Refuge ecologist visits Borneo, marvels at giant trees in a rapidly vanishing rainforest

by Ed Berg

The author climbing a Koompasia tree in Borneo, using Jumar ascenders on a rope. The first branch was 160 feet above the ground. The tree was about 260 feet tall; it is in the pea family. The surrounding area was selectively logged 10-20 years ago for even larger trees. Photo Credit: Stephanie Moore

My travels this winter took me to Borneo, a huge island in Southeast Asia halfway between Vietnam and Australia. I traveled with Roman Dial and his tropical ecology class from Alaska Pacific University.

The northern third of Borneo is part of Malaysia; we traveled mostly in the Malaysian state of Sabah, the least developed part of Borneo. The southern two-thirds of Borneo is part of Indonesia. A tiny sultanate called Brunei is perched on the north coast of Borneo; it has little land but most of the crude oil, natural gas and money.

Much of Borneo has been logged in the last several decades, and replanted with oil palm plantations, especially in the Indonesian part. Oil palms have created an economic boom with people now driving cars who were on motorbikes 15 years ago. Palm oil is widely used in paints, cosmetics, cooking oil, and even as biodiesel fuel. Colgate-Palmolive soap, introduced in 1898, was one of the first big users of palm oil, along with olive oil.

The seed-to-seed time for an oil palm tree is just 30 months, and investors expect to recover their initial capital in five years, a 15% annual return. Oil palm productivity starts to decline after a dozen years and the trees become too tall to harvest efficiently, so plantations must be replanted every 25 years. I asked various people how many cycles of replanting could be done before the soil nutrients were depleted, but no one seemed to know; they're still on the first or second cycle. Once the nutrients are gone, heavy doses of petroleum-dependent fertilizer will be needed, and the "gold" may disappear from the "green gold" of palm oil.

Landowners large and small have made a lot of money from oil palms, but the market price of palm oil is presently down and this will provide less incentive to cut down virgin rainforest to plant oil palms, at least for the moment.

Since the 1970s Borneo has been a logger's paradise. I have never seen such huge and perfectly formed trees. Trees grow rapidly in this warm, "everwet" climate. Many are dipterocarps, a family of trees mostly native to the Old World tropics of Southeast Asia. They typically grow very straight and self-prune their lower branches; they have a cabbage-like top which towers above the surrounding canopy of smaller trees.

The relatively open character of the high canopy in the Old World tropics appears to have favored the evolution of a variety of gliding animals, such as flying squirrels, flying geckos, flying frogs, and flying colugos (a possum-sized arboreal mammal). There is even a "flying" snake with hinged ribs which can flatten it-

self out enough to have a bit of an airfoil; it can stall its gliding flight just in time to land vertically on a tree. The New World tropics have much smaller trees with an overall flatter canopy, and haven't developed these kinds of gliding animals.

The lack of lower branches makes these trees excellent for knot-free plywood. Indeed, we were told that much of Borneo's tropical rainforest has been logged to provide plywood for concrete forms for Japan; the forms are used twice and then discarded. I recently bought some 3/8-inch AC plywood at a local lumberyard; the A-side was a uniform knot-free surface that showed no tree-ring swirls, unlike typical fir plywood. Tropical trees have no tree-rings, e.g., balsa and mahogany, due to the lack of seasonality, and I wondered if this plywood came from Borneo.

We visited Tawau Hills Park, a fertile volcanic area with the world's tallest tropical tree (88.32 meters, 290 feet), which Roman Dial and some Australian friends found and climbed a few years ago and measured with a long tape measure. In this park Roman and friends have found seven species of trees more than 80 meters (262 feet) tall, four belonging to the dipterocarp genus Shorea (which has 196 species). The timber volumes in these huge trees can be up to 250 cubic meters (106,000 board feet); this is enough wood to build more than six 2000-square foot houses from a single tree.

For nature lovers any visit to the tropics is a celebration of biodiversity. The famous naturalist and ant specialist E.O. Wilson coined the phrase "biophilia" to describe the affinity of human beings for other life forms, our love for "all creatures great and small," as James Herriot expressed it. In the tropics there are interesting creatures everywhere you look, if you take the time to walk slowly and look carefully. We saw walking sticks 8 inches long, moths with 10-inch wingspreads and fruit bats with 3-foot wingspreads, 3-inch beetles, monkeys, gibbons, orangutans, and dozens of species of colorful birds.

In southcentral Alaska we have a dozen or so species of trees: 4 species of spruce, 2 cottonwoods, 2 hemlocks, birch, aspen, alder, and a bunch of willows– a few of which can grow to tree size if the moose don't get them. You might get a half dozen of these trees growing on the same acre or same hectare (2.5 acres). Neotropical rainforests average 200 tree species per hectare; SE Asia averages 150, Africa averages 100. The single richest hectare yet measured is in Amazonian Ecuador with 942 species of vascular plants, half of which are trees. The tropical areas of the world have had relatively stable climates for millions of years, and they have had time for species to diversify and become finely tuned to specialized food sources and habitat niches.

There are some striking difference between the Old World tropics like Borneo and the New World tropics. I have traveled extensively in the New World forests of Central America; in Borneo I missed seeing some old friends like hummingbirds darting from flower to flower, bromeliad epiphytes heavily encrusting tree branches, and a general profusion of colorful flowers so abundant in countries like Costa Rica, Belize, and Panama. The dipterocarp forests of SE Asia are more lean, or more precisely, they have a "boom and bust" natural economy that is based on the phenomenon of mast fruiting of the dipterocarp trees. These trees only flower (and produce fruit) every 2-7 years, catalyzed by dry periods that track the El Nino cycle.

The dipterocarps produce winged fruit from the size of a pea up to the size of a walnut, depending on the species. During a mast year over a hundred species of trees all fruit in synchrony, and all the fruit-eating creatures celebrate and gorge themselves. Even with such intense fruit consumption, enough fruit is left to provide seeds for new trees and forest regeneration. (Alaskans may recognize this in the masting of spruce trees—the years when most trees are loaded with cones.) In non-mast years in Borneo, like this one, bird and animal populations shrink, and there is less visible activity in the forest.

In my next article I'll describe our visit to Gomantong Cave to see the birds whose nests are used for highly prized Chinese bird's nest soup, as well as our hard-won ascent of Mt. Kinabalu, the highest mountain in Borneo at 13,435 feet.

There is an excellent article on Borneo in the November 2008 National Geographic magazine, which is available at: http://ngm.nationalgeographic.com/2008/11/borneo/white-text.html.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. He will be teaching his 5-week Global Climate Change course at the Kenai Peninsula College starting March 24 in Soldotna and March 26 in Homer. Previous Refuge Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.