

Preface

Rain Forest Biology and the Canopy System, Sarawak, 1992–2002

The rain forest takes an immense breath and then exhales, once every four or five years, as a major global weather pattern plays out, usually heralded by El Niño–Southern Oscillation. While this powerful natural cycle has occurred for many millennia, it is during the past decade that both the climate of Earth and the people living on it have had an increasing influence on the weather pattern itself, with many biological consequences. In Southeast Asia, as also in most of the Neotropics, El Niño accompanies one of the most exuberant outpourings of nature's diversity. After several years of little activity, the incredibly diverse rain forests suddenly burst into flower—a phenomenon referred to as General Flowering in Asia. Plant populations are rejuvenated and animals are fed, but the process involves a delicate and complex balance.

When the canopy access system was under construction at Lambir Hills National Park in the early 1990s, it made use of an underlying technology that was already in place: bridges. For centuries, bridges have spanned the natural chasms over rivers. This existing network of bridges and the people who built and use them produced the technology we needed to gain access to the canopy. Bridge builders were our natural allies in the quest for biological knowledge of the high canopy. We saw the two massive tree towers take shape, then the walkways between them, all in a setting that would make any naturalist or explorer dizzy with excitement, if not vertigo. Studies at the top of the living envelope of forest

were finally to gain a firm footing and would soon be incorporated with the more traditional, earthbound observations. Professor Tamiji Inoue recognized that the special environment of the rain-forest canopy held the future for tropical scientific exploration.

Now, over a decade later, technology has placed at our disposal a new canopy access system—an immense construction crane towering 80 meters high, with a jib reaching 75 meters across the surrounding forest, and a remote-controlled gondola that can travel from the ground to well above the canopy. This represents a revolution in the study of tropical rain forests. It may also represent a final frontier in natural history studies, in one of the most important, but little known, biomes on Earth.

Students of the rain forest strive to see the entire forest and its denizens, across both space and time. Of the 367 species of mammals, birds, reptiles, and frogs at Lambir Hills National Park, the disturbed or open habitat species are increasing, while forest animals such as hornbills and primates are in decline or have disappeared (Shanahan and Debski 2002). An unusually severe drought and an El Niño in 1997 and 1998 increased tree mortality by seven times (Nakagawa et al. 2000) and led uniformly to local extinctions of mutualistic insects (Harrison 2000). Also following that event was an outbreak of certain insect herbivores (Itioka et al. 2003). Many changes and dynamics continue apace.

Similar themes are emerging elsewhere. At the other side of the world, in Costa Rica, a gathering to commemorate the fortieth anniversary of the Organization for Tropical Studies recognizes a worldview with particular resonance for the tropics. One of the speakers is Dr. Edward O. Wilson, a spokesman for, and well-known pioneer of, themes about the rain forest that have captured attention with their urgency; for example:

- In 1988, the term *biodiversity* was introduced, yet even today, 90% of the world's species remain undescribed and unappreciated. Half of them live only in the tropical forests.
- The second-greatest block of rain forest on the planet is in Borneo. It is representative of what remains on Earth in the standing tropical forests, now diminished from 12% to 6% of the planet's surface, since the precipitous advance of human populations.
- In the small but biodiverse region of Costa Rica, national parks and preserves now include 37% of all land, an increase from 20% a short time ago. Why? One reason is purely economical, because the water provided by forest is more valuable than one of its popular economic alternatives—beef cattle that would be produced on land cleared of its natural vegetation.
- Currently, the poor outnumber the rest of humanity by about 75:1, and almost 100 million people live in absolute poverty. However, future generations will pay the heaviest price. It will stem from the loss of biodiversity and the services, quality of life, culture, and potential for development that biodiversity provides.

- Our collective retirement funds lie, now and in the future, in the sustained partnership of people and their environment, not in the short-term profit taking that leads to erosion of all that is valued by society.

Even though the pessimists seem to outnumber the optimists, we still agree with Dr. Wilson and the participants of that tropical conference in the Americas. We need to act, we need to reason, and we need to understand. From a tract of rain forest in the north of Borneo, the information given here brings us a little closer to seeing the scientific reality of the rain forest. We are striving to keep in step with the race to realize our potential before the great forests are taken away, for, as Professor Inoue once remarked, these places are the windows in which we can behold the entire history of life on Earth. As presented in the closing chapter of this work, expressed by our friend the late Professor Inoue, who died tragically during the Sarawak studies, there is enduring relevance in rain-forest research. Maintaining the human birthright—the preservation of nature’s masterpieces while fulfilling the true goals of our lives and histories—is still the primary purpose of science.

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