture and ecological succession, and (2) how has this farming method adapted to accommodate commodity crops like oil palm? By answering these questions, the study discusses the role of ecological succession in sustaining indigenous agricultural practices and how these practices are being reshaped in response to broader environmental and economic forces.

Keywords

slash-and-burn agriculture, degrowth, metabolism, sustainability, ecological succession

1 Introduction

Slash-and-burn agriculture is a common farming practice, especially in areas often beyond direct government control. The Dayak Benuaq community in Kutai Barat, East Kalimantan, relies on this method, locally known as *umaq*, to meet their daily needs, including cultivating food crops and vegetables. *Umaq* typically refers to dry paddy field farming and shares similarities with other terms like shifting cultivation or swidden farming. The process begins with cutting down trees, leaving them to dry, and then burning them to clear the land for farming. This practice, primarily aimed at self-sufficiency, is widespread among indigenous communities in regions with suitable land for shifting cultivation. However, the local government perceives slash-and-burn farming as a significant contributor to deforestation. During the dry season, when the Dayak Benuaq community deems it an ideal time to clear land by cutting and burning trees, the Regional Board for Disaster Management (*Badan Penanggulangan Bencana Daerah* or BPBD) often intervenes. They investigate the fields, searching for those deemed responsible for deforestation in the area. This paper seeks to examine the practice of slash-and-burn farming, which is frequently stigmatized for its alleged role in deforestation, and to provide a nuanced understanding of its importance to indigenous livelihoods and its environmental impact.

Meanwhile, numerous anthropologists have studied slash-and-burn farming, revealing its potential to be environmentally sustainable (Padwe, 2020) and conducive to ecological balance. We argue that there is a strong relationship between slash-and-burn farming and indigenous ecological succession. This method allows the soil and forests to recover over time, aligning with natural cycles of regeneration. Using the

concept of *degrowth* (Saito, 2020), we suggest that slash-and-burn farming intentionally slows the accumulation-driven processes of modern agriculture by prioritizing subsistence farming and enabling forest regrowth through indigenous ecological practices. In light of the ongoing ecological crisis, this study also examines the metabolic dynamics of slash-and-burn farming (Saito, 2020), offering a deeper understanding of its role in fostering a more sustainable interaction with the environment.

This paper aims to address the research question of how the Dayak Benuaq community manages their forests through slash-and-burn farming. Drawing on insights from Gilang Mahadika's master's thesis, *Gardening in Plantation* (2023), we will further investigate how indigenous communities practice slash-and-burn agriculture as a means of living sustainably amidst the environmental challenges of today. During his fieldwork in the village of Muara Nayan, Mahadika observed that the community rarely uses chemical pesticides or fertilizers in their cultivation system. Instead, they believe that the charcoal and ash produced from burning trees act as natural fertilizers. The Dayak Benuaq typically cultivate a plot of land no more than twice—occasionally three times—before moving to a new area to begin the process again. During the fallow period, previously cultivated land is left to regenerate, allowing it to recover and eventually return to its natural forested state. This cyclical approach ensures the forest's ecological succession and sustainability, aligning with the indigenous community's traditional knowledge and practices. This paper seeks to explore the relationship between slash-and-burn farming and the ecological succession of forests, emphasizing how these practices reflect the sustainable way of life of indigenous communities in Kalimantan.

2 Methods

To answer our research questions**,** what is the relationship between slash-and-burn agriculture and (indigenous) ecological succession, and how has this farming practice adapted to accommodate commodity crops?**—**we examine Mahadika's thesis (2023) on Dayak Benuaq smallholders in West Kutai, East Kalimantan**.** Our study employs a systematic literature review**,** integrating multidisciplinary perspectives**,** including philosophical and social-ecological approaches to slash-and-burn agriculture. The selected literature was analyzed using a qualitative thematic approach**,** where key themes and patterns were identified and categorized within major theoretical frameworks and conceptual debates, such as 'degrowth' and metabolism**,** in relation to slash-and-burn agriculture and marginality**.** Additionally, critical perspectives were considered to identify gaps in existing research. Following this analysis, we provide a descriptive examination of indigenous smallholders' slash-and-burn farming practices**,** connecting them to broader sustainability frameworks and debates.

3 Literature Reviews

3.1 Slash-and-Burn Agriculture

Slash-and-burn agriculture is a traditional farming practice found among many ethnic communities across the globe. Its origins can be traced back to the prehistoric Neolithic period (Daniel Tang & Yap, 2020). This agricultural system is characterized by short-term cultivation followed by long-term fallow periods, allowing the land to regenerate (Fox, 2000). The process involves cutting down trees and burning them, both to clear the land and to fertilize the soil with ash, before leaving the land to recover over an extended period (Otto & Anderson, 1982). Historically, slash-and-burn agriculture has been associated with land-use transformation, particularly from forests to agricultural areas. It has primarily been viewed as a subsistence farming method, suitable only for meeting the daily food needs of families and not for large-scale agriculture (Edivaldo & Rossel, 2020). Despite the widespread adoption of modern farming techniques, slash-and-burn agriculture continues to be practiced in tropical regions around the world, highlighting its enduring relevance in certain contexts (Murdjoko et al., 2022; Kishimoto et al., 2024; Tanzito et al., 2020).

According to Ziegler et al. (2011), slash-and-burn agriculture is one of the agricultural models that upholds conservation values, making it both productive and sustainable. This is largely because slash-and-burn farming is highly adaptive and effective, particularly in areas where the soil has been degraded or polluted. Anthropologists, agronomists, and geographers have noted that this practice helps release nutrients trapped in forest vegetation (Otto & Anderson, 1982). By burning trees, the resulting ash provides

essential nutrients to the soil, significantly enhancing its fertility, especially in tropical regions (Giardina et al., 2000). This model of farming remains sustainable when accompanied by a fallow period, allowing the soil time to recover. The duration of the fallow period varies depending on soil conditions and the types of plants previously cultivated in the area. Scholars suggest that an effective fallow period typically lasts between seven and 15 years (Fachin et al., 2021; Kamara et al., 2016; Lintemani et al., 2020). However, if the fallow period is shortened, the sustainability of slash-and-burn agriculture is compromised, as it fails to provide sufficient time for soil recovery (Thomaz, 2013).

