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Introduction

The past five decades of land-use change in Borneo mark an unprecedented, vivid example of land exploitation to induce economic development. Borneo, the world's third-largest island located in Southeast Asia (Figure 1.1), was endowed with one of the oldest rainforests in the world. However, since the 1970s the island has experienced rampant timber extraction on a massive scale; a huge amount of valuable tropical wood was logged and exported, either as raw logs or plywood, resulting in millions of hectares of deforestation and forest degradation. In total, about 20 million ha of old-growth forests were destroyed from 1973 to 2018, largely due to human activities (CIFOR 2020).

In the 1980s, the cultivation of oil palm, a lucrative cash crop grown mainly for export, was introduced throughout the island. By 2018, about 22 million tonnes of the world's vegetable oils (12 per cent) came from the island, compared to 5 million tonnes in 2000 (FAOSTAT 2021). The widespread logging and replacement of forests with oil palm and other crops has resulted in serious degradation of peatland (mainly in Central Kalimantan, Sarawak and West Kalimantan) and greatly escalated the risk of fires, especially during periodic long droughts (Santika, Budiharta, et al. 2020). Repeated peat and forest fires have led not only to enormous carbon stock loss but also transboundary haze that has exerted detrimental health impacts over the entire region (Zhang and Savage 2019).

While land-based developments over the past five decades have substantially reduced poverty, these achievements have been secured at the expense of the environment. Such exploitative activities have generated quick revenues for Malaysia and Indonesia, but peoples' livelihoods have also been threatened, from immediate local health risks to long-term global climate change (Santika, Wilson, Budiharta, Kusworo, et al. 2019; Santika, Wilson, Budiharta, Law, et al. 2019). There is also evidence that the newly generated wealth has been mostly concentrated in the hands of a small group of elites, creating huge wealth gaps among the people. Communities

FIGURE 1.1
Location of Borneo



continuing to seek traditional livelihoods (planting dry rice in swiddens, creating rubber, rattan, or mixed fruit gardens, engaging in small-scale mining, hunting, fishing, or collecting forest products), as well as those working as day labourers on plantations, have found themselves victimized or “left behind” in the wave of development.

Today, many parts of the island are plagued by social conflicts, poor governance, corruption, and ineffective law enforcement. The over-reliance on the exports of primary products for fiscal revenues has also exposed Borneo to periodic economic crises due to fluctuations in commodity prices, making incomes unstable and unpredictable. All these drawbacks imply that such a development pathway is unsuitable for continuation into the future. To avoid further environmental degradation and ensure long-term sustainable development, proper strategies with the right

incentives must be put in place to transform conventional land-based economies (Ogg 2020).

Globally, the broad concept of “bio-economy” has caught people’s imagination in producing more food and bio-based materials while dealing with the environmental issues of conventional land-based development (Bugge, Hansen, and Klitkou 2016). This concept is mainly championed by “productivists”, i.e., advocates of productivity. It asks for increasing economic output while reducing resource consumption through improving system efficiency. The underlying motivation is that the economy has to keep growing, and it is believed that this can be done within safe and sustainable operating boundaries. Especially in developed countries, “climate neutrality” is emphasized as a central piece of the bio-economy (Fritsche et al. 2020). The concept illustrates the transition from a fossil-fuel-based to a bio-based economy by using cutting-edge biological knowledge and technological innovation to optimize the potential of land and biological resources. The spectrum of bio-economy strategies is wide, covering the different components from upstream (e.g., intensifying primary production) to downstream (e.g., creating new products and markets) (Jordan et al. 2007; Shen, Worrell, and Patel 2010). Along these lines, rural development is also emphasized in terms of job creation, income generation, and infrastructure construction (Johnson and Altman 2014). Pressing the importance of increasing overall economic productivity, it seeks to offer a strategic means to reconcile socio-economic progress with environmental sustainability.

