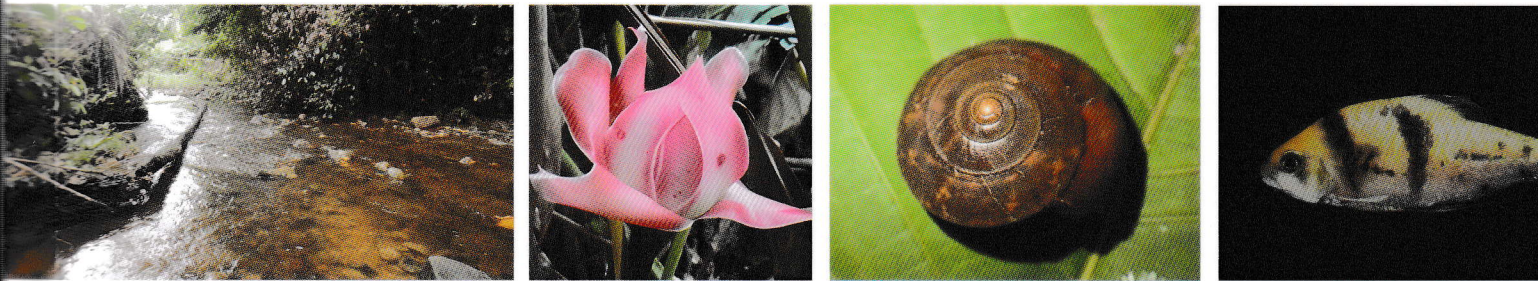


EXPLORING NATURE'S RECOVERY



BIODIVERSITY RESILIENCE



SABAL FOREST RESERVE

Edited By

Mohd Zacaery Khalik, Dayang Nuriza Abang Abdillah, Azahari Omar,
Runi Anak Sylvester Pungga, Meekiong Kalu, Faisal Ali Anwarali Khan



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Recovery Sabal Forest Reserve

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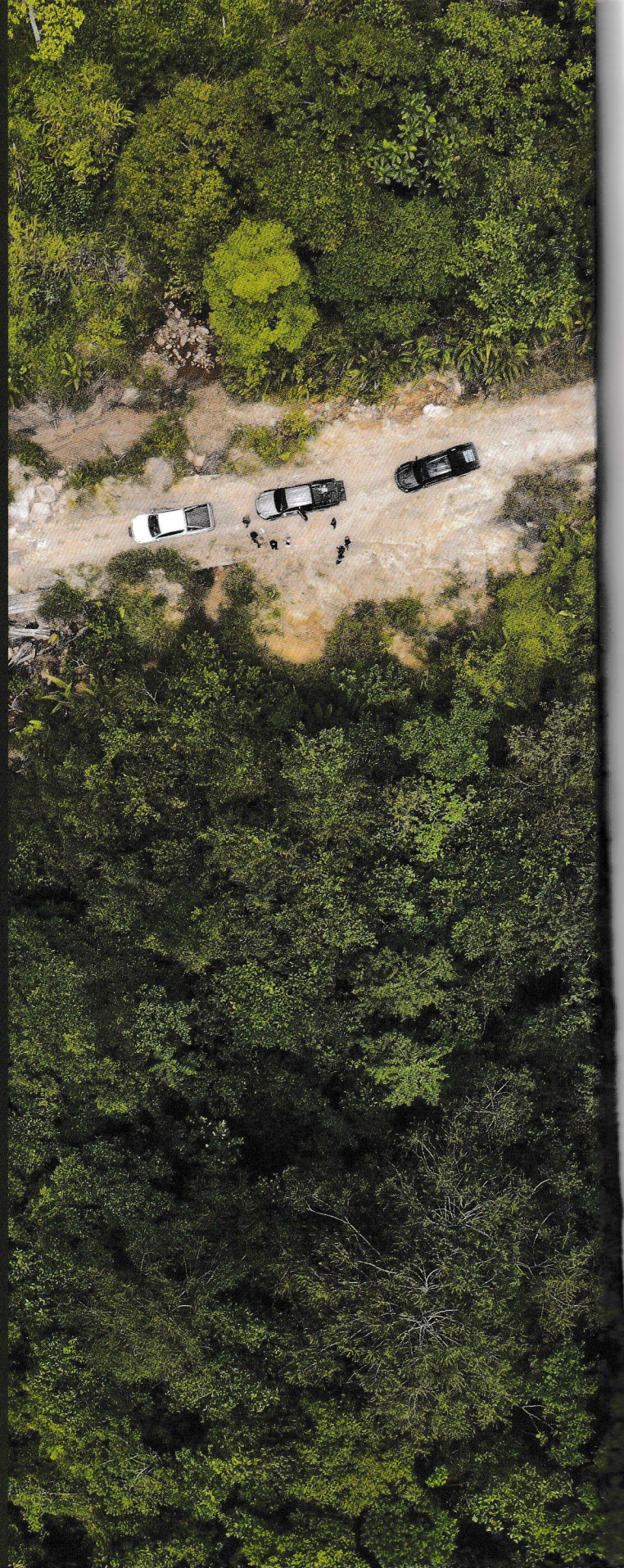