3.2 Sustainable Agriculture

Sustainable agriculture is an approach to agricultural management that emphasizes the production of food and energy in an environmentally responsible and enduring manner. As Lichtfouse (2021) explains, it involves processes that prioritize environmental responsibility in food production. This concept is part of the broader political framework of "sustainable development," as outlined by the United Nations (Janker et al., 2018). Sustainable agriculture focuses on implementing practices that minimize environmental impact while ensuring fair and equitable agricultural productivity (Saikanth et al., 2023). The overarching goal of sustainable agriculture is to achieve a balance between social, economic, and ecological dimensions (Farrell & Hart, 1998). Additionally, this approach emphasizes diversification and reduces reliance on agro-chemical inputs, instead focusing on the management and enhancement of soil fertility (Faroque et al., 2013). In this context, it is essential to consider how slash-and-burn agriculture aligns with the principles of sustainable agriculture, particularly in its attention to soil fertility and ecological regeneration.

Various studies have explored sustainable farming models, focusing on their significance and the steps needed to achieve sustainable agriculture (Cao & Solangi, 2023; González-Abraham et al., 2023; Melo et al., 2021). However, some research has critically reassessed the success of these models. For instance, Siebrecht (2020) highlights challenges and obstacles identified by multiple stakeholders, while Brown (2016) examines how power dynamics contribute to inequalities and hinder the effective implementation of sustainable agriculture. Additionally, other scholars have emphasized the role of technological advancements in achieving sustainable agriculture (Khan et al., 2021; Dhanaraju et al., 2022; Trivedi et al., 2021). These studies collectively underscore the importance of sustainable agriculture as a concept that requires a multidisciplinary approach to address its complexities and dynamics, which vary across different contexts and time periods.

3.3 Ecological Succession

Ecological succession is defined as a process of community development aimed at achieving a more stable ecosystem (Copper, 1988). Chang and Turner (2019) describe this concept as the regrouping and transformation of biological communities over time in response to natural or human-induced disturbances. Drawing on Odom's framework, as cited by Pérez-Hernández and Gavilán (2021), ecological succession can be understood through three key parameters: (1) it is a process of change in plant communities that is regular and sufficiently directed to be considered predictable; (2) it results from modifications in the physical environment caused by the target plant community; and (3) it culminates in a stable ecosystem. A stable ecosystem, in this context, refers to the successful maintenance of maximum biomass and the establishment of mutualistic relationships between organisms (Pérez-Hernández & Gavilán, 2021). Ecological succession, therefore, involves an increase in biomass production, greater species richness, and changes in species distribution over time (Würtz & Annila, 2010).

In simple terms, ecological succession is the process through which an ecosystem evolves from a simpler state to a more complex and stable one. Kappesser et al. (1969) classified succession into two categories: primary and secondary succession. Primary succession typically occurs in areas devoid of life, such as bare rock surfaces, where pioneer species like mosses first establish themselves. In contrast, secondary succession happens in areas that have been disturbed but still retain soil, such as regions affected by fire, storms, or human activities like agriculture. Secondary succession involves the recolonization and recovery of the ecosystem (Chen et al., 2022; Pietrzykowski et al., 2024). The involvement of indigenous communities is crucial in promoting secondary succession, particularly in the context of ecological restoration (Moreno-Casasola, 2022). Local knowledge and practices held by these communities play a vital role in the restoration process, contributing to the success of ecological succession (Schmidt et al., 2021).

4 On Indigenous Degrowth, Metabolism, and Sustainability

The concept of indigenous degrowth, when combined with ecological sustainability and metabolic processes, provides valuable insights into how modern development can be balanced with traditional ecological knowledge. Indigenous degrowth emphasizes living within the planet's ecological limits, focusing on reducing material and energy consumption while nurturing cultural, spiritual, and ecological connections to the land (Escobar, 2015). This approach stands in stark contrast to capitalist growth models, which prioritize economic expansion often at the cost of environmental sustainability and social well-being (Kothari et al., 2019).

Contemporary capitalism often disrupts the natural metabolism between humans and the world around them. In ecological and social systems, metabolism refers to the exchange and transformation of energy and matter between humans and their environment (Fischer-Kowalski et al., 2014; Fischer-Kowalski & Haberl, 2007). In contrast, indigenous practices reflect an intuitive understanding of these metabolic flows, ensuring that resource extraction remains within the regenerative capacity of ecosystems. This balance is evident in practices such as communal land management and diversified cropping systems, which minimize reliance on external inputs while promoting biodiversity (Viswanath & Lubina, 2017).

For indigenous communities, degrowth is not merely a theoretical concept but a lived reality grounded in their symbiotic relationships with nature. Traditional practices, such as rotational slash-and-burn agriculture (swidden farming), embody the principles of degrowth. This agricultural model promotes sustainable land use through cycles of cultivation and fallow periods, allowing ecosystems to regenerate and maintaining soil fertility (Bezerra et al., 2024). In contrast to industrial monoculture farming, which depletes soil nutrients and disrupts ecological balance, slash-and-burn practices align with the degrowth ethos by prioritizing ecological integrity over maximum productivity (Fox, 2000). Moreover, indigenous worldviews often embrace a holistic understanding of metabolism, recognizing the interconnectedness of human and non-human interactions. For example, the ashes produced from burning vegetation are not seen as waste, but as a nutrient-rich resource that contributes to the metabolic cycle of soil fertility (Brady, 1996; Palm et al., 2005). This cyclical perspective stands in stark contrast to the linear, extractive logic of modern industrial systems.