Meanwhile, alternative conservation-oriented economic strategies proposed by some conservationists have also received an enthusiastic resonance across the world (Kitchen and Marsden 2009). While the term “bio-economy” has been widely discussed for its definition and scope, there is no common term with that level of attention for alternative strategies in the context of land-based economic activities. Only for a broad indication, they may be loosely placed under the broad concept of “eco-economy”. Generally, such a concept stresses the multifunctionality of land-based activities, advocating the need to observe the biological capacity of the Earth system when optimizing the human use of nature (Marsden and Farioli 2015). Unlike the bio-economic concept, the urgency of economic growth over fixing past damages is questioned. While it seeks alternative economic opportunities to restore previously damaged landscapes, maintaining a harmonious relationship with nature is prioritized over economic productivity (Karsenty, Vogel, and Castell 2014). In general, the concept portrays a self-sufficient landscape with small-scale farming systems and alternative income-generation programmes, such as ecosystem restoration,

banking on international carbon market mechanisms, and other “green” businesses like eco-tourism (Gómez-Baggethun et al. 2010; Sills et al. 2014; Das and Chatterjee 2015).

Along with these two broad directions of “bio-economy” and “eco-economy”, a variety of strategies have been formulated, to drive economic transformation in different parts of Borneo, albeit with a different order of priority over the environment, economy, and society. The choices of strategies, however, depend highly on local complexities shaped by endogenous political, agroecological, social, economic, and cultural factors (Goh et al. 2018). The transformation process becomes more complicated with non-local factors like international trade, foreign investment, migrations, climate change, and other transboundary impacts (Delphin et al. 2016; Goh, Wicke, Faaij, et al. 2016; Nobre et al. 2016; Radel et al. 2019).

While there is no strict dichotomization between the two concepts as the development processes are mostly hybridized, general differences do exist. In the northern part of Borneo, the two Malaysian states, with greater autonomy from the federal government, have tended to prioritize economic development with multiple “bio-economy” policies implemented, although Sabah has also seen more involvement of international organizations in pushing for alternative development strategies and conservation plans. Meanwhile, the less developed Indonesian provinces in the south have been receiving relatively more influence from international conservation efforts with more “eco-economy” initiatives launched. That said, the more urbanized and industrialized eastern coastal areas, particularly East Kalimantan, have also actively engaged in productivity-based strategies, especially utilizing their bountiful coal resource. Generally, the Kalimantan provinces have less freedom to differ from some Central Government policies than their Malaysian counterparts, though decentralization in 2000 resulted in challenges to some central policies, notably on land and forests. These variations make Borneo a very interesting case as it may generate new perspectives in comparing the different tracks chosen by individual territories, despite their geographical, climatic, and socio-cultural continuities.

PREVIOUS WORKS

To fully understand the dynamics of such economic transformation, careful attention must be paid to territorial-specific characteristics and on-ground realities, including historical land-use patterns. General country studies focusing on land-based economies especially agriculture, forestry, and

to a lesser extent mining are available. Examples are the books edited by Vincent and Ali (1997) and Jomo, Chang, and Khoo (2004) which lucidly illustrate the strategies deployed by the Malaysian government in the 1980s to jump-start the economy using the country's natural resources, with timber and oil palm among the major contributors. Similarly for Indonesia, edited books by Pierce Colfer and Resosudarmo (2002) and McCarthy and Robinson (2016) provide detailed accounts of the respective development pathways in Indonesia, with attention given to oil palm expansion, forest conservation, and land reform and a "way forward" in the modern era. Specifically, on oil palm expansion, the equally relevant volume edited by Cramb and McCarthy (2016) discusses and analyses issues arising in both Malaysia and Indonesia.

