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Editor: **Lyn Loveless**, Department of Biology, The College of Wooster, Wooster, OH 44691. Phone: (330) 263-2022. Fax: (330) 263-2378. Email: mloveless@wooster.edu

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Production Editor:**Carol Mozell** OTS
Design by **Katherine Hartman**

A Change in Climate

William F. Laurance
Smithsonian Tropical Research Institute, Apartado 2072, Balboa, Panama
Email: laurancew@si.edu

If killing two birds with one stone is good, then killing three is even better. This concept is at the heart of an intriguing new initiative to use carbon-offset funds to slow the rampant destruction of tropical forests, while simultaneously cutting emissions of dangerous greenhouse gases and helping to alleviate rural poverty in developing nations. The proposal is in its infancy, and could still be derailed by powerful opponents or daunting technical challenges. But, should it succeed, it would offer one of the brightest prospects for the global environment in decades.

We all know about the mounting perils of global warming and atmospheric change: rising sea levels, disrupted rainfall patterns, bigger storms, the spread of tropical diseases, and widespread species extinctions are but some of the possible consequences. Carbon-dioxide concentrations in the atmosphere have risen by 40% over the past two centuries, with much of the increase occurring in the last few decades (Fig. 1). In 2005, atmospheric carbon dioxide jumped by 2.6 parts per million in volume—the biggest annual increase ever recorded. This acceleration has three main causes. First, greenhouse-gas emissions in industrial nations—most notably the U.S., which accounts for nearly a fifth of all such emissions—have continued to grow apace. Second, emissions are increasing rapidly in the world's emerging economies, such as China and India. Finally, up to a quarter of all emissions, according to the Intergovernmental Panel on Climate Change, result from the rampant razing and burning of tropical forests.

The idea of using carbon-offset funds to slow tropical deforestation is not new. Under the Kyoto Protocol, industrial nations, including the U.S. under President Clinton, agreed to gradually reduce their emissions to levels below those they produced in 1990 (developing nations, struggling to grow their economies and reduce poverty, were not asked to make such cuts). As part of Kyoto, a formal mechanism was established for carbon trading—whereby a country that produces lower emissions than allowed under Kyoto could sell its remaining "carbon credits" to other countries, to help offset their emissions. For example, if the U.S., Germany, or Japan were struggling to meet their agreed targets, they could buy carbon credits at market value from any other industrial nation that was below its own Kyoto limit. Carbon credits could also be purchased from developing countries—for example, by paying to replant a denuded landscape in Costa Rica and thereby locking up carbon in trees rather than the atmosphere—so long as it led to a demonstrable reduction in greenhouse gases.

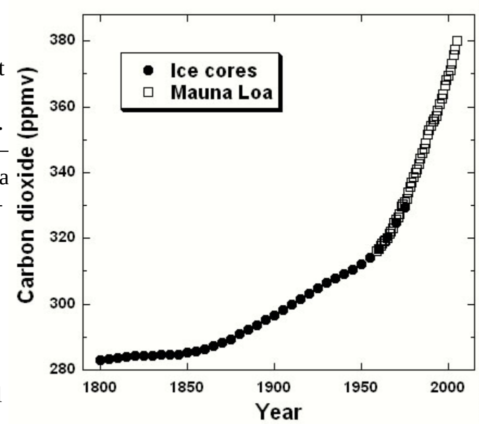

Figure 1. Carbon-dioxide levels rose markedly after the industrial revolution and far more dramatically in recent decades. The curve shows the average trend (in parts per million in volume), compiled from Antarctic ice cores and atmospheric measurements at Mauna Loa, Hawaii.

Slowing deforestation was originally seen by many as a key element of Kyoto, under its Clean Development Mechanism. But the provision ran into heated opposition, for several reasons. At the outset a number of environmental groups, particularly in Europe, opposed the idea that wealthy nations like the U.S. could simply buy their way out of their international obligations to control burgeoning industrial and automobile emissions. In addition, some opponents argued that forest conservation was a risky strategy for battling greenhouse gases. For example, even though one might try to slow deforestation by establishing a new national park in Madagascar, "leakage" could occur if slash-and-burn farmers just move to other areas and keep destroying the forest. Finally, Brazil, which alone contains 40% of the world's remaining tropical rainforest, adamantly opposed carbon trading to reduce deforestation—and lobbied other developing nations to do likewise. In Brazil, as in many other countries, national-sovereignty issues are enormously sensitive, and some within the Brazilian government argued that accepting money from industrial nations to slow deforestation could limit their future development options.

Because of these concerns, the avoided-deforestation provision was dropped from Kyoto—at least for the "First Commitment Period," from 2008-2012, during which participating nations agreed to phase in their emission reductions. Meanwhile, the world continues to destroy ten to fifteen million hectares of tropical forest annually—equivalent to forty to sixty football fields a minute (Fig. 2). As the forests keep falling, massive quantities of greenhouse gases are spewing into the atmosphere each year. Rapid deforestation also causes serious losses of biodiversity, increased flooding, and regional climate changes in addition to greatly damaging the livelihoods of some of the world's poorest people. While the world fiddles, Rome is burning.

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The avoided-deforestation provision under Kyoto was considered dead by many, but, like Lazarus, the idea has been reborn. The surprise came in December 2005, at a major global conference on climate change (the Eleventh Convention of Parties to the United Nations Framework Convention on Climate Change, or COP-11 meeting) in Montreal, Canada. There, a determined coalition of developing nations, led by Papua New Guinea and Costa Rica, argued that the issue should be put back on the table. And this time—at least for the time being—many of its former opponents are giving the idea a chance.