Incorporating indigenous knowledge into sustainability discourses emphasizes the significance of the metabolic rift—the disruption of ecological cycles caused by industrialization (Moore, 2015). Addressing this rift necessitates a rethinking of modern agricultural practices and an acknowledgment of indigenous strategies that align human activities with natural cycles. To challenge the extractive logic of modern capitalist industrial systems, we also draw on Karl Marx's theory of metabolism, which is crucial for understanding the socio-ecological rift generated by capitalist expansion (Harvey, 2023; Marx, 2005). In short, the dominance of neoliberal globalization and advanced capitalism has significantly intensified the effects of overproduction and overconsumption on the Earth's environmental systems. The capitalist mode of production drives extensive anthropogenic activities that profoundly impact the planet. Contrary to the modern ideal of human emancipation, the global ecological crises point to the "return of nature" (Foster, 2020). In this context, capitalism plays a central role in exacerbating the metabolic rift (Saito, 2016).

Karl Marx's exploration of the metabolic rift in *Grundrisse* offers profound ecological insights and has sparked a new movement in ecological politics in contemporary times. As Kohei Saito (2023) discusses, the theory of metabolism has evolved through three key shifts: technological, spatial, and temporal. This theory highlights the contradiction within capitalist accumulation, which simultaneously boosts social production while diminishing natural productivity. Such a contradiction persists because technological innovations fail to resolve these rifts. The metabolic shift, therefore, emerges as a response to the ecological and economic crises inherent in capitalism. Furthermore, Saito (2024) radicalizes the significance of the metabolic rift by applying it to the envisioning of revolutionary subjectivities, particularly within non-Western contexts. As the ecological crisis extends beyond localized areas to affect the planet as a whole, this perspective becomes even more crucial. Finally, using the concept of 'degrowth', we propose that slash-and-burn farming acts as a mechanism to decelerate the accumulation process through subsistence practices and forest regeneration, rooted in indigenous ecological succession. This perspective broadens the discussion of metabolism in the context of the ongoing ecological crisis.

In summary, integrating indigenous degrowth principles with modern sustainability frameworks requires a multidisciplinary approach. Research has demonstrated that agroecological practices inspired by indigenous knowledge can enhance resilience to climate change while promoting food security (Dorji et al., 2024; Nelson & Edwards, 2020). Additionally, the political dimension of sustainability must address power imbalances and the colonial legacies that continue to marginalize indigenous voices in environmental governance (Rodríguez & Inturias, 2018; Sultana, 2023). Furthermore, technological

innovation can amplify the benefits of indigenous practices. For instance, participatory mapping and GIS technologies have been used to document and protect indigenous territories, ensuring the preservation and respect of traditional knowledge systems (Rundstrom, 1995). However, these technologies must be implemented collaboratively, in a manner that upholds indigenous sovereignty and self-determination.

The intersection of indigenous degrowth, metabolism, and sustainability offers transformative opportunities to reimagine development, with Slash-and-Burn Agriculture serving as a strategy to slow the progress toward sustainability. However, in Indonesia, a society that values collective responsibility, there is a cautious approach to shifting away from economic practices reliant on non-renewable energy, arbitrary concessions, and a lenient stance on environmental justice. Given the relatively low public interest in environmental issues, it remains unclear where Indonesia intends to position itself within the broader "transitional discourse." Meanwhile, the concept of degrowth, originally grounded in Western perspectives, has gained increasing attention in academic discourse. This approach underscores the finite nature of resources and advocates for sufficiency as a guiding principle in managing nature, ensuring equitable access for all (Heikkurinen, 2019, 2024).

Emphasizing the concept of slowing down through indigenous agricultural practices presents specific challenges for countries in the Global South. These nations often view their abundant natural resources as essential to achieving development goals, while simultaneously facing issues such as structural dependencies, development aspirations, and historical inequalities (Mahaswa et al., 2025). Nevertheless, by embracing the wisdom embedded in indigenous practices and addressing the metabolic rift, indigenous degrowth can pave the way toward a more equitable and ecologically harmonious future. This approach requires not only technical solutions but also a profound cultural shift that prioritizes reciprocity, humility, and respect for the Earth.

5 *Orang Hulu* and Marginality of Other

People in Kalimantan (Borneo) typically identify their regions by dividing them into two categories. The first category refers to areas that are more "isolated," meaning they are located far from trade centers, government administration, and urbanized regions. The second category encompasses areas that are more densely populated and urbanized compared to the former. Locals often use the terms *hulu* and *hilir* to distinguish these two types of regions. *Hulu* refers to less densely populated areas, while *hilir* refers to more populated or urbanized areas. Sometimes, *hulu* is also used to describe remote or isolated regions, whereas *hilir* is associated with more urbanized spaces, where government administration may be present. Additionally, people often draw an analogy between *hulu* and *hilir* to describe the contrast between highland and lowland communities in Indonesia, though in reality, the two are not exactly the same. As one resident put it,

> "The position that is more on the edge, or on the periphery, is closer to *hulu*. The farther away it is from the mainstream, the more it aligns with *hulu*. You can imagine it like a river, with *hulu* being upstream and *hilir* downstream. But if we look at the direction on a map, it's a different story," Khilip said (March 31, 2022).

The division between highland and lowland communities in Kalimantan closely mirrors the distinction made by locals between *hulu* and *hilir*. People living in *hulu* are mostly from the Dayak and Kutai tribes, while those in *hilir* are primarily from the Banjar tribe, residing in urbanized regions like Samarinda and Balikpapan in East Kalimantan. Muara Nayan, the village where this research took place, is considered part of *hulu* by the Dayak Benuaq community. They often refer to themselves as *orang hulu* (hulu people). When some of them plan to visit Samarinda, they typically say they are going "*ke hilir*" (heading downstream). This division serves as a fundamental navigation point for understanding the social configuration of Kalimantan's inhabitants.

Some anthropologists have studied communities considered marginalized on the island, highlighting the contrasting regions' distinct histories and cultural features. Edmund Leach's ethnographic work, *Political Systems of Highland Burma: A Study of Kachin Social Structure* (1970), examines the lives of the Kachin people living in the highlands of Burma (Myanmar). Leach begins by contrasting the Shan people, who reside in the lowlands along the river, with the Kachin people in the hilly highland areas. The Shan are known for their sedentary farming practices, relying heavily on irrigation systems for subsistence. As a result, the Shan are often viewed as more sophisticated compared to the Kachin. In contrast, the Kachin

engage in slash-and-burn farming as their primary livelihood, which has led them to be seen as "primitive," while the Shan are regarded as more "modern" due to their infrastructure and irrigation systems. This case demonstrates how different geographical positions can shape societal cultures and how notions of 'modernity' are influenced by such geographic and economic factors.

