Human attitudes toward the forest and the environment as a whole have changed and evolved as civilization has expanded, as religious and ethical views have developed, as population pressures have increased, and as forest resources have been depleted.

The various anthropocentric attitudes place humanity’s interests and well-being above all other concerns for the forest and the environment. One view maintains that the physical, economic, and social welfare of humans is paramount and takes precedence over all other environmental values, including those of forest resources. Another view holds that everything in the environment, including our forests, has been created or exists for humankind’s use and enjoyment. Another view, still anthropocentric, is that the world and all its components exist, no matter whether created by a supreme power or some other initiating force, and the human race has the right to their use. Regardless of the differences, actions based on anthropocentric views may take the form of exploitation or stewardship. Exploitation is defined here as the use of forest resources for profit or to satisfy one’s own ends without concern for consequences. In contrast, stewardship has a fundamental tenet: that people may use the forest and other resources of the natural environment but they must not destroy or damage them and must pass them on for future generations to use and enjoy.

The harmonic or ecocentric attitude considers that humanity is but one of the creatures that inhabit the earth and they must share it and live in harmony with all other forms of life. An extreme expression of this philosophy is the deep ecology movement.

In brief, the various attitudes toward the forest can be viewed as forming a spectrum—at one end is total preservation; at the other is maximum utilization with little concern for protection and maintenance.

Forms of Ownership

The form of ownership of the forest can have a profound effect on the way it is treated. Four different forms of ownership are recognized: private property, common property, state property, and open access property.

Private property assigns ownership of the forest to specified individuals guaranteeing control of access and the right to socially acceptable uses. Under private ownership, the way in which the forest resources are used may be exploitation and consumption, management and stewardship, or passive ownership. Forests under a common property regime are owned by an identified group of people who have the right to exclude nonowners and to use the resource within the constraints placed on it. Forests under state property are owned by the citizens of some political unit such as a nation, state, or municipality. Open access property has no assigned ownership and is open to all. Experience seems to show that private ownership tends to encourage, but does not guarantee, sustained management of forest resources.

The tremendous impact that conflicts have on forest and other natural resources and the environment has not been emphasized sufficiently. The greatest waste of natural resources is caused by wars and the industries that produce the arms and means to wage them. Armed conflicts are also directly destructive of the forest and other components of the environment.

An important social impact on forests and the environment is the growth of cities. Other social impacts include the migration of populations to escape from war zones, political conflicts, or oppression; demographic pressures; and natural disasters such as floods and volcanic eruptions. Further, the application of technological advances, principally in the form of industrial development, has important effects on the environment in the form of increased demands on forest and other natural resources.

The concept of sustainable development of forest resources is now understood to mean social and economic development with a minimum or acceptable modification of the natural forest ecosystems affected. This concept is not completely new but rather is related to the older idea of the sustained yield of the forest. The basic difference is that sustained yield concentrates on maintaining the productivity of wood or cellulose and does not specifically address other biological, economic, and social values, although there may be a vaguely implied concern for some of these additional aspects. The differences between sustainable development, conservation, and preservation are also clarified.

For more information, contact Bertram Husch, INFORA Estudios Ltda, Av. El Litre 1326, Santiago, Chile; e-mail: infora1@entechile.net.

—Bertram Husch, INFORA Estudios Ltda
Biometrics
Third Conference on Statistics in Ecology and Environmental Monitoring (SEEM3). December 6–10, Dunedin, New Zealand. Contact Centre for Applications of Statistics and Mathematics, University of Otago, P.O. Box 56, Dunedin, New Zealand; 64-03-479-7774; fax 64-03-479-8427; e-mail: casm@maths.otago.ac.nz; website: http://www.casm.otago.ac.nz/courses/SEEM3/.

Economics, Policy, and Law
International Plant Protection Policy and Market Development: On the Threshold of a New WTO Round. November 4–5, Wageningen, The Netherlands. Contact A.A. Meurs, Postbus 9102, 6700 HC Wageningen, The Netherlands; +31 317 496730 or 496 911; fax +31 317 421701; e-mail: pd100@pd.agro.nl; website: http://www.economics.cass.utoronto.ca/PGS/.

Conservation 2000: Conference to Highlight Local, State, and Federal Programs. December 15–17, New Orleans, Louisiana. Contact Lynn T. Kirschner, Conservation Technology Information Center, 1220 Potter Drive, #170, West Lafayette, IN 47906; (765) 494-1827; fax: (765) 494.5969; e-mail: ctic@ctic.purdue.edu; website: http://www2.ncsu.edu/ncr/ncr/ctic.