Why the change in attitude? First, European green groups have grown increasingly alarmed by the acceleration of greenhouse-gas emissions worldwide, and realize we need every possible arrow in our quiver to battle the menace. Simply from a climate-change perspective, failing to address the issue of tropical deforestation is dangerously irresponsible. Second, those worried about the "leakage" issue were mollified when the coalition proposed to tally deforestation at the national level. Thus, if a carbon-trading project reduced deforestation in one part of, say, Gabon but simply allowed it to increase elsewhere in the country, Gabon would receive no benefit. Finally, Brazil, led by its environment minister, Marina Silva, has tentatively embraced the proposal. For the Brazilians, the fact that the initiative is being driven by developing nations was evidently enough to surmount deep suspicions, especially among their foreign ministry, of international initiatives to slow Amazon deforestation.

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Aside from its obvious benefits for the atmosphere and forests, using carbon credits to slow deforestation has one very big thing going for it—it makes sense economically. Every hectare of rainforest contains, on average, around two hundred tons of carbon in its aboveground vegetation, and more if plant roots and carbon in the soil are considered. Most of the aboveground carbon, and some of that belowground, is released to the atmosphere if the forests are felled or burned. Carbon dioxide and other greenhouse gases mix freely in the atmosphere, so saving a few thousand hectares of Bolivian rainforest from destruction might have roughly the same environmental benefit, for instance, as improving the efficiency of a coal-fired generating plant in Ohio. Doing the latter involves big bucks, so why not invest some of that money to save rainforests?

The economic logic becomes even more compelling—and hence more attractive to developing nations—when one realizes that many land-uses in the tropics, such as slash-and-burn farming or cattle ranching, are only marginally profitable. For example, a hectare of rainforest might cost $300 to clear for pasture, and then be worth only $500 to its owner, giving him a net profit of only $200 for all his hard work. At the current market value for carbon (which varies around the world), the hectare of rainforest, if left intact, could be worth up to several thousand dollars. Hence, there are strong economic arguments for saving tropical forests. In theory, it should be a win-win proposition for everyone involved.

But, as in many endeavors, the devil is in the details. Many of the fifteen small countries that actively support the initiative to slow deforestation, known as the Coalition for Rainforest Nations (www.rainforestcoalition.org), met recently at Columbia University in New York City, and there I learned about the practical challenges—and potential political foes—they may face.

The practical hurdles become apparent when one asks what a developing country would actually have to do to qualify for carbon credits. The first step is to establish its "baseline" rate of deforestation—the amount of forest it typically fells each year. A common idea for the baseline, for example, is to use the average yearly deforestation rate for each country between 1990 and 2005. That might sound simple, but the main estimates of past deforestation, compiled by the U.N. Food and Agricultural Organization, are based on reports from the countries themselves and are notoriously inconsistent among countries and years. For this reason, the best data on past deforestation are likely to come from satellite imagery, but generating such estimates takes money and technical expertise. At present only two developing nations, Brazil and India, have such long-term monitoring programs. To quantify past deforestation, and carefully monitor future deforestation, many other countries will need some financial assistance—start-up funds from international donors or lenders, to get the ball rolling.

Once the baseline rate is known, a country could then profit by slowing its annual deforestation rate below its baseline rate. Some countries, especially forest-rich nations with high deforestation rates, like Brazil and Indonesia, could potentially win big. Suppose, for example, that the baseline rate for Indonesia is 1.5 million hectares per year, and that the country manages to reduce this to 1.0 million hectares annually. If one assumes that every hectare of preserved forest saves 200 tons of carbon emissions and that each ton of carbon is worth $10 on the international market, then Indonesia could gain around $1 billion each year.

Figure 2. Industrial logging often precedes deforestation in developing countries (photo by W. F. Laurance).

But industrial nations would never turn over such impressive sums without convincing assurances that they were effective in reducing net carbon emissions. Indonesia would need to show that leakage was not occurring and, even more importantly, that the cuts in deforestation were permanent, not temporary. If they reduced deforestation to 1.0 million hectares one year but allowed it to rebound to 2.0 million hectares the next, they would gain nothing. This all sounds simple and logical, but the realities of monitoring and complying with international agreements, and of making permanent commitments to the buyers of carbon credits, make some developing nations very nervous.

The above example—in which Indonesia gains a cool $1 billion each year—also assumes that the price of carbon would remain stable at $10 per ton. Many believe this is a conservative figure, but if a number of developing nations cut their deforestation rates simultaneously, then the market could be oversupplied with carbon credits. As with any tradable commodity, the price of carbon credits is determined by the balance between supply and demand. Keeping the price at an adequate but reasonable level means striking a balance between the needs of carbon-credit producers (developing countries) and consumers (industrial nations).

In addition to monitoring and complying with their agreements, developing nations will have another challenge—ensuring that a good chunk of the money from carbon credits gets into the hands of impoverished small-scale farmers and rural landowners that directly cause much deforestation (Fig. 3). They will also need to monitor the activities of individual landowners, to ensure they abide by their agreements to reduce forest cutting. Costa Rica is already doing this with considerable success, but it involves a concerted effort to monitor land-use and reward cooperating individuals. Similar efforts will be needed in other nations that accept carbon credits, and could be especially challenging in remote, frontier regions—such as the Amazon and Congo Basins—where environmental enforcement is limited and land-tenure is often insecure or nonexistent.

