

# Endangered Species UPDATE

*Including a Reprint of the latest USFWS  
Endangered Species Technical Bulletin*

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THE UNIVERSITY OF MICHIGAN  
School of Natural Resources



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# Pressing Plants, Monographing, and Networking: Tropical Systematic Botany in the 1990s

by  
Douglas Daly

In setting priorities for tropical systematic botany in the 1990s, there are basically two questions to be answered: what should systematists be doing in systematics, and what should they be doing with it, in other words, how should we be utilizing or applying systematics? My obvious implication is that that we aren't doing enough on either side. There is a great need not only for more systematics, but for people to do more with systematics as well.

## More Systematics

It has been calculated that if *Flora Neotropica* monographs continue to be published at the same rate, it will take about 300 years for us to classify the flora of the New World tropics. Even on a day-to-day basis, not enough priority is given to prompt determination of plant collections, often of collections from areas undergoing rapid deforestation. Obviously plant systematic research in the tropics needs to be greatly accelerated. The question is how?

## More Collections

The unacceptable rate of taxonomic synthesis and publication is in part due to the inadequate base of collections with which to work as well as the inadequate rate of collecting. Probably every specialist in a tropical plant group has at least a few species in his or her cabinets that cannot yet be described because collections of the species are too poor or too few. In addition, most of us have taxonomic problems we can't resolve

because the available collections do not reflect the entire geographic and morphological ranges of these species. The inadequacy of the collections base is dramatized by the rapidity with which floristic and monographic treatments become obsolete as new material arrives in the herbaria.

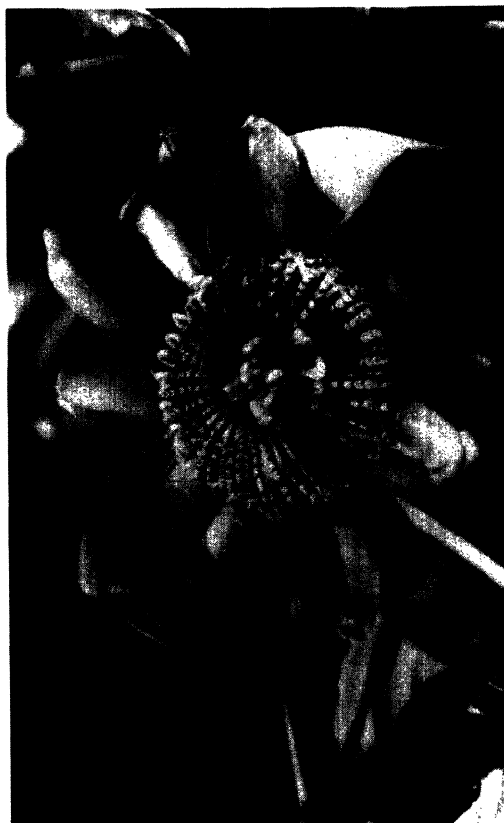
## Better Collections

There is no reason why an increase in the quantity of collections cannot be accompanied by an increase in their quality and usefulness. Ideally, a complete field collection should include photographs; seeds (where permitted); a wood sample; a bark sample; a bulk sample of one or more organs for

chemical analysis (where permitted); material preserved in the appropriate solutions for work on cytology, morphology (especially different stages of flower and fruit development), and anatomy; observations on habitat, soils, terrain, frequency of the species, and plant-animal interactions; a description of its architecture; and local names and uses. Gathering this information will not add appreciably to the time in collecting or to the bulk of the collections. For dioecious plants, both sexes must be sought. Zygomorphic flowers must be preserved and/or dried loose (not pressed). Many plant groups require special procedures and observations to increase the taxonomic value of the collections: inclusion of rhizomes for bambusoid grasses, observation of the distribution and color of the arillate structure on *Bursera* stones, cutting open the fruit of Sapotaceae to reveal the hilum scar on the seeds, noting the orientation of Piperaceae inflorescences, recording the color of the androecial hood of Lecythidaceae flowers, and so on. It is the responsibility of specialists in these plant groups to communicate their requests for these customized collections. On the other hand, every collector should also maintain a file of special collections requests and of instructions on how to collect different plant groups.