Table of Content

Foreword	i
<i>by Yang Berhormat Datuk Amar Awang Tengah Ali Hasan</i>	
Preface 1	ii
<i>by YBhg. Datu Haji Hamden Mohammad</i>	
Preface 2	iii
<i>by YBhg. Professor Dr Ahmad Hata Rasit</i>	
Introduction	2
<i>by Meekiong Kalu, Mohd Effendi Wasli & Mohd Zacaery Khalik</i>	

Environment

-Landscape Changes	6
<i>by Siti Nurbaidzuri Reli, Nurul Hazlina Acheh, Muhammad Alif Muhaimin Muhammad Suhaimi & Nur Alis Sofiyah Rosli</i>	
Water Quality and Solid Wastes	9
<i>by Siti Akmar Khadijah Ab Rahim, Ruhana Hassan, Mustafa Kamal @ Harris Norman & Besar Ketol</i>	

Flora

Orchids	15
<i>by Mohd Akmal Mohd Raffi, Meekiong Kalu, Zinnirah Shabdin, Haniza Razali, Yazid Kalbi, Ain Johari, Charlen Joyce Chakiris & Farah Alia Nordin.</i>	
Wild Gingers (Zingiberaceae)	19
<i>by Meekiong Kalu, Mohd Akmal Mohd Raffi, Nur Sabrina Mohd Subri, Bernaddete Andriesse, Nurul Nurain, Johari, Charlene Joyce Chakiris. Yazid Kalbi & Nur Safinas Jelani</i>	

Introduction: Sabal Forest Reserve And The Scientific Expedition

Meekiong Kalu, Mohd Effendi Wasli & Mohd Zacaery Khalik

The Sabal Forest Reserve (Sabal FR) is a vital ecological area located in Sarawak, Malaysian Borneo, serving as a hub for biodiversity and scientific study. Situated between latitudes $0^{\circ} 58' - 01^{\circ} 04' N$ and longitudes $110^{\circ} 51' - 110^{\circ} 57' E$, the reserve is a significant component of Sarawak's biodiversity and topographical despite its relatively small size. Sabal FR was gazetted in 1927 (Notification No. 331) with an initial area of 4,600 ha. Expansions and additions were made in 1953, 1962, and 1982, bringing the total area to 7,833 ha. However, the size of Sabal FR subsequently decreased when a portion of the reserve, measuring 4,709 ha, was gazetted as Sabal National Park on 22 May 2018. The reserve's area was further reduced for the construction and expansion of the Pan-Borneo Highway project (Package 3), connecting Serian and Sri Aman. This project, which included a two-lane road alignment and road reserves, has reduced the current area of Sabal FR to 2,163 ha (Figure 1).

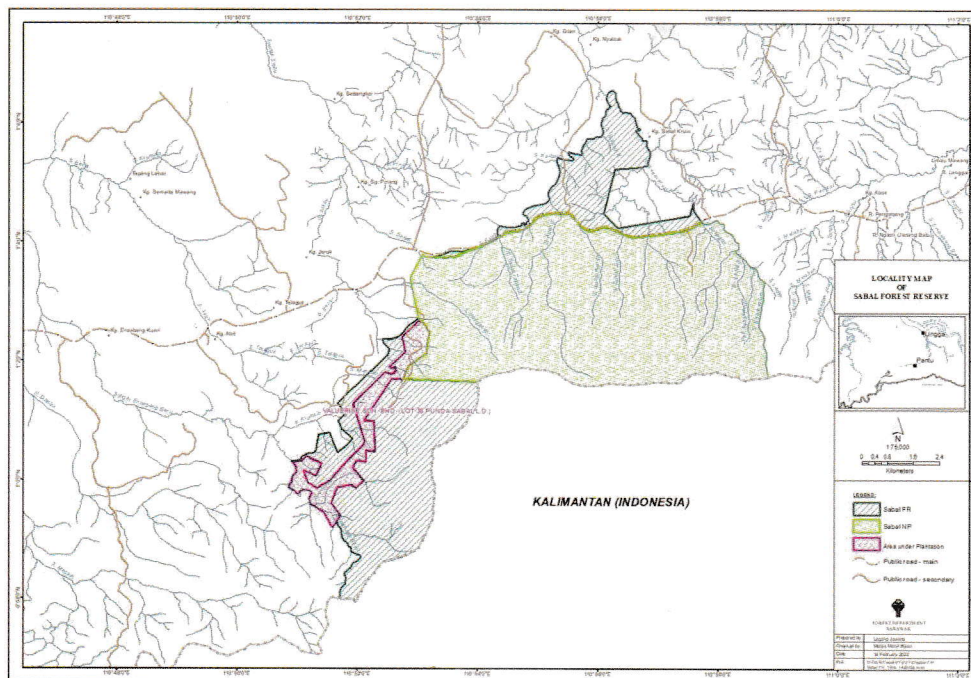


Figure 1. Sabal FR and Sabal NP.

