A Q U A P H Y T E

A Newsletter about Aquatic, Wetland and Invasive Plants

Center for Aquatic and Invasive Plants
with support from
The Florida Department of Environmental Protection,
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Invasives Information Retrieval System

The **APIRS** office, long known for its information gathering and dissemination relating to aquatic plants, native and non-native, has widened its focus to include invasive plants of uplands as well. In fact, the research center of which **APIRS** is a part has changed its name to the Center for Aquatic and Invasive Plants. Many of the researchers associated with the Center are already well known for their work on invasive plants.

As a first step, **APIRS database manager**, Karen Brown, and reader, Mary Langeland, have begun collecting the literature of the invasive plants on the two lists of the Florida Exotic Pest Plant Council (FLEPPC), as well as the Noxious Weed List of the Florida Department of Agriculture and Consumer Services (FDOACS). The FLEPPC lists are Category I plants (that are invading and disrupting native habitats, 65 species) and Category II plants (that have shown a potential to disrupt native habitats, 60 species). **(FLEPPC: http://www.fleppc.org)** The FDOACS lists 63 species, some of which are in common with the FLEPPC lists. **(FDOACS: http://fdoacs.state.fl.us/~pi/noxioustbl.htm)**

Support is being sought to expand our information gathering and dissemination capabilities more quickly, so that the literature on additional plants on "invasives and noxious lists" of other states and countries can be collected, cataloged, disseminated and used.

Already, several hundred researchers routinely contribute their articles and reports for inclusion in the **APIRS** system and database. Other researchers and authors who work on invasive plants, and who may not be aware of our established system, are encouraged to join our modest partnership. Works will be entered into our science library and central source for aquatics and invasives literature. In exchange, our information and referral services will remain free of charge to our contributors, as they have been for the past 18 years. For more information, contact Karen Brown at kpb@gnv.ifas.ufl.edu

As was the case for aquatic plants, projects manager Victor Ramey is building a thorough **collection of photographs and line drawings** of invasive plants. These and other resources are being used to develop all kinds of information and education products, from museum backdrops to ID decks, from invasives posters to coloring books, from magazine articles to homeowner slide shows.

And, of course, our **web site** is expanding its content as well. So far, fairly extensive information about 16 invasive plants is online at our site. There also are pictures and drawings of a number of other invasive plants. See it all at: **http://plants.ifas.ufl.edu**

APIRS has a new color catalog with full descriptions of our free and for-sale products and services. Included are database instructions, lists of plants featured in various publications, full lists of available slides and drawings, and ordering information. Contact the **APIRS** office for a copy of the new catalog: varamey@nersp.nerdc.ufl.edu