## More Time for Systematists

More so than in many branches of biology, taxonomic work requires large chunks of uninterrupted time, but very few biologists of any stripe have the luxury of devoting the majority of their time to research. Teaching, grant-writing, departmental responsibili-



Passiflora spp.

Photo by William Anderson

ties (and politics), obeying the publish-or-perish mandate— these and other time-eaters leave little opportunity for sustained, larger scale research.

Systematists suffer additional burdens. Chores peculiar to systematics, such as typing up voucher labels, processing collections, recording identifications, and distributing duplicates are tedious and time consuming. Tropical botanists based in the temperate zone must spend a great deal of time negotiating inter-institutional agreements, developing collaborative programs, obtaining collecting permits, and raising money for visits by collaborators.

For some systematists, the greatest burden of all is trying to keep systematics alive by convincing universities that overhead from grants is not the only measure for evaluating a discipline. It is ironic that systematists, by always priding themselves on being able to produce more research per dollar, have undermined their own future.

Field-oriented botanists must seek or demand and develop work environments that keep the fund-raising burden to a minimum, provide adequate support staff (both secretarial and collections management), do not impose excessive teaching loads, understand the value of systematic research, and appreciate the fact that, in this discipline, thorough and useful work cannot be published with great frequency.

### More Systematists

More botanists from the developed countries are always needed to work on projects in the tropics. More important is the need for more resident botanists. Unfortunately there are many limiting factors, any one of which is sufficient to perpetuate the shortage of professional botanists: inadequate undergraduate preparation; too few domestic graduate programs; insufficient opportunities for graduate work in foreign countries; a shortage of jobs because of economic constraints and warped priorities. Essentially two barriers must be overcome: education and jobs. Without jobs there is no incentive to study bot-

any; without motivated and well-prepared students there are no future botanists.

The developed nations must provide more opportunities for graduate work. These opportunities must include adequate stipends. Our academic institutions have to realize that a significant proportion of the applicants to graduate programs from tropical countries are mature people who already have jobs. This is an advantage, because they can apply their new professional skills immediately on their return. In addition, however, many of them also have families. In many cases, extremely promising applicants have had to decline offers of graduate fellowships because the stipend was not enough to support even their spouses, and these spouses were not allowed to work in this country.

Parallel to improving graduate opportunities in the developed world, it is, of course, necessary to support existing graduate programs in tropical countries, and to encourage new ones. Fewer than half the countries in Latin America have graduate programs in any area of plant biology, and most of the existing programs reach only the master's level.

Even in the United States, jobs for systematic botanists are scarce. Organismal biology isn't represented in the faculties of some of our most prestigious universities. In an appreciable number of Latin American universities, the standard professor's salary is too low to support even a spouse. This constitutes a strong incentive not to study botany, since agronomy offers more professional opportunities.

### Support Botanical Institutions

It's not enough for foreign botanists simply to collaborate. Institutions in developing countries need literature, equipment, visiting professors, traineeships for their students and support staff, and support for their field programs. Every grant proposal written by a temperate-zone botanist for research in the tropics should include support of some type for the host institutions.

## Endangered Species UPDATE

*A forum for information exchange on endangered species issues*

May 1989

Vol. 6 No. 7

Rob Blair.....Editor

Dr. Michael Soulé.....Faculty Advisor

### Instructions for Authors:

The Endangered Species UPDATE welcomes articles related to species protection in a wide range of areas including but not limited to: research and management activities for endangered species, theoretical approaches to species conservation, and habitat protection and preserve design. Book reviews, editorial comments, and announcements of current events and publications are also welcome.

Readers include a broad range of professionals in both scientific and policy fields. Articles should be written in an easily understandable style for a knowledgeable audience. Manuscripts should be 10-12 double spaced typed pages. For further information please contact Rob Blair at the number listed below.