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Such concerns about monitoring and compliance are far from trivial, but a compelling counter-argument is that developing nations direly need to develop this capacity, regardless of carbon trading. As explained by Robert Aisi, the eloquent United Nations Ambassador from Papua New Guinea who is helping to spearhead the Coalition for Rainforest Nations, lawlessness, waste, and corruption in the frontier exact a massive cost on developing countries. In the Brazilian Amazon, for example, about 80% of all timber cutting is illegal—meaning that the timber is effectively stolen, with absolutely no environmental control over harvest operations and no payment of government royalties. Many other tropical nations suffer similar corruption, especially in their timber and mining industries. This not only has serious environmental costs, but also has a big impact on government coffers. Hence, using carbon credits to promote conservation should help governments to stabilize and manage their often-unruly frontiers.

Aside from its obvious environmental benefits, the avoided-deforestation initiative might also have important political ramifications. One of the main reasons offered by the Bush Administration and U.S. Congress for failing to support Kyoto was that it failed to address growing carbon emissions in developing countries. Because deforestation is the biggest source of emissions for many developing nations, this initiative might help to remove a key stumbling block for future U.S. climate accords.

Even its most enthusiastic proponents expect that a great deal of political wrangling and determined alliance building will be needed before a final agreement to reduce deforestation can be hammered out. Some developing nations will surely try to mold the agreement to benefit their particular interests. For this reason negotiations to date have purposely focused on general strategy rather than specific details. One of the biggest fears is that the Bush Administration might try to hamstring the delicate ongoing dialogue by insisting, as it has often done in past, on "scientific rigor"—that concrete actions to attack global warming must be preceded by virtual scientific certainty. Such certainty is a rare commodity in science, particularly in the complex field of climate change, so the common perception is that such calls are in reality an excuse to do nothing.

Yet, for all the challenges it faces, the Coalition for Rainforest Nations seems determined not to let this rare opportunity fail. We should applaud their efforts, for their initiative could help to reduce two of the most serious environmental threats—global warming and tropical deforestation—we face today. In the words of Ambassador Robert Aisi, "this is not a new initiative, but we—an alliance of developing nations—are new initiators." In the final analysis, that may be their most important advantage.

William Laurance is a staff scientist at the Smithsonian Tropical Research Institute in Panama, and President of the ATBC.

Figure 3. Developing countries will likely need to compensate local landowners, such as these shifting cultivators in Gabon, to achieve long-term reductions in deforestation (photo by W. F. Laurance).

BRITISH ECOLOGICAL SOCIETY SETS UP £500,000 FUND FOR ECOLOGY IN AFRICA AND EASTERN EUROPE

The British Ecological Society has set up an innovative new fund designed to build capacity in ecological science in Africa and Eastern Europe. The Building Capacity for Ecology Fund will make £500,000 available over five years to support the establishment and development of ecological societies in Africa and Eastern Europe.

Learned societies are a vital part of the scientific infrastructure. Where they do not exist, however, scientists and their local communities suffer. According to Professor Sir John Lawton, president of the British Ecological Society: "Networks and professional societies are vital support mechanisms to promote best practice, exchange information, present the results of individual researchers to a wider audience, and generally make people feel they have colleagues to turn to when they need it."

"This is a unique and timely opportunity to build ecological networks in developing countries that will allow ecologists there to tackle some of the world's most pressing environmental problems, such as climate change, soil erosion and invasive species. As the world's oldest ecological society, and one approaching its 100th birthday, the British Ecological Society believes that this is the best present that global ecology could get. We hope that in the near future there will be more ecological societies across the globe that can join us in ensuring that ecology is a vibrant science throughout the world," Lawton says.

Full details and an application form for the Building Capacity for Ecology Fund are available at www.britishecologicalsociety.org/grants/bcef.

Smithsonian's National Zoological Park's Conservation and Research Center, Front Royal, VA ofrece:

Introducción al uso de SIG y Sensores Remotos en la Conservación y Manejo de Vida Silvestre, 5 al 9 de junio de 2006. Este curso corto esta orientado a la aplicación de Sistemas de Información Geográfico (SIG) y Sensores Remotos en el monitoreo y manejo de vida silvestre y hábitats forestales. Cada participante tendrá a su disposición una computadora para todos los ejercicios de laboratorio. Los ejercicios estan orientados para determinar ubicaciones geográficas con el Sistema de Posicionamiento Global (GPS), ingresar información a un SIG, y utilizar técnicas de análisis espacial. Además se proveerán actividades prácticas y experiencias del mundo real donde los participantes aprenderán a:

COLECTAR datos de SIG en el campo utilizando diferentes técnicas de muestreo y GPS;
CORREGIR diferencialmente los datos de GPS;
INGRESAR los datos de GPS y los datos colectados en el campo a un SIG;
UTILIZAR SIG para el manejo de bases de datos provenientes de múltiples fuentes;
DISEÑAR y realizar análisis utilizando datos de SIG y técnicas de análisis espaciales;
INTEGRAR datos con información auxiliar derivada de imágenes satelitales, fotografías aéreas, o bases de datos de diferentes instituciones.