Several books covering aspects of Borneo Island appeared at the end of the 1980s and during the 1990s. This was an era of transition from "traditional" to "modern" livelihoods, leading to a considerable flowering of scholarship concerning local traditions and the inevitability and direction of change. They included *People of the Weeping Forest: Tradition and Change in Borneo*, by Avé and King (1986). It was followed by *Borneo: Change and Development*, by Cleary and Eaton (1992); *The Peoples of Borneo*, by King (1993); *In Place of the Forest*, by Brookfield, Potter, and Byron (1995), and *Borneo in Transition: People, Forests, Conservation, and Development*, by Padoch and Peluso (1996) (with an updated edition in 2003).

These books all dealt with the forests, the transformation of the Borneo environment, and strategies for development, but the approaches differed somewhat. Borneo, in that particular period, was seen alternately as a "resource frontier" (Brookfield, Potter, and Byron 1995), an "underdeveloped periphery" (Cleary and Eaton 1992), "a neglected island" (King 1993), or most importantly, as a region with "complex, diverse and dynamic" social and ecological reality (Padoch and Peluso 1996). The five books also discussed shifting cultivation (a contentious issue) and other farming systems, ethnicity, land settlement, transmigration, and resource rights, such as those of the Penan (Cleary and Eaton 1992). King (1993) was more concerned with the socio-political organization and material culture of the Dayak and Islamic groups, while Brookfield, Potter, and Byron (1995) raised issues of environmental history such as drought, forest fire, and the origin of the *Imperata cylindrica* (*alang-alang*) grasslands. Oil palm was only mentioned briefly for that period, except in Avé and King (1986) and King (1993) where the early developments, especially in Sabah, were analysed. The book by Kaur (1998) on the economic history of Sabah and Sarawak since 1850 also made a sound contribution at that time.

Two more recent books have continued to represent the whole island. The first, *Reflections on the Heart of Borneo*, edited by Persoon and Osseweijer (2008), raises many questions about the Heart of Borneo, that “large transborder area of high conservation value shared by the three countries”, about which the contributions ranged widely, canvassing conservation issues throughout the island. A second edited volume, *Borneo Transformed: Agricultural Expansion on the Southeast Asian Frontier*, by De Koninck, Bernard, and Bissonnette (2011), skilfully combined and compared the developments in both the Malaysian and Indonesian territories in Borneo at a subnational level. One new work, edited by Ishikawa and Soda (2019), *Anthropogenic Tropical Forests*, has further extended the scope of transdisciplinary research in Borneo, albeit with a special focus on Sarawak compared to the other parts of Borneo. It represents a comprehensive collection of knowledge from both natural and social scientists on topics related to commodity chains, material cycles, and food webs in the dimensions of environmental and societal changes.

While the more recent books mentioned above provided useful background up to the 2010s, they did not further examine the potential pathways beyond primary production, e.g., downstream bio-based industries, and eco-tourism that open new opportunities for economic transformation, and how different strategies can work together or against each other. Recent years have not seen efforts to consolidate knowledge across both sides of “bio-economy” (productivity-centric) and “eco-economy” (conservation-centric) for the case of Borneo as a whole. Such a comprehensive study will have to take many years and a large number of specialists to complete.

While this present book aims to fill in some of the gaps, it is not envisaged that it would be as ambitious. However, a comprehensive review with updated information in a territorial context and comparative analyses across sectors and disciplines can be a timely work, neatly filling in the knowledge gap given the rapid changes in social, economic, and political aspects across the island from 2000 to 2021. This allows the authors to verify the robustness of different strategies and narrow the set of possible alternatives that can be employed in different contexts, by examining questions like “does what makes sense for big players also work for smallholders?”, “does what fails in Central Kalimantan also fail in Sabah?”. By putting these pieces of the puzzle together, this book provides a more complete picture of how Borneo has been transformed in the past two decades, with different strategies or interventions producing good, bad, or mixed results in different territories. The experience in Borneo can also

be relevant for other tropical communities, which have seen more calls for the transformation of exploitative land-based economies, especially in South America and Africa.