Leach highlights the distinction between people living in lowland and highland areas, a division that mirrors the classification of regions into *hulu* and *hilir* in Kalimantan. Another significant ethnographic work, Anna Tsing's *In the Realm of the Diamond Queen: Marginality in an Out-of-the-Way Place* (1993), examines the lives of the Dayak Meratus in South Kalimantan. The Dayak Meratus are often negatively stigmatized as *hulu* people, labeled as "uncivilized." Tsing argues that this notion of marginality attached to the Dayak Meratus does not originate from the community itself but is instead imposed through historical processes involving various societal apparatuses, such as the government (both colonial and state), territorial formations, ethnic identity distinctions, and gender dynamics in Kalimantan (Tsing, 1993, p. 5). Consequently, the Dayak Meratus are frequently perceived as "primitive," isolated, and marginalized. This marginalization, Tsing suggests, contributes to their displacement as discourses of progress and civilization, particularly promoted by the government, marginalize their way of life.

Since 1974, under the authoritarian regime of Soeharto, the Indonesian government often classified marginalized groups as "isolated communities" or *masyarakat terasing* (remote communities). As a result, the government implemented several empowerment programs aimed at "civilizing" these groups. During the New Order regime, the government's identification of *masyarakat terasing* was based on technical categorizations, problematizations, and classifications it had created. One significant criterion for this categorization was the community's adherence to established belief systems or religions, particularly monotheistic ones. Ethnic groups such as the Dayak were often regarded as "isolated" due to their traditional religious practices, which were not aligned with the monotheistic religions recognized by the state. In addition, factors such as inadequate public health, a poor education system, and lack of transportation infrastructure were used to further classify these communities as isolated. Marginality in Indonesia has often been framed as a challenge faced by people living outside Java, particularly in regions like Kalimantan, where some communities, especially those in the hulu, continue to practice shifting cultivation (*swidden farming*) (Li, 2000, p. 154). Thus, the term *terasing* (isolated) can be understood as part of a process of negotiation and interaction between the government and local communities in Kalimantan, where local ways of life are categorized and redefined by state-driven notions of progress and civilization.

Additionally, the marginalization of the Dayak community is also evident in their interactions with other ethnic groups. Tsing highlights the dynamics between the Dayak Meratus and the Banjar communities, noting that some Banjar people take pride in their Islamic identity. Historically, the presence of Islam in Kalimantan can be traced back to the Sultanate of Banjarmasin, which began spreading Islamic teachings from southern Kalimantan to other regions as early as the 1500s (Aritonang & Steenbrink, 2008, p. 493). However, in 1860, during the colonial period, the Sultanate of Banjarmasin lost its power to the Dutch East Indies government (Tsing, 1993, p. 43). This long-standing association with Islam set the Banjar community apart from other ethnic groups in Kalimantan, who were less familiar with monotheistic religions. During the colonial era, missionaries, recognizing the established presence of Islam in South Kalimantan, chose to focus their efforts on spreading Christianity to indigenous communities in regions such as East Kalimantan (Aritonang & Steenbrink, 2008, p. 945). As a result, the Dayak community, which traditionally adhered to animistic beliefs such as Kaharingan, was often viewed as "backward" or "primitive" for not following monotheistic religions. Even though some Dayak people later converted to Christianity or Islam, these conversions were often driven by necessity rather than belief. Many converted in order to gain access to citizenship rights and educational opportunities. In the 1990s, for example, Dayak children faced significant challenges in enrolling in public schools (*sekolah negeri*) unless they identified as Muslim, while those who chose to attend missionary schools were often required to convert to Christianity (Tsing, 1993, p. 54). This practice reinforced the marginalization of the Dayak community, forcing them to adopt foreign religious identities to gain basic rights and access to public services.

Fig. 1 Pentecostal Church in Indonesia (*Gereja Pantekosta di Indonesia* (GPJI)), Muara Nayan village, Jempang, West Kutai, East Kalimantan (Mahadika, 2023, p. 89).

Looking at the Banjar people, it is important to note that their position in Kalimantan, while distinct, does not necessarily equate to a dominant or central role with power or authority. They, too, are a minority group facing disadvantaged circumstances, much like the Dayak community. In Indonesia, marginalization is most often associated with groups outside of the Javanese and Chinese communities. This is because both Javanese and Chinese communities have historically dominated the political and economic spheres of the country, particularly since the 1980s. This power dynamic is evident in the transmigration program (*program transmigrasi*) enacted during the New Order regime. The program was based on the belief that Javanese people were more capable of driving economic growth compared to the indigenous populations in Kalimantan, who were often labeled as "lazy natives" or lacking an entrepreneurial mindset in the eyes of the government (Li & Semedi, 2021, p. 10). Thus, both the Banjar and Dayak communities, despite their differences, are considered "small fry" in the broader context of marginalization in Indonesia (Tsing, 1993, p. 55). Tsing's ethnographic work on the Dayak Meratus community illustrates how marginalization operates both through the government's policies and through interactions with other communities, such as the Banjar. The Dayak, often living in the hulu (upstream) areas, are geographically distant from government centers and development projects. This isolation, both physical and social, has led to the Dayak community being marginalized in their own lands.