Education and Communication
Millennium Conference on Environmental Education and Communication: The Next Steps. December 9–10. A “virtual conference” held on the Internet. Contact Walter Leal, Posting Office, 236-2730, ext. 246; e-mail: leal@crossroad.de/millennium/.

Fire
Forest Fires: Needs and Innovations. Definition and Creation of a Common Knowledge Base for Forest Fires. November 16–19, Athens, Greece. Contact G. Gogas, 39-41 Lykavittou Street, 106 72 Athens, Greece; +30 1 3647601; fax +30 1 3643511; e-mail: afeacong@travelling.gr; website: http://www.cinar.gr/delfi/delfi_symposium.html.

Forest Entomology and Pathology
Back to the Future on Jointed Legs: The Entomological Society of America Annual Meeting. December 12–16, Atlanta, Georgia. Contact Z.B. Mayo, program chair, 1999 ESA Annual Meeting, Department of Entomology, 202 P.L., University of Nebraska-Lincoln, NE 68583-0816; (402) 472-8703; fax (402) 472-4687; e-mail: zbasa@unl.edu; website: http://www.entsoc.org/annmeet.htm.

Geographic Information Systems

Recreation
Congress on Recreation and Resource Capacity 1999. November 29 to December 2, Aspen, Colorado. Contact Glenn Haas, College of Natural Resources, Colorado State University, Fort Collins, CO 80523; (970) 491-5126; fax (970) 491-2255; e-mail: glenn@cnr.colostate.edu; website: http://www.cnr.colostate.edu/nrrt/capacity/.

Remote Sensing and Photogrammetry
BioGeo99: Applications of Geospatial Technology to Biological Sciences. November 2–4, Cajundome, Lafayette, Louisiana. Contact Frank D’Erchia, USGS Biological Resources Division, Central Regional Office, Federal Center, PO Box 25046, Bldg. 20, Mail Stop 300, Denver, CO 80225-0046; (303) 236-2730, ext. 246; e-mail: frank_derchia@usgs.gov; website: http://biology.usgs.gov/geotech/activities/biogeo99/start.html.

GIS/GPS for Natural Resources Workshops. November and December, Lafayette, Louisiana. The US Geological Survey’s National Wetland Research Center and Mid-Continent Mapping Center, in cooperation with the University of Southwestern Louisiana, offers two training courses: Introduction to GIS (Arc/Info) for Natural Resources, November 16–18, and Introduction to GPS for Natural Resource Assessment and Survey, December 1–3. Contact Pat O’Neil, 700 Cajundome Blvd., Lafayette, LA. 70506-3154, (318) 266-8699; e-mail: pat_o’neil@usgs.gov; website: http://www.nwrc.usgs.gov/training.html.

Demonstrating the Value of Satellite Imagery: Percora 14 and Land Satellite Information III. December 6–10, Denver, Colorado. Contact Kass Green, technical program chair, Pacific Meridian Resources, 5915 Hollis Street, Building B, Emeryville, CA 94608; (510) 654-6992; fax (510) 654-5774; e-mail: kgreen@pacificmeridian.com; website: http://www.asprs.org/satellite_imaging_conference/index.htm.

Water Resources
Wetlands & Remediation: An International Conference. November 16–17, Salt Lake City, Utah. Registration: The Conference Group, 1989 West Fifth Avenue, Suite 5, Columbus, OH 43212-1912; (800) 783-6338 or (614) 424-5461; fax (614) 488-5477; e-mail: conferencegroup@compuserve.com; website: http://www.battle.org/environment/wetconf.html.

Watershed Management to Protect Declining Species: American Water Resources Annual Conference 1999. December 5–9, Seattle, Washington. Contact Rodney Sakrison, USGS Biological Resources Division, Central Regional Office, Federal Center, PO Box 25046, Bldg. 20, Mail Stop 300, Denver, CO 80225-0046; (303) 236-2730, ext. 246; e-mail: frank_derchia@usgs.gov; website: http://www.nwrc.usgs.gov/training.html.

Hydrological and Geochemical Processes in Large-Scale River Basins (with special emphasis on the Amazon and other Tropical Basins). November 15–19, Manaus, Brazil. Contact Jean Loup Guyot, IRD, CP 7091, Lago Sul, 71619-970 Brasilia DF, Brazil; (5561) 248-5323; fax (5561) 248-5915 Hollis Street, Building B, Emeryville, CA 94608; (510) 654-6992; fax (510) 654-5774; e-mail: manaus99@apis.com.br; website: http://www.unb.br/ig/hibam/Manaus99/manaus99.htm.