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*Victoria cruziana*

Photo by D. M. Johnson

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Slash and burn agriculture in the tropics

Photo by William Anderson

### Plug the Gaps

There are two kinds of gaps: taxonomic and geographic. Some important Neotropical plant groups, such as the Flacourtiaceae, Boraginaceae, Celastraceae, Clusiaceae, Verbenaceae, and Erythroxylaceae, have no active specialist -- meaning someone who regularly provides identifications. The number of orphan plant groups is growing as well. The specialists in some critical groups, including the Bromeliaceae, Begoniaceae, Myristicaceae, Hippocrateaceae, and Melastomataceae, are near or past retirement age. Still other plant families, including the Euphorbiaceae, Myrtaceae, Lauraceae, Cactaceae, Moraceae, and Orchidaceae, are too large or too complex for one or two people.

The geographic gaps can usually be accounted for by two factors: convenience and comfort. In general, botanical research activity decreases rapidly with increasing rainfall and increasing distance from major (especially capital) cities. The latter factor also involves logistical and financial constraints.

### More Funding

Federal funding from traditional

sources in the U.S. for purely systematic work is getting much tighter, and the situation is far worse in most tropical countries. In addition to lobbying for more government support (or at least maintenance of existing levels), systematists must diversify and be more creative in their quest for money. In the U.S., many private foundations offer us flexibility while Latin American scientists are having to become adroit in seeking funds from international sources. The field work, at least, can be supported indirectly by involvement in other types of projects, as discussed below.

### Utilizing and applying systematics

Logically, environmentalists have been championing systematics in recent years; systematics provides baseline data necessary for critically important work in conservation, ecology, and the development of crops and other useful plants. However, more systematists need to take the initiative in connecting their research to such fields as conservation, agronomy, and pharmacognosy. This means working more frequently and more closely with regional planners, zoologists, parks personnel,

ecologists, agriculture-oriented government institutions, anthropologists, and economists, among others.

### Selecting Appropriate Research Topics

More systematists should make a conscious effort to work on plant groups that are important in key habitats and/or regions, such as the coastal forests of Colombia or of Bahia, Brazil. The phylogeographic portion of any publication of systematic research should be developed thoroughly and should attempt to address problems of endangered taxa or floras.

Making the results of systematics research functional necessarily means increasing communication among tropical systematists as well as between systematists and researchers from other disciplines. Those working in tropical botany tend to be behind the times in the use of computers. Specialists in tropical plant families should maintain regular contact with each other through a network that conservationists can tap into on relatively short notice when data are needed for particular taxa or regions. How else can reliable information be obtained to assess endemism and therefore gauge the number of endangered species in a given area that is being deforested?

### Potential Projects

Types of projects in which systematists can make important contributions include

*Florulas*— Greater emphasis is being placed on medium-term floristic projects. For example, now that there is a more adequate survey of the Amazon flora in the herbaria, rather than ask the impossible of the funding agencies and try to take on the entire flora of the Amazon, systematists should find it much more useful to execute local and regional floras in carefully targeted areas. For example, those areas scheduled for or threatened with destruction, those showing high endemism, those

(Continued on UPDATE page 4)

under consideration for reserve status, and those already protected to some degree but not well understood biologically.

*Ground-truthing*— Short-term, intensive collecting is necessary to provide the ground-level data for valid remote-sensing studies of vegetation types, deforestation, successional stages, and occurrence of particular taxa. In Rondonia, Brazil, for example, systematists are working with remote-sensing specialists to analyze changes in forest structure and composition caused by construction of the Samuel Dam.

*Ethnobotanical surveys*— Systematists should participate in more ethnobotanical projects, or at least assist them. Overall, indigenous cultures in the tropics are under even greater and more immediate threats than forest habitats. In recent years, systematists and anthropologists working in Brazil, Venezuela, and Peru have combined quantitative forest inventories with ethnobotanical studies. A Brazilian ethnopharmacologist is making herbarium vouchers as part of her studies in eastern Amazonia of medicinal plant use by Indians and other people in the interior. Ethnobotanical collections for anti-cancer and anti-AIDS screens are being emphasized in plant collections being made in the tropics. More ecologists and anthropologists are making valuable plant collections because they have been convinced of the importance of preserving decent voucher specimens

for their research and because they have been trained by systematists to do so.