In contrast to South Kalimantan, the Dayak Benuaq people of East Kalimantan were first influenced by Protestant missionaries in 1929 through the CAMA (Christian and Missionary Alliance) program. Catholic missions followed in the 1950s (Aritonang & Steenbrink, 2008, pp. 518–519). This shows how the Dayak Benuaq embraced Christianity and Catholicism, while still maintaining their traditional customs, particularly their Kaharingan beliefs, which they continue to practice during ceremonies and rituals to this day. As a result, the Dayak Benuaq can be seen as a community that integrates heavenly religions while preserving long-standing traditions. This complexity complicates the notion of marginality, suggesting that the Dayak do not necessarily view themselves as marginalized. Instead, they have actively worked to assert their beliefs, notably through a successful movement to have Kaharingan recognized by the state. Their efforts culminated in the recognition of a Hindu-Kaharingan syncretism, though disputes continue regarding whether Kaharingan should be an autonomous religion separate from other belief systems (Buana, 2020, pp. 1–2). Furthermore, Tsing argues that anthropology should focus on studying "the Other,"

a concept that has long been considered marginal. Inspired by a Meratus love song, she adopts a subjective approach to understand the local community's perspective. She suggests that to truly grasp the experience of "the Other," one must approach them with curiosity and empathy—much like falling in love. This perspective invites us to explore the qualities of the "Other" not through detached objectivity, but through an engaged and enthusiastic embrace of their subjectivity.

> *The love song's frankly admiring gaze at the Other serves here as a remainder of the specificity and limitations of conventional anthropological claims about cultural description: The ethnographic gaze is said to be neutral and value-free, even it situates itself in a European tradition in which to be Other is always to be excluded from full membership in humanity . . . The Other is praised from below rather than exoticized from above . . . the love song refuses "objectivity" as it draws attention to passionate and relentless negotiations of difference and deference* (Tsing, 1993, pp. 51-52).

Fig. 2 *Draagmanden van gespleten rotan in de Apo Kajan op Oost-Borneo* (Carrying Baskets Made of Split Rattan from Apo Kayan, East Kalimantan (KITLV, 1931).

In Tania Li's *Local Histories, Global Markets: Cocoa and Class in Upland Sulawesi* (2002), she highlights how indigenous communities in upland areas have begun cultivating commodity crops for global markets, demonstrating their openness to external influences. Similarly, in East Kalimantan, rattan has been a significant global commodity since colonial times and the era of the Sultanate of Banjar (Peluso, 1992, p. 52). Another notable commodity is the gaharu tree, which has been traded globally since the 15th century (Soehartono & Newton, 2002). Among the Dayak Benuaq people, several commodities have been cultivated over time, including rattan, rubber, and more recently, oil palms. Rattan, in particular, holds a unique position—it is not only a marketable product but also serves as a resource for self-sufficiency, used to craft bags, baskets, and containers for daily life. This dual value reflects how deeply rattan is embedded in the cultural practices of the Dayak people. These examples illustrate that communities in *hulu* areas are far from being entirely "isolated." They have long engaged with *hilir* or urbanized regions through trade and other exchanges, showing a receptiveness to external changes and influences.

Meanwhile, another anthropologist who has explored the lives of "the Other" is James C. Scott. In his book *The Art of Not Being Governed* (2009), Scott examines the lives of highland communities that adhere to egalitarian principles. Similar to the Dayak Benuaq people living in *hulu*, these highland communities share distinctive characteristics in their livelihoods. Scott conceptualizes highland populations as part of an "ungoverned periphery" or non-state spaces. The highlands, he argues, have historically served as refuges for people escaping the control of lowland states, fleeing corvée labor under colonial rule, epidemics, taxation, slavery, starvation, and poverty (Scott, 2009, pp. ix, 7). Highland communities are often characterized by their mobility, shifting cultivation, hunting, fishing, and other subsistence practices, which make them less accessible and harder for states to govern. This anarchic or stateless way of life has long attracted Scott's interest, particularly as these communities' modes of production inherently resist state control. For instance, the Dayak Benuaq people in hulu areas often engage in slash-and-burn agriculture, which the government frequently criticizes for its potential contribution to deforestation. However, this

traditional practice reflects a mode of life that prioritizes adaptability and self-sufficiency, presenting a challenge for governments seeking to regulate or integrate these communities into state systems. The tension between the government's attempts to manage hulu communities and the realities of traditional practices such as slash-and-burn agriculture highlights a broader intersection of governance, environmental policies, and the global demand for commodity crops grown in Dayak Benuaq lands. This dynamic invites further exploration into how such practices balance ecological sustainability with the socio-economic needs of these communities.

6 Slash-and-Burn Agriculture and (Indigenous) Ecological Succession

The Dayak Benuaq community has an intriguing story of adaptation to global commodity crops, such as rubber and oil palm, while continuing to meet their subsistence needs by cultivating their own fields. Reflecting on Leach's perspective regarding highland communities, these groups traditionally practice slash-and-burn agriculture as a central part of their livelihoods. In Burma, Leach identified three categories of land use to determine suitability for farming. The first is *monsoon taungya*, a seasonal practice involving the clearing and burning of forests with large, mature trees to open fertile land for cultivation. This category is ideal for slash-and-burn farming because the presence of giant trees indicates fertile soil. The second is *grassland taungya*, which refers to areas dominated by grass, shrubs, or reeds. Such land is generally deemed unsuitable for farming due to its poor soil fertility. Finally, there are *irrigated hill terraces*, which involve the use of water management techniques for agriculture. While this model is considered preferable for reducing deforestation and increasing productivity, qualities favored by colonial governments—it is labor-intensive, costly, time-consuming, and challenging to maintain. As a result, highland communities, including the Dayak Benuaq, often prioritize more flexible and less resource-intensive farming methods like slash-and-burn, while viewing terrace farming as impractical for their circumstances. This adaptive approach highlights the balance these communities strike between integrating global commodities and maintaining traditional practices tailored to their unique ecological and social conditions.

In contrast to the Javanese people, who primarily rely on irrigation systems and sedentary farming to cultivate wet rice paddies, highland or *hulu* communities, such as the Dayak Benuaq, grow rice through slash-and-burn agriculture. The Dayak Benuaq refer to their rice as dry rice or upland rice because it is cultivated without the use of water irrigation systems. This agricultural practice aligns with the first category described by Leach in his observations of highland communities in Burma—swidden farming. This method involves cutting down trees to clear land, which is then used for food crops such as rice, tubers, and vegetables. For the Dayak Benuaq, slash-and-burn agriculture includes several well-defined stages that must be followed when preparing *umaq*, or paddy fields, created through this method. These stages reflect the community's deep understanding of their environment and their ability to sustain both agricultural productivity and cultural traditions despite the challenges posed by their highland terrain.