Burma reed
Neyraudia reynaudiana
Photo by Ann Murray

Invasive Plants

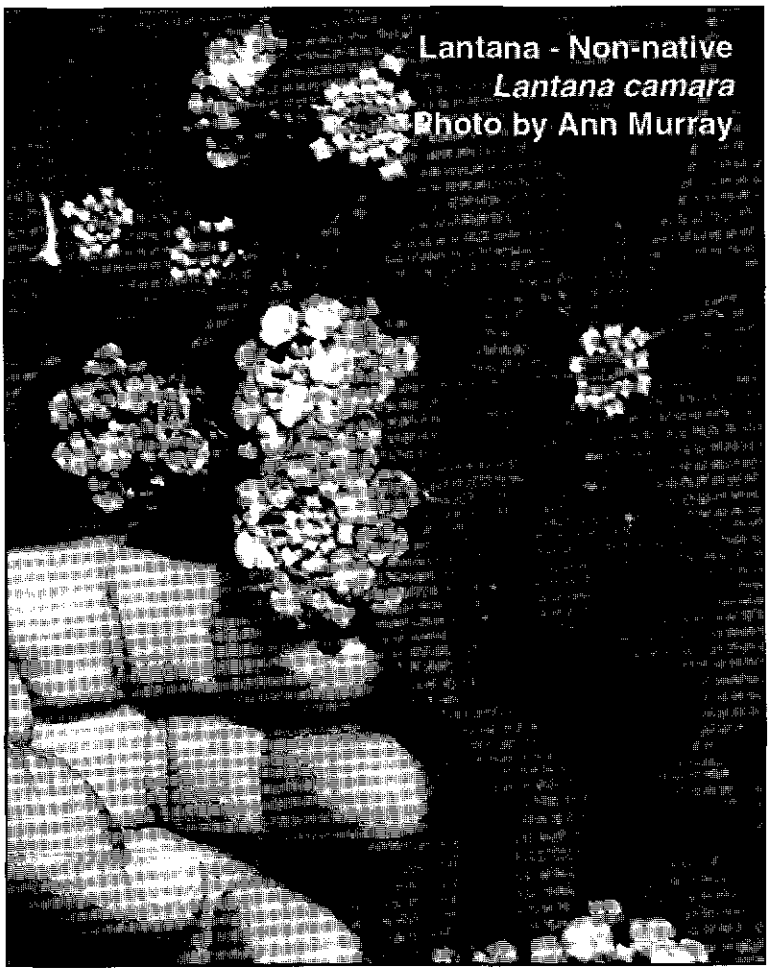
Lantana, shrub verbena
Lantana camara L.

Lantana camara L. - *deciduous shrub* to 6 ft tall; **stems** square, covered with bristly hairs, often with thorns and/or small prickles; **leaves** opposite, simple, with petioles (leaf stems) strongly aromatic; **leaf blades** oval, rough, hairy to 6 in. long to 2.5 in. wide, veins conspicuous; **leaf margins** coarsely serrate; **inflorescense** a stalked dense cluster of flowers; **flowers** small, multicolored, in a single cluster, may be white to pink or lavender, yellow to orange or red, color changing over time; **fruit** small, round, fleshy, 2-seeded drupe, green turning purple to blue-black.

"There grow on this island many curious shrubs, particularly a beautiful species of lantana. It grows in coppices in old fields, about five or six feet high, the branches adorned with rough serrated leaves, which sit opposite, and the twigs terminated with umbelliferous tufts of orange-colored blossoms, which are succeeded by a cluster of small blue berries; the flowers are of various colors, on the same plant, and even in the same cluster, as crimson, scarlet, orange and golden yellow; the whole plant is of a most agreeable scent."

from *The Travels of William Bartram,* his observations of lantana in 1773 while exploring the islands of Lake George in northern Florida.

***Lantana camara*, lantana, and its many cultivated varieties, has a mixed reputation.** On one hand, lantana is listed by Holm *et al.* as one of the worst weeds in all the world: a thicket-forming menace in 47 countries that has "infested millions of hectares of natural grazing lands" (especially in Asia and Africa) and that is a weed in 14 major crops including coffee, oil palms, coconuts, cotton, bananas, pineapples, sugarcane, sandalwood, tea, rubber and rice. In Indonesia, lantana is the most dominant species among 54 species found on the east slope of the Candikuning pine plantation. Reportedly, in India the lantana invasion in some places has been so complete as to require the moving of several entire villages. In Hawaii, several hundred thousand acres are infested with lantana; lantana infests four million acres in Australia. What's more, *Lantana camara* leaves and fruit (green and mature) are very toxic, having been blamed in the deaths of animals as diverse as livestock, parrots, rabbits and snakes, as well as humans.



On the other hand, *Lantana camara* and its varieties are frequently planted in the U.S. to attract butterflies, is planted to herald the arrival of spring at Boston Garden, and is still considered one of the "10 favorite plants of Malaysians." In the US, some nurseries tout lantana as a native plant; it is sold over the internet from companies in Ohio, Texas and New Mexico. According to Indian research, there is evidence that lantana extracts could be used for weed control in rice.