*Environmental impact studies*— When floristic surveys can be included in environmental impact studies, botanists must be able to mobilize intensive collecting efforts and to accelerate the identification of specimens. It goes without saying that these studies can be sensitive activities in a political sense, and foreign botanists who participate must be sure to function as visiting scientists and not as advocates. Advocacy must come primarily from those whose forests are being destroyed; for foreigners, selection of a research project is already a political gesture.

*Holistic regional studies*— The state of Acre in Brazil is an example of a region that has attracted the interest of anthropologists, economists, sociologists, regional planners, foresters, wildlife-management scientists, zoologists, conservationists, and botanists. Acre has attracted attention because of the tremendous, and poorly known, biological diversity of its forests, and because of the chaotic and destructive development of neighboring Rondonia that could be repeated in Acre. The botanists involved in the region are trying to coordinate their projects with research in the other disciplines. We intend to integrate our research on the identity and ecology of native economic plants with other studies of local labor patterns, markets for the plant products, and transportation problems.

Another type of holistic study

would be biological surveys of ecological field stations. The ideal we should work toward is a network of Barro Colorado Islands, that is, a network of research stations where systematists will classify the flora and fauna well enough that the foundation is laid for biologists from various disciplines to investigate the ecosystems in greater depth. This kind of activity is often necessary to justify the continued existence of forest reserves.

*Funding strategies*— The greater the range of projects in which systematic botanists involve themselves, the greater the range of funding sources that becomes available to them. Potential sources of research monies include: private companies (in rare instances); government agencies concerned with pure science, agronomic research, medical research, or foreign aid; foundations focused on conservation, training of scientists from the developing world; interdisciplinary research; and exploration.

Biologists have a difficult time striking a balance between pure research and its potential applications, between generating data and putting it to use. For many of us, however, opting for the traditional, insular approach to science is no balance whatsoever.

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Doug Daly is the B. A. Krukoff Curator of Amazonian Botany at The New York Botanical Garden and has 12 years of field experience in various parts of Amazonia.

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# Book Review

## Audubon Wildlife Report 1988/1989

Edited by William J. Chandler



The National Audubon Society has continued its excellent series on wildlife conservation and policy with this year's edition of the *Audubon Wildlife Report 1988/1989*. The series provides an introduction to wildlife issues for both the layman and the professional by revealing a portion of the processes and players that affect wildlife policy in the United States. This year, the hefty 817-page book is comprised of 28 articles and a variety of appendices covering a range of issues, species, and agencies.

The first section of the *Report* traditionally focuses on a federal agency that is involved in wildlife issues. In previous years, this section has covered the U.S. Fish and Wildlife Service, the U.S. Forest Service, and the Bureau of Land Management. This year, the *Report* focuses on the National Marine Fisheries Service (NMFS), which has the task of managing the fish and mammals in one-fifth of the world's most

productive marine waters with a budget that is one-fifth that of the National Park Service. The in-depth analysis of the NMFS should be of particular interest to those involved in endangered species as the Service is also charged with implementing the Endangered Species Act for marine species.

This 97-page section provides an overview of the NMFS and its mission. It summarizes the federal legislation that most directly affects the service, explores the service's organization and administration, delves into the politics surrounding the agency, and reviews the agency's budget. This section explores the depths of an agency that has traditionally been known as a handmaiden of the marine fisheries industry and should be required reading for anyone involved in the conservation of marine species.

The second section of the *Audubon Wildlife Report* is devoted to a review of specific programs within several agencies. This year, articles explore wildlife issues in the National Forests, the Bureau of Land Management, and in the National Parks. Michael Bean, whose work should be familiar to *UPDATE* readers, reviews recent legal developments affecting wildlife conservation. The last two articles explain the North American Waterfowl Plan and the Land and Water Conservation Fund.