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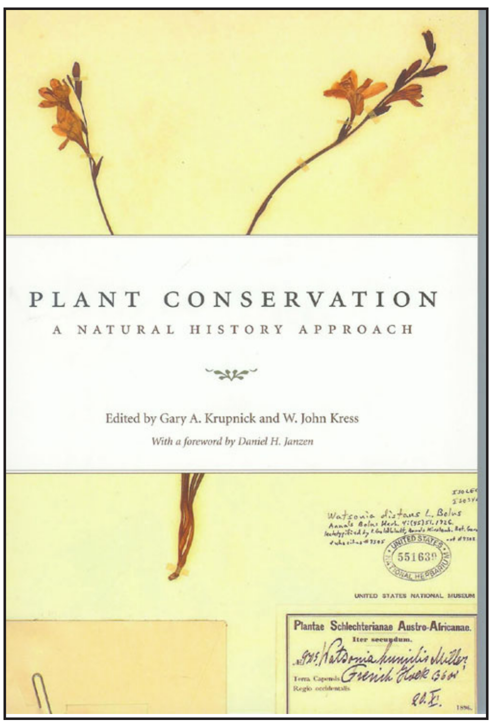
Note: Our English-language introductory and advanced Conservation GIS and Remote Sensing training courses are offered several times a year; for more information, visit: http://nationalzoo.si.edu/ConservationAndScience/ConservationGIS/GIS%5Ftraining/

A Smithsonian Primer on Plant Conservation

A review of: W. John Kress and Gary A. Kupnick (eds.) 2005. Plant Conservation: A Natural History Approach. The University of Chicago Press, Chicago & London. 346 pages. ISBN 0-226-45513-0.

Scott A. Mori
Curator of Botany
New York Botanical Garden, Bronx, N.Y.

The recent change of our society from the Association of Tropical Biology to the Association of Tropical Biology and Conservation was in response to the need for all of us to incorporate as much conservation into our research as possible. Tropical forests, as well as ecosystems throughout the world, are losing biodiversity at an alarming rate. Trained as an undergraduate in biology and conservation at the University of Wisconsin in Stevens Point, and subsequently in botany by Hugh Iltis at the University of Wisconsin in Madison, I have been aware of the assault on natural areas since 1960. Since then, I have seen tropical forest destruction practically everywhere I have traveled in the tropics, especially in the Atlantic coastal forests of Brazil where original forest cover has been reduced to somewhere around 5% of the original coverage. Therefore, I welcome Krupnick and Kress's edited volume on plant conservation.



Gary Kupnick is the director of the Plant Conservation Unit and John Kress is the chairman of the Department of Botany at the Smithonian Institution. In addition, Kress is the Executive Director of the ATBC and a driving force behind the movement to emphasize conservation as well pure research in our organization. Krupnick and Kress called upon a wide range of authorities on different aspects of plant conservation to prepare essays in their fields of study. Twenty-six of the 48 contributors are from the Smithsonian Institution, which shows the dedication and commitment to conservation by biologists of our nation's natural history museum. A problem, however, with relying on so many specialists from one institution is that some of the essays were volunteered by contributors slightly outside of their fields of expertise. In those cases, the contributions are acceptable, but others more familiar with the topics could have provided more insight on the subject.

The book is organized into four parts with three to six chapters in each part. In Part I plant diversity in the past and present, the current diversity and distribution of plants, and plant extinctions are covered. Scott Wing points out that the vast majority of plant species that have ever existed are now extinct. However, the current extinction wave is fueled by the rapacity of human beings, not by a natural disaster such as a meteor crashing into the earth. Part II covers plant diversity and includes essays on conservation of the Ecuadorian Andes, the Venezuelan Andes, the Guiana Shield, Pacific Oceanic Islands, the Gaoligong Mountains of China and Myanmar, and the following taxonomic groups: dinoflagellates, lichens, mosses, grasses, day flowers, the acanthus family, and litchis and rambutans. Part III investigates the topic of plant extinctions with discussions of habitat fragmentation, global climate change, and genetic consequences of reduced diversity. Finally, Part IV discusses the conservation of plant diversity with essays on mapping biological diversity, assessing conservation status, species assessment for the IUCN red list, management strategies, and the Convention on Biology Diversity. The book is introduced by Daniel Janzen, who emphasizes the need for correct naming of species because without a name, a plant is "just another green glob" and closed by Kress and Kupnick, who write about documenting and conserving plant diversity in the future. By all measures this is a diverse review of plant conservation.

The diversity of topics is both a strength and weakness of the book. A strength is that so many aspects of plant conservation are available for the reader to select and learn from. I was, for example, intrigued with discussions of marine habitats and the excellent reviews of degradation of algae in coral reefs, the alternation of kelp communities, and models for managing coral reefs and seagrass communities sustainably. In particular, I was introduced to the ideas of Mark and Diane Littler who have developed top-down and bottom up models for coral-reef and seagrass management. For me it was instructive reading about the impact of destructive fishing and pollution on the interactions of coralline algae, algae growing on corals and other plants, and the response of macroalgae to excessive and destructive fishing and pollution.

On the other hand, a weakness is that topics that deserved more coverage could only be addressed superficially because of space constraints caused by such a vast array of topics. I would have liked to learn more about threats to different groups of plants and different habitats in Part II, as well as to have been more informed about the impact on plants of global warming in Part III. The essay on the earlier flowering times of plants in the vicinity of Washington, DC. is only one small impact that global warming has and will have on plant communities. I picked these examples, not to criticize their content, but to point out that the reader should not look to this book for complete coverage of topics in plant conservation. It is, however, a great introduction to plant conservation and, fortunately, the reader is directed to further reading about the topics in the citations following each of the parts of the book.

Missing are examples of the importance of plant/animal interactions, which is surprising because John Kress is well-known for his research on pollination biology, including, among other studies, a classic report on the pollination by bats of *Phenakospermum guyannense* of the Strelitziaceae (Kress & Stone, 1993). I realize that an entire book could be dedicated to this topic alone and understand that not all topics can be covered in one volume on plant conservation, but this is a major topic that would have fit well into the natural history content of the book. Perhaps the authors have such a topic planned for a future book; if not, I encourage them to do so.