Wildlife and Fish Ecology
Dam Removal and Fish Passage: Restoration of Aquatic Ecosystems. 61st Midwest Fish and Wildlife Conference. December 6–8, Chicago, Illinois. Contact Paul Kanelh, Wisconsin Department of Natural Resources, 1350 Femrite Drive, Monona, WI 53716; (608) 221-6332; fax (608) 221-6353; e-mail: kanelhp@dnr.state.wi.us; website: http://www.fw.umn.edu/ncdafs/rivers/DamRemSym.html.
Energy Use and CO₂ Emissions

Climate Change

The US forest and paper industry is performing a number of studies intended to clarify the potential significance of greenhouse-gas emission reduction targets proposed by the Kyoto Protocol on climate change. The National Council of the Paper Industry for Air and Stream Improvement, Inc., is gathering information to determine the impact of meeting the proposed targets. In the process, it has developed an estimate of annual carbon dioxide emissions resulting from compliance with existing, proposed, or expected US federal environmental regulations. It shows the extent to which meeting other environmental objectives conflicts with achieving reductions in greenhouse gas emissions.

Estimated CO₂ Emissions Resulting from Compliance with the US Federal Environmental Regulations in the Forest Products Industry (NCASI Special Report No. 98-02) describes the calculations of estimated energy use and carbon dioxide emissions resulting from environmental controls currently or expected to be in operation at the industry’s primary manufacturing facilities. Some 1.45 million metric tons of carbon are emitted annually as a result of compliance with existing environmental regulations, including effluent treatment and associated solid waste disposal activities, combustion-source particulate controls, and Kraft mill total reduced sulfur controls. Recently promulgated, proposed, and expected regulations are predicted to nearly double compliance-related emissions, to 2.52 million metric tons of carbon annually. Cluster rule effluent limits and emission standards account for about one-fifth of this total.

The estimate of the forest and paper industry’s mid-1990s carbon emissions from all manufacturing activities is 30 million metric tons per year, which includes 10 million tons emitted by utility companies that generate the industry’s purchased electrical power. Compliance with existing environmental regulations currently accounts for 4.9 percent of the industry’s total emissions.

For more information on this report, contact Steve Stratton, senior research engineer; (514) 752-8801, ext. 232; e-mail: sstratton@ncasi.org; or Reid Miner, vice-president, Water and Pollution Prevention Programs; (919) 558-1991; e-mail: rminer@ncasi.org.

To obtain a copy of the report, contact Mary McReynolds, NCASI, 79 TW Alexander Drive, Building 4401, Suite 205, Research Triangle Park, NC 27709-3318; (919) 558-1999; e-mail: publications@ncasi.org; website: http://www.ncasi.org/.

Building Forest Access Roads

Engineering

Need to build a road? Check the Landowner’s Guide to Building Forest Access Roads, a document published on the Web and in hard copy by the USDA Forest Service’s Northeastern Area, St. Paul Field Office. Although the guide is “designed for landowners in the northeastern United States who will use a tractor and ordinary earth moving equipment to build the simplest access roads on their property, or who will contract for these services,” it includes information useful in planning and executing more complex construction projects.

Author Richard L. Wiest provides detailed discussions of road planning and location, construction, maintenance, closure, and stream crossing methods. He offers recommendations for incorporating best management practices designed to reduce nonpoint-source pollution. Wiest also discusses fish habitat protection, building roads in wetland areas, dealing with beavers, and using geotextiles. The guide includes a glossary, a list of references, a metric conversion chart, and instructions for making and using a simple grade meter.

You can access the guide online at: http://willow.ncfes.umn.edu/accessroads.htm. To order printed copies, you can fill out an online form on the website to receive one free copy. You can order multiple copies for $8 each from the Government Printing Office website (using the link on the road construction site) or by calling (202) 512-1800 or faxing (202) 512-2250 (request stock number: 001-001-00664-5).

For more information, contact the USDA Forest Service, St. Paul Field Office, State and Private Forestry, 1992 Folwell Avenue, St. Paul, MN 55108, (651) 649-5243; fax (651) 649-5238, website: http://willow.ncfes.umn.edu/
Foresters have seen a tremendous change in the forest nursery industry over the past 10 years, primarily because of the increasing emphasis given to planting high-quality stock. While the bottom line used to be the initial cost of the growing stock, foresters have gotten together with their accountants to conclude that while poor stock may be economical initially, replants are cost prohibitive. First-year survival became the primary objective and two- and three-year-old bare-root stock the most common choice for planting. While some container nursery facilities could meet a forester’s height specifications, none could achieve the desired stem caliper, lateral branching, bud sizes, and most important, stem lignification necessary to avoid devastating animal damage.