Notwithstanding Bartram's observations of lantana in Florida more than 200 years ago, *Lantana camara* is listed as a Category I non-native, invasive plant by the Florida Exotic Pest Plant Council (FLEPPC). (However, lantana is not listed on the Noxious Weed List of the Florida Department of Agriculture and Consumer Affairs (FDACS).) FLEPPC believes lantana to be a native of the West Indies, not of Florida. Others believe it to be from Argentina.

***Lantana camara* grows well in full-sun disturbed places, but also grows well under shade.** It is a long-lived plant, and can form dense thickets in pastures, forests and along fence lines. It prefers well-drained soils, and, once established, requires only infrequent watering. It is spread by birds as well as humans. Lantana leaves are damaged at 27 degrees F. Lantana is allelopathic; it releases chemicals into the soil to prevent other plants from germinating. Lantana is not easy to control. Experience shows that burning, cutting and digging lantana often results in increased germination and more shoot growth. As for biological control possibilities, various arthropods and fungal pathogens have been or are being tested.

Florida's case is complicated by the fact that this state has at least two species of lantana believed to be native: *Lantana depressa*, Florida lantana, and *Lantana involucrata*, wild sage. Florida lantana, an endangered plant, has yellow flowers and tapered leaves. It is believed that *Lantana camara* hybridizes with Florida lantana, thus contaminating the Florida lantana gene pool. It is not easy to tell just by looking whether a plant is a 100% *Lantana camara* or a 50% *Lantana depressa*. Sales and plantings of lantana hybrids of many colors further complicate the scenario. The other lantana native to Florida, wild sage (*L. involucrata*), is decidedly less showy, having small whitish yellow-centered flowers and smaller, rounder leaves. Finally, another non-native lantana, *Lantana montevidensis*, trailing lantana, is sold to homeowners throughout the state. Its all-mauve lantana flowers are becoming more familiar, although *L. montevidensis* does not seem to be invasive.

Some references from the **APIRS** invasive plant database:

Gentle, C.B. and J.A. Duggin. 1997. Allelopathy as a competitive strategy in persistent thickets of *Lantana camara* L. in three Australian forest communities. Plant Ecology 132: 84-95.

Greathead, D.J. 1973. Progress in the biological control of *Lantana camara* in East Africa and discussion of problems raised by the unexpected reaction of some of the more promising insects of *Sesamum indicum*. pp. 89-92 in Dunn, P.H. (ed.), Proc. 2nd Int. Symp. Biol. Control Weeds. *Comm. Inst. Biol. Control Misc. Publ.* 6. 225 pp.

Holm, L.G., Plucknett, D.L., et al. 1977. The world's worst weeds - distribution and biology. University Press of Hawaii. 609 pp.

Langeland, K.A. and Craddock Burks, K. (eds.) 1998. Identification & biology of non-native plants in Florida's natural areas. University of Florida, Gainesville. 165 pp.

Wolfson, S.L. and T.W. Solomons. 1964. Poisoning by fruit of *Lantana camara*. Am J. Dis. Child, 107: 109-112.

Jess VanDyke
at Lake Jackson sinkhole
Photo by Ann Murray

No Aquatic Weeds On Jackson Prairie

Outstanding Florida Water Body, Lake Jackson (Tallahassee), is known nationally as a premiere bass fishing lake. And over the years, aquatic weed and water quality concerns in the lake have been the subject of countless homeowners' meetings and of primary interest to lake management personnel. However, its bass reputation and aquatic weed problems became much less consequential on September 16 when a sinkhole suddenly drained more than half the lake of every last gallon of water, not to mention every last fish and alligator. It is now possible to walk from shore to shore--but steer clear of the sinkhole.