John Robinson (1995) has said "Sustainable use is a powerful approach to conservation (see Redford & Robinson, 1991) but it is not the only one. Many species and biological communities will be lost unless they are protected and managed with the express goal of their conservation. Sustainable use is very appropriate under certain circumstances, but it is not appropriate in all. It will almost always lower biological diversity, whether one considers individual species or entire biological communities, and if sustainable use is our only goal, our world will be the poorer for it." Krupnick and Kress have edited and contributed to a volume on plant conservation that clearly shows the damage that humans are causing to plants in practically every part of our planet. If we do not heed the words of Robinson, the only plants left to conserve will be the weeds of disturbed habitats.

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News from the ATBC Conservation Committee

ATBC CELEBRATES A CONSERVATION VICTORY

The Conservation Committee of the ATBC played an active role in opposing a major oil road that would have penetrated deep into the heart of Yasuni National Park in Ecuador, one of the world's most biodiverse nature reserves. The major road was being constructed by a Brazilian oil corporation, Petrobras, to exploit oil reserves beneath the park.

In January of 2005, the ATBC passed a formal society resolution lobbying the Ecuadorian government against construction of the road. These efforts received media attention worldwide, especially in Ecuador, and were also featured in the New York Times.

The ATBC initiative, in concert with opposition to the road by other scientific and environmental organizations and indigenous groups, has apparently resulted in a big win. In January of 2006, the Yasuni road was finally halted by the Ecuadorian government—just 2 kilometers from the park boundary.

The decision to halt the road will hopefully be a permanent one, but continued vigilance is vital. At stake is the largest and most vital nature reserve in all of western Amazonia.

Membership in the ATBC Conservation Committee is open to all interested ATBC members. Please contact William Laurance (laurancew@si.edu) and Jose Fragoso (fragoso@hawaii.edu) for information.

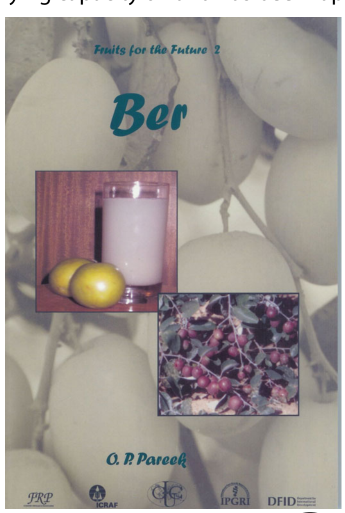
Exploring Our Future Harvest

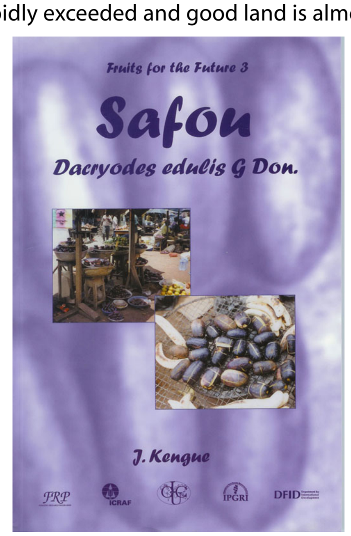
Book Review by Bhuwon R. Sthapit
Regional Office for Asia, The Pacific, and Oceania
International Plant Genetic Resources Institute, Serdang, Malaysia

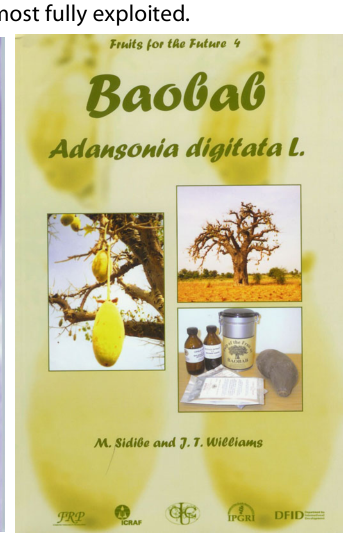
Pareek, O. P. 2001. Ber (*Ziziphus mauritiana* Lam.). Book 2 in the series Fruits for the Future, edited by A. Hughes, N. Haq and R. W. Smith. International Centre for Underutilised Crops, Southampton, UK. ISBN 854327525, 292 pp.

Mankind depends on a declining number of plant species to provide food security and economic development. Although people consume about 7,000 species of plants, only 150 species are commercially important. Modern agriculture and crop improvement in major crops has helped meet food demands of an increasing population. At the same time, this has dramatically reduced the number of species upon which global food security and agricultural income depend. Presently, only nine crops, namely wheat, rice, maize, sorghum, millet, potato, sweet potato, soybean, sugarcane and sugar beet, provide 75% of total human plant energy intake. Three crops (rice, wheat and maize) account for about 60% of the calories and 56% of the protein that people derive from plants. The narrowing species base of global food security has placed the future supply of food and rural income at risk. But there are many minor crops, including a range of underutilized fruits/crops such as ber, mangosteen, jackfruit, rambutan, belifruit, woodapple, tamarind, grain legumes, and small millets that are valuable sources of nutrition. While population is increasing in many developing countries of the world, the carrying capacity of land has been rapidly exceeded and good land is almost fully exploited. Further increase in food production will have to come from so-called marginal lands that are not suitable for major crops. Therefore, other minor crops will play an important role in increasing production and food security supply.