Currently, most bare-root nurseries in the Pacific Northwest are growing primarily 1+1s and both spring and fall transplant plug+1s (P+1s). While a 1+1 lot can be a healthy, homogenous crop in any given year, they generally lack the consistency of a healthy P+1 crop. For example, the 1+1 crop may have an average height of 18 inches and caliper of 7.0 mm, but the variation may range from 10–30 inches, and 5–10 mm, respectively, with the survivability and performance experiencing similar variation. The P+1 spends its first season in a greenhouse as a small container seedling (such containers typically have a volume of 2 cubic inches), which eliminates the source of much of the variation commonly found in a 1+1 lot. The P+1 takes advantage of the controlled environment of a greenhouse during its first growing season, which results in less variation in the final product and a higher percentage of the crop in closer proximity to the average. The added cost of the seedling having spent its first season in a greenhouse is approximately $60 per thousand, with the final P+1

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**Does Fuels Reduction Harm Wildlife?**

With an increasing emphasis on fuels-reduction projects, especially in the inland West, forest managers must consider the effects of such activities on wildlife. Two USDA Forest Service researchers, Arlene K. Blumton and Evelyn L. Bull, have documented the effects of several types of treatments in Effect of Fuels Reduction on American Martens and Their Prey (Pacific Northwest Research Station, Research Note PNW-RN-539, March 1999).

The authors tracked the populations of small mammals—the prey of martens—in harvested and unharvested lodgepole pine and mixed-conifer stands in northeast Oregon. Before harvesting, both types of stands were overstocked: The lodgepole pine stands had a mature overstory of lodgepole pine and a dense understory of subalpine fir and lodgepole pine, with 40 tons to 68.6 tons of downed wood per acre. Stem densities per acre averaged 1,177 seedlings, 985 trees 1 inch to 7.9 inches dbh, and 44 trees 8 inches dbh or larger. The mixed-conifers were subalpine fir, grand fir, western larch, Engelmann spruce, and Douglas-fir in the overstory and understory, with 27.3 tons to 40.6 tons per acre of downed wood. Stem densities per acre averaged 690 seedlings, 323 trees 1 inch to 7.9 inches dbh, and 119 trees 8 inches dbh or larger.

Three treatments were used in the lodgepole pine stands:
- Control: no harvest activity.
- Island (20 percent of area left in one-acre islands of no harvest): 36 percent of the seedlings, 62 percent of the trees 1 inch to 7.9 inches dbh, and 6 percent of the trees 8 inches dbh or larger were removed. Fifty-nine percent of the logs 3 inches or larger (large-end diameter) were removed.
- Scatter (40 logs per acre left scattered throughout the unit): 44 percent of the seedlings, 65 percent of the trees 1 inch to 7.9 inches dbh, and 10 percent of the trees 8 inches dbh or larger were removed. Sixty-nine percent of the logs 3 inches or larger were removed.

In the mixed-conifer stands, all dead material (standing and down) less than 15 inches in diameter was removed. The following structures were retained: green trees with more than 40 percent crown, any dead standing or down wood larger than 15 inches in diameter, and about 40 logs per acre. The harvest treatment removed 59 percent of the seedlings, 82 percent of trees 1 inch to 7.9 inches dbh, and 62 percent of trees 8 inches dbh or larger. Forty-one percent of the logs 3 inches or larger were removed.

The authors concluded that:
- The numbers of red squirrels and snowshoe hares decreased in lodgepole pine treatments after harvest.
- In most treatments, the number of red-backed voles decreased and chipmunks increased after harvesting.
- Overall, the island treatment provided better habitat for small mammals.

The authors suggest that declines in the primary prey species—red-backed voles, squirrels, and snowshoe hares—in harvested stands would be detrimental to martens. An increase in chipmunks (continued on next page)
seedlings costing approximately $300 per thousand.

In the past several years, another paradigm shift has become evident as some foresters have experimented with container seedlings grown for one year in very large containers, with volumes of 15 to 20 cubic inches. While stock grown in such large containers is more expensive than the bare-root alternatives ($350 to $450 per thousand), these trees have several benefits over bare-root stock that may justify the extra initial expense:

- One-year planning horizons.
- Seedlings that are in better condition upon outplanting.
- The potential for increased survival.
- The flexibility to begin planting in the fall, as awaiting peak dormancy for lifting seedlings is not an issue.
- Improved response to first-year fertilizer treatments due to intact root tips.