SCOPE AND STRUCTURE

This book attempts to systematize the strategies proposed or implemented to transform the land-based economies in Borneo and explores the underlying dynamics in addressing the big question: how to improve livelihoods, not only without causing further environmental impacts but also repairing the damage done in the past. It is further guided by three sub-questions: (i) what strategies are implemented or proposed to transform the land-based economies? (ii) what are the current status, opportunities, and challenges of these strategies from different perspectives? and (iii) how do they complement or contradict each other in a territorial context?

The framework of the book was established based on the authors' years of experience in varied parts of Borneo and discussions with various actors (local communities, governments, researchers, industries, international organizations, non-governmental and civil society organizations) while working in different capacities, following which the content gradually evolved through a careful analysis of the now voluminous literature.

This book is organized into 14 chapters grouped into four parts. Part I consists of this introduction and Chapter 2, in which both quantitative and qualitative background information about the island is provided, including a summary of the post-independence land-based developments in chronological order.

The chapters in Part II describe five productivity-oriented strategies for transforming land-based economies in Borneo. Chapter 3 gives an overview of the first strategy, i.e., boosting upstream productivity of oil palm and timber, the two major commodities in Borneo's export-oriented economies. It provides a detailed account of the biological and physical limitations, as well as the problems associated with small farmers and labour availability. The next strategy, activating underutilized low-carbon land resources for future production, is analysed in Chapter 4. Both the biophysical and non-biophysical characteristics of such land resources are examined, and the factors that affect the mobilization of these land resources are identified.

The next three chapters primarily deal with strategies related to downstream activities and markets. The efforts in upgrading and diversifying downstream activities, particularly the oleochemical industries and

biorefineries are elaborated upon in Chapter 5. This is followed by a discussion about the importance and the current status of infrastructure and investment. Chapter 6 provides a broader perspective of value creation through strategic branding of the two aforementioned commodities, i.e., timber and palm oil. The market status, schemes, impacts, and challenges are analysed. Lastly, the strategy of establishing domestic demand for bio-resources to boost local growth and supply security is reviewed in Chapter 7. The motivation and effectiveness of implementing this strategy in the food, energy, and manufacturing sectors are assessed.

Part III consists of Chapters 8 to 12 which cover conservation-oriented development strategies. These five chapters are arranged in a way analogous to the five chapters in Part II. Corresponding to the productivity-boosting strategy described in Chapter 3, enhancing agroecological resilience is portrayed as an alternative strategy for ensuring long-term growth in Chapter 8. Adoption of a landscape approach in (re)designing the land-use system, with a special focus on peatland restoration, is deemed the key to enhancing the resilience of the land-use systems in Borneo. In addition, commodifying ecosystem services is perceived as a revolutionary approach to addressing the perennial issue of environmental degradation as described in Chapter 9. It is fundamentally different from most of the other strategies as it does not measure the outputs in terms of biological products or human-based services. Instead, it attempts to arbitrarily create value for ecosystem services and markets to trade them. The issues of measurement, monetization, scheme design, and implementation are elaborated.

As the counterpart of Chapter 5, Chapter 10 portrays the potential of establishing eco-based tertiary sectors, such as eco-tourism, as an alternative to conventional industrialization. Meanwhile, Chapter 11 focuses on marketing products from smallholdings to create new value propositions. This strategy is complementary to the one described in Chapter 6, but with different focuses and approaches. Chapter 12 represents more of an ideological approach than an economic strategy. It describes the idea of a self-sufficient farming-hunting-gathering system in rural areas largely linked to traditional lifestyles. This is discussed in the context of urban-rural transition, ethnicity, and land-use practices.

The last part of this book, Part IV, has two chapters. Chapter 13 explores the potential impacts of the ongoing digital revolution on Borneo, particularly the application of new technologies for realizing transformative strategies. Chapter 14 discusses future perspectives, especially in light of current climate change predictions.