There is an increasing interest in neglected and underutilized crop species (NUS) throughout the world, reflecting a growing trend within agriculture to identify and develop new crops for export and domestic markets. NUS crops are those plant species traditionally used for their food, fibre, fodder, fuelwood, oil or medicinal properties, but which have been overlooked by scientific research and development workers. The FAO Global Plan of Action for the Conservation and







Sustainable Use of Plant Genetic Resources for Food and Agriculture, which was adopted in 1996 by some 150 countries, identified the improved conservation and use of NUS as one of its 20 main activities. These plants are often marginalized in production, yet they may play a crucial role in food and nutrition security, income generation and the culture of the rural poor. The Millennium Development Goals call for the world to reduce by half the proportion of people who suffer from hidden hunger, bythe year 2015. Hidden hunger is the lack of micro-nutrients, vitamins, and other components of the diet whose impact on the body is profound relative to the amount needed. NUC crops could provide alternative sources of nutrition for the poor. They also have great potential to provide income to rural micro-entrepreneurs.

The book on *Ziziphus mauritiana* has 17 chapters with a comprehensive list of references, 6 additional appendices, a glossary, and an index. Chapter 1 deals with taxonomy, while Chapters 2 and 3 cover the origin and history of the crop. Composition and use of the crop is described in Chapter 4 and 5 respectively. These initial chapters introduce readers to background information needed to understand the scope of underutilised crops. The value of the Ber crop, in terms of goods and services, could be appreciated from the study of Chapter 4 and 5. However, these chapters fail to consider use value in terms of socio-cultural and religious perspectives, which sometimes add significant value to such locally important crop species.

The genetic resources of Ber are illustrated with colour photographs in Chapter 6, while reproductive biology and breeding are discussed in Chapter 7 and 8 respectively. Crop physiology, production areas, and propagation methods are covered in the subsequent chapters (9, 10, and 11). These chapters provide useful basic information required for the improvement of underutilised crop like Ber; however, the content is relatively weak in the context of emerging participatory plant breeding approaches which could apply to this species. Propagation methods and training and pruning chapters of the book are the most useful for researchers and development workers. The agronomy and management of pests and diseases are also reviewed well in the book; however the documentation of farmers' practices in unique circumstances is not sufficiently explored. Harvesting and post-harvest handling of the crop is well described in the book. The remaining chapters are short but useful insights in understanding the difficulty of promoting UC in the world.

In this series, the reviewer also received two other Fruits for the Future publications (Nos. 3 and 4). One is authored by J. Kengue (2002) on Safou (*Dacryodes edulis*) and the other by M. Sidibe and J. T. Willams (2002) on Baobab (*Adansonia digitata L.*). The format and layout of these books are similar to the Ber book. In each case, the books assemble information on production, processing, marketing and utilization of these crops in order to identify research constraints and highlight the importance of the species for nutrition and poverty reduction. The publications in this series were funded by the Department for International Development Fund (DFID), UK as part of a project called "Fruits for the Future". This publication has been the outcome of a strategic partnership with renewed international agricultural research centres such as International Centre for Underutilized Crops (ICUC), The International Centre for Research in Agroforestry (ICRAF)-currently known as World Agroforestry Centre- and The International Plant Genetic Resources Institute (IPGRI).

The design of the books is in a very conventional format. The books include some colour photographs and high quality illustrations to show distinct fruit variation. However, conservation status of the crops are not well covered. The book scould also have been better organised in terms of chapters; some are too short to be called chapters.

Despite some omissions, these books would be useful for students of the conservation of genetic resources, crop improvement, and the value chain of neglected and underutilized crops. Information provided in the book would be useful for breeders, extensionists, development workers, fruit growers and actors at all levels of the value chain. I am sure all researchers and development workers of neglected and underutilised crops would make good use of these publications.

PATTERNS IN GLOBAL PLANT DIVERSITY II: THE CTFS STAND TABLE BOOKS

Review of: C.V.S. Gunatilleke et al., 2004. *Ecology of Sinharaja Rain Forest and the Forest Dynamics Plot in Sri Lanka's Natural World Heritage Site.* WHT Publications (Pvt.) Ltd., 221 pp.
Lee H.S. et al., 2002. *The 52-Hectare Forest Research Plot at Lambir Hills, Sarawak, Malaysia: Tree Distribution Maps, Diameter Tables, and Species Documentation.* The Forest Department of Sarawak & The Arnold Arboretum – CTFS Asia Program, 621 pp.
J.V. LaFrankie et al., 2005. *Forest Trees of Bukit Timah: Population Ecology in a Tropical Forest Fragment.* Simply Green, 178 pp.

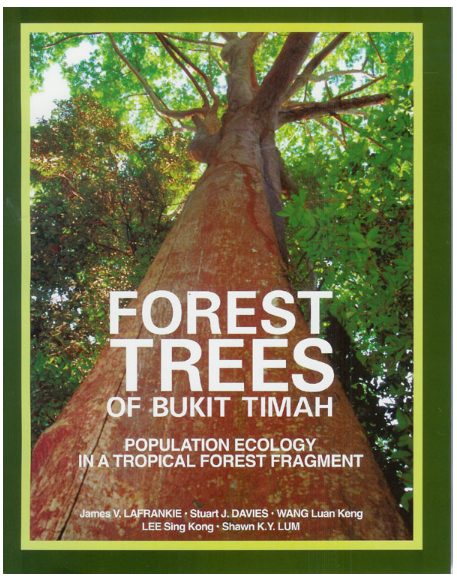
Jimmy Grogan
Yale School of Forestry & Environmental Studies
New Haven, CT