Still, the most significant obstacle facing these container facilities is the ability to produce stock in only one growing season with the necessary height, caliper, and lignification to withstand moderate levels of animal damage. Several container facilities in the Pacific Northwest and Canada are working on overcoming this problem. Generally speaking, the Canadian operations have a higher level of technology and have the ability to redirect CO₂ from their heating systems to the greenhouses, increase daylength (the number of hours of daylight) using artificial growing lights, and decrease daylength by placing the seedlings in darkness after the target height has been achieved (imitating the onset of fall and dormancy).

Halting stem elongation is significant because, after the seedling target height is reached and daylengths are artificially reduced, the seedling can spend the remainder of the growing season allocating resources to building caliper, buds, and stem lignification.

The technology is in place to grow seedlings to meet our needs in one growing season. Container stock will never replace bare-root seedlings because of economics, logistics, and the huge growing space requirements. However, properly grown container trees can greatly increase our flexibility and can serve as an important addition to our growing list of planting options.

For additional information, contact George Severson, consulting silviculturist, Camas Creek Resources LLC, Eugene, Oregon. He can be reached at (541) 935-0645. This is an edited version of an article that originally appeared in the May/June issue of Western Forester.

(Fuels Reduction, continued)

would be of little value because they are unimportant prey for martens.

As for marten habitat, Blumton and Bull suggest that the scatter-treatment areas would be unsuitable for martens, because they do not provide adequate subnivean (under snow) habitat. They could not determine if the island treatment in lodgepole pine retained enough cover and subnivean structure to provide suitable habitat for martens. The authors write that marten would probably not enter the mixed-conifer stands because of the reduced canopy closure and stem density. Radio-collared martens in the area avoided all harvested stands and stands with less than 50 percent canopy closure.

Blumton and Bull say additional long-term research is required, including investigation of different sizes of islands and connecting islands with no-cut corridors to provide continuity.

For more information about the report, contact the Pacific Northwest Research Station, PO Box 3890, Portland, OR 97208-3890; (503) 808-2592; website: http://www.fs.fed.us/pnw.

**Forest Images: Insects and Disease**

Looking for photos of forest insects and the damage they cause? The University of Georgia’s Entomology and Forest Resources Digital Information Work Group offers Forest Pests of North America Integrated Pest Management Photo CD Series, a collection of 300 images related to North American forest pathology and entomology. The images on the three compact disks come in Kodak Photo CD format. The price had not been set at press time, but is expected to be $45 to $50.

Another collection, Forest Insects and Their Damage Photo CDs, vols. 1 and 2, contains 200 images from the Southern Forest Insect Work Conference Slide Series. This series is devoted to insects that inhabit the southern United States. The $25 set was originally released in 1995; a few copies are still available.

Both CD sets include Kodak Access software that works with PC, Macintosh, and Photo CD players; the program lets you sort, crop, and display Photo CD images and convert them to common computer graphics formats. Each set includes a color booklet with descriptions and thumbnail photos of the images, a list of scientific and common names, and the photographers’ names and affiliations.

Although the images are copyrighted by the University of Georgia and the individual photographers or organizations, they may be copied and used for nonprofit, educational purposes, provided that all reproductions bear an appropriate credit and copyright notice.

Order forms are available on the Work Group’s Bugwood USA website at http://www.bugwood.caes.uga.edu/. The website also lists the insects pictured and features an online library of forest pathology and entomology information.

For more information, contact Sally Campbell, Agricultural Business Office, Cooperative Extension Service, Room 203, Conner Hall, University of Georgia, Athens, GA 30602. For technical assistance, send e-mail to B.T. Watson at bwatson@uga.cc.uga.edu.
Remote Sensing and Photogrammetry

Remote sensing–based spatial information and the decision-support systems that help land managers analyze that information play an important role in sustainable forest management. Such tools are ineffective, however, without access to affordable, up-to-date data. To address the problems in providing adequate data, the International Institute for Aerospace Survey and Earth Sciences (ITC), in cooperation with the Food and Agriculture Organization of the United Nations and other organizations, carried out a study of user requirements for remote sensing–based spatial information for the sustainable management of forests. The study was commissioned by three Netherlands government ministries: Economic Affairs, Foreign Affairs, and Agriculture, Nature Management and Fisheries.

The study, completed in February, focused on three principal issues:

- The requirements for spatial information in order to support sustainable forest management.
- The extent to which these requirements for spatial information can be met by existing and planned remote sensing systems.
- The need for an improved “end-to-end” information supply mechanism.