Jess VanDyke, long-time regional biologist with the Bureau of Invasive Plant Management (Florida Department of Environmental Protection) was there when it happened. "It was spectacular: animals trying to scramble out; a whirlpool of gators, birds and bass went down the hole," said VanDyke. Lake Jackson is one of Florida's disappearing lakes, lakes with sinkholes that are known to drain periodically. Lake Jackson, for example, has drained 4 times previously in the 20th century, in 1907, 1933, 1957, 1982 and now in 1999.

"Our records show that in 1982 the lake refilled from rainfall within about 6 months. In 1957 there was a drought, so it took much longer to refill. It's all about long term rainfall patterns," says VanDyke. It is expected that the lake will eventually collect water and again become a top-notch fishing lake.

For more information, contact Jess VanDyke, the regional biologist for the northwest Florida region (which includes Lake Jackson), at Bureau of Invasive Plant Management, 3915 Commonwealth Blvd., Tallahassee, FL 32399; (850) 487-2600. E-mail: Jess.VanDyke@dep.state.fl.us

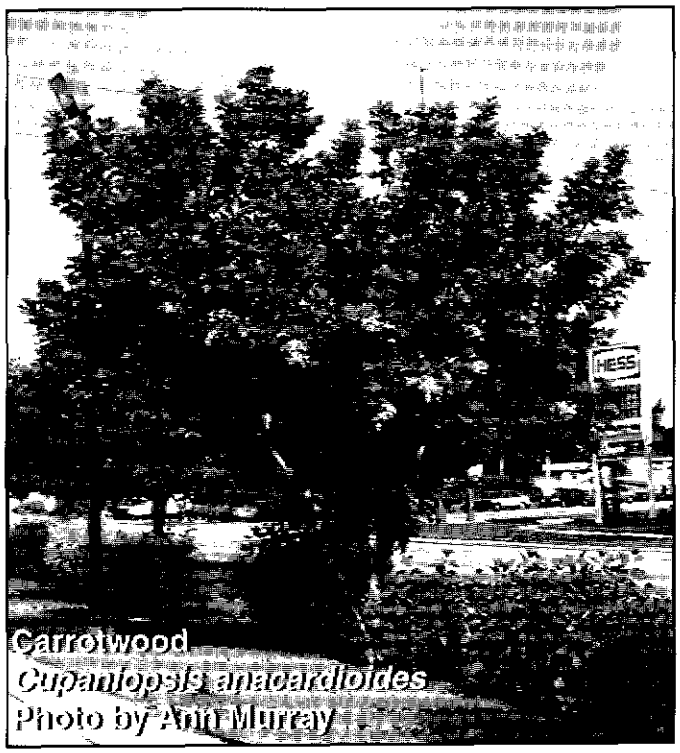
For more pictures, go to our website: http://plants.ifas.ufl.edu/depguys.html

Florida Ag Adds 11

Eleven terrestrial weeds were recently added to the official "Noxious Weed List" of the Florida Department of Agriculture and Consumer Services (FDOACS). The Noxious Weed List prohibits introducing, possessing, moving, growing and selling these species. The full list can be seen at **http://doacs.state.fl.us/~pi/noxioustbl.htm**

The 11 new terrestrial weeds added to the official noxious weeds list are:

Air potato (*Dioscorea bulbifera*)
Burma reed (*Neyraudia reynaudiana*)
Carrotwood (*Cupaniopsis anacardioides*)
Downy rose myrtle (*Rhodomyrtus tomentosa*)
Japanese climbing fern (*Lygodium japonicum*)
Kudzu (*Pueraria montana*)
Small-leaved climbing fern (*Lygodium microphyllum*)
Sewer-vine (*Paederia cruddasiana*)
Skunk-vine (*Paederia foetida*)
Wetland nightshade (*Solanum tampicense*)
White yam (*Dioscorea alata*)



Carrotwood
Cupaniopsis anacardioides
Photo by Ann Murray

Nurserymen Give Up 11

The Florida Nurserymen and Growers Association (FNGA) has decided to encourage its members to voluntarily phase out the growing and selling of 11 species of plants identified as being invasive in Florida. The 11 came from a list of especially invasive plants as determined by the Florida Exotic Pest Plant Council (FLEPPC). The full list can be seen at **http://www.fleppc.org** Ten of these plants are *not* officially banned by the state of Florida, carrotwood being the exception.