Here are three of five "Stand Table Books" published so far summarizing demographic and floristic data from the Smithsonian Tropical Research Institute Center for Tropical Forest Research (CTFS)'s ever-expanding global network of large-scale long-term forest dynamics plots (18 to date in 15 African, Asian, and American countries). The elegant idea behind the CTFS network is simple: a general theory of tropical forest dynamics and diversity can be derived by describing and measuring … tropical forest diversity and dynamics. In sufficient detail. At relevant timeframes. With adequate repetition. In practice, this idea has provoked a staggering logistical undertaking to map and measure all plants larger than 1 cm diameter within forest mega-plots typically 500 m wide by 1 km long, depending on the site. And that's just the baseline census, the getting-ready-to-learn something part: the Barro Colorado Island plot in Panama has seen ~230,000 plants re-censused four times since its establishment during 1980-1983. Imagine a dynamic database of 2.4 million individual plants among 5500 species (not counting the two most recently established plots) shared among scientists at research, educational, and policy institutions the world over. Witness the explosion in recent years of published science, both basic and applied, derived from these data. Now read the books.

Each of which is quite different from the others, in keeping with the divergent goals and intended audiences addressed by respective author teams. During a walk this morning, leafing again through these books in my mind's eye, their distinctive natures came to me in three words, highlighted below.

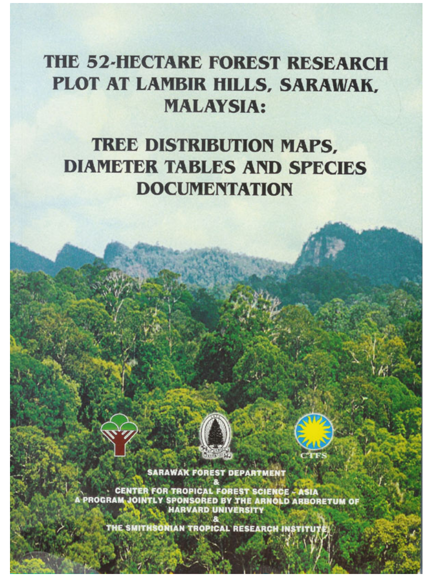
C.V.S. Gunatilleke et al.'s "Ecology of Sinharaja Rain Forest" offers a **declaration** of accomplishment, summarizing decades of interdisciplinary research in Sri Lanka's only Natural World Heritage Site. Located in the southwest wet zone, Sinharaja's 11,000 hectares represent the largest surviving block of relatively undisturbed lowland dipterocarp forest on the island. Logged in parts early in the 1970s, Sinharaja has since hosted a wide range of biological, silvicultural, and socio-economic research aimed at developing strategies for conservation management. Chapter 1 briefly outlines this impressive program that has encompassed floral and faunal diversity, post-logging regeneration pathways, reproductive biology of commercial species, genetic diversity of dipterocarps, ecophysiology, restoration ecology, natural resource economics, ethnobotany, and rural sociology.

The Sinharaja Forest Dynamics Plot was established in 25 hectares of unlogged forest during the early 1990s. Chapter 2 describes methods and provides summary results from the first census on forest structure and composition. We learn that in this forest "it's the elevation, stupid!" – the plot's 150-meter valley-to-ridge vertical rise shapes dramatic soil, disturbance, forest structure, and compositional gradients. Chapter 3 profiles 144 most-common species of the 220 recorded on the plot. A page per species lists scientific and local names, forest stratum occupied at maturity, Red Data Book conservation categories, timber class, and plywood grade where applicable. Population structures (number of individuals by six diameter size class categories) are interestingly shown as bar-column charts divided among five elevation classes, complemented by a separate map showing their spatial distribution on the plot's topographic overlay. Finally, a map of Sri Lanka divided into floristic zones indicates each species' island-wide distribution. Chapters 4 and 5 conclude by showing interesting comparative species distribution patterns, often of congenerics, and by discussing the Sinharaja plot within the context of the CTFS network.



J.V. LaFrankie et al.'s "Forest Trees of Bukit Timah" reads like a heart-felt **invitation** to Singaporeans to visit and explore the 164-hectare nature reserve that lies at the geographic heart of their island nation. The smallest CTFS network site at only 2 hectares, the Bukit Timah plot's Stand Table Book may prove to be the most useful as an educational tool, offering as it does succinct natural (Chapter 1) and anthropogenic (Chapter 2) histories of the Nature Reserve before summarizing forest structure, dynamics, and floristics on the plot (Chapter 3). Particularly interesting (I hope) to the lay reader is the authors' emphasis on forest dynamics, with clear presentation of mortality, growth, and recruitment patterns observed through three re-censuses following plot establishment in 1993. This emphasis continues into Chapter 4 profiling 103 most-common species of the ~330 recorded on the plot. Each species page presents scientific and local names; brief prose descriptions of life form, reproductive habits, and spatial distribution within the plot; simple illustrations of leaves showing insertion patterns; a nice table summarizing growth, mortality, and recruitment over 10 years; a bar-column chart showing population structure by diameter size classes; and spatial distribution on a topographic map of the plot. All of this is clear and uncrowded on a single page, and I wouldn't think of returning (20 years later) to Bukit Timah without this sweet little field-guide.