The Dayak Benuaq community follows a seasonal calendar that is deeply rooted in their culture and traditions. In early June, they begin searching for suitable land to create *umaq* (paddy fields). This process starts with *ngerakng*, where they clear a small 4x4 meter area by cutting down a few trees. They then mark the area using *ngelempang*, which involves cutting a small piece of wood with leaves and placing it within the site. After marking the land, they leave it for a few days to observe its stability and suitability for farming. From early June to July, once the ideal site is identified, they commence the clearing process. This begins with *ngebabar*, which involves cutting down straw and wild grass, followed by cutting large trees or *noang* and small trees or *nokab*. Large trees are typically felled using chainsaws, while machetes are sufficient for the smaller ones. Once the trees and vegetation have been cleared, the felled material is left to dry, a process that takes place over the next couple of months. By August or September, when the wood, branches, and leaves have dried, the next phase begins: burning the dry vegetation in a process called *oikng joa*. For the older generation of Dayak Benuaq, this stage is sometimes accompanied by a ritual known as *kerongo*, where they draw a figure of a person using charcoal from the burned wood. The figure holds fire in its left hand and a fan in its right, symbolizing the hope for wind to help burn all the wood completely. According to the Dayak Benuaq, good land is defined by its cleanliness after burning—there should be no remnants of wood or leaves left. Ideally, the land looks as clean and smooth as a soccer field, ready for planting. This intricate process reflects the community's deep connection to their environment and their reliance on both tradition and practical knowledge in their agricultural practices.

Fig. 3 Once the wood has dried sufficiently (*oikng*), they begin the process of burning it, known as *nyuru*. The act of burning the piles of wood is specifically referred to as *oikng joa*. (Mahadika, 2023, p. 150).

If many pieces of wood remain unburned after the initial burning, the Dayak Benuaq community gathers these remnants into a single pile, a process called *mongkakng*. This term refers to partially burned wood that is then cut into smaller pieces, collected, and restacked into a new pile. The pile is burned again in a process known as *pluruq*, which involves reburning the wood to ensure the land is fully cleared. This reburning phase typically continues until early October. By mid-October, the community begins *ngasak* or *nugal*, activities that involve planting rice seeds (*bini*) into small holes made in the soil. Before planting, the seeds are stored in a *bisan*, a small rattan container that is tied around the waist, allowing for ease of movement while sowing. While performing *nugal*, certain traditional rules and rituals are observed to ensure the successful growth of the rice. However, these customs are less commonly followed by the younger generations today. One resident explained,

> *"Waktu kita nugal tidak boleh nafas, minimal 8 titik kita mau tanam jangan sampai bernafas, tidak semua yang menganjurkan begitu. Hanya 8 titik itu saja, sehabis itu bebas. Tapi tidak semua bilang, tapi ada yang bilang. Yang ke tujuh, yang ke-8 harus tahan dulu nafasnya. Harapannya yang kita tanam di situ baik padinya, ada tanam macam-macam itu namanya turutn*[1] *di situ*," Pak Murdani said, a son of the Dayak Benuaq chief in Muara Nayan (April 7, 2022).
>
> (When performing *nugal*, it is traditionally believed that one must hold their breath before placing seeds into the soil eight times. However, not everyone practices this ritual. Specifically, for the seventh and eighth planting, it is important to hold one's breath before sowing the seeds. This practice symbolizes a hope for abundant and healthy rice growth. In addition to rice, there are various other plants known as *turutn* that are also grown during this process. These secondary crops are planted alongside the rice to diversify the harvest and support the community's subsistence farming practices).

From November to December (until January), the Dayak Benuaq community focuses on maintaining their paddy fields. During this period, they take care of the fields by removing wild grass, a task they refer

[1] *Turutn* is a variety of food and vegetables grown outside *umaq*.

to as *ngejikut*, which means pulling out the wild grass. Between February and April, they begin the harvest. Using a small knife, called *gentiq* or *isip*, they cut the rice around the *umaq* (paddy fields). After gathering the unhulled rice, it is placed in large containers known as *gamaq* or *toman*. Once the rice is stored in the *gamaq*, it is then transferred to smaller containers called *amog*. Finally, the rice is placed in large sacks made from tree bark, known as *ancokng*, which can hold up to one ton of rice. However, with modern times, many in the community now also use secondhand sacks from rice mills to store their harvest.

Fig. 4 Dry paddy fields (*umaq*) among the Dayak Benuaq people for subsistence (Mahadika, 2023, p. 152).

Once the grain is collected, the Dayak Benuaq community continues with several important tasks. First, they allow the grain to dry under the sun. After drying, the grain is placed on an *idai*, a flat surface, typically a regular tarpaulin, where they begin the process of stepping on the grain, a practice known as *neek pare*. This traditional method helps peel the grain and release the rice. After the grain is peeled, it is placed into a tool called *lewakng*, which resembles a *tampah* in Java. The *lewakng* is used to separate the husk from the rice, a process called *nyiau* (winnowing). Finally, after completing this process, they have enough rice to meet the needs of their families and close relatives. This agricultural system is generally not market-oriented but is instead focused on sustaining the daily needs of the Dayak Benuaq community.