The authors of the study found “a substantial and urgent need for improved information supply, in terms of quantity, which is one reason those from the “push-down” school favor the “correct” planting depth for loblolly pine will result in the root collar 15 cm below ground (and the bottom of the roots will be 25 cm to 34 cm deep). They allow J-roots and L-roots but prohibit shallow planting holes (less than 25 cm deep) and pruning or stripping of roots by tree planters. However, due to a three-way interaction between species, site, and planting depth, members of this school do not recommend the same planting depth for all pine species or for all sites. Deep planting on sites where the water table is near the surface can decrease survival of loblolly pine. Therefore, the correct planting depth varies with site.

Because less time is required to make narrow, shallow holes, hand planters prefer recommendations from the “pull-up” school. Making a deeper planting hole by hand increases planting costs, which is one reason those from the “push-down” school favor machine planting.

J-Rooting Overrated as Danger to Seedlings

Which tree planting school graduates end up with greater seedling survival?

In the South, many planted seedlings (40 to 80 percent) can be classified as having deformed roots. However, just because a planted pine seedling has a bent taproot, this does not mean the performance will be worse than seedlings that originate from direct seeding. In fact, 30 percent or more of seedlings originating from seed have bent taproots. Therefore, bends in the taproot can be “natural” as well as “manufactured.” Even so, some claim that J-roots will kill seedlings and that utmost care should be exercised during planting to ensure the taproot is straight. They claim that planting seedlings roots deeply will bend the roots and, therefore, they say the “proper” planting depth is with the root collar slightly below groundline. But in actuality, shallow planting kills seedlings, J-roots per se do not.

In my opinion, tree planting guidelines for loblolly pine overemphasize the dangers of both J-rooting and deep planting. These guidelines should be rewritten to eliminate the unimportant aspects of planting to and stress the important. Most data with loblolly pine indicate that bent roots do not affect early seedling survival or growth. On many sites, planting loblolly pine deep in the hole increases survival.

Two schools of thought exist regarding the planting of loblolly and slash pine seedlings. The older school favors the “pull-up” technique in which the seedling is placed into the planting hole and then pulled up 3 cm to 10 cm (and the root-collar is about 1 cm to 5 cm below the soil surface). This action purportedly improves field performance by straightening out the roots. Several tree planting guides recommend this technique even though empirical trials by Philip Wakeley showed no advantage of this technique when compared to planting with a mattock. Nor do we know if pulling the seedling up 3 cm is really enough to straighten out the roots. To avoid bending long roots, members of this school allow some pruning of long fibrous roots by tree planters. “Graduates” of this school prefer straight taproots to deep planting. They claim the “correct” planting depth is to have the root collar at or slightly below the groundline.

The other school recommends the “push-down” technique (which favors deep planting over straight taproots). To increase the probability of success, members of this school prefer machine planting to hand planting (average planting hole depth for machine planting is about 30 cm and the root collar is typically about 15 cm below the soil surface; this sometimes results in a high percentage of L-roots).

On sites where hand-planting is required, leaders in this school recommend making a wide (15 cm to 18 cm) and deep (27 cm to 34 cm) planting hole. The roots are placed at the bottom of the hole and there they remain. As a result, the root collar ends up at least 5 cm to 10 cm deeper than recommended by the “pull-up” school. For many sites, the “correct” planting depth for loblolly pine indicate that bent roots do not affect early seedling survival or growth. On many sites, planting loblolly pine deep in the hole increases survival.

Because less time is required to make narrow, shallow holes, hand planters prefer recommendations from the “pull-up” school. Making a deeper planting hole by hand increases planting costs, which is one reason those from the “push-down” school favor machine planting.

Tree planting guidelines should be rewritten to (1) emphasize the proper depth of planting (to increase seedling survival); (2) de-emphasize intuitive beliefs that roots of pine should look “normal” after planting; (3) eliminate unnecessary refinements in planting technique; (4) explain the advantages of machine planting; (5) explain the species, site, and planting depth interaction for survival; and (6) cite references to support recommendations.

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quality, detail and recency.” They also found that much existing data is not accessible.

They offered four recommendations:
1. Establish a supranational mechanism or mechanisms through an international protocol for the improved exchange of data and information between users without impeding existing information supplies. Currently there are no mechanisms for the exchange of spatial data between users, within and between levels. The distribution of synoptic spatial data (such as from satellite imagery) and the aggregation of local and national data into data sets for use at regional and international levels should be included in the mechanism.
2. National governments should formulate an information strategy for decentralized data management for sustainable forest management. Creating awareness is important in improving the data supply. Many countries have policies and procedures that prohibit or limit the distribution or use of spatial data. The information strategy should provide the framework in which this flow of data is possible, while simultaneously safeguarding other national interests.
3. Refine and implement existing information strategies such as the Forest Assessment and Monitoring Environment (FAME) concept. FAME, an end-to-end forest assessment and monitoring system concept developed by several institutes in the Netherlands, could be validated and further tailored through pilot projects that would encompass the complete flow of information from data generation and capture to the presentation of information to the user.
4. Develop and apply capacity-building modules for the different categories of users of the information systems.