Lee H.S. et al.'s "The 52-Hectare Forest Research Plot at Lambir Hills, Sarawak, Malaysia" is the biggest, blockiest, bookiest of the Stand Table Books at hand, so why am I thinking **celebration**? Of botanical diversity, with 1192 species described here from the world's most species-rich forest. Of botany as field science, with the dizzying challenge of collecting, sorting, and identifying 360,000 individuals from all life phases oddly resonant in terse summary statements prefacing species descriptions. Of field taxonomy as a persistent, pain-staking, collaborative exercise in pattern recognition, with excerpts from J.V. LaFrankie's species notes hinting at how we may enter these forests blind and yet re-emerge seeing, well, better – there's joy to be found there within that sharpening focus.



The numbers from Lambir are inexorable: species descriptions, two per page, begin on page 26 and end in the 600s. For each species we are given: scientific name, written notes, spatial distribution within the plot on a topographic overlay, and a table summarizing population structure by diameter size classes. What a shame, no local names! How many meters do contour lines represent? Why are families presented in this taxonomically impeccable but otherwise indecipherable order (Table 2, p. 15)? But these are quibbles. Hats off to the Lambir team, and to those other teams mapping and measuring trees, trees, trees across this shrinking planet.

The Smithsonian Institution's Monitoring and Assessment of BiodiversityProgram (MAB)

is offering 2 professional training courses for international scientists, resource managers, graduate students and educators. Both courseswill be held in Front Royal, Virginia, USA at the National Zoo'sConservation and Research Center.

The Biodiversity Assessment and Monitoring course will take place May 14-June 3, 2006. The cost is $3,250 and topics include monitoring techniques for vegetation, mammals and arthropods, as well as an introduction to project planning, GIS, and statistics.

The Smithsonian Environmental Leadership course will take place September 17-29, 2006. The cost is $2,750 and topics include foundation skills for the environmental leader, determining mission and vision, negotiation and conflict resolution strategies, and impactful environmental communication.

The cost for both courses includes tuition, course materials, lodging and/meals, and local transportation. For more information contact MelissaBellman at bellmanm@si.edu or look online at www.si.edu/simab

MEETINGS CALENDAR

IX CONGRESS OF THE LATIN AMERICAN BOTANICAL SOCIETY (IX CONGRESO LATINOAMERICANO DE BOTÁNICA). 19-25 June, 2006, Santo Domingo, Dominican Republic – Web http://www.botanica-alb.org/index2.html

SOCIETY FOR CONSERVATION BIOLOGY 20TH ANNUAL MEETING, 24-28 June 2006, San Jose, CA USA. Meets concurrently with the ***SOCIETY FOR CONSERVATION GIS.***

HELICONIA SOCIETY INTERNATIONAL 2006 CONFERENCE, 24 June – 1 July, 2006 Darwin, NT, Australia. hintze@ozemail.com.au.

ASSOCIATION FOR TROPICAL BIOLOGY AND CONSERVATION ANNUAL MEETING**,** 18-21 July 2006, Xishuangbanna, China.. Details: www.atbio.org.

PLANT LITTER PROCESSING IN FRESHWATERS, 23-26 July, 2006, in Coimbra, Portugal. http://www.uc.pt/plpf5

THE INTERNATIONAL UNION FOR THE STUDY OF SOCIAL INSECTS (IUSSI), 30 July– 4 August, 2006. Washington D.C. http://www.iussi.org/IUSSI2006.html

BOTANICAL SOCIETY OF AMERICA ANNUAL MEETING, 2006, 28 July-3 August, 2006, California State University, Chico, CA, USA. http://www.2006.botanyconference.org/

PLANTS, PEOPLE AND EVOLUTION: IN HONOUR OF BARBARA PICKERSGILL, 4 August 2006, London. Themes include cytogenetics, PGR and domestication. See the website at www.linnean.org

ANIMAL BEHAVIOR SOCIETY 43rd annual meeting, August 12-16, 2006, Snowbird, UT, USA. http://www.animalbehavior.org/ABS/Meetings/Snowbird06

2006 NORTH AMERICAN ORNITHOLOGICAL CONFERENCE (NAOC), 3-7 October, 2006, in Veracruz, Mexico. See http://www.naoc2006.org/english/

CONTRIBUTION OF AFRICAN BOTANICA TO HUMANITY 1st INTERNATIONAL SYMPOSIUM**.** 3-7 October, 2006, N'Zerekore, Guinea. http://www.botaniqueafricaine.com.

53rd ANNUAL SYSTEMATICS SYMPOSIUM, Missouri Botanical Garden, 13-14 October, 2006. "The Impact of Peter Raven on Evolutionary and Biodiversity Issues in the 20th and 21st Centuries " See: www.mobot.org/MOBOT/research/symposium/register2006.shtml.

3rd INTERNATIONAL ORCHID CONSERVATION CONGRESS, 19-24 March, 2007. San Jose, Costa Rica. http://www.jardinbotanicolankester.org/ing/congress.html

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ATBC is an international society that promotes tropical biology and conservation in its broadest sense. ATBC publishes the quarterly journal BIOTROPICA and sponsors annual meetings and symposia. Information: W. John Kress, ATBC Executive Director, Smithsonian Institution, US National Herbarium, Department of Botany, NBH 166, Washington, DC 20560.

OTS is a non-profit consortium of 65 academic and research institutions in the United States, Australia, Latin America, and Asia. Its mission is to provide leadership in education, research and the responsible use of natural resouces in the tropics. Graduate, undergraduate, and professional training and research facilities are provided at three field stations in Costa Rica. Information on OTS and *Tropinet* contributions: OTS, Box 90630, Durham, NC 27708-0630.

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