Nowadays, the practice of making *umaq* is no longer primarily for subsistence. Instead, the focus has shifted to opening and expanding oil palm plantations. As observed in the Dayak Benuaq community, *umaq* was traditionally only done once to three times for harvests. Now, when the land is cleared for rice planting, oil palm saplings are also planted among the rice crops. After the rice harvest, the oil palms are typically one year old. However, by the time the oil palms reach two years of age, the *umaq* land becomes unsuitable for rice cultivation, though vegetables like tomatoes and chilies can still be grown. As the oil palms continue to grow, attention shifts to their maintenance, and the practice of *umaq* is gradually abandoned. The development of oil palm plantations among the Dayak Benuaq community began in earnest around 2014 (Haug, 2021, p. 71), contributing to a broader trend in the region. By 2004, oil palm plantations in Kalimantan had reached three million hectares (Potter, 2008, p. 80). In the case of the Dayak Benuaq, oil palms are now a popular commodity, with some plantations already ten years old. Mr. Marwan, a resident of Muara Nayan, explained the shift: “So we calculated, rather than taking care of paddy fields, we can just take care of that (oil palms), sell it, and buy rice,” he said (March 30, 2022). The shift toward oil palms is also driven by the labor-intensive nature of *umaq*. Maintaining paddy fields requires constant attention to protect crops from pests, whereas oil palms are less demanding once established. Consequently, the Dayak Benuaq community now prefers oil palm cultivation over umaq farming.

> “*Kalo memang sawit ini tidak turun, bertahan, bahkan bisa naik (harganya), rasanya bagi kami ini bertani, selama ini, saya dari umur 10 tahun sudah bertani tanam padi. Kalo padi ini ya bagi yang berladang ada yang panen. Tikus yang gasak, gak tahan. Kita*

orang-orang yang dari Benuaq ini tidak tahan melawan tikus. (Padi) itu kembang kempis. Tapi kalo ini (sawit) gak ada cerita. Kebun ini sedikit-sedikit dia naik, ini dulu kan satu ton dapat tujuh pikul (700 kg/7 kuintal), sekarang dapat empat juta, masih bisa beli beras. Jadi, dengan adanya sawit ini rasanya bah..," jelas Pak Marwan (Maret 30, April 2022).

(If the price of oil palm remains steady or even increases, as a smallholder, it feels like a great opportunity. I've been growing paddy fields since I was ten. We can harvest the rice, but there's always the problem with rats stealing our crops, and we just can't compete with them. The Dayak Benuaq community really hates rats when they invade our umaq. But with oil palms, there's no issue with pests. When my oil palms were still small, I harvested 700 kilograms, but now I get four million per ton, and I can still buy rice from the market. Oil palms have truly helped me).

Fig. 5 A one-year-old oil palm sapling planted at the center of the *umaq* (Mahadika, 2023, p. 154).

Even though the Dayak Benuaq community now relies more on commodity exchange, this doesn't mean they have abandoned their swidden farming practices. In fact, oil palms have become integrated into their shifting cultivation model. When oil palms become over 30 to 40 years old and are no longer productive, the community typically moves to new areas to plant oil palms, allowing the old land to fallow. Typically, when oil palm trees have been growing on a plot of land for 40 years or more, the trees are cut down and the land is returned to the *umaq* cycle. In this sense, oil palm is integrated into the slash-and-burn agriculture practiced by local smallholders. After clearing the land, they may replant oil palm, grow other tree crops, or cultivate vegetables—depending on their needs. Oil palm plantations are not considered forests in the conventional sense. The Dayak Benuaq community has its own definition of forest, referring to forest-like areas as *bengkar***.** For them, aging oil palms—especially those that are tall and difficult to harvest—are not simply seen as unproductive, but as indicators that the land is ready to be reused for shifting cultivation. These old plots may then be cleared to grow vegetables, fruit trees, or new oil palms. In this view, commodity crops like oil palm and rubber are not separate from traditional practices, but part of a dynamic agricultural system.

Additionally, they don't rely solely on oil palms for income; they can tap rubber trees if oil palm prices drop. This diversification of commodity crops has made the Dayak Benuaq people more resilient to

fluctuations in the global market. As a result, *umaq*, which once primarily served to meet their daily food needs, has evolved into an alternative method for growing commodities. Rattan, too, remains a valuable crop for the community, used not only for market exchange but also for self-provisioning.

State apparatuses, such as local police officers and staff from the National Disaster Management Agency (Badan Nasional Penanggulangan Bencana/BPBN), are involved in monitoring the Dayak Benuaq community's forest burning practices. They believe that forest burning should be stopped because it is unsustainable and harmful to the environment. However, government officials often fail to recognize that the Dayak Benuaq people engage in burning the forest to create *umaq*, a traditional farming method that supports their subsistence. *Umaq* is an essential way for the community to meet their daily needs, particularly for food, through slash-and-burn agriculture. Many government officials overlook the broader context of these practices and simply perceive them as indiscriminate deforestation, without considering the community's intentions. During one of our visits to observe the burning process, we were used as "alibis" by the Dayak Benuaq people, who told us, "If they come, you just say this is for research purposes." In reality, the Dayak Benuaq people are largely indifferent to government appeals, and they continue to burn the land for farming purposes. According to Mr. Murdani (April 11, 2022), the process of burning can be confusing for authorities because multiple people are involved in burning different areas at the same time: "When it's time to open up fields, there are people burning over there, and others burning here, which makes it hard for them to track.

Fig. 6 A sign installed by government officials urges the indigenous Dayak Benuaq community to refrain from burning the forests (Mahadika, 2023, p. 156).

Looking back at Leach's ethnographic work among the Kachin community in Burma, which focuses on their practice of slash-and-burn farming, there is a cyclical process that has been followed by the local people as part of their tradition of shifting cultivation. After clearing the land, it can be used to grow a variety of food crops for one year. Following the harvest, the community moves to a new area, leaving the land fallow. The land that has been cultivated cannot be reused immediately and must be left untouched for about twelve to fifteen years, allowing it to regenerate. If this process continues to be followed by the Kachin community, it ensures that deforestation is avoided and soil fertility is preserved. After the fallow period, the land returns to its natural state as a secondary forest, as Leach describes it (Leach, 1970, p. 24).