The 11 plants the nurserymen have agreed to phase out are:

Woman's tongue (*Albizia lebbeck*)
Orchid tree (*Bauhinia variegata)*
Bischofia (*Bischofia javanica*)
Carrotwood (*Cupaniopsis anacardioides*)
Cat's claw vine (*Macfadyena unguis-cati*)
Chinaberry (*Melia azedarach*)
Sword fern (*Nephrolepis cordifolia*)
Guava (*Psidium guajava*)
Oyster plant (*Rhoeo spathacea*)
Java plum (*Syzygium cumini*)
Seaside mahoe (*Thespesia populnea*)


Chinaberry
Melia azedarach
Photo by Ann Murray

Other plants sold by nurseries, such as lantana, ardesia and nandina, also have been declared to be invasive by the FLEPPC. The nurserymen have not agreed to cease selling them. But that's another story.

Books/Reports

PLANT INVASIONS -- Studies from North America and Europe, edited by J.H. Brock, M. Wade, P. Pysek and D. Green. 1997. 224 pp.

(Order from Backhuys Publishers, POB 321, 2300 AH Leiden, The Netherlands. US$52.75 plus S/H. Email: backhuys@euronet.nl WWW: http://www.euronet.nl/users/backhuys)

"When an alien plant(s) overtakes the native vegetation and essentially develops a monoculture, it can be said that the environment of that area has changed... Management attempts that extol eradication of these alien species most likely will be futile... Existing vegetation management tools will effectively control alien invasive plants if there is both the political and social concensus for vegetation management." Included are 19 papers on various invasive plants in the U.S. and Europe written by scientists well-known for their work on invasive plants.

PLANT INVASIONS -- Ecological Mechanisms and Human Responses, edited by U. Starfinger, K. Edwards, I. Kowarik and M. Williamson. 1998. 362 pp.

(Order from Backhuys Publishers, POB 321, 2300 AH Leiden, The Netherlands. US$97.00 plus S/H. Email: backhuys@euronet.nl WWW: http://www.euronet.nl/users/backhuys)

"Adventive floristics" is a term from the 19th century which refers to plant invasion studies. Although "non-native plant invasions" only recently have become important environmental news in the United States, Europeans have much experience in their study. This volume includes papers presented at the 4th International Conference on the Ecology of Invasive Alien Plants, 1-4 October 1997, in Berlin. Twenty-two of the chapters are case studies of invasive species, from Russian olive invasion of Arizona to the invasion of *Impatiens glandulifera* in Poland; from the invasion of North American blueberry hybrids in Germany to the spread of a tropical alga in the Mediterranean Sea. Several essays about aspects of plant invasions also are included.

EXOTIC PESTS OF EASTERN FORESTS, edited by K.O. Britton. 1997. 198 pp.

This is the proceedings of the Exotic Pests of Eastern Forests Conference, Nashville, Tennessee, April 8-10, 1997. Papers discussing exotic plants, insects and diseases are presented, forming a basic overview of the exotic species threat in the United States, and who, in 1997, were doing something about it.

HARMFUL ALGAE, edited by B. Reguera, J. Blanco, M.L. Fernandez and T. Wyatt. 1998. 635 pp.

(Order from Centre on Harmful Algae, Instituto Espanol de Oceanografia, Centro Oceanografico de Vigo, aptdo 1552 Vigo, 36080 Pontevedga, Spain. E-mail: vigohab@vi.ieo.es)

This is the (huge) proceedings of the VIII International Conference on Harmful Algae, Vigo, Spain, June 25-29, 1997. It includes many scientific descriptions of harmful algae events such as toxic blooms of cyanobacteria; ciguatera dinoflagellates; shellfish killers PSP, DSP and ASP; and fish killing and manatee killing algae such as *Gymnodinium breve*. Included are other large sections on population dynamics and ecology of harmful algae; their monitoring and management; their taxonomy and identification; their toxin production and degradation; their interactions with other organisms; the uptake and biotransformation of toxins by shellfish; toxin descriptions and detection methods; and the toxic mechanisms of the algae.