Geographically, the Sabal FR presents a varied topography that shapes its ecosystems. The northern part is characterized by undulating and low-lying lands, while the south is dominated by the steeper hills of the Kelingkang Range. This range culminates at the highest point, Gunung Gaharu, which stands at 820 meters above sea level. The elevation changes across the reserve are a critical factor influencing both its climate and hydrological systems. The climate of Sabal FR is consistent with that of a tropical rainforest, marked by high humidity and warm temperatures throughout the year. The average annual rainfall is approximately 4000 mm, with a mean annual temperature of 26°C. This humid and consistently wet environment is a primary driver of the reserve's lush and diverse plant life, creating ideal conditions for a wide range of tropical species to thrive.

The soils of the Sabal Forest Reserve (FR) are as varied as the surrounding landscape (Figure 2), illustrating the interaction of geology, landform, and hydrology. Studies have identified several soil types, with Red-Yellow Podzolic soils (Ultisols) being the most notable. These soils are produced from non-calcareous sedimentary rock and, in some cases, are interspersed with Grey-White Podzolic and Podzol soils. These soils are often very acidic, with pH values below 5.0, and have low base saturation. In terms of texture, it can range from heavy to light clay soils in steep terrain places where Red-Yellow Podzolic soils are abundant, while the soils in low-lying undulating areas are mainly sandy. These edaphic features have a significant effect on vegetation dynamics since they affect nutrient availability and regulate water retention, affecting the distribution, growth, and health of plant communities within the Sabal FR.

Within Sabal FR, a total of 18 soil series have been documented according to the Soil Classification system of Sarawak. The Saratok soil series is the most extensive, covering 708.05 hectares in the northern portion of the reserve, which constitutes 26.64% of the total area. The prevalence of Saratok series soils underlines the importance of recognizing site-specific soil conditions for effective management as these soils present inherent limitations on land use while simultaneously supporting natural forest ecosystems. The variety of soil types present in Sabal FR highlights its natural diversity, facilitating numerous forest habitats and enhancing the area's conservation significance.

The vegetation within the reserve exhibits a mosaic of forest types. Originally, the Sabal FR was characterized by a mixed dipterocarp forest (MDF), kerangas forest, and riparian forest. The area has undergone extensive selective logging over several decades. Following these logging activities, encroachment began, as shifting cultivators living in adjacent areas utilized logging roads to access the interior. They practiced a slash-and-burn method to clear thinned forests for hill padi cultivation.