The study results are discussed at length in “User Requirements Study—Final Report” and in eight supporting documents, all of which may be downloaded as PDF files from the ITC website: http://www.itc.nl/forestry/URS/. A text version of the executive summary is also available for viewing.

For more information, contact Eduard Westinga, International Institute for Aerospace Survey and Earth Sciences, Hengelostraat 99, PO Box 6, 7500 AA Enschede, The Netherlands; +31-53-4874-240; fax +31-53-4874-399; e-mail: forest@itc.nl.

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**FYI**

Money for Wetlands Projects

The Environmental Protection Agency has recently published guidelines for obtaining Wetland Program Development Grants for fiscal year 2000 and implemented a Five Star Restoration Program. The development grants are designed to assist state, tribal, and local government agencies with their wetland management programs. Grant funds can be used to develop new or refine existing wetland protection, management, or restoration programs. Funds are typically awarded through a competitive process at the regional level.

The program is intended to help agencies increase the quantity and quality of wetlands in the United States by conserving and increasing wetland acreage, and improving wetland health through planning, development or improvement of regulatory programs, and creation of wetland training programs. Examples of such projects include:

- Integration of wetland management into broad watershed protection approaches
- Development of agency wetland conservation plans
- Development of a framework for state or tribal section 404 assumption and/or implementation of state programmatic general permits.
- Assessment of and reporting on comprehensive state or tribal wetland programs for demonstrating progress in meeting certain wetland program goals.
- Development of widely applicable model wetland training programs.

For more information on the development grants, call the EPA's Wetlands Hotline at (800) 832-7828 or send e-mail to wetlands-hotline@epamail.epa.gov. Website: http://www.epa.gov/owow/wetlands/2000grant/.

**Five-Star Restorations**

The goal of the Five Star Restoration Program is to encourage cooperation among citizen groups, corporations, youth conservation corps, students, landowners, and government agencies in streambank and wetland restoration projects. The program provides challenge grants, technical support, and peer information exchange in support of such projects.

The challenge grants are designed to enlist five or more partners in each project to contribute funding, land, technical assistance, workforce support, or other in-kind services that match EPA's funding assistance. To qualify, projects must have a strong on-the-ground habitat restoration component that provides long-term ecological, educational, or social benefits for people and their communities. The grants average about $10,000 per project.

The Five Star Program's website provides descriptions of several trial projects that were completed in 1998. The EPA plans to begin 50 or more projects this year and is seeking sponsors for future projects. For more information, call the EPA Wetlands Information Hotline at (800) 832-7828 or contact John Pai, Wetlands Division (4502F), USEPA, 401 M Street SW, Washington, DC 20460; (202) 260-8076; e-mail: pai.john@epa.gov; website: http://www.epa.gov/owow/wetlands/restore/5star.

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Looking for practical information? **Have some advice you’d like to share?**

We welcome suggestions and comments from those who are seeking or have found solutions to professional challenges in the broad field of forestry and natural resources. Information that appears here has not been peer reviewed or tested by the Journal. Contact Steve Wilent, swilent@compuserve.com; (503) 622-5499.
A Stackable Wooden Litter Trap

Litter traps are a necessity for forest ecologists and others who need to measure litterfall quantity or quality or both. Such data may be used in estimates of productivity or nutrient fluxes in litterfall. Here are simple plans for making inexpensive, stackable 50 x 50 cm (0.25 m²) litter traps using commercially marketed 1 x 6 inch, 8-foot softwood boards (the actual thickness and width will probably be about 0.75 x 5.75 inches), screws or nails (preferably rustproof), fiberglass or plastic window screening, and heavy-duty staples. For cutting the lumber, a table-mounted circular saw is helpful because it will saw much faster and produce straighter cuts than a hand-held circular saw.

For each litter trap, saw a board lengthwise into 2-cm, 10-cm, and 2.5-cm wide boards (fig. 1a). From the 2-cm board, saw two 50-cm and two 54-cm long pieces to hold the window screening to the bottom of the litter trap. From the 10-cm wide board, saw two 50-cm and two 68-cm long pieces for the sides of the litter trap. From the 2.5-cm wide board, saw four 13-cm long pieces for the legs. Cut a 60 x 60-cm piece of window screening for each litter trap.