THE BIOLOGY OF STREAMS AND RIVERS, by P.S. Giller and B. Malmqvist. 1998. 296 pp.

(Order from Oxford University Press, 198 Madison Avenue, New York, NY 10016-4314. Cloth: $85 plus S/H Paperback: $35 plus S/H)

This book, a comprehensive overview written as an undergraduate text, provides more than a glimpse of the life below the water surface of streams and rivers. It "delves into the rich and growing literature and provides an up-to-date introduction to stream and river biology." The authors describe the different kinds of watercourses; outline the range of living organisms of rivers, and their adapations; discuss population, community and ecosystem patterns and processes such as energy flow and secondary production; and discuss applied issues such as the effects of pollution, tourism, sport fishing and exotic species.

STONEWORTS--Valuable for Water Management, by M.S. Van den Berg and H. Coops. 1999. 40 pp.

(Order from Harry Hosper, RIZA, POB 17, NL-8200 AA Lelystad, The Netherlands.)

It is well known that water plants make water clear. Even in very nutrient rich lakes, where the water is generally murky green with free-floating algae, the water may be crystal clear within and above submersed plant beds. In this book, Dutch researchers compare the underwater stoneworts, such as *Chara* species, with other species to identify plants which might keep the water clear, but which at the same time would cause relatively little nuisance to swimmers, skiers and boaters. They found that the stoneworts have a "particularly great effect on the surrounding waters", having "a major influence on the clarity of the water." Stoneworts also benefit animals, especially birds, fish and amphibians. The message: selectively manage for stoneworts.

LIVING AT THE LAKE -- A Handbook for Florida Lakefront Property Owners, by M. Bachmann, M. Hoyer and D.E. Canfield, Jr. 1999. 182 pp.

(Order from IFAS Publications, POB 110011, Gainesville, FL 32610-0011. (800) 226-1764. $15.00 plus S/H.)

A book long needed in Florida, this is "the definitive introduction to lakeside living." It includes information on selecting lakeside property for specific needs and lifestyles; real-English explanations of government rules and regs; an introduction to lake plants and animals; information about the numerous federal and state agencies -- information and inspiration for those who live (or who want to live) on one of Florida's 7,000 lakes.

HUDSON RIVER FIELD GUIDE TO PLANTS OF FRESHWATER TIDAL WETLANDS, by New York State Department of Environmental Conservation, illustrated by L.B. McCloskey. 1998. 50 pp.

(Order from Hudson River National Estuarine Research Reserve, c/o Bard College Field Station, Annandale, NY 12504. (914) 758-7010.)

Meant for weekend marsh explorers, this very beautifully illustrated handbook treats 4 submersed, 1 floating, and 18 emersed plants of the tidal Hudson River. The line drawings illustrate how the plants appear in different stages throughout the year, and in many cases include microscopic enlargements of important features. Text for each plant briefly notes distinctive characteristics and habitat. As nice as the book is, the best part is that apparently it is free of charge.

ATLAS OF RUSSIAN WETLANDS--Biogeography and Metal Concentrations, by A.V. Zhulidov, J.V. Headley, R.D. Robarts, A.M. Nikanorov and A.A. Ischenko. 1997. 309 pp.

(Order from Dr. Richard D. Robarts, National Water Research Institute, Environment Canada, 11 Innovation Blvd., Saskatoon, SK, CANADA S7N 3H5. E-mail: richard.robarts@ec.gc.ca)

This clearly written, carefully produced, well indexed, good looking and easy-to-follow large-format book is a "comprehensive compilation of wetland ecosystems of 13 major ecological regions of Russia that extend from polar to subtropical regions and across some 6,500 km from Europe to the Pacific Ocean," and includes detailed summaries of their topographical, hydrological, climatic, and surface water and wetland features. Maps, tables and photographs abound.