The third section of the book tackles several wide-ranging conservation issues including: the effect of water projects on wildlife in the Platte River, the international trade in wildlife and orchids, the effects of plastic debris on marine wildlife, implications of the 1985 Farm Act for wildlife, and an overview of the efforts to restore the Florida Everglades

The fourth, and most popular, sec-

tion of the *Report* covers several threatened and endangered species and provides a synopsis of the species' natural history, significance, historical and current status, management, and future needs. This section is particularly useful to anyone needing a quick update on the current conditions of certain species. This year's species include the moose in Alaska, the Florida panther, the common barn-owl, the greater flamingo, the desert tortoise, the Eskimo curlew, the red wolf, the Indiana bat, the Bachman's warbler, the American pronghorn, the sanderling, the nearctic river otter, the North Atlantic right whale, the Dungeness crab, and the Alaska red king crab.

The last section of the book may prove the most useful to those conservationists who need a guide to the maze of bureaucracy in Washington. The appendices in this section include directories to the Forest Service, the U.S. Fish and Wildlife Service, the National Park Service, the Bureau of Land Management, the National Marine Fisheries Service, congressional contacts, and those portions of agencies involved in wetlands management. The last two appendices provide an update to the endangered species lists and the budgets to federal fish and wildlife programs.

The *Audubon Wildlife Report 1988/1989* provides an excellent introduction to federal wildlife issues and would be a worthwhile acquisition for any conservationist involved in wildlife policy.

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*Audubon Wildlife Report 1988/1989* is available for \$49.95 clothbound or \$24.95 paperbound plus shipping and handling from Academic Press, Inc. Troy, Missouri 63379. Telephone (800)-321-5068.

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## Local Planning and Biological Diversity

by Robert Culbert

Certain biologists have predicted that more than half of all species will go extinct within the next 50 to 100 years. We must devise a technique for preventing such dire predictions from becoming reality, for the techniques currently in use are not sufficient to protect even the relatively low diversity of the temperate climates. Evidence of this is the ever increasing list of endangered species in this country, where 531 species living in the U.S. (out of 1038 species listed worldwide) are currently protected. We must be able to protect our own endangered species before Third World and other foreign countries

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**The bottom line of the Endangered Species Act is that of the 16 species that have been de-listed, only three have been de-listed because their populations recovered.**

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will listen to our advice about how they should protect their own biodiversity.

Probably the most frequently proposed solution to preserving our biodiversity is to enact new federal legislation. Supporters of this approach often cite the Endangered Species Act and its accomplishments. Yet the bottom line of the Endangered Species Act is that of the 16 species that have been de-listed, only three have been de-listed because their populations recovered. This is not sufficient; we must improve this rate of recovery if we are going to successfully protect our biological diversity.

If we are to use the Endangered Species Act as a role model for new legislation to protect biological diversity, as many suggest, we must first

examine the reasons for the Act's ineffectiveness. Foremost of these reasons is the hesitancy of any governmental bureaucracy to change their standard operating procedures. And such changes must be made if any land-holding agency is going to change their land management practices to benefit wildlife. Thus, any new federal legislation must establish the protection of biological diversity as the foremost priority of every federal land-holding bureaucracy. For such a drastic shift to be effective it is necessary to amend each bureaucracy's enabling legislation, and to insure that private citizens have the right to force compliance by challenging faulty decisions in court.

A second reason for the ineffectiveness of the Endangered Species Act is the limited funding given to the Fish and Wildlife Service. Additional funding is desperately needed, but extremely unlikely. We must be certain that any new federal biodiversity legislation does not further dilute the already insufficient staffing and funding for the Endangered Species Act.

Some other factors contributing to the Act's lackluster performance are a reliance on federal land in recovery plans, the difficulty of enforcing the Act on private property, and a focus on individual species rather than on biological communities. All of these problems must be overcome if any biodiversity legislation is to be effective.

Because of the difficulties associated with overcoming the above problems, I feel that we should focus on improving the Endangered Species Act rather than seeking new federal legislation to protect our biological diversity. Unfortunately, this action alone will not be sufficient. We must also establish regional efforts to preserve habitats.