In the modern era, many smallholders are becoming familiar with agricultural technologies that help restore soil nutrients, such as using geological materials like dolomite to stabilize soil acidity (pH), enabling the soil to regain its fertility. This type of recovery through modern technology is also evident among the Dayak Benuaq smallholders. However, most of them still rarely use chemical fertilizers or additives to restore soil fertility. The Dayak Benuaq community has its own understanding of "recovery." They believe that nature has the ability to recover on its own after farming. Drawing on the concept developed by Jonathan Padwe (Padwe, 2020, p. 162), recuperation in agricultural systems is a collective process carried out by indigenous communities in collaboration with the biodiversity of former farming areas. This recuperation is typically a process "from below," meaning there is no external intervention from governments or agricultural science. Instead, recovery occurs naturally through agro-ecological diversity activities. Thus, the word "recovery" for the Dayak Benuaq community carries a different meaning than the

general notion of restoring or replicating what was lost. For them, recovery or recuperation is about embracing a more heterogeneous approach—one that acknowledges incompleteness and embraces change. This aligns with the concept of ecological succession, where an ecological community undergoes a process of change over time, shaped by various actors and natural processes (Padwe, 2020, p. 165).

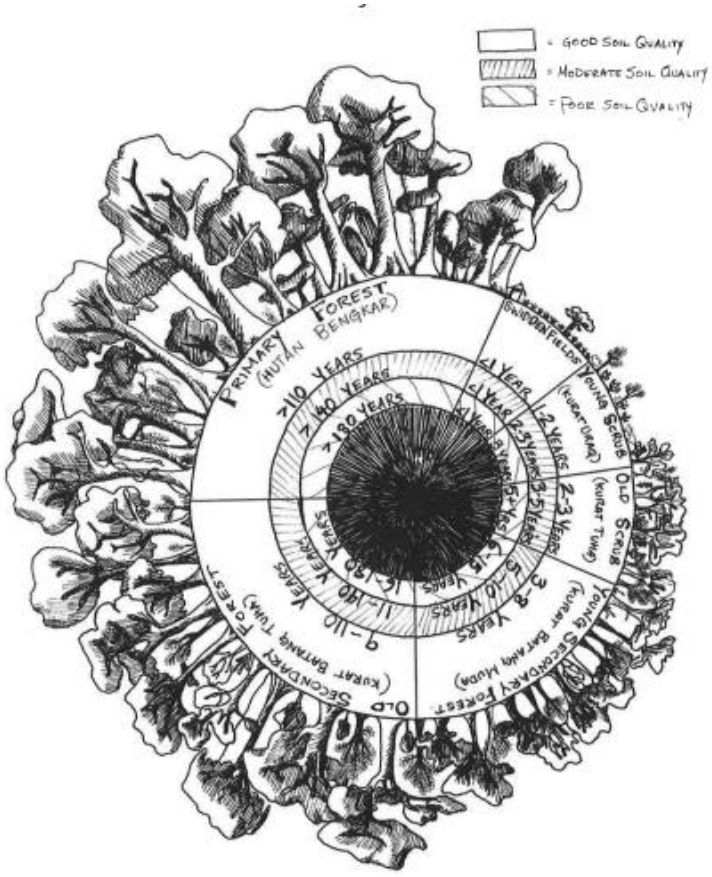

Fig. 7 An illustration of indigenous ecological succession in the forests of the Dayak Benuaq community (Abdoellah, et al., 1993 cited in Mahadika, 2023, p. 158).

The Dayak Benuaq community possesses a deep understanding of ecological succession, which they use to guide the regeneration of their lands after slash-and-burn agriculture. They divide the process into several phases, which allow the forest to recover naturally during the fallow period (see fig 7). Observing the regrowth of trees after swidden farming, the community believes that the land has regained its fertility. The growth of larger and taller trees is seen as a sign of the land's abundance of natural fertilizer (Olofson, 1983, pp. 155–156), signaling that it is once again ready to be used for *umaq* cultivation in the future. According to the Dayak Benuaq, the first phase of forest regeneration is the emergence of grass, called *uraq*, a pioneer species, typically seen 1–2 years after slash-and-burn farming. The second phase, *uraq bataknq*, occurs when the grass has grown taller, and the stalks turn a brownish hue. This stage lasts around 2–3 years. The next phase is *roboot*, where small trees and branches start to emerge. At this point, some Dayak Benuaq people believe the land is already suitable for umaq again, with *roboot* generally being around 3–8 years old. Following this, the *kerengkaknq* phase appears, characterized by tall, mature trees such as Meranti (*Shorea*) and Ulin (*Eusideroxylon zwageri*), resembling a natural forest. At this stage, the community feels that it is appropriate to return to slash-and-burn agriculture. *Kerengkaknq* forests are typically 9 to 110 years old (Joshi et al., 2004, p. 8). The final phase, *bengkar*, represents a forest that closely resembles primary forest, rarely used for farming. The age of *bengkar* forests can exceed hundreds of years. Such forests can still be found in Lempunah (Lembonah) village, Jempang, East Kalimantan, where some Dayak Benuaq people go to hunt sun bears (*Helarctos malayanus*) in groups.

7 Conclusions

Slash-and-burn agriculture is a prevalent practice among indigenous communities in remote (hulu) areas of Kalimantan. In examining how the Dayak Benuaq community implements this model, it becomes evident that they possess a deep understanding of soil recuperation and nature's regeneration in a sustainable manner. This practice invites us to reconsider the concept of metabolism in the context of indigenous farming methods. Moreover, the principle of degrowth aligns with their agricultural approach, as the Dayak Benuaq people believe in the inherent capacity of nature to regenerate, with the process of recuperation occurring through collective efforts involving more-than-human agencies during the fallow period, without any outside intervention from the government or the use of bio-geo-chemical substances. At the same time, slash-and-burn agriculture has had to adapt to the global market for commodity crops, particularly oil palms. This integration shows that oil palms have become a part of the Dayak Benuaq's farming practices. While the community increasingly relies on commodity crops for trade, they continue to use slash-and-burn agriculture to meet their daily subsistence needs. The diversification of global commodities, such as cultivating rubber and oil palms in the same area, serves as a strategy to mitigate the impacts of global market fluctuations, ensuring a steady income even when prices decline. After more than 30 years, the community returns to slash-and-burn farming to open up land for both subsistence and commodity exchange. Ultimately, the practice of slash-and-burn agriculture emphasizes the importance of ecological succession, highlighting that slowing down certain processes is essential for achieving sustainability in forest and commodity crop management.

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