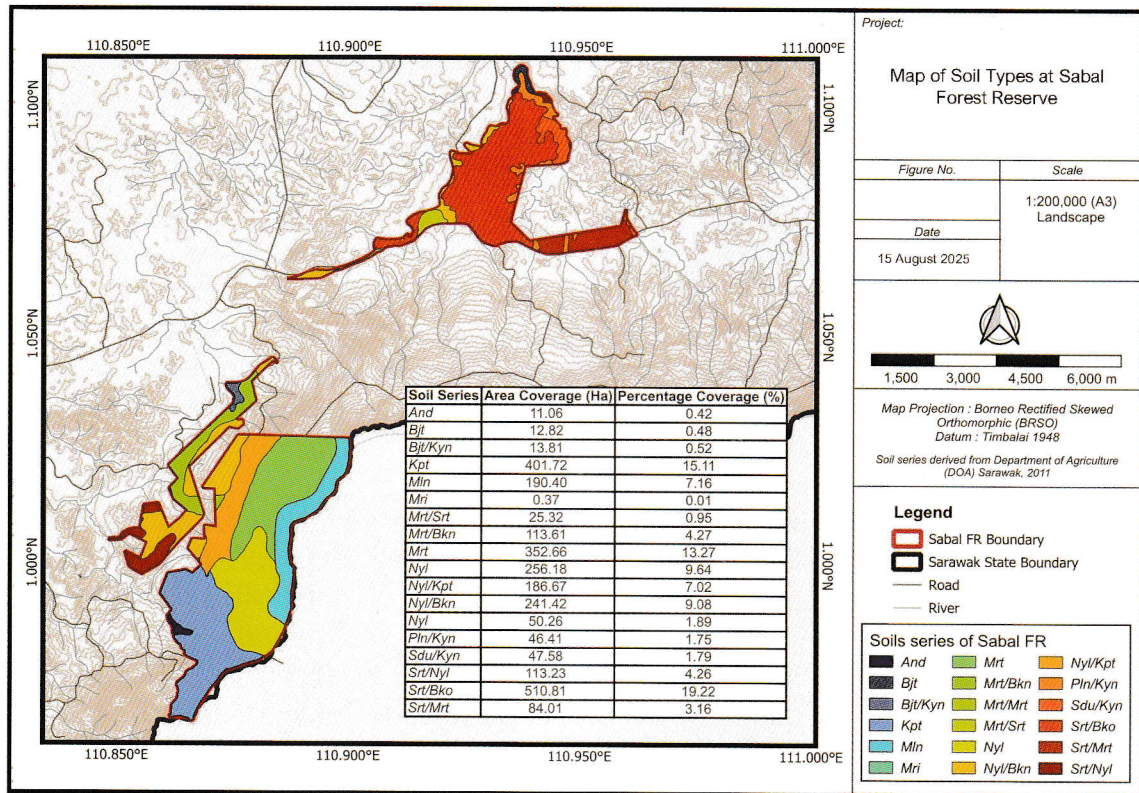


Figure 2. Sabal Forest Reserve

Deforestation within the reserve was subsequently mitigated by the introduction of an agroforestry project in the 1990s. The remnants of this shifting cultivation have become a challenge for the Forest Department Sarawak (FDS), as most of these areas become poorly degraded.

The impact of this shifting cultivation has resulted in the formation of secondary forests dominated by pioneer species such as grasses, sedges, ferns, and other shrubs. After 15–25 years, these secondary forests begin to resemble their original state. However, the most notable difference is that the plant species diversity in the regenerating forest is significantly lower than that of a primary MDF. The dominant plant families found are Euphorbiaceae, Lamiaceae, Moraceae, Sapotaceae, and Theaceae. In contrast, forest regeneration in kerangas forests is slower and takes a longer time. These areas are typically dominated by sedges and the somah tree (*Ploarium alternifolium*).

In 1965, the Sabal FR area was chosen as a research site to evaluate the suitability of fast-growing exotic species for the development of forest plantations under the Reforestation Research Program. Among the exotic species tested at the time were *Pinus* species; however, the project was unsuccessful. Subsequently, the FDS through its own reforestation program from 1981 to 1994, planted 2,078 hectares with native

species, namely Engkabang Jantong (*Rubroshorea macrophylla*), and the exotic species *Acacia mangium*. Additionally, the Forest Plantation Model Project (256 ha) began in 2010.

Building upon the ecological and historical context outlined above, this volume further consolidates the outcomes of the Sabal Scientific Expedition (23-29 November 2024), a coordinated field initiative designed to generate baseline scientific data for the Sabal Forest Reserve. The expedition was conducted over a one-week period, bringing together a multidisciplinary team of researchers, lecturers, technical staff, and students. This intensive field campaign enabled the simultaneous execution of multiple sub-projects, each focusing on distinct yet interconnected components of the ecosystem, thereby ensuring a holistic understanding of the reserve's biological and environmental complexity.

The book is organized into thematic chapters that reflect the breadth of investigations undertaken during the expedition. These chapters encompass biodiversity assessments of key taxonomic groups, including mammals, avifauna, herpetofauna, invertebrates, and plant communities, alongside studies on water quality, soil characteristics, and habitat structure. Each chapter presents methodological approaches, field observations, and analytical outcomes, collectively forming a comprehensive scientific record of Sabal FR. The integration of these findings provides a multidimensional perspective of the reserve, linking species diversity with environmental parameters and landscape features.

Despite its reduced size and history of disturbance, Sabal Forest Reserve continues to support a considerable level of biodiversity and ecological value. The presence of species of conservation concern, coupled with diverse habitat types ranging from secondary mixed dipterocarp forests to kerangas ecosystems, underscores the importance of the area as a conservation refuge. However, the studies also reveal ongoing challenges, including habitat fragmentation, legacy effects of logging and shifting cultivation, and pressures associated with infrastructure development. These factors contribute to variations in species distribution, reduced primary forest characteristics, and altered ecosystem dynamics.

Importantly, the expedition also identified significant knowledge gaps and opportunities for future research, particularly in under-documented taxa and ecological processes. The findings emphasize the need for long-term monitoring, integrative conservation planning, and strengthened collaboration between academic institutions and management authorities. Collectively, this book not only documents the scientific outputs of the Sabal Expedition but also serves as a foundational reference for guiding conservation strategies, informing policy decisions, and supporting sustainable management of the Sabal Forest Reserve in the years to come.