Most states now have programs, such as Natural Heritage Programs, that

document the distribution of species and seeks their protection on a state-wide basis. But these programs, with their limited staffing, are subject to the vagaries of state politics that can reduce their effectiveness. Additionally, most states are simply too large for these small programs to be effective, even with the generous help of many non-profit conservation groups.

I suggest that efforts to protect wildlife should be more localized: county-wide planning is necessary if a county is growing rapidly, otherwise several counties can be combined into a regional planning district. Since the most imminent threat to our biological diversity is loss of habitat, the planning should be most localized where development (loss of habitat) is greatest.

Perhaps the most important advantage to planning at the local level is that it can be more detailed. Inventories of the existing habitats can be based on aerial photography or satellite imagery, the abundance and distribution of each particular habitat type (for example fields or old-growth forests) can be documented, and the threats to each particular habitat fragment can be determined. Once this type of information is known it is much easier to protect the habitat and the wildlife that depends on that habitat. A result of such local habitat protection across the country will be the preservation of our biological diversity.

Planning at this scale is going to be expensive, but not impossible. In next month's opinion page, I will discuss how this planning can be funded.

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Robert Culbert is from Martha's Vineyard where they have established a county-wide land bank which supports preservation planning. Currently, he is a student in the School of Natural Resources at the University of Michigan.

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## Ecuador's Debt-for-Nature Swap

The World Wildlife Fund-U.S. and The Nature Conservancy (TNC) have purchased \$9 million of Ecuador's foreign debt under an agreement with *Fundacion Natura*, Ecuador's leading conservation group. The agreement marks significant progress for debt-for-nature swaps where conservation organizations help developing countries reduce environmental problems and, at the same time, help them meet their obligations to private and governmental lenders.

This transaction is the second step in a \$10 million WWF swap negotiated with Ecuador in 1987, and is the largest debt-for-nature swap to date. In early 1988, WWF acquired the first \$1 million of the Ecuadorian debt. The 1989 WWF and TNC swap reaches the ceiling authorized under the agreement.

The mechanism for the swap was first proposed by Roque Sevilla, director of *Fundacion Natura*, and authorized by Ecuador's Central Bank. Under this agreement, *Fundacion Natura* will convert this debt into \$9 million of local currency bonds, which will produce interest and principle for conservation over the next eight years. This is the first swap where the full value of the transac-

tion will be redeemed in local currency, thus reducing the threat of inflationary impacts on Ecuador and guaranteeing a long-term financial base for local conservation.

## Update on Hawaii

The Natural Resources Defense Council (NRDC) has just completed a report on endangered species protection efforts in Hawaii, entitled *Extinction in Paradise*. Hawaii has the highest proportion of endemic species anywhere on earth, and also the highest number of endangered species of any state in the nation.

The NRDC analyzes federal and state efforts to counter threats to Hawaii's species and makes a number of recommendations for improving both. In short, the Council recommends increased funding for the Fish and Wildlife Service and a number of policy changes. For the full 90-page report, send \$5 to Faith Campbell at The NRDC, 1350 New York Ave, NW, Washington DC 20005.

## Economics and Bio-Diversity

*Economics and Biological Diversity: Developing and Using Economic*

*Incentives to Conserve Biological Resources* is a new publication from the IUCN. This book explains how economic approaches can be applied to solving conservation problems in innovative ways. Based on a series of case studies, with an in-depth review of how economic incentives have both destroyed and conserved wildlife resources, it provides a series of practical guidelines for governments, resource agencies, and development agencies on how incentives that promote conservation can be successfully implemented. It may be purchased for \$15 through IUCN Publications Services, 1196 Gland, Switzerland.

## Global Change

The American Institute of Biological Sciences (AIBS) will hold their 40th annual meeting, entitled "Global Change", in Toronto, Canada from August 6-10. For information on the program and registration, write: Meetings Department, AIBS, 730 11th Street NW, Washington DC 20001-4584 or call (202) 628-1500.

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*Bulletin board information provided in part by Jane Villa-Lobos, Smithsonian Institution and Faith Campbell, Natural Resources Defense Council.*

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