Nail or screw the 68-cm sides to the 50-cm sides (fig. 1b) using three fasteners per corner. Remember that the inside surfaces of the 50-cm pieces must be 50 cm apart; you might use an extra 50-cm long board as a jig for this spacing. Turn the litter trap frame upside down and staple a piece of window screening to the bottom of the litter trap, keeping the screening somewhat tight across the frame as you staple. Four or five staples on each side should be sufficient. Nail or screw the 2.5-cm wide pieces through the window screening into the bottoms of the litter trap sides (using screws instead of nails will make it easier to replace damaged screening in the future). These pieces hold the screening flush against the bottoms of the sides and help keep the screening from tearing through the staples.

Finally, screw the legs to the insides of the 68-cm long side pieces (fig. 1b). Overlap the legs and sides about 3 cm, and leave 1 or 2 cm between the legs and the 50-cm long side. By using only a single screw in each leg, you will be able to adjust the legs to level the litter trap on the ground. For transportation to the site, litter traps may be stacked upside down by sliding each one over the legs of the preceding litter trap.

For additional information, contact Thad E. Yorks, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210; (315) 470-6760; e-mail: teyorks@syr.edu.

—Thad E. Yorks,
State University of New York

Auto Tours: Driving for Forestry

Out for a Sunday drive? Residents of and visitors to Michigan’s peninsula can choose between two self-paced forestry tours. The Upper Peninsula Auto Tour was created by the Michigan SAF and the Michigan Sustainable Forestry Initiative Project. The tour includes stops at 12 sites in the midst of the area’s 8.7 million acres of forest; each site is marked by numbered SAF shields along highways in the region. Together, the 12 sites offer 121 outdoor education stations, each of which is marked with a number that corresponds to a forest type or vegetation condition described in a color brochure.

Tens of thousands of color brochures have been picked up over the last few years. Such a tour provides an excellent tool for travelers to learn about particular forest types. It also is a way to introduce SAF to the public in an interesting, educational, and professional manner.

Featured forest types, with the number of stations in parentheses, include aspen (7), white birch (6), red pine (18), white pine (5), jack pine (12), northern hardwoods (29), hemlock (6), spruce-fir (8), cedar (14), grass openings (7), fire importance (3), and old-growth (6). The tour also provides information about wildlife habitat, Michigan’s Sustainable Forestry Initiative, Michigan forests, forest industry, recreation, wetlands, and the American Tree Farm System.

A Lower Peninsula tour was created by the Michigan Forest Resource Alliance and Michigan Sustainable Forestry Initiative Project. It includes 10 sites along a 67-mile route and ends at the Hartwick Pines State Park Forest Visitor Center, where tourists may learn about the history of local white pine logging and take a guided walk through a “virgin” white pine grove.

Links to the brochures for both tours are available on the Michigan SAF website: http://forestry.msu.edu/msaf (click on the Auto Tours links). For more information about the Upper Peninsula tour, contact Bill Cook, Department of Forestry, Michigan State University, 126 Natural Resources, East Lansing, MI 48824-1222; (517) 355-0091; fax (517) 343-1143; e-mail: cookw@pilot.msu.edu. For information about the Lower Peninsula Auto Tour, contact the Michigan Forest Resource Alliance at (800) 474-1718; e-mail: mfraeva@up.net
In less than one year, the American Forest & Paper Association (AF&PA) added more than 1.8 million acres to its Sustainable Forestry Initiative (SFI) program under a new licensing plan. The following organizations are the first non-AF&PA members licensed to adhere to the tough requirements of the SFI Standard:

- **The Conservation Fund** — 19,480 acres in New York, Vermont and Maryland;
- **The Ida Cason Callaway Foundation** — 11,000 acres in west-central Georgia;
- **St. Louis County Land Department** — 903,000 acres in northern Minnesota;
- **Itasca County Land Department** — 300,000 acres in northern Minnesota;
- **Lake County Forestry** — 143,600 acres in northeastern Minnesota;
- **Massachusetts Department of Environmental Protection** — 285,000 acres of state forests and parks;
- **Ames Plantation** — 14,500 acres in southwest Tennessee;
- **Nicolet Hardwoods Corporation** — 35,000 acres in northeastern Wisconsin;
- **J.M. Jones Lumber Company** — 125,000 acres in southwestern Mississippi;
- **HHP Inc.** — Sawmill in southwestern New Hampshire.

The award winning SFI program — whose goals are supported by more than a dozen conservation groups and public agencies, and by nine state legislatures — is a comprehensive system of forestry and conservation practices designed to ensure that future generations of Americans will have the same abundant forests we enjoy today.

To learn more about the SFI licensing program, visit our Web site at www.afandpa.org
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