THE BIOLOGY OF LAKES AND PONDS, by C. Bronmark and L. Hansson. 1998. 216 pp.

(Order from Oxford University Press, 198 Madison Avenue, New York, NY 10016. $35.00 paper; $85.00 cloth.)

This is an introductory text to aquatic ecology and limnology. Though the book is by two Swedish researchers, the focus is on "the general patterns in adaptations and processes among organisms of lakes and ponds", patterns which apply to lakes throughout the world. The authors especially seek to present "what we think is interesting and important to know for an aquatic ecologist at the begining of his or her career." Chapters include "The abiotic frame and adaptations to cope with abiotic constraints"; "The organisms: the actors within the abiotic frame"; "Biotics: competition, herbivory, predation, parasitism, and symbiosis"; "Food web interatcions in freshwater ecosystems"; and "Environment and conservation".

THE HUMANURE HANDBOOK, by J. Jenkins. 1999. 305 pp.

(Order from Chelsea Green Publishing, POB 428, White River Junction, VT 05001. (800) 639-4099.)

Another Y2K worry: what to do if the toilets don't flush. First of all, according to the author, an organic gardener, human excrement is not a waste material, it's a resource material. Beginning with an essay on wasteful humans, this treatise on human waste eventually tells us what to do if and when the Y2K bug backs up your toilet. Or if and when you decide to start using this valuable resource. Suffice to say this is a mature discussion about "composting humanure, an act of humility". If you're into it, and have the time and the acreage, this book is full of detailed and scientific answers on what to do, a well-written and entertaining manual.

INVASIVE PLANTS - Changing the Landscape of America - Fact Book, by R.G. Westbrooks and the Federal Interagency Committee for the Management of Noxious and Exotic Weeds. 1998. 107 pp.

(Order from U.S. Department of Agriculture, Natural Resources Conservation Service, Plant Materials Center, 14119 Broad Street, Brooksville, FL 34601. (352) 796-9600.)

This large format, glossy color book begins with essays on "understanding the problem" of invasive plants. It then describes invasive plants in more than a dozen different situations, croplands to private preserves. This is certainly not an identification manual (no morphological descriptions, too-small pictures...); rather, each plant is described in terms of ecologic and economic impacts as weeds in the United States. Lots of facts!

USE WATER HYACINTH! A Practical Handbook of Uses for the Water Hyacinth from Across the World, by K. Lindsey and H.-M. Hirt. 1999. 115 pp.

(Order from Anamed, Schafweide 77, 71364 Winnenden, Germany. E-mail: keith_lindsey@hotmail.com. $15 plus S/H.)

Lake Victoria, Africa, has 10,000 hectares of water hyacinths, "an immediate catastrophe." The authors state, "There are strong pressures and voices for and against the use of chemicals. It is imperative that alternatives are found....Conventional voices propose utilization as being merely ancillary to the real task of control, which must be tackled by chemical, biological or mechanical means. We disagree." Regarding chemical control of water hyacinths by 2,4-D and glyphosate, the authors state: "Chemical control is rapid and effective. It is also costly and environmentally disastrous."

The book presents good descriptions of water hyacinth, its growth, problems it creates and its control, and a good history of its spread. It also presents descriptions of how to use water hyacinth to produce compost, hay and silage; pig, rabbit and fish food; rope, crafts and furniture; briquettes and biogas; paper and boards; and building materials. The book includes a listing of several organizations and companies which are said to produce things from water hyacinths.

SIGNIFICANT HABITATS AND HABITAT COMPLEXES OF THE NEW YORK BIGHT WATERSHED, by the U.S. Fish and Wildlife